UNITED STATES DEPARTMENT OF AGRICULTURE RURAL DEVELOPMENT CATEGORICAL EXCLUSION REPORT

CITY OF BOILING SPRING LAKES DAMS CONSTRUCTION/RECONSTRUCTION PROJECT

BRUNSWICK COUNTY, NORTH CAROLINA

McGILL ASSOCIATES, P.A.

HICKORY, NORTH CAROLINA

APRIL 2021 (REV OCTOBER 2021)

CATEGORICAL EXCLUSION REPORT

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BRUNSWICK COUNTY, NC

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BRUNSWICK COUNTY, NC

COMPLETED IN ACCORDANCE WITH: UNITED STATES DEPARTMENT OF AGRICULTURE RURAL UTILITIES SERVICE 7 CFR PART 1970, SUBPART C

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Firm License No.: C-0459

APRIL 2021 (REV OCTOBER 2021)

PROJECT NO. 20.07036

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1.0 PROJECT DESCRIPTION AND LOCATION

1.1 Project Description and Location

The project sites encompass four dams that make up the Boiling Spring Lake system. The Sanford and Upper Dams traverse Allen Creek while the Pine Lake and North Lake Dams cross tributaries north of Allen Creek. The primary study areas were approximately 150 feet upstream and downstream from the center of the dams. The study area encompassing the Sanford Dam also includes downstream wetland and floodplain areas affected by the dam failure. The Pine Lake and North Lake sites can be accessed from Boiling Springs Road, east of Highway 87. The Sanford Dam can be accessed from Alton Lennon Drive off of Boiling Spring Road. The Upper Lake Dam is partially closed to traffic and can be accessed from Dam Road which is west of Highway 87. The project sites occupy the southern tip of the Cape Fear River Basin in Brunswick County, which is a coastal county subject to the rules of policies of the Coastal Resources Commission. A location map is provided in Appendix A-1.

Previous findings on the existing conditions of the sites indicate the dams were breached and/or inlet/outlet structures were damaged during Hurricane Florence in September of 2018. The information provided in this report is based on project work that would involve repairing dams to “pre-Florence” conditions with upgraded spillways to provide overtopping protection. The project work would include restoring dams to the original grade and installation of new water control structures. Following is a description of main proposed design features for each dam:

- Sanford Dam: Install a cutoff wall for the entire length of the dam, upgraded riser structure that provides 140 ft long weir that discharges into cast-in-place (CIP) six box culverts (7.5 ft span x 6.5 ft rise). The embankment to be rebuilt at the location of the breach.
- North Lake Dam: Remove the existing bottom metal culverts because they are not compliant with current codes and standards and install a riser structure that provides 55 ft long weir draining into two CIP box culverts (6 ft span x 6 ft rise), with seepage controls adjacent to the embankment.
- Pine Lake Dam: Remove the existing bottom metal culverts and install a riser structure that provides 14 ft long weir draining into one CIP box culvert (5 ft span x 4 ft rise), with seepage controls adjacent to the embankment.
- Upper Lake Dam: Install a riser structure that provides 94 ft long weir that discharges into 5 CIP box culverts (6 ft span x 5 ft rise), with seepage controls adjacent to the embankment and rebuild the embankment at the breach of Upper Lake Dam.

2.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

2.1 Land Ownership and Land Use

The project area is located within existing rights-of-way and property currently owned by the City of Boiling Spring Lakes. Areas of the project are within Boiling Spring Lakes Limesink Complex, City of Boiling Spring Lakes Open Space, Blue Pond/Allen Creek Natural Area, North Carolina Coastal Land Trust Easement, and Brunswick County Open Space. These formally classified lands will not be negatively impacted by the project. The City requested rights of entry form adjacent landowners for any portion of the work that involve land disturbing activities as required to obtain an erosion control permit from the North Carolina Department of Environmental Quality. **No further action required**.

2.2 Historic Preservation

A. Historic Resources: The City of Boiling Spring Lakes initiated consultation with the State Historic Preservation Office (SHPO) and received a response on December 3, 2019 (SHPO correspondence included in Appendix C-4. The SHPO conducted a review of the project and had the following comments:

   i. The Boiling Springs Lake Dam (BW0545), or Sanford Dam, was constructed in 1961 with the purpose of creating a centerpiece for development of the Boiling Spring Lakes community. The importance of this resource is related to its engineering and use in community planning. The proposed repair/replacement of key elements will return the resource to its historic form and function. We strongly recommend that the earthen dam be replaced in-kind and have no objection to the project as proposed. During the Brunswick County survey update of 2010, the dam had not yet reached 50 years of age and could not be considered eligible for listing on the National Register of Historic Places. Today, the dam meets the minimum age requirement. If the Town of Boiling Spring Lakes is interested in finding out more about the survey and listing process, please instruct them to contact the NCHPO Survey Specialist assigned to Brunswick County, Hannah Beckman-Black, at 919-814-6577, or Hannah.beckman@ncdcr.gov. **No further action required**.

B. Cultural Resources: The following tribes were consulted with this undertaking:

   i. Catawba Indian Nation – The Catawba has no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project areas. The Catawba requested to be notified if Native American artifacts and/or human remains are located during the ground disturbance phase of the project. (See mitigation measures)

2.3 Threatened and Endangered Species/Biological Resources

The Applicant reviewed the North Carolina Natural Heritage Program (NCNHP), and the U.S. Fish and Wildlife (USFWS) Information Planning and Consultation (IPaC) website to determine the species that are currently listed as federally protected (threatened or endangered), federal species of concern (FSC), candidate or proposed or their critical habitats in Brunswick County. There is a total of 15 (fifteen) threatened, endangered, or candidate species identified on the official species list (Appendix B-1). There were no critical habitats identified within the project area. Suitable habitat was identified for five of the listed species: Bald Eagle, Red-cockaded woodpecker, Wood stork, Cooley's meadowrue, and rough-leaved loosestrife, however, no individuals were observed during the time of the survey. Therefore, a determination of **"May Affect Not Likely to Adversely Affect"** was concluded for the proposed action. A response letter from USFWS confirming a finding of MANLA is attached in Appendix C-3.
No further action required.

2.4 Wetlands

According to a review of the National Wetland Inventory (NWI) Mapper, soil survey data maintained by the Natural Resources Conservation Service (NRCS), and site investigations completed by McGill Associates environmental specialists, there are no wetlands located within the proposed dam repair/replacement project area.

Correspondence with the US Army Corps of Engineers (USACE) and North Carolina Division of Water Resources (NCDWR) has indicated that permitting requirements for impacts to jurisdictional waters at the dam sites will be based on conditions prior to dam failures (i.e. the former Ordinary High Water Mark of the lakes) and be considered open water. The proposed project is covered under a NCDWR Nationwide Permit (NWP) 3 which was applied for and received on March 18, 2021 and can be found in Appendix C-7. The City of Boiling Spring Lakes has applied for a Water Quality GC 4132 with no response as of March 30, 2021. **No further action required**.

2.5 Floodplains

The North Carolina Flood Risk Information System online mapping service was reviewed to determine if any floodway or floodplain areas exist within or near the project area. A review of floodplain mapping indicates there are flood hazard areas within all four dam sites (Appendix A-6). Allen Creek and its 2 tributaries Clear Pond (aka, North Pond) and Pine Lake are located on FIRM panels 2079, 2089, 2180, and 2190. The creek has been modeled by the Federal Emergency Management Agency (FEMA) as a Detailed Study with base flood elevations and floodway. Proposed improvements to Sanford Dam and the Upper Dam will take place within the mapped floodway. Proposed improvements to North Lake Dam will take place within mapped 100-year floodplain. Pine Lake is not modeled in FEMA and is represented as Zone A floodplain. The proposed work will include new structures within floodway and floodplain areas to maintain historic lake water levels. The base flood elevations will be changed as a result of the proposed improvements from prior conditions, requiring a flood study to remap the surrounding flood hazard areas and a Floodplain Development Permit from the City of Boiling Spring Lakes. A Conditional Letter of Map Revision has been prepared as described below. A Letter of Map Revision will also be required within 6 months of completion of construction which generally requires 4 to 6 months for review.

A FEMA Conditional Letter of map Revision (CLOMR) was completed by McGill Associates, PA, and submitted to FEMA. Allen Creek is a detailed study stream and Clear Pond is a limited detailed study stream in the Flood Insurance Study (FIS) for Brunswick County dated Effective December 6, 2019. Allen Creek is represented in two models:

- Allen Creek (US Reach) for the river reach upstream of Sanford Dam, which includes Middle Lake Dam and Upper Lake Dam.
- Allen Creek (DS Reach) for the river reach downstream of Sanford Dam.
- Sanford Dam is not explicitly modeled, rather represented by a change in flow based on routing inflows through the structure.

The CLOMR study involved hydrologic and hydraulic analyses of the existing (pre-breach) structures and the proposed structures at the dams.

The 8-step decision-making process/alternative analysis was completed March 9, 2021. The Preliminary Public Notice for Potential Impacts to Floodplains was published March 10 and 17, 2021, the Final Public Notice for Potential Impacts to Floodplains was published July 7, 2021. The 8-step process documentation, affidavit of publication for the Preliminary and Final Floodplain Notices, and copies of the Floodplain Notices can be found attached in Appendix C-9.

USDA Rural Housing Services received no comments during the public comment period.

The City of Boiling Spring Lakes received a USDA – Private Party Notice to Applicant of a Rural Housing Service (RHS) Loan stating that flood insurance is not required as a condition of loan closing (See Appendix C-2). **No further action required**.

2.6 Coastal Areas

Brunswick County is located within a Coastal Zone Management Area (CZMA) as designated under the North Carolina Coastal Management Program administered by the Department of Environmental Quality (DEQ) Division of Coastal Management (DCM). See attached Appendix C-5 for NCDEQ – Division of Coastal Management Federal Consistency stating that the Boiling Spring Lakes area depicted in the maps is consistent with North Carolina's approved coastal management program. **No further action required**.

2.7 Important Farmland

According to the 2010 Census Urban Cluster Reference Map (Appendix A-5) for Boiling Spring Lakes, North Carolina and the Soil Report for Brunswick County (Appendix A-10), the Sanford, Upper, Pine Lake, and North Lake project sites are located in an urban cluster area not subject to the Farmland Protection Policy Act (FPPA), and/or not considered prime farmland. **No further action required**.

2.8 Environmental Risk Management

Based on a review of the NCDEQ Division of Waste Management Site Locator Tool (https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=7dd59be2750b40bebebfa49fc383f688). The agency has determined that taking the property as security or providing financial assistance on this property would **NOT** pose an adverse effect to the human environment. **No further action required**.

2.9 Air Quality

The North Carolina Department of Environmental Quality (NCDEQ) has been delegated by the United States Environmental Protection Agency (EPA) for implementation of the Clean Air Act. Any area that does not meet the national ambient air quality standards (NAAQS) for criteria pollutants is classified as a "nonattainment or maintenance area". Based on a review of the NAAQS-EPA Green Book (https://www3.epa.gov/airquality/greenbook/anayo_nc.html), Brunswick County is **NOT** classified as a "nonattainment or maintenance area" (Appendix A-8). **No further action required**.

2.10 Other Resources

The proposed project is not located within key water resource areas such as sole source aquifers

or wellhead protection areas. The project area is not within Audubon's Important Bird Areas. **No further action required**.

3.0 SUMMARY OF MITIGATION

Mitigation measures are required and follow regulatory agencies direction to minimize impacts and concerns as a result of construction. Mitigation measures must appear in the Letter of Conditional Commitment, Bid Documents, Construction Contracts and other financing instruments which relate to RD's commitment for this project. In addition, these mitigation measures are incorporated into the project development plans as appropriate.

A. Mitigation Measure #1 – Historic Preservation: Any excavation by the contractor that uncovers a historical or archaeological artifact or human remains shall be immediately reported to the owner and a representative of the Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the State Historic Preservation Officer (SHPO). During the ground disturbance phase of the project, Native American Tribes must be notified if Native American artifacts and /or human remains are located.

B. Mitigation Measure #2 – Threatened and Endangered Species/Biological Resources: Contractor shall comply with the Endangered Species Act, which provides for the protection of endangered and/or threatened species and critical habitat. Should any evidence of the presence of endangered and/or threatened species or their critical habitat be brought to the attention of Contractor, Contractor will immediately report this evidence to Owner and a representative of Agency. Construction shall be temporarily halted pending the notification process and further directions issued by Agency after consultation with the U.S. Fish and Wildlife Service (USFWS). The USFWS recommends the following measures to be implemented to protect aquatic resources which are highly susceptible to sedimentation: (1) All practicable measures should be taken to avoid adverse impacts to aquatic species, including implementing directional boring methods and stringent sediment and erosion control measures when replacing the failed dams. (2) An erosion and sedimentation control plan should be submitted to and approved by the North Carolina Division of Land Resources, Land Quality Section prior to construction. (3) Erosion and sedimentation controls should be installed and maintained between the construction site and any nearby down-gradient surface waters. Natural, vegetated buffers should be maintained on all streams and creeks adjacent to the project site.

- Mitigation Measure #3 – Floodplains: The City of Boiling Spring Lakes participates in the National Flood Insurance Program (NFIP) and enforces a Flood Damage Prevention Ordinance that requires a Floodplain Development Permit be issued for all development

located in the Special Flood Hazard Area (SFHA) within its jurisdiction. The City of Boiling Spring Lakes must ensure the Floodplain Administrator reviews and issues permits prior to any actions located in the SFHA. When disposing of excess, spoil, or other construction materials on public or private property, the Contractor shall not fill in or otherwise convert 100-year floodplain areas or SFHA delineated on the latest Federal Emergency Management Agency Floodplain Maps, or other appropriate maps, e.g., alluvial soils on Natural Resource Conservation Service (NRCS) Soil Survey Maps.

C. Mitigation Measure #4 – Coastal Areas: The project is located within North Carolina's coastal zone (Brunswick County) and must comply with the Coastal Zone Management Act (CZMA) and enforceable policies of the North Carolina Coastal Management Program (CMP). According to correspondence with CMP, a Coastal Area Management Act (CAMA) permit is not required prior to construction of the proposed project. Documentation of an approved federal consistency determination from the North Carolina Division of Coastal Management (DCM) Federal Consistency Coordinator is attached to this document (see Appendix C-5).

4.0 COORDINATION, CONSULTATION, AND CORRESPONDENCE

4.1 Scoping Letter Packages

The following regulatory agencies and organizations received scoping packages outlining the proposed project and potential environmental impacts:

1. City of Boiling Spring Lakes, NC
2. Brunswick County, NC
3. NC State Historic Preservation Office
4. NC Wildlife Resources Commission
5. USDA Natural Resources Conservation Service
6. Catawba Indian Nation Tribal Historic Preservation Office
7. US Army Corps of Engineers
8. US Fish & Wildlife Service
9. NC Department of Environmental Quality (NCDEQ)
10. NCDEQ – Division of Waste Management
11. NCDEQ – Division of Air Quality
12. NCDEQ – Division of Water Resource – Public Water Supply
13. North Carolina Department of Public Safety – Emergency Management
14. North Carolina Department of Transportation
15. NC Department of Natural and Cultural Resources Natural Heritage Program

4.2 Scoping Letter Responses

Scoping letter packages were sent by mail and email on October 8, 2019, October 28, 2019, and February 15, 2021. The response from the USACE is in the form of a Section 404 Permit which can be found in Appendix C-7.

Scoping responses from each agency and organization can be found in Appendix C. The NC State Environmental Review Clearinghouse Response Package can be found in Appendix C-8.

5.0 REFERENCES

1. U.S. Census Bureau, American Community Survey (ACS). 2011-2015.

6.0 LIST OF PREPARERS

1. Jon Swaim, Environmental Specialist II, McGill Associates, P.A.
2. Jonathan M. Herman, Environmental Planner I, McGill Associates, P.A.

APPENDIX A

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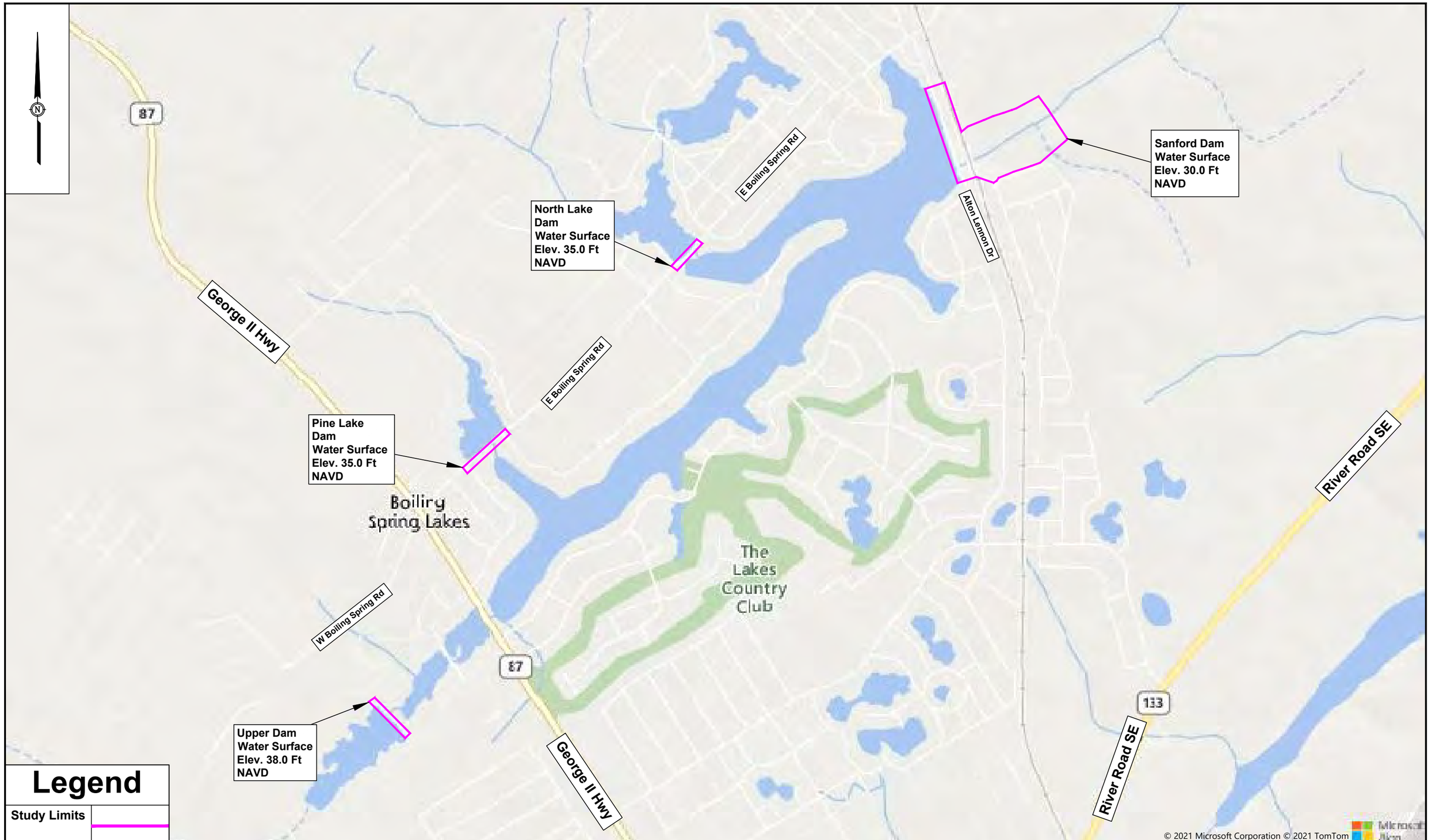
10. PRIME AND IMPORTANT FARMLAND SOILS REPORT
11. NCDEQ – DIVISION OF WASTE MANAGEMENT SITE LOCATOR MAP

APPENDIX A-1

LOCATION MAP



Legend

Study Limits	

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DATE 4/1/2021	PROJECT # 19.07042
OFFICE MANAGER MC	DESIGNER AL
PROJECT MANAGER MH	REVIEWER JS

DAM CONSTRUCTION/
RECONSTRUCTION PROJET

CITY OF BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

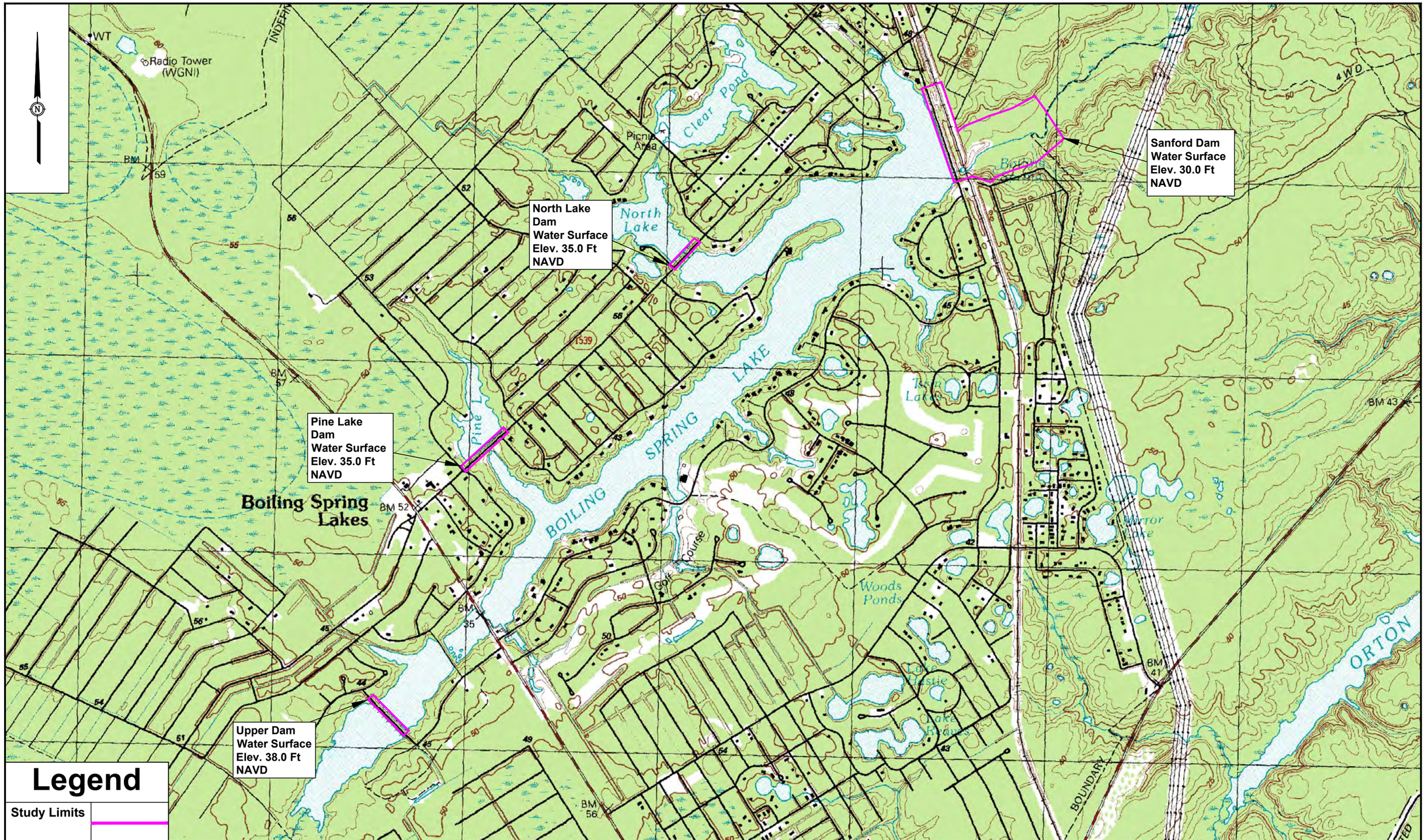
1500 0 750 1500 3000
GRAPHIC SCALE DIVISION VALUE = 1500 FEET

LOCATION MAP

FIGURE
A-1

APPENDIX A-2

USGS MAP



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DATE 4/1/2021	PROJECT # 19.07042
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RECONSTRUCTION PROJET

CITY OF BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

1500 0 750 1500 3000
GRAPHIC SCALE DIVISION VALUE = 1500 FEET

USGS MAP

FIGURE
A-2

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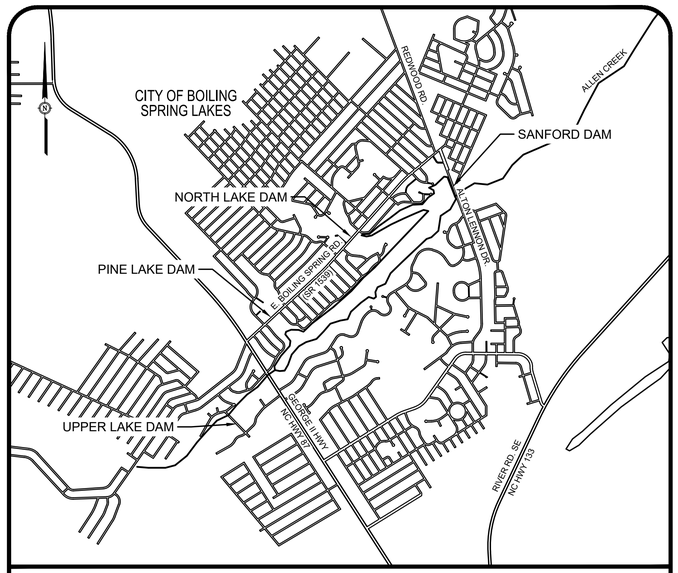
APPENDIX A-3

PROJECT PLANS

DAM CONSTRUCTION/ RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA



VICINITY MAP NOT TO SCALE

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

JANUARY, 2021

SCHEDULE OF DRAWINGS

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~~SD-I-03~~	~~INSTRUMENTATION DETAILS SHEET 1~~
~~SD-I-04~~	~~INSTRUMENTATION DETAILS SHEET 2~~
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~~SD-R-04~~	~~ROADWAY SECTIONS 1 OF 4~~
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~~SD-R-06~~	~~ROADWAY SECTIONS 3 OF 4~~
~~SD-R-07~~	~~ROADWAY SECTIONS 4 OF 4~~

UPPER LAKE DAM (ULD)

ULD-C-01	EXISTING CONDITIONS
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ULD-C-10	FINAL SITE PLAN STA. 10+00 - STA. 16+00
ULD-C-11	FINAL SITE PLAN STA. 16+00 - STA. 20+00
~~ULD-C-20~~	~~SITE ACCESS AND TEMPORARY FACILITIES~~
ULD-A-01	STAGE 1 SEQUENCE AND E&SC PLAN
ULD-A-02	STAGE 2 SEQUENCE AND E&SC PLAN
ULD-A-03	STAGE 3 SEQUENCE AND E&SC PLAN
ULD-A-04	STAGE 4 SEQUENCE AND E&SC PLAN
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~~ULD-B-05~~	~~STAGE 2 GRADING SECTIONS~~
~~ULD-B-06~~	~~STAGE 3 GRADING PLAN AND PROFILE~~
~~ULD-B-07~~	~~STAGE 3 GRADING SECTIONS~~
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~~ULD-S-02~~	~~SPILLWAY PROFILE & INLET DETAILS~~
~~ULD-S-03~~	~~INLET HEADWALL & BASESLAB DETAILS~~
~~ULD-S-04~~	~~INLET BASESLAB PLAN & DETAILS~~
~~ULD-S-05~~	~~BOX CULVERT SECTION DETAILS~~
~~ULD-S-06~~	~~INLET & BOX CULVERT SECTION DETAILS~~
~~ULD-S-07~~	~~LOW-LEVEL DRAIN & INTAKE WELL DETAILS~~
~~ULD-S-08~~	~~INTAKE WELL SECTION DETAILS~~
~~ULD-S-09~~	~~INTAKE WELL SECTION DETAILS~~
~~ULD-S-10~~	~~OUTLET SECTION DETAILS~~
~~ULD-S-11~~	~~OUTLET SECTION DETAILS~~
~~ULD-S-12~~	~~FENCE AND RAILING LAYOUT~~
~~ULD-I-01~~	~~UPPER LAKE DAM INSTRUMENTATION PLAN~~
~~ULD-R-01~~	~~ROADWAY, DRAINAGE, AND UTILITIES PLAN 1 OF 2~~
~~ULD-R-02~~	~~ROADWAY, DRAINAGE, AND UTILITIES PLAN 2 OF 2~~
~~ULD-R-03~~	~~ROADWAY SECTIONS 1 OF 3~~
~~ULD-R-04~~	~~ROADWAY SECTIONS 2 OF 3~~
~~ULD-R-05~~	~~ROADWAY SECTIONS 3 OF 3~~

NORTH LAKE DAM (NLD)

NLD-C-01	EXISTING CONDITIONS
NLD-C-02	DEMOLITION PLAN
NLD-C-10	FINAL SITE PLAN STA. 10+00 - STA. 14+00
NLD-C-11	FINAL SITE PLAN STA. 14+00 - STA. 17+50
~~NLD-C-20~~	~~SITE ACCESS AND TEMPORARY FACILITIES~~
NLD-A-01	STAGE 1 SEQUENCE AND E&SC PLAN
NLD-A-02	STAGE 2 SEQUENCE AND E&SC PLAN
NLD-A-03	STAGE 3 SEQUENCE AND E&SC PLAN
~~NLD-B-01~~	~~STAGE 1 GRADING PLAN AND PROFILE~~
~~NLD-B-02~~	~~STAGE 1 GRADING SECTIONS AND PROFILE~~
~~NLD-B-03~~	~~STAGE 2 GRADING PLAN AND PROFILE~~
~~NLD-B-04~~	~~STAGE 3 GRADING PLAN AND PROFILE~~
~~NLD-B-05~~	~~STAGES 2 AND 3 GRADING SECTIONS AND PROFILE~~
~~NLD-B-06~~	~~STAGE 3 GRADING ELEVATIONS~~
~~NLD-B-07~~	~~FILTER DIAPHRAGM~~
~~NLD-S-01~~	~~SPILLWAY PLAN~~
~~NLD-S-02~~	~~SPILLWAY PROFILE & INLET DETAILS~~
~~NLD-S-03~~	~~INLET HEADWALL & BASESLAB DETAILS~~
~~NLD-S-04~~	~~INLET BASESLAB PLAN & DETAILS~~
~~NLD-S-05~~	~~INLET SECTIONS & DETAILS~~
~~NLD-S-06~~	~~BOX CULVERT SECTION DETAILS~~
~~NLD-S-07~~	~~INLET & BOX CULVERT SECTION DETAILS~~
~~NLD-S-08~~	~~LOW-LEVEL DRAIN & INTAKE WELL DETAILS~~
~~NLD-S-09~~	~~INTAKE WELL SECTION DETAILS~~
~~NLD-S-10~~	~~INTAKE WELL SECTION DETAILS~~
~~NLD-S-11~~	~~OUTLET SECTION DETAILS~~
~~NLD-S-12~~	~~OUTLET SECTION DETAILS~~
~~NLD-S-13~~	~~FENCE AND RAILING LAYOUT~~
~~NLD-I-01~~	~~NORTH LAKE DAM INSTRUMENTATION PLAN~~
~~NLD-R-01~~	~~ROADWAY, DRAINAGE, AND UTILITIES PLANS 1 OF 2~~
~~NLD-R-02~~	~~ROADWAY, DRAINAGE, AND UTILITIES PLANS 2 OF 2~~
~~NLD-R-03~~	~~ROADWAY SECTIONS~~

PINE LAKE DAM (PLD)

PLD-C-01	EXISTING CONDITIONS
PLD-C-02	DEMOLITION PLAN
PLD-C-10	FINAL SITE PLAN STA. 11+00 - STA. 16+50
PLD-C-11	FINAL SITE PLAN STA. 16+50 - STA. 20+25
~~PLD-C-20~~	~~SITE ACCESS AND TEMPORARY FACILITIES~~
PLD-A-01	STAGE 1 SEQUENCE AND E&SC PLAN
PLD-A-02	STAGE 2 SEQUENCE AND E&SC PLAN
PLD-A-03	STAGE 3 SEQUENCE AND E&SC PLAN
~~PLD-B-01~~	~~STAGE 1 GRADING PLAN AND PROFILE~~
~~PLD-B-02~~	~~STAGE 1 GRADING SECTIONS AND PROFILE~~
~~PLD-B-03~~	~~STAGE 2 GRADING PLAN AND PROFILE~~
~~PLD-B-04~~	~~STAGE 3 GRADING PLAN AND PROFILE~~
~~PLD-B-05~~	~~STAGES 2 AND 3 GRADING SECTIONS AND PROFILE~~
~~PLD-B-06~~	~~STAGE 3 GRADING ELEVATIONS~~
~~PLD-B-07~~	~~FILTER DIAPHRAGM~~
~~PLD-S-01~~	~~SPILLWAY PLAN~~
~~PLD-S-02~~	~~SPILLWAY PROFILE & INLET DETAILS~~
~~PLD-S-03~~	~~INLET HEADWALL & BASESLAB DETAILS~~
~~PLD-S-04~~	~~INLET BASESLAB PLAN & DETAILS~~
~~PLD-S-05~~	~~INLET SECTIONS & DETAILS~~
~~PLD-S-06~~	~~BOX CULVERT SECTION DETAILS~~
~~PLD-S-07~~	~~INLET & BOX CULVERT SECTION DETAILS~~
~~PLD-S-08~~	~~LOW-LEVEL DRAIN & INTAKE WELL DETAILS~~
~~PLD-S-09~~	~~INTAKE WELL SECTION DETAILS~~
~~PLD-S-10~~	~~INTAKE WELL SECTION DETAILS~~
~~PLD-S-11~~	~~OUTLET SECTION DETAILS~~
~~PLD-S-12~~	~~OUTLET SECTION DETAILS~~
~~PLD-S-13~~	~~FENCE AND RAILING LAYOUT~~
~~PLD-I-01~~	~~PINE LAKE DAM INSTRUMENTATION PLAN~~
~~PLD-R-01~~	~~ROADWAY, DRAINAGE, AND UTILITIES PLANS 1 OF 2~~
~~PLD-R-02~~	~~ROADWAY SECTIONS~~

DAM (XXX-X-XX)	
SD	SANFORD DAM
ULD	UPPER LAKE DAM
NLD	NORTH LAKE DAM
PLD	PINE LAKE DAM

SERIES (XXX-X-XX)	
G	GENERAL
C	CIVIL
A	SEQUENCING
B	GEOTECHNICAL
S	STRUCTURAL
I	INSTRUMENTATION
R	ROADWAY & UTILITIES

ABBREVIATIONS

@	AT
A	AREA
A.B.C.	AGGREGATE BASE COURSE
AC	ACRE
A.D.	ALGEBRAIC DIFFERENCE
A.F.F.	ABOVE FINISHED FLOOR
AL	AREA LIGHT
APPROX.	APPROXIMATE
ARCH.	ARCHITECTURAL
ASSY.	ASSEMBLY
B-B	BACK TO BACK
BEAR.	BEARING
BLDG.	BUILDING
BOC	BACK OF CURB
BOT.	BOTTOM
℄	CENTERLINE
C.A.B.C.	CRUSHED AGGREGATE BASE COURSE
CB	CATCH BASIN
C-C	CENTER TO CENTER
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
C&G	CURB AND GUTTER
CH	CHORD
CI	CURB INLET
CL.	CLASS
CNST	CONSTRUCTION
C.O.	CLEAN-OUT
CO.	COMPANY
COL	COLUMN
CONC.	CONCRETE
CONN	CONNECTION
CPP	CORRUGATED PLASTIC PIPE
CSP	CORRUGATED STEEL PIPE
CULV.	CULVERT
° / DEG	DEGREE(S)
△	DELTA ANGLE
Ø / DIA.	DIAMETER
D	DEPTH / DEEP
DB	DEED BOOK
Dc	DEGREE OF CURVATURE
DET	DETAIL
DI	DROP INLET
DIP	DUCTILE IRON PIPE
DN	DOWN
D/W	DRIVEWAY
DWG(S).	DRAWING(S)
E	EAST
E&SC	EROSION & SEDIMENT CONTROL
EA.	EACH
EL/ELEV	ELEVATION
ELEC.	ELECTRICAL
EOP	EDGE OF PAVEMENT
ESMT	EASEMENT
EX/EXIST	EXISTING
F.D.	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION(S)
FES	FLARED END SECTION
FFE	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FHA	FIRE HYDRANT ASSEMBLY
FI	FLOW INDICATOR
FLEX.	FLEXIBLE
FL	FLANGE
FM	FORCE MAIN
FO	FIBER OPTIC CABLE
FOP	FIBER OPTIC POST
FOSC	FIBER OPTIC SIGNAL CABLE
FOC	FACE OF CURB
FT	FEET
FUT	FUTURE
GA	GAUGE
GAL.	GALLON
GALV.	GALVANIZED
GEN	GENERATOR
G/L	GUTTER LINE
GV	GATE VALVE
GW	GUY WIRE/ANCHOR
HD	HEAVY DUTY
HEX.	HEXAGONAL
HOR(IZ).	HORIZONTAL
HP	HIGH POINT
HWL	HIGH WATER LEVEL
HWY.	HIGHWAY
ICV	IRRIGATION CONTROL VALVE
I.D.	INSIDE DIAMETER
IN	INCH(ES)
INV.	INVERT
JB	JUNCTION BOX
K	CURVE COEFFICIENT
L	LENGTH
LB	POUND(S)
LD	LIGHT DUTY
LF	LINEAR FEET
LG	LONG
LP	LIGHT POLE
LT	LEFT
LWL	LOW WATER LEVEL
MAX.	MAXIMUM
MECH.	MECHANICAL
MFR.	MANUFACTURER
MH	MANHOLE
MI	MILE
MIN.	MINIMUM
MIP	MIXED-IN-PLACE
MJ	MECHANICAL JOINT
# / NO.	NUMBER
N	NORTH
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
N/F	NOW OR FORMERLY
N.I.C.	NOT IN CONTRACT
NTS	NOT TO SCALE
NWL	NORMAL WATER LEVEL
O.C.	ON CENTER(S)
O.D.	OUTSIDE DIAMETER
OHE	OVERHEAD ELECTRIC
OPER	OPERATION
OPNG	OPENING
PB	PLAT BOOK
PC	POINT OF CURVATURE
PERM.	PERMANENT
PG	PAGE
PI	POINT OF INTERSECTION
PITO	POINT OF INTERSECTION - TURN OUT
PL	PROPERTY LINE
PP	POWER POLE
PROP.	PROPOSED
PS	POINT OF SWITCH
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PT	POINT
PVC	POLYVINYL CHLORIDE
P.V.C.	POINT OF VERTICAL CURVATURE
P.V.I.	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
P.V.T.	POINT OF VERTICAL TANGENCY
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RED.	REDUCER
REQ'D.	REQUIRED
RJ	RESTRAINED JOINT
RR	RAILROAD
RT	RIGHT
ROW	RIGHT OF WAY
S	SOUTH
SAN	SANITARY
SCH	SCHEDULE
SDMH	STORM DRAIN MANHOLE
SEC	SECONDS
SECT.	SECTION
SED.	SEDIMENT
SEW	SEWER
SF	SQUARE FEET
SHT. / SH.	SHEET
SP	SERVICE POLE
SPEC.	SPECIFICATION
SQ.	SQUARE
SR	STATE ROAD
SS	STAINLESS STEEL
SSCO	SANITARY SEWER CLEANOUT
SSMH	SANITARY SEWER MANHOLE
STA.	STATION
STD.	STANDARD
STL	STEEL
S/W	SIDEWALK
T/C	TOP OF CURB
TEL.	TELEPHONE
TEMP.	TEMPORARY
TK	THICK
T/G	TOP OF GRATING
T.O.	TOP OF...
TP	TELEPHONE PEDESTAL
T/S	TOP OF SLAB
TSB	TRAFFIC SIGNAL BOX
TST	TEMPORARY SEDIMENT TRAP
T/W	TOP OF WALL
TYP.	TYPICAL
U/G	UNDER GROUND
UGE	UNDER GROUND ELECTRIC
UP	UTILITY POLE
UV	ULTRAVIOLET
V	VALVE
VC	VERTICAL CURVE
VERT.	VERTICAL
W	WIDTH
W	WEST
W/	WITH
WD	WIDE
WL	WATER LEVEL
W/L	WATER LINE
WM	WATER METER
WSE	WATER SURFACE ELEVATION
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
YD	YARD
YI	YARD INLET
YH	YARD HYDRANT

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

SCHEDULE OF DRAWINGS AND ABBREVATIONS

DATE	PROJECT #	FUNDING #
JANUARY, 2021	20.07036	N/A

SHEET
G-02

GENERAL NOTES

1. SURVEY IS REFERENCED TO HORIZ: NAD83, STATE PLANE (FEET) NORTH CAROLINA (FIFS 3200) VERTICAL: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) BY MCGILL ASSOCIATES AND EAST COAST ENGINEERING AND SURVEY IN APRIL AND MAY 2020.
2. CONTRACTOR SHALL VERIFY ALL ELEVATIONS BEFORE INSTALLATION OF FACILITIES.
3. NOT ALL UTILITIES ARE SHOWN. CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE EXISTING UTILITIES AND UTILITY INFORMATION PRESENTED ON THESE DRAWINGS. ANY DISCREPANCIES SHALL BE ADDRESSED TO THE ENGINEER IN WRITING. THE CONTRACTOR IS RESPONSIBLE OF NOTIFYING AND COORDINATING WORK WITH THE AFFECTED UTILITY COMPANIES WHETHER HE PERFORMS THE WORK OR A UTILITY COMPANY PERFORMS THE WORK. ANY DAMAGE DONE TO EXISTING UTILITIES (SHOWN OR NOT SHOWN ON PLANS) SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL CONTACT NC ONE CALL AT 1-800-632-4949 AT LEAST THREE WORKING DAYS PRIOR TO CONSTRUCTION. NON-SUBSCRIBERS SHALL BE CONTACTED DIRECTLY.
4. ALL PUBLIC ROADWAYS SHALL REMAIN OPEN AT ALL TIMES UNLESS SPECIFICALLY DESIGNATED IN THE PLANS. CONTRACTOR SHALL COMPLY WITH/AND IMPLEMENT ALL TRAFFIC MANAGEMENT MANEUVERS SHOWN IN THE PLANS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN ROAD SURFACES CLEAN AND FREE OF CONSTRUCTION SEDIMENT AND DEBRIS AT ALL TIMES.
5. ALL WORK SHALL BE PREFORMED IN ACCORDANCE WITH APPLICABLE LOCAL CITY, STATE, AND FEDERAL REGULATIONS AND PROJECT SPECIFIC PERMIT REQUIREMENTS.
6. CONTRACTOR SHALL OBTAIN AND PROVIDE TO THE OWNER TEMPORARY ENCROACHMENT PERMIT FOR CONSTRUCTION ENTRANCES PRIOR TO ANY CONSTRUCTION ACTIVITY WITHIN NCDOT RIGHT-OF-WAY.
7. BORINGS, CPT SOUNDINGS, AND ELECTRICAL RESISTIVITY SURVEYS DEPICTED ON THE DRAWINGS WERE PERFORMED BY SCHNABEL ENGINEERING, P.C. IN TWO PHASES OF SUBSURFACE EXPLORATION. DATA COLLECTED DURING THE SUBSURFACE EXPLORATIONS (EXCLUDING THE TEST PITS EXCAVATED AT SD AND ULD IN SEPTEMBER 2020) IS PRESENTED IN THE PHASE 1 AND 2 GEOTECHNICAL DATA REPORT, REVISION 1 DATED JANUARY 12, 2020.

7.1. ERI LINES 1, 2, AND 3 WERE PERFORMED AT SD BY SCHNABEL DURING PHASE 1 IN JULY 2019. ERI LINE EXTENSIONS 1, 2, AND 3 WERE PERFORMED AT SD BY SCHNABEL DURING PHASE 2 IN MARCH 2020.

7.2. PHASE 1 AND PHASE 2 BORINGS WERE DRILLED BY RED DOG DRILLING OF MIDLAND, NC. PHASE 1 BORINGS WERE DRILLED IN AUGUST AND SEPTEMBER 2019, AND PHASE 2 BORINGS WERE DRILLED IN APRIL 2020.

7.3. CPT SOUNDINGS WERE PERFORMED BY CONETEC, INC. OF CHARLES CITY, VA IN APRIL 2020.

7.4. TEST PITS EXCAVATED AT SD AND ULD WERE PERFORMED BY THE CITY OF BOILING SPRING LAKES IN SEPTEMBER 2020.

8. SEQUENCING AND CONCEPTUAL CONTROL OF WATER LAYOUTS SHOWN ON SD-A, ULD-A, NLD-A, AND PLD-A SERIES SHEETS WERE DESIGNED BY SCHNABEL ENGINEERING, P.C. AND ARE PRESENTED UNDER THE PROFESSIONAL ENGINEER SEAL ON THOSE RESPECTIVE SHEETS. EASC MEASURES AND LAYOUT SHOWN ON THE SD-A, ULD-A, NLD-A, AND PLD-A SERIES SHEETS WERE DESIGNED BY MCGILL ASSOCIATES, P.A. AND ARE PRESENTED UNDER THE PROFESSIONAL ENGINEER SEAL THIS SHEET.

GENERAL CONSTRUCTION SEQUENCING AND CONTROL OF WATER NOTES

1. CONCEPTS FOR COFFERDAMS AND TEMPORARY STREAM DIVERSIONS WERE DEVELOPED TO PROTECT THE WORK AREAS FROM A 10-YEAR STORM. THIS MINIMUM LEVEL OF PROTECTION MUST BE PRESENTED IN THE CONTRACTOR'S CONTROL OF WATER PLAN, THOUGH THE CONTRACTOR MAY CHOOSE TO PROVIDE ADDITIONAL PROTECTION. COFFERDAM TOP ELEVATIONS WERE DETERMINED TO BE MINIMUM ELEVATIONS BASED ON HYDRAULIC DESIGN OF TEMPORARY CONCEPTUAL STREAM DIVERSION CONFIGURATION PRESENTED ON DRAWINGS, AND WOULD NEED TO BE CONSIDERED IF CONTRACTOR PROPOSES ALTERNATE STREAM DIVERSION CONFIGURATION. SEE THE CONTROL OF WATER SPECIFICATION SECTION FOR ADDITIONAL REQUIREMENTS AND DETAILS.
2. ALL DEWATERING OPERATIONS MUST BE PERFORMED IN ACCORDANCE WITH PERMIT REQUIREMENTS AND SUCH THAT PUMPED OR DIVERTED EFFLUENT DOES NOT PRODUCE SEDIMENT-LADEN RUNOFF.
3. A CONCEPTUAL CONSTRUCTION SEQUENCE AND CONTROL OF WATER CONFIGURATION IS PROVIDED FOR EACH DAM FOR THE PURPOSE OF OBTAINING PERMITS REQUIRED FOR CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR DESIGNING OF COFFERDAMS, DIVERSIONS, DEWATERING SYSTEMS, ETC. AND FOR DEVELOPING AND SUBMITTING A CONTROL OF WATER PLAN TO THE ENGINEER FOR APPROVAL IN ACCORDANCE WITH THE SPECIFICATIONS. SHOULD THE CONTRACTOR PROPOSE TO DEVIATE SIGNIFICANTLY FROM THE CONCEPTS PRESENTED ON THE DRAWINGS, SUCH DEVIATIONS MAY REQUIRE REVIEW AND APPROVAL BY NC DAM SAFETY AND NCDEQ WHICH MAY DELAY CONSTRUCTION FOR 60 DAYS AFTER SUBMITTAL TO THE APPROPRIATE AGENCIES. NO ADDITIONAL CONTRACT TIME WILL BE GRANTED FOR SUCH DELAY.
4. AFTER CONTRACT WORK IS COMPLETE, ALL GATES SHALL REMAIN OPEN AND THE LAKES MAINTAINED IN DRAINED CONDITION UNTIL APPROVAL TO IMPOUND IS OBTAINED FROM NC DAM SAFETY.
5. THE SEQUENCE NOTES ON SHEET SD-A-01 STATE THAT A MISSING SPILLWAY WEIR WALL SECTION IS TO BE CONSTRUCTED DURING SANFORD DAM CONSTRUCTION SEQUENCE STAGE 4. THE CONTRACTOR MAY ELECT TO POSTPONE CONSTRUCTION OF THE MISSING SPILLWAY WEIR WALL SECTION UNTIL CONSTRUCTION WORK AT THE OTHER THREE DAMS IS COMPLETE TO LIMIT ENCROACHMENT OF TAILWATER DURING STORM EVENTS.
6. CLOSURE OF EAST BOILING SPRING ROAD FOR WORK ON NORTH LAKE DAM CANNOT COMMENCE UNTIL ALTON LENNON ROAD HAS BEEN OPENED TO TRAFFIC. REFER TO SHEET G-03A FOR A BID ALTERNATE TO ALLOW CONSTRUCTION OF NORTH LAKE DAM AND CLOSURE OF EAST BOILING SPRING ROAD CONCURRENTLY WITH OTHER DAMS.

EXISTING CONDITIONS LEGEND

TEL PED	TELEPHONE PEDESTAL
ELEC PED	ELECTRIC PEDESTAL
CATV PED	CABLE TV PEDESTAL
SIGN	SIGN
CATV	UNDERGROUND CABLE TV SIGN
UG FOC	UNDERGROUND FIBER OPTIC CABLE SIGN
UG TCS	UNDERGROUND TELEPHONE CABLE SIGN
UG GAS	UNDERGROUND GAS LINE SIGN
UG ELEC	UNDERGROUND ELECTRIC LINE SIGN
LP	LIGHT POLE
UP	UTILITY POLE
	GUY WIRE ANCHOR
TSP	TRAFFIC SIGNAL POLE
RR	RAILROAD CROSSING SIGNAL
MH	MANHOLE
SSMH	SANITARY SEWER MANHOLE
SDMH	STORM DRAIN MANHOLE
COMMH	COMMUNICATION MANHOLE
ELMH	ELECTRICAL MANHOLE
J.B.	JUNCTION BOX
SPIGOT	SPIGOT/YARD HYDRANT
C.O.	SEWER CLEAN-OUT
E.SS	ELECTRIC SERVICE STUB-OUT
G.SS	GAS SERVICE STUB-OUT
CB	CATCH BASIN
CI	CURB INLET
WM	WATER METER
FH	FIRE HYDRANT
WV	WATER VALVE
BLOWOFF VALVE	BLOW OFF VALVE
G/M	GAS METER
G/V	GAS VALVE
ICV	IRRIGATION CONTROL VALVE
PIV	POST INDICATOR VALVE
E.JUNC	ELECTRIC JUNCTION BOX OR OUTLET
SIG BOX	TRAFFIC SIGNAL BOX

	CALCULATED POINT
IPS	1/2" REBAR SET WITH CAP
	CONCRETE MONUMENT
CM-R/W	RIGHT-OF-WAY MONUMENT
DOT MON	D.O.T. CONTROL POINT
RBF	REBAR FOUND
RRSPIKE	RAILROAD SPIKE
PK NL	PK NAIL FOUND / SET
SPINDLE	SPINDLE FOUND / SET
CPHUB	HUB & TACK SET
CP/NL GPS	CONTROL POINT NAIL SET / FOUND
CP/NL	CONTROL POINT/NAIL SET GPS
CP/TEMP	CONTROL POINT TEMPORARY MARK
NGS METAL ROD	NATIONAL GEODETIC SURVEY METAL ROD
NGS CM	NATIONAL GEODETIC SURVEY CONCRETE MONUMENT
	TEMPORARY CONTROL POINT SET
	NETWORK TRIANGULATION POINT
STAKE	STAKE FOUND
40	INTERSTATE HIGHWAY
66	U.S. HIGHWAY
FFE ELEVATION	FINISHED FLOOR ELEVATION
MW	MONITORING WELL
PZ	PIEZOMETER
	LANDFILL GAS MONITORING PROBE
	SURFACE WATER SAMPLING LOCATION
	LANDFILL GAS VENT
	LANDFILL GAS COLLECTION WELLHEAD
W	POTABLE WATER WELL
MB	MAILBOX OR PAPER BOX
PB	POSTAL DROP BOX
SAT DISH	SATELLITE DISH
YARD ORNAMENT	STATUE, BIRD BATHS, ETC.
	TREES
	SHRUBS / BUSHES
(H)	HORIZONTAL GROUND DISTANCE
(G)	NC STATE PLANE GRID DISTANCE

	CULVERT
X	FENCE
	SILT FENCE
	GUARD RAIL
S	APPROXIMATE LOCATION OF EXISTING SEWER LINES
W	APPROXIMATE LOCATION OF EXISTING WATER LINES
G	APPROXIMATE LOCATION OF EXISTING GAS LINES
	TOP OF SLOPE
	TOE OF SLOPE
DL	DITCH LINES
CTV	APPROXIMATE LOCATION OF UNDERGROUND CABLE TV LINE
FOC	APPROXIMATE LOCATION OF UNDERGROUND FIBER OPTIC CABLE LINE
E	APPROXIMATE LOCATION OF UNDERGROUND ELECTRIC LINE
E	APPROXIMATE LOCATION OF OVERHEAD ELECTRIC LINE
T	APPROXIMATE LOCATION OF UNDERGROUND TELEPHONE LINES
ROW	RIGHT-OF-WAY
	TREELINE
	PROPERTY LINE NOT SURVEYED
	STREAM LINE
	CENTERLINE
	SWAMPLINE/WETLANDS
SB-1 49.04'	GEOTECHNICAL BORING LOCATION WITH IDENTIFIER AND SURFACE ELEV.
SB-2A 49.04'	GEOTECHNICAL MONITORING WELL LOCATION WITH IDENTIFIER AND SURFACE ELEV.
SC-3 49.04'	GEOTECHNICAL CPT SOUNDING LOCATION WITH IDENTIFIER AND SURFACE ELEV.
SD-TP-1	GEOTECHNICAL TEST PIT LOCATION WITH IDENTIFIER

EROSION CONTROL LEGEND

	PROJECT LIMITS OF DISTURBANCE
	TEMP. CONSTRUCTION EASEMENT
	TEMP. SILT FENCE (SEE DETAIL EC-2, SH. G-11)
	TEMP. SILT FENCE OUTLET (SEE DETAIL EC-4, SH. G-11)
	TEMP. FLOATING TURBIDITY CURTAIN (SEE NOTE EC-5, SH. G-11)
	TEMP. DIVERSION BERM (SEE DETAIL EC-9, SH. G-12)
	TEMP. DIVERSION SWALE (SEE DETAIL EC-15, SH. G-13)
	TEMP. BYPASS PIPE
	TEMP. SLOPE DRAIN (SEE DETAIL EC-8, SH. G-12)
	TEMP. WATTLE BARRIER (SEE DETAIL EC-11, SH. G-12)
	TEMP. ROCK CHECK DAM (SEE DETAIL EC-10, SH. G-12)
	TEMP. ROCK DONUT INLET PROTECTION (SEE DETAIL EC-14, SH. G-13)
	TEMP. RIP RAP OUTLET PROTECTION (SEE DETAIL EC-12, SH. G-13)
	TEMP. CONCRETE WASHOUT STRUCTURE (SEE DETAIL EC-6, SH. G-11)
	TEMP. CONSTRUCTION ENTRANCE (SEE DETAIL EC-1, SH. G-10)
	TEMP. SOIL STOCKPILE
TS	TEMP. SEEDING (SEE NOTES, SH. G-10) - STABILIZE GROUND PER TABLE ON SH. G-10
PS	PERM. SEEDING (SEE NOTES, SH. G-10) - STABILIZE GROUND PER TABLE ON SH. G-10

LAND DISTURBANCE ACREAGE

LOCATION	DISTURBED AREA (AC)
SANFORD DAM	12.86
UPPER LAKE DAM	3.34
NORTH LAKE DAM	3.30
PINE LAKE DAM	4.04
TOTAL	23.54

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/ RECONSTRUCTION PROJECT

BOILING SPRING LAKES

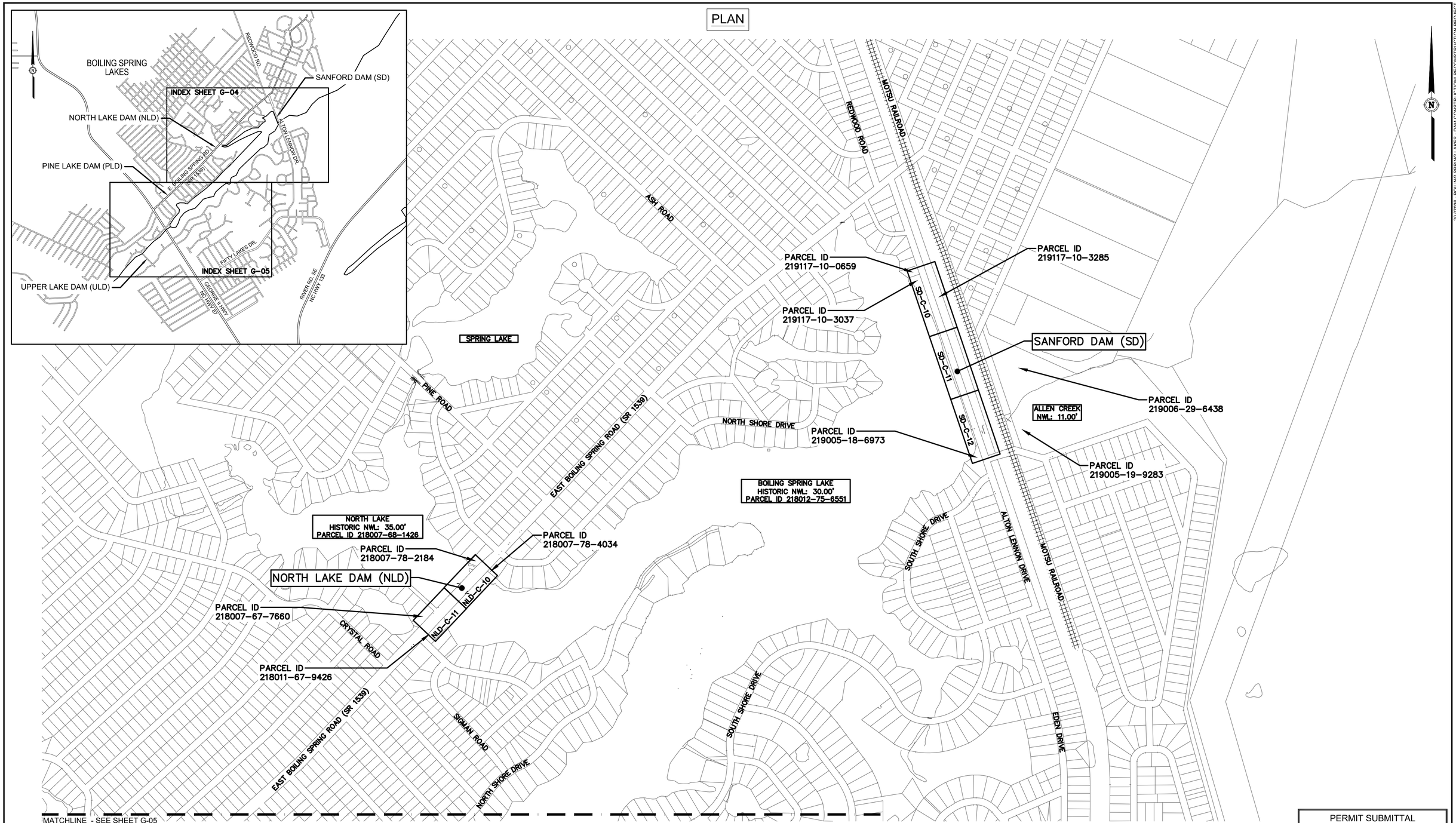
BRUNSWICK COUNTY, NORTH CAROLINA

GENERAL NOTES AND LEGEND

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	JANUARY, 2021	20.07036	N/A
M. HANSON	M. HANSON			

SHEET G-03

PLAN



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Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 400 0 200 400 800 — DIVISION VALUE = 400 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	INDEX SHEET 1 OF 2		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
G-04

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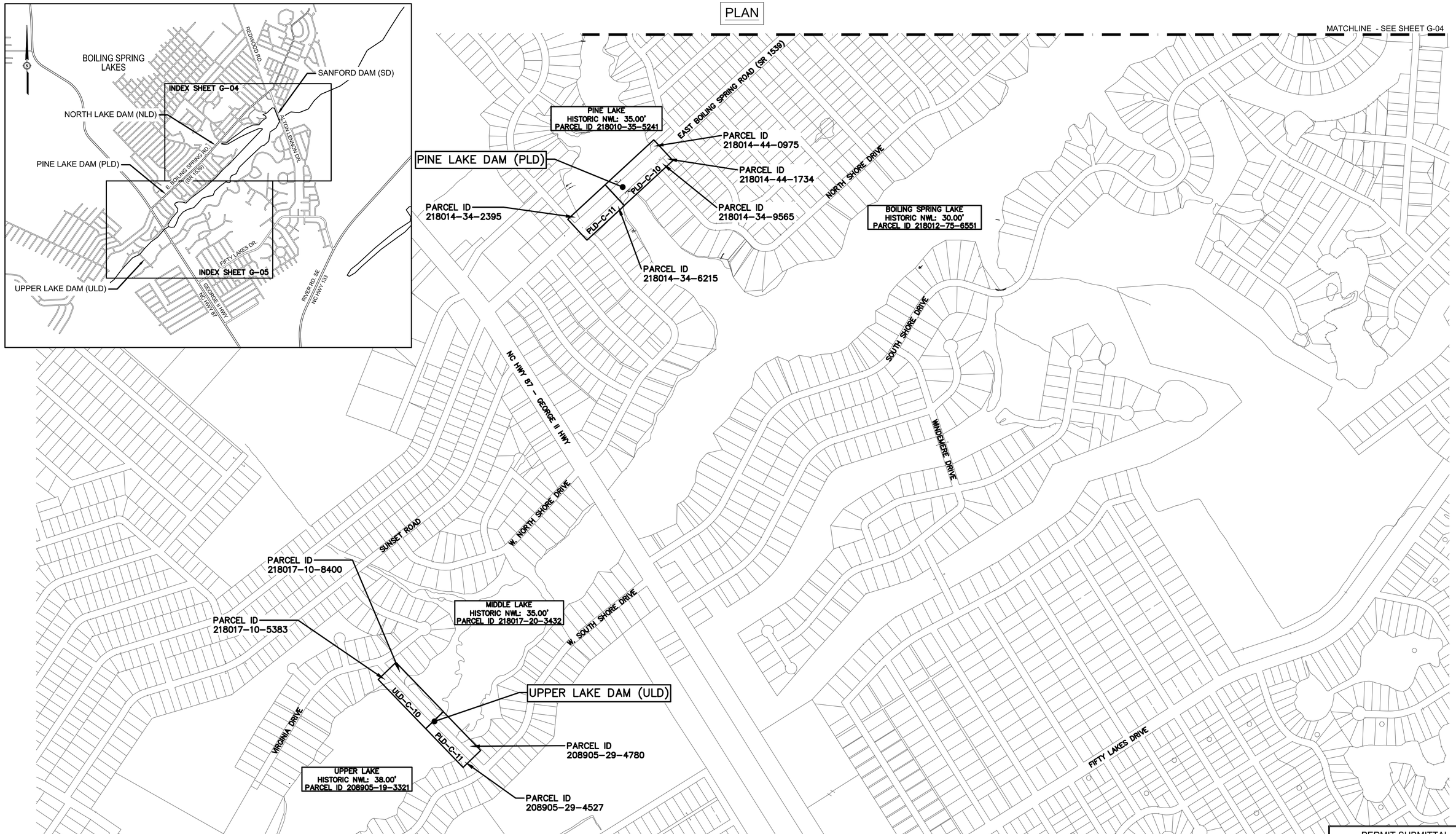
20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 400 0 200 400 800 — DIVISION VALUE = 400 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	INDEX SHEET 2 OF 2		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
G-05

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20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT

GROUND STABILIZATION AND MATERIALS HANDLING PRACTICES FOR COMPLIANCE WITH THE NCG01 CONSTRUCTION GENERAL PERMIT

Implementing the details and specifications on this plan sheet will result in the construction activity being considered compliant with the Ground Stabilization and Materials Handling sections of the NCG01 Construction General Permit (Sections E and F, respectively). The permittee shall comply with the Erosion and Sediment Control plan approved by the delegated authority having jurisdiction. All details and specifications shown on this sheet may not apply depending on site conditions and the delegated authority having jurisdiction.

SECTION E: GROUND STABILIZATION

Required Ground Stabilization Timeframes

Site Area Description	Stabilize within this many calendar days after ceasing land disturbance	Timeframe variations
(a) Perimeter dikes, swales, ditches, and perimeter slopes	7	None
(b) High Quality Water (HQW) Zones	7	None
(c) Slopes steeper than 3:1	7	If slopes are 10' or less in length and are not steeper than 2:1, 14 days are allowed
(d) Slopes 3:1 to 4:1	14	-7 days for slopes greater than 50' in length and with slopes steeper than 4:1 -7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed
(e) Areas with slopes flatter than 4:1	14	-7 days for perimeter dikes, swales, ditches, perimeter slopes and HQW Zones -10 days for Falls Lake Watershed unless there is zero slope

Note: After the permanent cessation of construction activities, any areas with temporary ground stabilization shall be converted to permanent ground stabilization as soon as practicable but in no case longer than 90 calendar days after the last land disturbing activity. Temporary ground stabilization shall be maintained in a manner to render the surface stable against accelerated erosion until permanent ground stabilization is achieved.

GROUND STABILIZATION SPECIFICATION

Stabilize the ground sufficiently so that rain will not dislodge the soil. Use one of the techniques in the table below:

Temporary Stabilization	Permanent Stabilization
• Temporary grass seed covered with straw or other mulches and tackifiers • Hydroseeding • Rolled erosion control products with or without temporary grass seed • Appropriately applied straw or other mulch • Plastic sheeting	• Permanent grass seed covered with straw or other mulches and tackifiers • Geotextile fabrics such as permanent soil reinforcement matting • Hydroseeding • Shrubs or other permanent plantings covered with mulch • Uniform and evenly distributed ground cover sufficient to restrain erosion • Structural methods such as concrete, asphalt or retaining walls • Rolled erosion control products with grass seed

POLYACRYLAMIDES (PAMS) AND FLOCCULANTS

1. Select flocculants that are appropriate for the soils being exposed during construction, selecting from the *NC DWR List of Approved PAMS/Flocculants*.
2. Apply flocculants at or before the inlets to Erosion and Sediment Control Measures.
3. Apply flocculants at the concentrations specified in the *NC DWR List of Approved PAMS/Flocculants* and in accordance with the manufacturer's instructions.
4. Provide ponding area for containment of treated Stormwater before discharging offsite.
5. Store flocculants in leak-proof containers that are kept under storm-resistant cover or surrounded by secondary containment structures.

EQUIPMENT AND VEHICLE MAINTENANCE

1. Maintain vehicles and equipment to prevent discharge of fluids.
2. Provide drip pans under any stored equipment.
3. Identify leaks and repair as soon as feasible, or remove leaking equipment from the project.
4. Collect all spent fluids, store in separate containers and properly dispose as hazardous waste (recycle when possible).
5. Remove leaking vehicles and construction equipment from service until the problem has been corrected.
6. Bring used fuels, lubricants, coolants, hydraulic fluids and other petroleum products to a recycling or disposal center that handles these materials.

LITTER, BUILDING MATERIAL AND LAND CLEARING WASTE

1. Never bury or burn waste. Place litter and debris in approved waste containers.
2. Provide a sufficient number and size of waste containers (e.g dumpster, trash receptacle) on site to contain construction and domestic wastes.
3. Locate waste containers at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
4. Locate waste containers on areas that do not receive substantial amounts of runoff from upland areas and does not drain directly to a storm drain, stream or wetland.
5. Cover waste containers at the end of each workday and before storm events or provide secondary containment. Repair or replace damaged waste containers.
6. Anchor all lightweight items in waste containers during times of high winds.
7. Empty waste containers as needed to prevent overflow. Clean up immediately if containers overflow.
8. Dispose waste off-site at an approved disposal facility.
9. On business days, clean up and dispose of waste in designated waste containers.

PAINT AND OTHER LIQUID WASTE

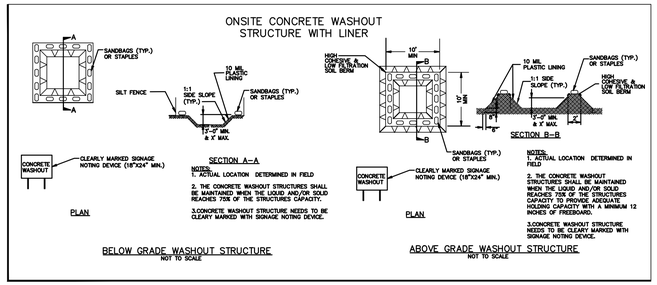
1. Do not dump paint and other liquid waste into storm drains, streams or wetlands.
2. Locate paint washouts at least 50 feet away from storm drain inlets and surface waters unless no other alternatives are reasonably available.
3. Contain liquid wastes in a controlled area.
4. Containment must be labeled, sized and placed appropriately for the needs of site.
5. Prevent the discharge of soaps, solvents, detergents and other liquid wastes from construction sites.

PORTABLE TOILETS

1. Install portable toilets on level ground, at least 50 feet away from storm drains, streams or wetlands unless there is no alternative reasonably available. If 50 foot offset is not attainable, provide relocation of portable toilet behind silt fence or place on a gravel pad and surround with sand bags.
2. Provide staking or anchoring of portable toilets during periods of high winds or in high foot traffic areas.
3. Monitor portable toilets for leaking and properly dispose of any leaked material. Utilize a licensed sanitary waste hauler to remove leaking portable toilets and replace with properly operating unit.

EARTHEN STOCKPILE MANAGEMENT

1. Show stockpile locations on plans. Locate earthen-material stockpile areas at least 50 feet away from storm drain inlets, sediment basins, perimeter sediment controls and surface waters unless it can be shown no other alternatives are reasonably available.
2. Protect stockpile with silt fence installed along toe of slope with a minimum offset of five feet from the toe of stockpile.
3. Provide stable stone access point when feasible.
4. Stabilize stockpile within the timeframes provided on this sheet and in accordance with the approved plan and any additional requirements. Soil stabilization is defined as vegetative, physical or chemical coverage techniques that will restrain accelerated erosion on disturbed soils for temporary or permanent control needs.



CONCRETE WASHOUTS

1. Do not discharge concrete or cement slurry from the site.
2. Dispose of, or recycle settled, hardened concrete residue in accordance with local and state solid waste regulations and at an approved facility.
3. Manage washout from mortar mixers in accordance with the above item and in addition place the mixer and associated materials on impervious barrier and within lot perimeter silt fence.
4. Install temporary concrete washouts per local requirements, where applicable. If an alternate method or product is to be used, contact your approval authority for review and approval. If local standard details are not available, use one of the two types of temporary concrete washouts provided on this detail.
5. Do not use concrete washouts for dewatering or storing defective curb or sidewalk sections. Stormwater accumulated within the washout may not be pumped into or discharged to the storm drain system or receiving surface waters. Liquid waste must be pumped out and removed from project.
6. Locate washouts at least 50 feet from storm drain inlets and surface waters unless it can be shown that no other alternatives are reasonably available. At a minimum, install protection of storm drain inlet(s) closest to the washout which could receive spills or overflow.
7. Locate washouts in an easily accessible area, on level ground and install a stone entrance pad in front of the washout. Additional controls may be required by the approving authority.
8. Install at least one sign directing concrete trucks to the washout within the project limits. Post signage on the washout itself to identify this location.
9. Remove leavings from the washout when at approximately 75% capacity to limit overflow events. Replace the tarp, sand bags or other temporary structural components when no longer functional. When utilizing alternative or proprietary products, follow manufacturer's instructions.
10. At the completion of the concrete work, remove remaining leavings and dispose of in an approved disposal facility. Fill pit, if applicable, and stabilize any disturbance caused by removal of washout.

HERBICIDES, PESTICIDES AND RODENTICIDES

1. Store and apply herbicides, pesticides and rodenticides in accordance with label restrictions.
2. Store herbicides, pesticides and rodenticides in their original containers with the label, which lists directions for use, ingredients and first aid steps in case of accidental poisoning.
3. Do not store herbicides, pesticides and rodenticides in areas where flooding is possible or where they may spill or leak into wells, stormwater drains, ground water or surface water. If a spill occurs, clean area immediately.
4. Do not stockpile these materials onsite.

HAZARDOUS AND TOXIC WASTE

1. Create designated hazardous waste collection areas on-site.
2. Place hazardous waste containers under cover or in secondary containment.
3. Do not store hazardous chemicals, drums or bagged materials directly on the ground.

NCG01 GROUND STABILIZATION AND MATERIALS HANDLING

EFFECTIVE: 04/01/19

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
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BOILING SPRING LAKES
BRUNSWICK COUNTY, NORTH CAROLINA

AS NOTED

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M. NORTON	S. MEEKINS	JANUARY, 2021	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

NCG01 GENERAL PERMIT NOTES 1 OF 2

SHEET
G-08

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION A: SELF-INSPECTION

Self-inspections are required during normal business hours in accordance with the table below. When adverse weather or site conditions would cause the safety of the inspection personnel to be in jeopardy, the inspection may be delayed until the next business day on which it is safe to perform the inspection. In addition, when a storm event of equal to or greater than 1.0 inch occurs outside of normal business hours, the self-inspection shall be performed upon the commencement of the next business day. Any time when inspections were delayed shall be noted in the Inspection Record.

Inspect	Frequency (during normal business hours)	Inspection records must include:
(1) Rain gauge maintained in good working order	Daily	Daily rainfall amounts. If no daily rain gauge observations are made during weekend or holiday periods, and no individual-day rainfall information is available, record the cumulative rain measurement for those un-attended days (and this will determine if a site inspection is needed). Days on which no rainfall occurred shall be recorded as "zero." The permittee may use another rain-monitoring device approved by the Division.
(2) E&SC Measures	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the measures inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Indication of whether the measures were operating properly, 5. Description of maintenance needs for the measure, 6. Description, evidence, and date of corrective actions taken.
(3) Stormwater discharge outfalls (SDOs)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	1. Identification of the discharge outfalls inspected, 2. Date and time of the inspection, 3. Name of the person performing the inspection, 4. Evidence of indicators of stormwater pollution such as oil sheen, floating or suspended solids or discoloration, 5. Indication of visible sediment leaving the site, 6. Description, evidence, and date of corrective actions taken.
(4) Perimeter of site	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If visible sedimentation is found outside site limits, then a record of the following shall be made: 1. Actions taken to clean up or stabilize the sediment that has left the site limits, 2. Description, evidence, and date of corrective actions taken, and 3. An explanation as to the actions taken to control future releases.
(5) Streams or wetlands onsite or offsite (where accessible)	At least once per 7 calendar days and within 24 hours of a rain event ≥ 1.0 inch in 24 hours	If the stream or wetland has increased visible sedimentation or a stream has visible increased turbidity from the construction activity, then a record of the following shall be made: 1. Description, evidence and date of corrective actions taken, and 2. Records of the required reports to the appropriate Division Regional Office per Part III, Section C, Item (2)(a) of this permit of this permit.
(6) Ground stabilization measures	After each phase of grading	1. The phase of grading (installation of perimeter E&SC measures, clearing and grubbing, installation of storm drainage facilities, completion of all land-disturbing activity, construction or redevelopment, permanent ground cover). 2. Documentation that the required ground stabilization measures have been provided within the required timeframe or an assurance that they will be provided as soon as possible.

NOTE: The rain inspection resets the required 7 calendar day inspection requirement.

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION B: RECORDKEEPING

1. E&SC Plan Documentation

The approved E&SC plan as well as any approved deviation shall be kept on the site. The approved E&SC plan must be kept up-to-date throughout the coverage under this permit. The following items pertaining to the E&SC plan shall be documented in the manner described:

Item to Document	Documentation Requirements
(a) Each E&SC Measure has been installed and does not significantly deviate from the locations, dimensions and relative elevations shown on the approved E&SC Plan.	Initial and date each E&SC Measure on a copy of the approved E&SC Plan or complete, date and sign an inspection report that lists each E&SC Measure shown on the approved E&SC Plan. This documentation is required upon the initial installation of the E&SC Measures or if the E&SC Measures are modified after initial installation.
(b) A phase of grading has been completed.	Initial and date a copy of the approved E&SC Plan or complete, date and sign an inspection report to indicate completion of the construction phase.
(c) Ground cover is located and installed in accordance with the approved E&SC Plan.	Initial and date a copy of the approved E&SC Plan or complete, date and sign an inspection report to indicate compliance with approved ground cover specifications.
(d) The maintenance and repair requirements for all E&SC Measures have been performed.	Complete, date and sign an inspection report.
(e) Corrective actions have been taken to E&SC Measures.	Initial and date a copy of the approved E&SC Plan or complete, date and sign an inspection report to indicate the completion of the corrective action.

2. Additional Documentation

In addition to the E&SC Plan documents above, the following items shall be kept on the site
and available for agency inspectors at all times during normal business hours, unless the Division provides a site-specific exemption based on unique site conditions that make this requirement not practical:

(a) This general permit as well as the certificate of coverage, after it is received.

(b) Records of inspections made during the previous 30 days. The permittee shall record the required observations on the Inspection Record Form provided by the Division or a similar inspection form that includes all the required elements. Use of electronically-available records in lieu of the required paper copies will be allowed if shown to provide equal access and utility as the hard-copy records.

(c) All data used to complete the Notice of Intent and older inspection records shall be maintained for a period of three years after project completion and made available upon request. [40 CFR 122.41]

PART III
SELF-INSPECTION, RECORDKEEPING AND REPORTING

SECTION C: REPORTING

1. Occurrences that must be reported

Permittees shall report the following occurrences:

(a) Visible sediment deposition in a stream or wetland.

(b) Oil spills if:
- They are 25 gallons or more,
- They are less than 25 gallons but cannot be cleaned up within 24 hours,
- They cause sheen on surface waters (regardless of volume), or
- They are within 100 feet of surface waters (regardless of volume).

(a) Releases of hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (Ref: 40 CFR 110.3 and 40 CFR 117.3) or Section 102 of CERCLA (Ref: 40 CFR 302.4) or G.S. 143-215.85.

(b) Anticipated bypasses and unanticipated bypasses.

(c) Noncompliance with the conditions of this permit that may endanger health or the environment.

2. Reporting Timeframes and Other Requirements

After a permittee becomes aware of an occurrence that must be reported, he shall contact the appropriate Division regional office within the timeframes and in accordance with the other requirements listed below. Occurrences outside normal business hours may also be reported to the Division's Emergency Response personnel at (800) 662-7956, (800) 858-0368 or (919) 733-3300.

Occurrence	Reporting Timeframes (After Discovery) and Other Requirements
(a) Visible sediment deposition in a stream or wetland	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the sediment and actions taken to address the cause of the deposition. Division staff may waive the requirement for a written report on a case-by-case basis. • If the stream is named on the NC 303(d) list as impaired for sediment-related causes, the permittee may be required to perform additional monitoring, inspections or apply more stringent practices if staff determine that additional requirements are needed to assure compliance with the federal or state impaired-waters conditions.
(b) Oil spills and release of hazardous substances per Item 1(b)-(c) above	• ***Within 24 hours***, an oral or electronic notification. The notification shall include information about the date, time, nature, volume and location of the spill or release.
(c) Anticipated bypasses [40 CFR 122.41(m)(3)]	• ***A report at least ten days before the date of the bypass, if possible***. The report shall include an evaluation of the anticipated quality and effect of the bypass.
(d) Unanticipated bypasses [40 CFR 122.41(m)(3)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days,*** a report that includes an evaluation of the quality and effect of the bypass.
(e) Noncompliance with the conditions of this permit that may endanger health or the environment[40 CFR 122.41(l)(7)]	• ***Within 24 hours***, an oral or electronic notification. • ***Within 7 calendar days***, a report that contains a description of the noncompliance, and its causes; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time noncompliance is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. [40 CFR 122.41(l)(6). • Division staff may waive the requirement for a written report on a case-by-case basis.

NCG01 SELF-INSPECTION, RECORDKEEPING AND REPORTING

EFFECTIVE: 04/01/19

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AS NOTED

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PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

NCG01 GENERAL PERMIT NOTES 2 OF 2

SHEET
G-09

GENERAL EROSION CONTROL NOTES

1. ALL SOIL EROSION CONTROL MEASURES REQUIRED BY THE GRADING PLAN SHALL BE PERFORMED PRIOR TO GRADING, CLEARING OR GRUBBING. TO THE EXTENT PRACTICAL, SILT FENCES INSIDE THE LIMITS OF DISTURBANCE AND 10 FEET FROM ACTIVE CONSTRUCTION WHERE FEASIBLE TO AVOID DAMAGE DURING OPERATION OF EQUIPMENT.

2. ENTIRE AREA TO BE GRADED SHALL BE CLEARED AND GRUBBED. NO FILL SHALL BE PLACED ON ANY AREA NOT CLEARED AND GRUBBED.

3. ALL EROSION CONTROL DEVICES SUCH AS SILT FENCES, ETC., SHALL BE MAINTAINED IN WORKABLE CONDITION FOR THE LIFE OF THE PROJECT AND SHALL BE REMOVED AT THE COMPLETION OF THE PROJECT ONLY ON THE ENGINEER'S APPROVAL. IF DURING THE LIFE OF THE PROJECT, A STORM CAUSES SOIL EROSION WHICH CHANGES FINISH GRADES OR CREATES "GULLIES" AND "WASHED AREAS", THESE SHALL BE REPAIRED AT NO EXTRA COST, AND ALL SILT WASHED OFF OF THE PROJECT SITE ONTO ADJACENT PROPERTY SHALL BE REMOVED AS DIRECTED BY THE ENGINEER AT NO EXTRA COST. THE CONTRACTOR SHALL ADHERE TO ANY APPROVED EROSION CONTROL PLANS WHETHER INDICATED IN THE CONSTRUCTION PLANS OR UNDER SEPARATE COVER.

4. DISPOSABLE MATERIAL
   - 4.1. CLEARING AND GRUBBING WASTES SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR AT HIS EXPENSE AT A PERMITTED SITE, UNLESS SPECIFIED OTHERWISE.
   - 4.2. ALL WASTE AND DEBRIS TO BE REMOVED, SUCH AS SIDEWALKS, CURBS, PAVEMENT, ETC., MUST BE REMOVED AND DISPOSED OF AT A PERMITTED SITE AT EXPENSE TO THE CONTRACTOR.
   - 4.3. ABANDONED UTILITIES SUCH AS CULVERTS, WATER PIPE, HYDRANTS, CASTINGS, PIPE APPURTENANCES, UTILITY POLES, ETC., SHALL BE THE PROPERTY OF THE SPECIFIC UTILITY AGENCY, OR COMPANY HAVING JURISDICTION. BEFORE THE CONTRACTOR CAN REMOVE, DESTROY, SALVAGE, REUSE, SELL OR STORE FOR HIS OWN USE ANY ABANDONED UTILITY, HE MUST PRESENT TO THE OWNER WRITTEN PERMISSION FROM THE UTILITY INVOLVED.
   - 4.4. ON SITE BURNING IS PROHIBITED.

5. THE CONTRACTOR SHALL CONTROL ALL "DUST" BY PERIODIC WATERING AND SHALL PROVIDE ACCESS AT ALL TIMES FOR PROPERTY OWNERS WITHIN THE PROJECT AREA AND FOR EMERGENCY VEHICLES. ALL OPEN DITCHES AND HAZARDOUS AREAS SHALL BE CLEARLY MARKED IN ACCORDANCE WITH APPLICABLE LAWS AND THE SPECIFICATIONS.

6. ALL UPLAND AREAS WHERE THERE IS EXPOSED DIRT SHALL BE SEEDED, FERTILIZED AND MULCHED ACCORDING TO THE SPECIFICATIONS. THE FINISHED SURFACE SHALL BE TO GRADE AND SMOOTH, FREE OF ALL ROCKS LARGER THAN 3", EQUIPMENT TRACKS, DIRT CLODS, BUMPS, RIDGES AND GOUGES PRIOR TO SEEDING; THE SURFACE SHALL BE LOOSENED TO A DEPTH OF ±4"-6" TO ACCEPT SEED. THE CONTRACTOR SHALL NOT PROCEED WITH SEEDING OPERATIONS WITHOUT FIRST OBTAINING THE ENGINEER'S APPROVAL OF THE GRADED SURFACE. ALL SEEDING SHALL BE PERFORMED BY A MECHANICAL "HYDRO-SEEDER". HAND SEEDING SHALL BE AUTHORIZED ON AN AREA BY AREA APPROVAL BY THE ENGINEER.

7. CONTRACTOR MAY RELOCATE CONCRETE WASHOUT AS NEEDED WITHIN THE LIMITS OF DISTURBANCE, BUT PLACEMENT MUST COMPLY WITH THE RESTRICTIONS AS NOTED IN THE NCG01 PERMIT.

8. SILT FENCE OUTLETS ARE TO BE PLACED AT THE LOW POINT AND AT 150' INTERVALS AT A MINIMUM, INCLUDE MORE SILT FENCE OUTLETS AS NECESSARY TO ALLOW DRAINAGE AND PREVENT EROSION AND SEDIMENT LOSS.

9. ALL STOCKPILING/STAGING, DEMOLITION, AND CONSTRUCTION SHALL BE PREFORMED WITHIN THE LIMITS OF DISTURBANCE.

10. ALL CONCRETE WASHOUTS AND STOCKPILES, WHEN REQUIRED, SHALL BE A MINIMUM OF 50' AWAY FROM ALL STORM DRAIN INLETS, TEMPORARY DIVERSIONS, CHANNELS, AND ANY SURFACE WATER BODIES.

11. CONTRACTOR SHALL INSTALL SLOPE DRAINS AS NEEDED TO PREVENT EROSION ON THE UPSTREAM AND DOWNSTREAM DAM FACES. INSTALLATION OF SLOPE DRAINS ALSO INCLUDE ALL GRADING NECESSARY GRADING TO CONVEY STORMWATER TO AND FROM SLOPE DRAINS TO ENSURE POSITIVE DRAINAGE; AND RIP RAP OUTLET PROTECTION.

EROSION CONTROL MAINTENANCE PLAN

1. ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CHECKED FOR STABILITY AND OPERATION FOLLOWING EVERY RUNOFF PRODUCING RAINFALL BUT IN NO CASE NOT LESS THAN ONCE EVERY WEEK. ANY NEEDED REPAIRS SHALL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED.
2. SEDIMENT SHALL BE REMOVED FROM BEHIND THE SILT FENCE WHEN IT BECOMES APPROX. 0.5 FEET DEEP AT THE SILT FENCE. THE SILT FENCE SHALL BE REPAIRED AS NECESSARY TO MAINTAIN A BARRIER.
3. ALL SEEDED AREA SHALL BE FERTILIZED, RESEED AS NECESSARY, AND MULCHED ACCORDING TO SPECIFICATIONS IN THE SEEDING SPECIFICATION TO MAINTAIN A VIGOROUS AND DENSE VEGETATIVE COVER.
4. MAINTAIN ALL MATTING THAT HAS BEEN PLACED ON SLOPES AND IN DITCHES. CHECK FOR GOOD GROUND CONTACT AND FOR THE OCCURRENCE OF ANY EROSION UNDER THE MATTING. MONITOR AND REPAIR OR REPLACE AS NECESSARY.
5. THE CONTRACTOR SHALL MAINTAIN SELF INSPECTION REPORTS AS REQUIRED BY NCDEQ AND THE NPDES CONSTRUCTION STORMWATER PERMIT. SELF INSPECTIONS ARE TO BE CONDUCTED AFTER EACH PHASE OF THE PROJECT FOR THE RECORD OF THE INSTALLATION AND MAINTENANCE OF THE EROSION CONTROL MEASURERS.

NORTH CAROLINA LAND QUALITY SECTION EROSION CONTROL NOTES

GENERAL: ALL EROSION CONTROL MEASURES ARE TO BE PERFORMED IN STRICT ACCORDANCE WITH REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY (NCDEQ), DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES (DEMLR), LAND QUALITY SECTION. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE COMPLIED WITH FOR ALL WORK.

1. PRIOR TO BEGINNING WORK ON THE PROJECT THE CONTRACTOR SHALL OBTAIN FROM THE OWNER A COPY OF THE "EROSION AND SEDIMENT CONTROL APPROVAL" FROM THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY (NCDEQ) DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES (DEMLR), DIVISION OF LAND QUALITY, OR THE LOCAL AUTHORIZED PROGRAM. THE APPROVAL NOTICE MUST BE AVAILABLE ON-SITE DURING ALL GRADING AND CONSTRUCTION ACTIVITIES.

2. INSTALL ALL EROSION CONTROL MEASURES AS REQUIRED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES, LAND QUALITY SECTION.

   NOTE: ALL UTILITY INSTALLATION WITHIN 25' OF A RIVER OR STREAM BANK SHALL BE INSTALLED PER STREAM PROTECTION DURING EXCAVATION DETAIL. NATIVE SEEDING AND MULCHING SHALL BE COMPLETED DAILY IN AREAS NOTED AS STREAM PROTECTION AREAS. SILT FENCE IN THESE AREAS SHALL NOT BE INSTALLED CLOSER THAN 5' FROM CREEK BANK UNLESS FIELD CONDITIONS PREVENT SUFFICIENT CLEARANCE. ALL SILT FENCES SHALL BE INSPECTED AND CLEANED AS NEEDED AFTER EACH RAIN.

3. OBTAIN CERTIFICATE OF COMPLIANCE THROUGH ON-SITE INSPECTION BY A REPRESENTATIVE OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES, LAND QUALITY SECTION.

4. PROCEED WITH GRADING, CLEARING AND GRUBBING. WASTES AND DEBRIS SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR AT HIS EXPENSE AT A PERMITTED SITE, UNLESS SPECIFIED OTHERWISE.

5. SEED AND PLACE EROSION CONTROL MATTING ON ALL UPLAND CUT AND FILL SLOPES THAT ARE NOT ROCK IMMEDIATELY UPON COMPLETION OF SLOPE STABILIZATION.

6. ALL TEMPORARY STREAM AND CREEK CROSSINGS FOR EQUIPMENT DURING CONSTRUCTION SHALL BE MADE USING TEMPORARY BRIDGES. NO STREAM BANK OR STREAM BED DISTURBANCE SHALL BE ALLOWED FOR EQUIPMENT CROSSINGS.

7. SEED AND MULCH DENUDED AREA WITHIN TIME FRAME SPECIFIED (SEE TABLE). SEED AND SOIL AMENDMENTS SHALL BE PLACED ON A PREPARED SEEDBED AT THE FOLLOWING RATES PER ACRE. STRAW MULCH SHALL BE TACKED WITH TACKING AGENT APPLIED BY HYDROSEEDER.

LIME	4,000 LBS
FERTILIZER (10-10-10)	1,000 LBS
KY-31 FESCUE (POA PRATENSIS)	100 LBS (MOWED AND MAINTAINED AREAS ONLY)
OR	
CREEPING RED FESCUE	100 LBS (NATURAL AREAS AND STREAMBANKS)
STRAW MULCH	60-80 BALES
FOR SUMMER SEEDING ADD TO THE ABOVE:	
GERMAN MILLET (SETARIA ITALICA)	40 LBS
SMALL-STEMMED SUDAN GRASS (SORGHUM BICOLOR)	50 LBS
FOR WINTER SEEDING ADD TO THE ABOVE:	
RYE GRAIN (SECALE CEREALE)	120 LBS

IF HYDROSEEDING, WOOD CELLULOSE MAY BE USED IN ADDITION TO STRAW MULCH AT THE RATE OF 1,000 LBS PER ACRE.

ALL SEEDING SHALL BE MAINTAINED, WATERED ETC.., UNTIL A PERMANENT VEGETATIVE GROUND COVER IS ESTABLISHED OVER ALL DISTURBED AREAS. FOR ALL SLOPES 2:1 OR STEEPER ADD TO THE ABOVE:

PURGE LIVE SEED SWITCHGRASS	4 LBS
BROWNTOP MILLET OR PEARL MILLET (PENNISETUM GLAUCUM)	8 LBS
GRAIN SORGHUM (SORGHUM BICOLOR (L.) MOENCH SSP. BICOLOR)	2 LBS

ALL SLOPES 2:1 OR STEEPER SHALL BE COVERED BY EROSION CONTROL MATTING.

NATIVE SEEDING

THE CORRECT SEEDBED PH IS 5.5 TO 6.5.

APPLY ZERO NITROGEN AT PLANTING.

INCORPORATE SOIL AMENDMENTS INTO TOPSOIL/ROOT ZONE BEFORE SEEDING.

FIRM SEEDBED BEFORE SEEDING (TRAVEL WITH DOZER CLEATS).

SEEDING DEPTH FOR ALL NATIVE SSP. EXCEPT E.GAMAGRASS (TRIPSACUM DACTYLOIDES) NEED TO BE 1/4" - 1/2". GREATER DEPTHS CAUSE HIGH SEED MORTALITY.

SPECIALIZED SEEDING IMPLEMENTS ARE REQUIRED. SEED MIXES AND RATES TO MATCH SEEDER USED. A NO-TILL, DROP SEEDER OR BROADCASTER WITH PRECISION METERING TO CONTROL SMALL SEED FLOW AND PICKER WHEEL AGITATORS TO HANDLE FLUFFY SEED ARE BEST SUITED FOR NATIVE SEED.

NATIVE PLANT SEEDING MX FOR WETLAND, STREAM, OR RIVERBANK STABILIZATION

1. SEEDING FOR STREAM OR RIVERBANK STABILIZATION SHALL BE A MIXTURE OF NATIVE GRASSES, PLANTS, AND TREES. NATIVE PLANT MIX SHALL INCLUDE THE FOLLOWING:

GRASSES - BIG BLUESTEM (ANDROPOGON GERARDII), INDIAN GRASS (SORGHASTRUM NUTANS), LITTLE BLUESTEM (SCHIZACHYRIUM SCOPARIUM), SWITCHGRASS (PANICUM VIRGATUM).	15 LBS/ACRE EACH
AUGUST THRU MAY - GREENRYE (SECALE CEREALE)	25 LBS/ACRE EACH
MAY 1 THRU AUGUST - MILLET (PENNISETUM GLAUCUM)	25 LBS/ACRE EACH

2. TREES - SILKY DOGWOOD (CORNUS AMOMUM), SILKY WILLOW (SALIX SERICEA), HAZEL ALDER (ALNUS SERRULATA) AND ELDERBERRY (SAMBUUS CANADENSIS)
3. NATIVE PLANT MIX VARIATIONS SHALL BE APPROVED BY ENGINEER. NO FERTILIZER SHALL BE USED WITHIN 10' OF TOP OF STREAM OR RIVER BANK.
4. MAINTAIN SOIL EROSION CONTROL MEASURES UNTIL PERMANENT GROUND COVER IS ESTABLISHED. USE FULLY BIODEGRADABLE MATTING.
5. REQUEST FINAL APPROVAL BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF ENERGY, MINERAL, AND LAND RESOURCES, LAND QUALITY SECTION.
6. REMOVE SOIL EROSION CONTROL MEASURES AND STABILIZE THESE AREAS.

TEMPORARY SEEDING SPECIFICATION

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
RYE (GRAIN)	120

SEEDING DATES: AUG 15 TO DEC 30

SOIL AMENDMENTS: FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2000 LB/AC GROUND AGRICULTURAL LIMESTONE AND, 750 LB/AC 10-10-10 FERTILIZER.

MULCH: APPLY 4000LB/AC STRAW. ANCHOR STRAW BY TACKING W/ ASPHALT, NETTING, OR A MULCH ANCHORING TOOL. A DISK W/ BLADES SER NEARLY STRAIGHT CAN BE USED AS A MULCH ANCHORING TOOL.

MAINTENANCE: RE-FERTILIZE IF GROWTH IS NOT FULLY ADEQUATE, RE-SEED, RE-FERTILIZE AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

CUT/FILL SLOPES SEEDING SPECIFICATIONS - STEEPER THAN 3:1

SEEDING MIXTURE:

SPECIES	RATE (LB/ACRE)
TALL FESCUE	100
SWITCHGRASS AND PARTRIDGE PEA MIX	30

NURSE PLANTS: BETWEEN MAY 1 AND AUG 15, ADD 10LB/AC GERMAN MILLET OR 15 LB/AC SUDANGRASS. PRIOR TO MAY 1 OR AFTER AUG 15, ADD 40 LB/AC RYE (GRAIN). IT MAY BE BENEFICIAL TO PLANT THE GRASSES IN LATE SUMMER.

SEEDING DATES:

BEST	POSSIBLE
AUG 25 - SEPT 15	AUG 20 - OCT 25
FEB 15 - MAR 20	FEB 1 - APRIL 15

SOIL AMENDMENTS: APPLY LIME AND FERTILIZER ACCORDING TO SOIL TEST, OR APPLY 4000 LB/AC GROUND AGRICULTURAL LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER.

MULCH: APPLY 4000 LB/AC GRAIN STRAW OR EQUIVALENT COVER OF ANOTHER SUITABLE MULCHING MATERIAL, ANCHOR MULCH BY TACKING W/ ASPHALT, ROVING OR NETTING, NETTING IS THE PREFERRED ANCHORING METHOD ON STEEP SLOPES.

MAINTENANCE: MOW NO MORE THAN ONCE A YEAR, RE-FERTILIZE IN THE SECOND YEAR UNLESS GROWTH IS FULLY ADEQUATE. RE-SEED, RE-FERTILIZE, RE-MULCH DAMAGED AREAS IMMEDIATELY.

DITCH/OPEN AREA PERMANENT SEEDING SPECIFICATION

SEEDING MIXTURE:

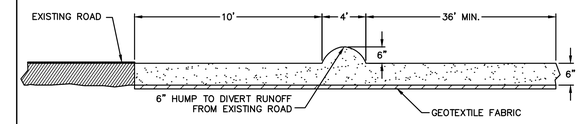
SPECIES	RATE (LB/AC)
TALL FESCUE	250 (6 LB/1000 SQ FT)

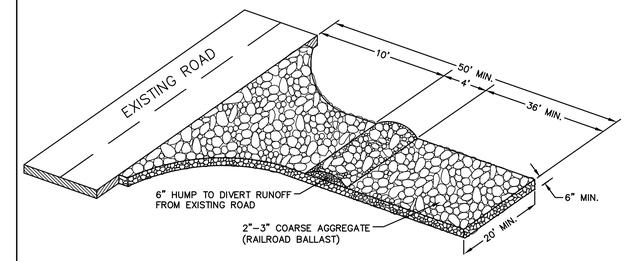
NURSE PLANTS: BETWEEN MAY 1 AND AUG 15, ADD 10 LB/AC GERMAN MILLET OR 15 LB/AC SUDANGRASS. PRIOR TO MAY 1 OR AFTER AUG 15, ADD 40 LB/AC RYE (GRAIN).

SOIL AMENDMENTS: APPLY LIME AND FERTILIZE ACCORDING TO SOIL TEST, OR APPLY 4000 LB/AC GROUND AGRICULTURAL LIMESTONE AND 750 LB/AC 10-10-10 FERTILIZER.

MULCH: USE CHANNEL LINING MATERIAL TO COVER THE BOTTOM OF DITCHES. THE LINING SHOULD EXTEND ABOVE THE HIGHEST CALCULATED DEPTH OF FLOW. ON CHANNEL SIDE SLOPES ABOVE THE HEIGHT, AND IN DRAINAGES NOT REQUIRING TEMPORARY LININGS, APPLY 4000 LB/AC GRAIN STRAW AND ANCHOR STRAW BY STAPLING NETTING OVER THE TOP. MULCH AND ANCHORING MATERIALS MUST NOT BE ALLOWED TO WASH DOWN SLOPE WHERE THEY CAN CLOG DRAINAGE DEVICES.

MAINTENANCE: INSPECT AND REPAIR MULCH FREQUENTLY. RE-FERTILIZE IN LATE WINTER ACCORDING TO SOIL TESTS OR APPLY 150 LB/AC 10-10-10 FERTILIZER (3 LB/1000 SQ FT). MOW REGULARLY TO A HEIGHT OF 2" TO 4".





NOTES:

1. A STABILIZED PAD OF CRUSHED STONE SHALL BE LOCATED WHERE TRAFFIC WILL BE ENTERING OR LEAVING A CONSTRUCTION SITE TO OR FROM AN EXISTING ROAD.
2. STONE TO BE 2 – 3 INCH WASHED STONE RAILROAD BALLAST.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
4. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC STREETS MUST BE REMOVED IMMEDIATELY.
5. WHEN NECESSARY WHEELS MUST BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTERING A PUBLIC STREET, WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN.
6. REFERENCE NCDENR LAND QUALITY SECTION DESIGN MANUAL: 6.06.

CONSTRUCTION SPECIFICATIONS:

1. CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AND PROPERLY GRADE IT.
2. PLACE THE GRAVEL TO THE SPECIFIC GRADE AND DIMENSIONS SHOWN ON THE PLANS, AND SMOOTH IT.
3. PROVIDE DRAINAGE TO CARRY WATER TO A SEDIMENT TRAP OR OTHER SUITABLE OUTLET.
4. USE GEOTEXTILE FABRICS BECAUSE THEY IMPROVE STABILITY OF THE FOUNDATION IN LOCATIONS SUBJECT TO SEEPAGE OR HIGH WATER TABLE.

MAINTENANCE:

MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOPDRESSING WITH 2-INCH STONE. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ONTO PUBLIC ROADWAYS.

EC 1 TEMPORARY CONSTRUCTION ENTRANCE

NOT TO SCALE

GROUND STABILIZATION TABLE

SITE AREA DESCRIPTION	STABILIZATION TIME FRAME	STABILIZATION TIME FRAME EXCEPTIONS
PERIMETER DIKES, SWALES, DITCHES, AND SLOPES	7 DAYS	NONE
HIGH QUALITY WATER (HQW) ZONES	7 DAYS	NONE
SLOPES STEEPER THAN 3:1	7 DAYS	IF SLOPES ARE 10' OR LESS IN LENGTH AND ARE NOT STEEPER THAN 2:1, 14 DAYS ARE ALLOWED
SLOPES 3:1 OR FLATTER	14 DAYS	7-DAYS FOR SLOPES GREATER THAN 50 FEET IN LENGTH
ALL OTHER AREAS WITH SLOPES FLATTER THAN 4:1	14 DAYS	NONE (EXPCEPT FOR PERIMETERS AND HQW ZONES)

*EXTENSIONS OF TIME MAY BE APPROVED BY THE PERMITTING AUTHORITY BASED ON WEATHER OR SITE-SPECIFIC CONDITIONS THAT MAKE COMPLIANCE IMPRACTICABLE" (NCG01 – SECTION II.B(2)(b))

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON
Jan 14, 2021

Schnabel ENGINEERING
LICENSE NUMBER C-2599
SCHNABEL ENGINEERING SOUTH, PC
11A Oak Branch Drive / Greensboro, NC / 27407
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

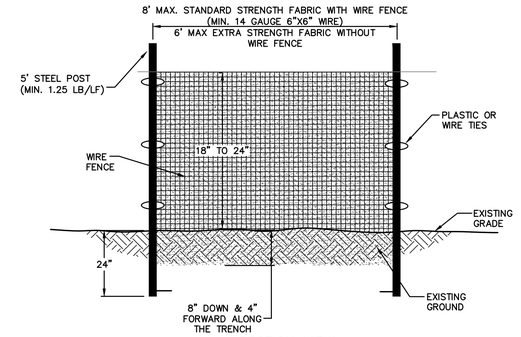
BRUNSWICK COUNTY, NORTH CAROLINA

AS NOTED

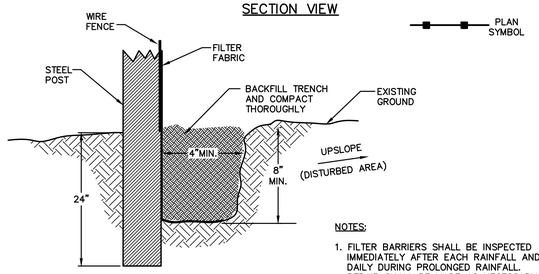
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

EROSION AND SEDIMENTATION CONTROL DETAILS 1 OF 5

SHEET G-10



SECTION VIEW



SLOPE	SLOPE LENGTH(FT)	MAXIMUM AREA(SQFT)
<2%	100	10,000
2 TO 5%	75	7,500
5 TO 10%	50	5,000
10 TO 20%	25	2,500
>20%	15	1,500

NOTES:

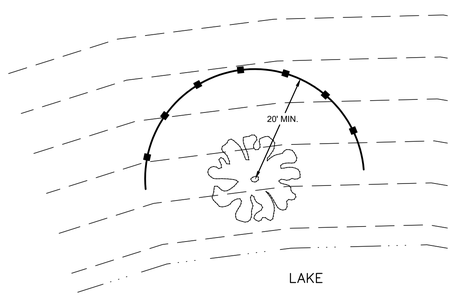
1. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND DAILY DURING PROLONGED RAINFALL. REPAIR SHALL BE MADE AS NECESSARY.
2. FABRIC SHALL BE REPLACED PROMPTLY IF FOUND TO BE IN DISREPAIR.
3. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT AND WHEN DEPOSITS REACH APPROXIMATELY 1/3 HEIGHT OF BARRIER.
4. REFERENCE NCDEQ LAND QUALITY SECTION DESIGN MANUAL: 6.62.

MAINTENANCE:

1. INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT.
4. REMOVE ALL FENCING MATERIALS UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

EC 2 SILT FENCE

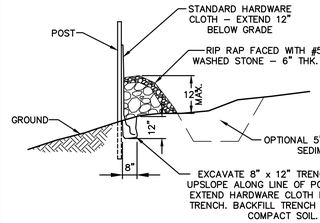
NOT TO SCALE



SILT FENCE LOCATION AT TREES TO BE REMOVED. 1/2 CIRCLE SILT FENCE SHALL BE INSTALLED 20' AWAY FROM TREE STARTING EACH END AT SAME GROUND ELEVATION AS TREE BASE ELEVATION.

EC 3 SILT FENCE PLACEMENT - TREE DETAIL

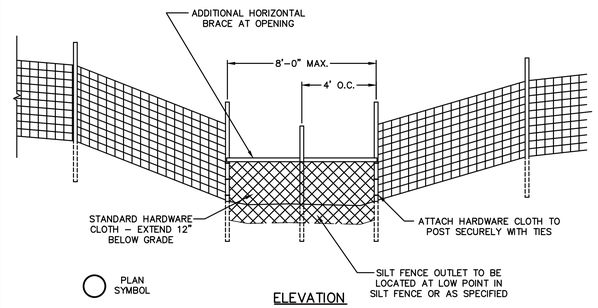
NOT TO SCALE



NOTES:

1. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND DAILY DURING PROLONGED RAINFALL. REPAIR SHALL BE MADE AS NECESSARY.
2. FABRIC SHALL BE REPLACED PROMPTLY IF FOUND TO BE IN DISREPAIR.
3. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT AND WHEN DEPOSITS REACH APPROXIMATELY 1/3 HEIGHT OF BARRIER.
4. SILT FENCE OUTLETS SHALL BE LOCATED AT LOW POINTS IN CONTINUOUS RUNS OF SILT FENCE.

SECTION



ELEVATION

EC 4 SILT FENCE OUTLET

NOT TO SCALE

DESCRIPTION

THIS WORK CONSISTS OF FURNISHING A FLOATING TURBIDITY CURTAIN TO DETER SILT SUSPENSION AND MOVEMENT OF SILT PARTICLES DURING CONSTRUCTION. THE FLOATING TURBIDITY CURTAIN SHALL BE CONSTRUCTED AT LOCATIONS AS DIRECTED.

MATERIALS

THE CURTAIN MATERIAL SHALL BE MADE OF A TIGHTLY WOVEN NYLON, PLASTIC OR OTHER NONDETERIORATING MATERIAL MEETING THE FOLLOWING SPECIFICATIONS:

PROPERTY	VALUE
GRAB TENSILE STRENGTH	*MD–370 LBS *CD–250 LBS
MULLEN BURST STENGTH	480 PSI
TRAPEZOID TEAR STRENGTH	*MD–100 LBS *CD–60 LBS
APPARENT OPENING SIZE	70 US STANDARD SIEVE
PERCENT OPEN AREA	4% PERMITTIVITY 0.28 SEC–1

*MD – MACHINE DIRECTION
*CD – CROSS MACHINE DIRECTION

IN THE EVENT THAT MORE THAN ONE WIDTH OF FABRIC IS REQUIRED, A 6" OVERLAP OF THE MATERIAL SHALL ALSO BE REQUIRED.

THE CURTAIN MATERIAL SHALL BE SUPPORTED BY A FLOTATION MATERIAL HAVING OVER 29 LBS/FT BUOYANCY. THE FLOATING CURTAIN SHALL HAVE A 5/16" GALVANIZED CHAIN AS BALLAST AND DUAL 5/16" GALVANIZED WIRE ROPES WITH A HEAVY VINYL COATING AS LOAD LINES.

CONSTRUCTION METHODS

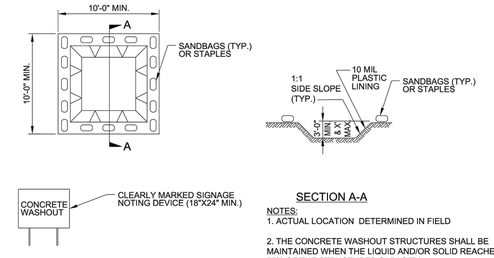
THE CONTRACTOR SHALL MAINTAIN THE FLOATING TURBIDITY CURTAIN IN A SATISFACTORY CONDITION UNTIL ITS REMOVAL IS REQUESTED BY THE ENGINEER. THE CURTAIN SHALL EXTEND TO THE BOTTOM OF THE JURISDICTIONAL RESOURCE. ANCHOR THE CURTAIN ACCORDING TO MANUFACTURER RECOMMENDATIONS.

MAINTENANCE:

1. INSPECT TURBIDITY BARRIER AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. ANCHORS, ANCHOR LINES AND BUOYS MUST BE REGULARLY CHECKED FOR DEBRIS.
3. IF REPAIRS TO THE FABRIC BECOME NECESSARY, REPAIR KITS ARE TYPICALLY AVAILABLE FROM THE MANUFACTURER. FOLLOW THE MANUFACTURER'S INSTRUCTIONS TO ENSURE THE ADEQUACY OF THE REPAIR.
4. TURBIDITY CURTAIN SHOULD NOT BE LEFT IN THE WATER OVER WINTER IN AREAS THAT ARE SUBJECT TO ICE FORMATION. IT SHOULD ALSO BE REMOVED BEFORE SEVERE STORMS.

EC 5 FLOATING TURBIDITY CURTAIN

NOT TO SCALE



PLAN

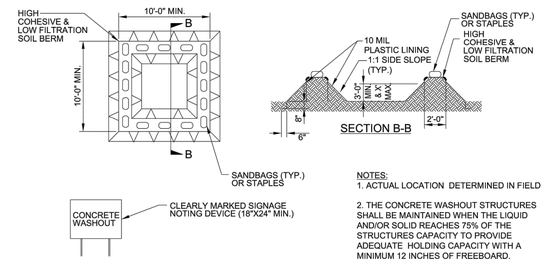
SECTION A-A

NOTES:

1. ACTUAL LOCATION DETERMINED IN FIELD
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY.
3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

BELOW GRADE WASHOUT STRUCTURE

NOT TO SCALE



PLAN

NOTES:

1. ACTUAL LOCATION DETERMINED IN FIELD
2. THE CONCRETE WASHOUT STRUCTURES SHALL BE MAINTAINED WHEN THE LIQUID AND/OR SOLID REACHES 75% OF THE STRUCTURES CAPACITY TO PROVIDE ADEQUATE HOLDING CAPACITY WITH A MINIMUM 12 INCHES OF FREEBOARD.
3. CONCRETE WASHOUT STRUCTURE NEEDS TO BE CLEARY MARKED WITH SIGNAGE NOTING DEVICE.

ABOVE GRADE WASHOUT STRUCTURE

NOT TO SCALE

DESCRIPTION

CONCRETE WASHOUT STRUCTURES ARE ENCLOSURES ABOVE OR BELOW GRADE TO CONTAIN CONCRETE WASTE WATER AND ASSOCIATED CONCRETE MIX FROM WASHING OUT READY–MIX TRUCKS, DRUMS, PUMPS, OR OTHER EQUIPMENT. CONCRETE WASHOUTS MUST COLLECT AND RETAIN ALL THE CONCRETE WASHOUT WATER AND SOLIDS, SO THAT THIS MATERIAL DOES NOT MIGRATE TO SURFACE WATERS OR INTO THE GROUND WATER. THESE ENCLOSURES ARE NOT INTENDED FOR CONCRETE WASTE NOT ASSOCIATED WITH WASH OUT OPERATIONS.

THE CONCRETE WASHOUT STRUCTURE MAY INCLUDE CONSTRUCTED DEVICES ABOVE OR BELOW GROUND AND OR COMMERCIALLY AVAILABLE DEVICES DESIGNED SPECIFICALLY TO CAPTURE CONCRETE WASH WATER.

MATERIALS

GEOMEMBRANE BASIN LINER SHALL MEET THE FOLLOWING MINIMUM PHYSICAL PROPERTIES FOR LOW PERMEABILITY; IT SHALL CONSIST OF A POLYPROPYLENE OR POLYETHYLENE 10 MIL THINK GEOMEMBRANE. IF THE MINIMUM SETBACK DIMENSIONS CAN BE ACHIEVED THE LINER IS NOT REQUIRED. (5 FEET ABOVE GROUNDWATER, 50 FEET FROM TOP OF BANK OF PERENNIAL STREAM, OTHER SURFACE WATER BODY, OR WETLAND.)

CONSTRUCTION METHODS

BUILD AN ENCLOSED EARTHEN BERM OR EXCAVATE TO FORM AN ENCLOSURE IN ACCORDANCE WITH THE DETAILS AND AS DIRECTED.

INSTALL TEMPORARY SILT FENCE AROUND THE PERIMETER OF THE ENCLOSURE IN ACCORDANCE WITH THE DETAILS AND AS DIRECTED IF STRUCTURE IS NOT LOCATED IN AN AREA WHERE EXISTING EROSION AND SEDIMENTATION CONTROL DEVICES ARE CAPABLE TO CONTAINING ANY LOSS OF SEDIMENT.

POST A SIGN WITH THE WORDS "CONCRETE WASHOUT" IN CLOSE PROXIMITY OF THE CONCRETE WASHOUT AREA, SO IT IS CLEARLY VISIBLE TO SITE PERSONNEL. INSTALL SAFETY FENCE AS DIRECTED FOR VISIBILITY TO CONSTRUCTION TRAFFIC.

ALTERNATE DETAILS FOR ACCOMMODATING CONCRETE WASHOUT MAY BE SUBMITTED FOR REVIEW AND APPROVAL.

THE ALTERNATE DETAILS SHALL INCLUDE THE METHOD USED TO RETAIN AND DISPOSE OF THE CONCRETE WASTE WATER WITHIN THE PROJECT LIMITS AND IN ACCORDANCE WITH THE MINIMUM SETBACK REQUIREMENTS. (5 FEET ABOVE GROUNDWATER, 50 FEET FROM TOP OF BANK OF PERENNIAL STREAM, OTHER SURFACE WATER BODY, OR WETLAND.)

MAINTENANCE AND REMOVAL

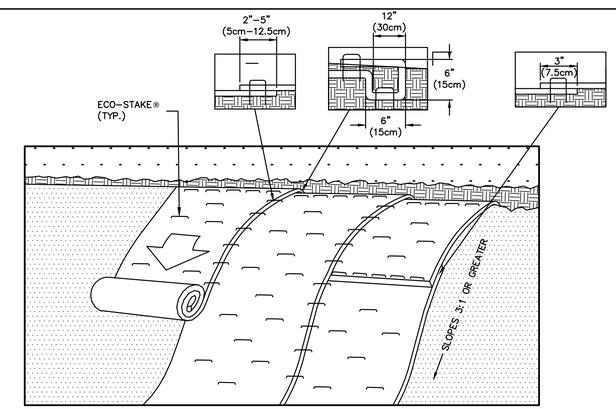
MAINTAIN THE CONCRETE WASHOUT STRUCTURE(S) TO PROVIDE ADEQUATE HOLDING CAPACITY PLUS A MINIMUM FREEBOARD OF 12 INCHES. REMOVE AND DISPOSE OF HARDENED CONCRETE AND RETURN THE STRUCTURE TO A FUNCTIONAL CONDITION AFTER REACHING 75% CAPACITY.

INSPECT CONCRETE WASHOUT STRUCTURES FOR DAMAGE AND MAINTAIN FOR EFFECTIVENESS.

REMOVE THE CONCRETE WASHOUT STRUCTURES AND SIGN UPON PROJECT COMPLETION. GRADE THE EARTH MATERIAL TO MATCH THE EXISTING CONTOURS AND PERMANENTLY SEED AND MULCH AREA.

EC 6 CONCRETE WASHOUT STRUCTURE

NOT TO SCALE



NOTES:

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP'S), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECP'S IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECP'S EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP'S WITH A ROW OF STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECP'S BACK OVER SEED AND COMPACTED SOIL. SECURE RECP'S OVER COMPACTED SOIL WITH A ROW OF STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE RECP'S.
3. ROLL THE RECP'S DOWN OR HORIZONTALLY ACROSS THE SLOPE. RECP'S WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP'S MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING AND SPACING STAKES IN APPROPRIATE LOCATIONS PER MANUFACTURER RECOMMENDATIONS.
4. THE EDGES OF PARALLEL RECP'S MUST BE STAKED WITH APPROXIMATELY 2"–5" OVERLAP DEPENDING ON RECP'S TYPE.
5. CONSECUTIVE RECP'S SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAKE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE RECP'S WIDTH.
6. IN LOOSE SOIL CONDITIONS, THE USE OF STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY SECURE THE RECP'S.
7. INSTALLATION OF MATTING SHALL CONFORM TO MANUFACTURER'S REQUIREMENTS.
8. SEE GRADING PLAN FOR LOCATIONS OF CUT AND FILL SLOPES 3:1 OR GREATER.
9. MATTING SHALL BE: US EROSION CONTROL PRODUCTS US–2SC NN OR APPROVED EQUAL. INSTALL ON ALL DISTURBED SLOPES (CHOSEN PRODUCT MUST BE RATED FOR SLOPES 3:1 OR GREATER).

MAINTENANCE REQUIREMENTS:

1. INSPECT ROLLED EROSION CONTROL PRODUCTS (RECP) AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAIN FALL EVENT REPAIR IMMEDIATELY.
2. GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED, AND EROSION MUST NOT OCCUR BENEATH THE RECP.
3. ANY AREAS OF THE RECP THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED.
4. IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED.
5. MONITOR AND REPAIR THE RECP AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED

EC 7 SLOPE MATTING INSTALLATION

NOT TO SCALE

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

AS NOTED

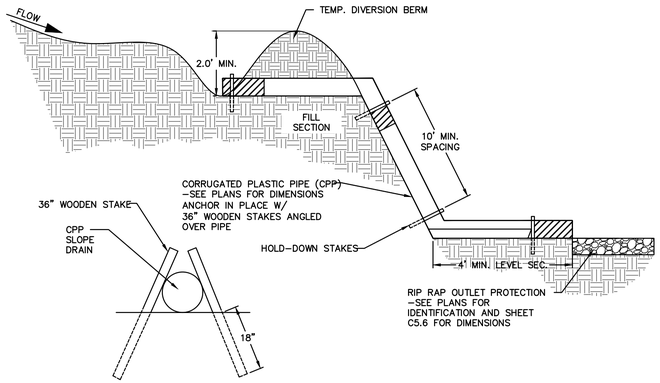
OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

EROSION AND SEDIMENTATION CONTROL DETAILS 2 OF 5

DATE	PROJECT #	FUNDING #
JANUARY, 2021	20.07036	N/A

SHEET

G-11



CONSTRUCTION NOTES:

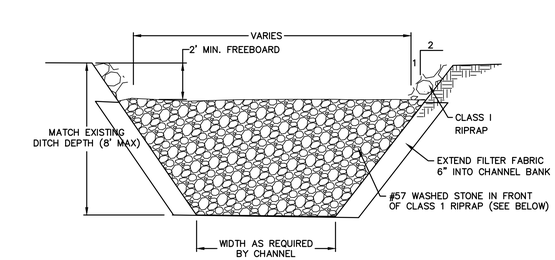
1. 1. PLACE SLOPE DRAINS ON UNDISTURBED SOIL OR WELL COMPACTED FILL AT LOCATIONS AND ELEVATIONS SHOWN ON THE PLAN.
2. SLIGHTLY SLOPE THE SECTION OF PIPE UNDER THE DIKE TOWARD ITS OUTLET.
3. HAND TAMP THE SOIL UNDER AND AROUND THE ENTRANCE SECTION IN LIFTS NOT TO EXCEED 6 INCHES.
4. ENSURE THAT FILL OVER THE DRAIN AT THE TOP OF THE SLOPE HAS MINIMUM DIMENSIONS OF 1.5 FEET DEPTH, 4 FEET TOP WIDTH, AND 3:1 SIDE SLOPES.
5. ENSURE THAT ALL SLOPE DRAIN CONNECTIONS ARE WATERTIGHT.
6. ENSURE THAT ALL FILL MATERIAL IS WELL–COMPACTED. SECURELY FASTEN THE EXPOSED SECTION OF THE DRAIN WITH GROMMETS OR STAKES SPACED NO MORE THAN 10 FEET APART.
7. EXTEND THE DRAIN BEYOND THE TOE OF THE SLOPE, AND ADEQUATELY PROTECT THE OUTLET FROM EROSION.
8. MAKE THE SETTLED, COMPACTED DIKE RIDGE NO LESS THAN 1 FEET ABOVE THE TOP OF THE PIPE AT EVERY POINT.
9. IMMEDIATELY STABILIZE ALL DISTURBED AREAS FOLLOWING CONSTRUCTION.

MAINTENANCE REQUIREMENTS:

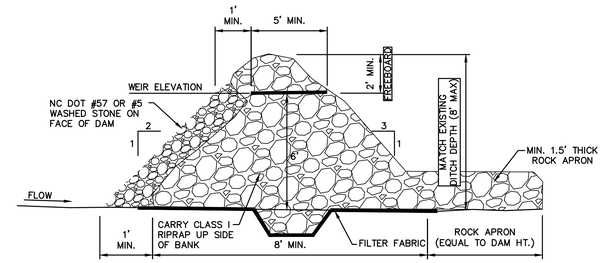
1. INSPECT THE SLOPE DRAIN AND SUPPORTING DIVERSION AFTER EVERY RAINFALL, AND PROMPTLY MAKE NECESSARY REPAIRS. WHEN THE PROTECTED AREA HAS BEEN PERMANENTLY STABILIZED, TEMPORARY MEASURES MAY BE REMOVED, MATERIALS DISPOSED OF PROPERLY, AND ALL DISTURBED AREAS STABILIZED APPROPRIATELY.

EC 8 TEMPORARY SLOPE DRAIN

NOT TO SCALE



FACE VIEW



SIDE VIEW

CONSTRUCTION NOTES

1. CLEAR THE AREAS UNDER THE EMBANKMENT AND STRIP OF ROOTS AND OTHER OBJECTIONABLE MATERIAL. DELAY CLEANING THE RESERVOIR AREA UNTIL THE DAM IS IN PLACE.
2. COVER THE FOUNDATION AREA INCLUDING THE ABUTMENTS WITH EXTRA–STRENGTH FILTER FABRIC BEFORE BACKFILLING WITH ROCK. IF A CUTOFF TRENCH IS REQUIRED, EXCAVATE AT CENTER LINE OF DAM, EXTENDING ALL THE WAY UP TO THE EARTH ABUTMENTS. APPLY FILTER FABRIC UNDER THE ROCKFILL EMBANKMENT FROM THE UPSTREAM EDGE OF THE DAM TO THE DOWNSTREAM EDGE OF THE APRON. OVERLAP FILL MATERIAL A MINIMUM OF 1 FOOT AT ALL JOINTS, WITH THE UPSTREAM STRIP LAID OVER THE DOWNSTREAM STRIP.
3. CONSTRUCT THE EMBANKMENT WITH WELL–GRADED ROCK AND GRAVEL TO THE SIZE AND DIMENSIONS ON THE DRAWING. IT IS IMPORTANT THAT ROCK ABUTMENTS BE AL LEAST 2 FEET HIGHER THAN THE SPILLWAY CREST AND AT LEAST 1 FOOT HIGHER THAN THE DAM, ALL THE WAY TO THE DOWNSTREAM TOE, TO PREVENT SCOUR AND EROSION AT THE ABUTMENTS.
4. SEDIMENT–LADEN WATER FROM THE CONSTRUCTION SITE SHOULD BE DIVERTED INTO THE BASIN RESERVOIR AT THE FURTHEST AREA FROM THE DAM.
5. CONSTRUCT THE ROCK CHECK DAM BEFORE THE BASIN AREA IS CLEARED TO MINIMIZE SEDIMENT YIELD FROM CONSTRUCTION OF THE BASIN. IMMEDIATELY STABILIZE ALL AREAS DISTURBED DURING THE CONSTRUCTION OF THE DAM EXCEPT THE SEDIMENT POOL.

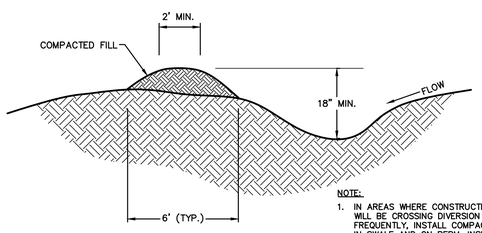
MAINTENANCE NOTES

1. CHECK SEDIMENT BASINS AFTER EACH RAINFALL EVENT. REMOVE SEDIMENT AND RESTORE ORIGINAL VOLUME WHEN SEDIMENT ACCUMULATED TO ABOUT ONE–HALD THE DESIGN VOLUME. SEDIMENT SHOULD BE PLAVED ABOVE THE BASIN AND ADEQUATELY STABILIZED.
2. CHECK THE STRUCTURE FOR EROSION, PIPING, AND ROCK DISPLACEMENT WEEKLY AND AFTER EACH SIGNIFICANT (½ INCH OR GREATER) RAINSTORM AND REPAIR IMMEDIATELY.
3. REMOVE THE STRUCTURE AND ANY UNSTABLE SEDIMENT IMMEDIATELY AFTER THE CONSTRUCTION SITE HAS BEEN PERMANENTLY STABILIZED. SMOOTH THE BASIN SITE TO BLEND WITH THE SURROUNDING AREA AND STABILIZE. ALL WATER AND SEDIMENT SHOULD BE REMOVED FROM THE BASIN PRIOR TO DAM REMOVAL. SEDIMENT SHOULD BE PLACED IN DESIGNATED DISPOSAL AREAS AND NOT ALLOWED TO FLOW INTO STREAMS OR DRAINAGE WAYS DURING STRUCTURE REMOVAL.

PLAN SYMBOL

EC 10 TEMPORARY ROCK CHECK DAM

NOT TO SCALE



NOTE:

1. IN AREAS WHERE CONSTRUCTION TRAFFIC WILL BE CROSSING DIVERSION BERM FREQUENTLY, INSTALL COMPACTED GRAVEL IN SWALE AND ON BERM. INSURE PROPER DRAINAGE THROUGHOUT THE DURATION OF THE PROJECT.

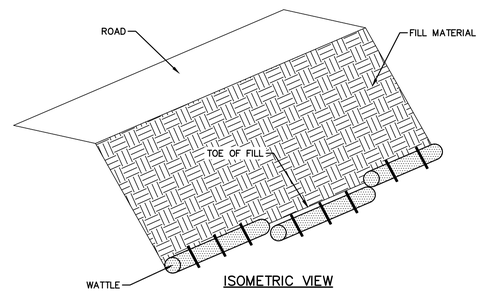
MAINTENANCE REQUIREMENTS:

1. INSPECT TEMPORARY DIVERSIONS ONCE A WEEK AND AFTER EVERY RAINFALL. IMMEDIATELY REMOVE SEDIMENT FROM THE FLOW AREA AND REPAIR THE DIVERSION RIDGE. CAREFULLY CHECK OUTLETS AND MAKE TIMELY REPAIRS AS NEEDED. WHEN THE AREA PROTECTED IS PERMANENTLY STABILIZED, REMOVE THE RIDGE AND CHANNEL TO BLEND WITH THE NATURAL GROUND LEVEL AND APPROPRIATELY STABILIZE IT.

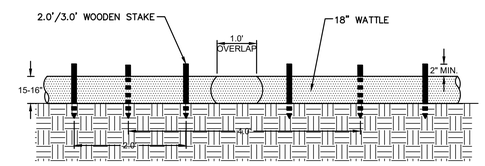
PLAN SYMBOL

EC 9 TEMPORARY DIVERSION BERM

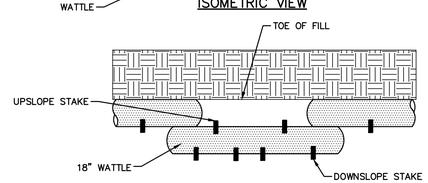
NOT TO SCALE



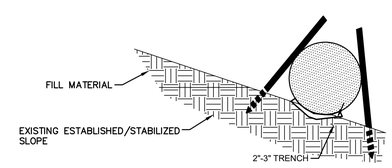
ISOMETRIC VIEW



SIDE VIEW



TOP VIEW



SECTION VIEW

CONSTRUCTION NOTES

1. USE EXCELSIOR WATTLE BARRIER WITH 18" DIA.
2. WATTLE BARRIERS USED TO REDUCE RUNOFF ALONG LARGE SLOPES SHOULD HAVE A MAXIMUM SPACING OF 20' MEASURED ALONG THE SLOPE.
   2.1. WHEN USED FOR BREAKS ALONG LARGE SLOPES, USE A MAXIMUM SPACING OF 25'.
3. USE 2'X2' WOODEN STAKES
   3.1. SHARPEN OR BEVEL ONE END OF THE STAKE TO FACILITATE DRIVING DOWN INTO SOIL.
   3.2. INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT AN ANGLE TO WEDGE WATTLE TO BOTTOM OF DITCH.
   3.3. DRIVE STAKES INTO THE GROUND A MINIMUM OF 10" WITH NO MORE THAN 2" PROJECTING FROM THE TOP OF THE WATTLE.
4. ALIGN WATTLE BARRIERS IN AN OVERLAPPING AND ALTERNATING PATTERN.
   4.1. OVERLAP ADJOINING SECTIONS OF WATTLES AT A MINIMUM OF 1'.
   4.2. EXCAVATE A TRENCH THE ENTIRE LENGTH OF EACH WATTLE WITH A DEPTH OF 2–3" FOR THE WATTLE TO BE PLACED IN.

MAINTENANCE NOTES

1. WATTLES SHOULD BE INSPECTED REGULARLY AND AFTER SIGNIFICANT RAINFALL TO CONFIRM FLOW OF WATER THROUGH THE WATTLES IS STILL POSSIBLE.
   1.1. SEDIMENT, DEBRIS, STRAW, AND OTHER ITEMS SHOULD BE REMOVED FROM WATTLE BARRIER, ESPECIALLY ON THE UPSLOPE SIDE.
   1.2. IF THE NATURAL FIBERS OF THE WATTLE BECOME TOO SATURATED WITH DEBRIS OR SEDIMENT, AND REMOVAL OF THE DEBRIS AND/OR SEDIMENT IS NOT POSSIBLE, WATTLE BARRIERS SHOULD BE REPLACED.
   1.3. STAKES SHOULD BE PROPERLY PLACED SO AS TO ANCHOR THE WATTLE BARRIER TO THE GROUND.

EC 11 SLOPE WATTLE BARRIER DETAIL

NOT TO SCALE

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

AS NOTED

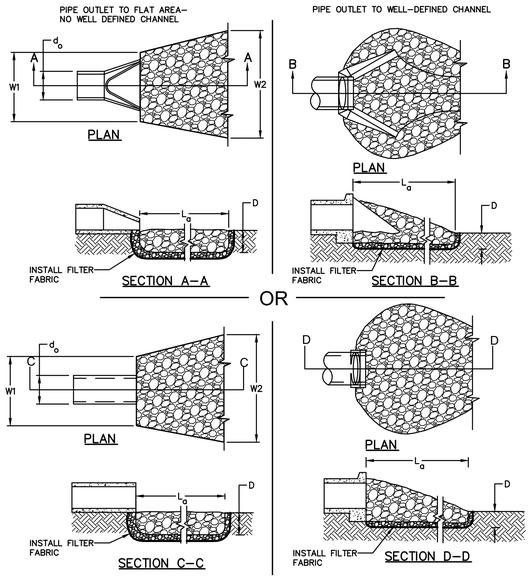
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

EROSION AND SEDIMENTATION CONTROL DETAILS 3 OF 5

SHEET G-12

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTION\RECONSTRUC\DRAWINGS\SHEETS\G-10 - 14 - EROSION AND SEDIMENTATION CONTROL DETAILS.DWG PLOT DATE 1/12/2021 3:12 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



NOTES

1. Lo IS THE LENGTH OF THE RIPRAP APRON
2. D= 1.5 TIMES THE MAXIMUM STONE DIAMETER BUT NOT LESS THAN 6". SEE TABLE THIS SHEET.
3. IN A WELL–DEFINED CHANNEL EXTEND THE APRON UP THE CHANNEL BANKS TO AN ELEVATION OF 6" ABOVE THE MAXIMUM TAILWATER DEPTH OR TO THE TOP OF THE BANK, WHICHEVER IS LESS.
4. FILTER FABRIC SHOULD BE INSTALLED BETWEEN THE RIPRAP AND SOIL FOUNDATION.
5. REFERENCE NCDEQ LAND QUALITY SECTION DESIGN MANUAL: 6.41.

MAINTENANCE REQUIREMENTS:

1. INSPECT RIPRAP OUTLET STRUCTURES WEEKLY AND AFTER SIGNIFICANT (½ INCH OR GREATER) RAINFALL EVENTS TO SEE IF ANY EROSION AROUND OR BELOW THE RIPRAP HAS TAKEN PLACE, OR IF STONES HAVE BEEN DISLODGED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT FURTHER DAMAGE.

TEMPORARY BY–PASS OUTLETS PROTECTION

DAM	LENGTH, L (FT)	START WIDTH, W1 (FT)	END WIDTH, W2 (FT)	MINIMUM THICKNESS (IN)	RIPRAP CLASS
SD	49	35	74	36	2
ULD	NOT NEEDED, BREACH USED FOR TEMP. BY-PASS				
NLD	30	20	40	36	2
PLD	30	15	35	36	2

NOTE: MINIMUM DIMENSIONS SHOWN IN THIS TABLE, SEE PLANS FOR RIPRAP EXTENT

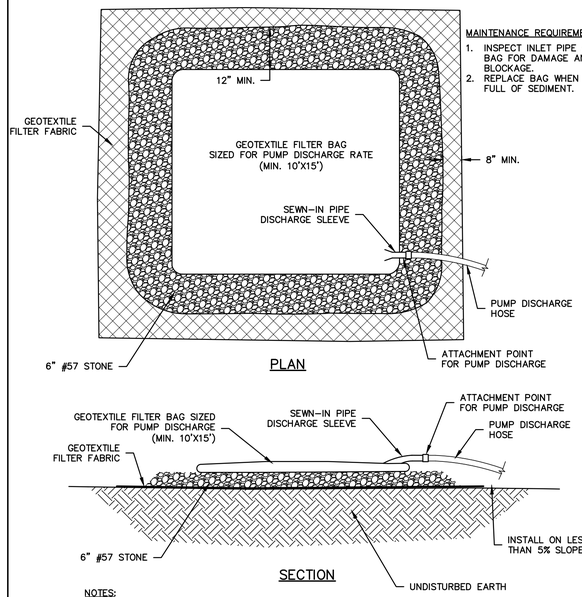
MISCELLANEOUS OUTLETS PROTECTION

DAM	DRAINAGE STRUCTURE	LENGTH, L (FT)	START WIDTH, W1 (FT)	END WIDTH, W2 (FT)	MINIMUM THICKNESS (IN)	RIPRAP CLASS
SD	BYPASS PIPE #1	10	8	8	7	A

NOTE: MINIMUM DIMENSIONS SHOWN IN THIS TABLE, SEE PLANS FOR RIPRAP EXTENT

EC 12 TEMPORARY PIPE OUTLET PROTECTION

NOT TO SCALE



MAINTENANCE REQUIREMENTS:

1. INSPECT INLET PIPE AND BAG FOR DAMAGE AND BLOCKAGE.
2. REPLACE BAG WHEN ¾ FULL OF SEDIMENT.

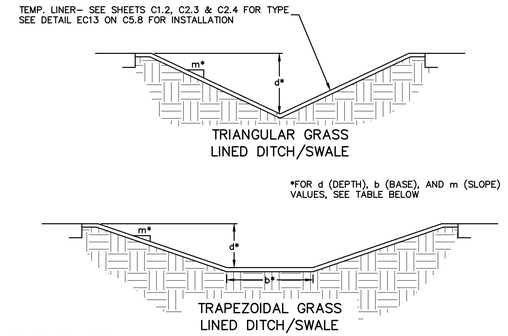
NOTES:

1. FILTER BAG SHALL BE CONSTRUCTED OF NON–WOVEN FILTER FABRIC WITH A MIN. 8 OZ/SQUARE YARD WEIGHT
2. FILTER BAG FABRIC SHALL HAVE A FLOW RATE OF 80 GPM/S.F. OR SIZED FOR PUMP DISCHARGE
3. SILT BAG SHALL HAVE SLEEVE SEWN–IN SLEEVE FOR RECEIVING THE PUMP DISCHARGE AND PUMP HOSE SHALL BE SECURELY ATTACHED TO SILT BAG
4. SILT BAG SHALL BE REPLACED WHEN HALF FULL OR PUMP DISCHARGE RATE IS REDUCED ENOUGH TO CAUSE OVERFLOW. CONTRACTOR SHALL PROVIDE ADDITIONAL BAGS AS REQUIRED.
5. BOTH FILTER BAG AND SILT WITHIN SHALL BE DISPOSED OF IN A PROPER MANNER AFTER MATERIAL INSIDE IS DRY, RESULTING IN NO DISCHARGE TO THE STREAM

* CONTRACTOR SHALL INSPECT DISCHARGE FROM SILT BAG TO PREVENT SEDIMENT OR TURBIDITY IN RECEIVING WATERS

EC 13 DEWATERING SILT BAG

NOT TO SCALE



CONSTRUCTION NOTES:

1. REMOVE ALL TREES, BRUSH, STUMPS, AND OTHER OBJECTIONABLE MATERIAL FROM THE FOUNDATION AREA, AND DISPOSE OF PROPERLY.
2. EXCAVATE THE CHANNEL, SHAPING IT TO MATCH THE DIMENSIONS SHOWN ON THE PLANS PLUS A 0.2' OVERCUT AROUND THE CHANNEL PERIMETER TO ALLOW FOR SOIL BULKING DURING SEED BED PREP AND SOD BUILDUP.
3. REMOVE AND PROPERLY DISPOSE OF ALL EXCESS SOIL SO THAT THE SURFACE WATER MAY ENTER THE CHANNEL FREELY.
4. THE PROCEDURE USED TO ESTABLISH GRASS IN THE CHANNEL WILL DEPEND ON THE SEVERITY OF THE CONDITIONS AND SELECTION OF SPECIES. PROTECT THE CHANNEL WITH MULCH OR A TEMPORARY LINER SUFFICIENT TO WITHSTAND ANTICIPATED VELOCITIES DURING THE ESTABLISHMENT PERIOD.

MAINTENANCE REQUIREMENTS

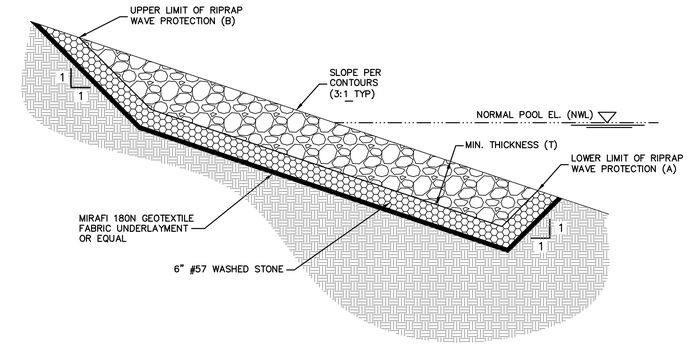
1. DURING THE ESTABLISHMENT PERIOD, CHECK GRASS–LINES CHANNELS AFTER EVERY RAINFALL. AFTER GRASS IS ESTABLISHED, PERIODICALLY CHECK THE CHANNEL; CHECK IT AFTER EVERY HEAVY RAINFALL EVENT. IMMEDIATELY MAKE REPAIRS. IT IS PARTICULARLY IMPORTANT TO CHECK THE CHANNEL OUTLET AND ALL ROAD CROSSINGS FOR BANK STABILITY AND EVIDENCE OF PIPING OR SCOUR HOLES. REMOVE ALL SIGNIFICANT SEDIMENT ACCUMULATIONS TO MAINTAIN THE DESIGNED CARRYING CAPACITY. KEEP THE GRASS IN A HEALTHY, VIGOROUS CONDITION AT ALL TIMES, SINCE ITS IS THE PRIMARY EROSION PROTECTION FOR THE CHANNEL.

EC 15 DITCH/SWALE

NOT TO SCALE

DITCH/SWALE DIMENSIONS

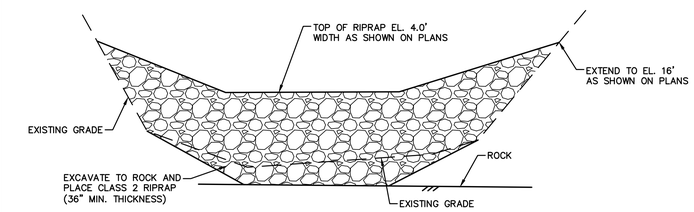
SWALE ID	TYPE	MIN. DEPTH (*d)	SIDE SLOPE (*m)	BASE (b)
SD – DIV. SWALE #1	V–SHAPED	1'	3	–



EC 16 SLOPE PROTECTION RIP RAP DETAIL

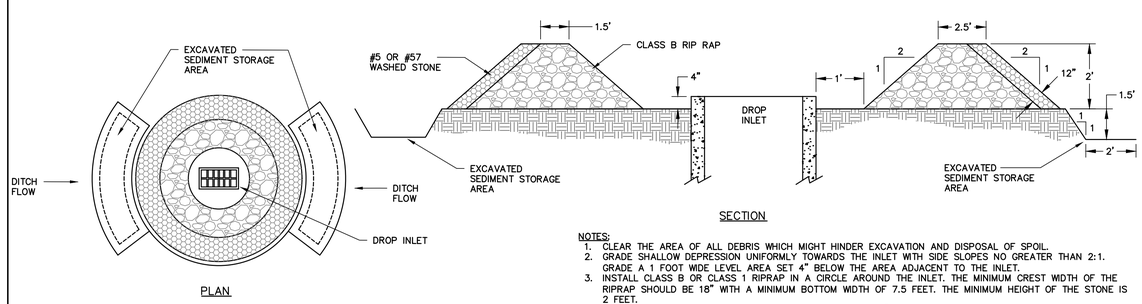
NOT TO SCALE

DAM	NWL (FT NAVD)	RIPRAP TYPE	T (IN)	A (FT NAVD)	B (FT NAVD)
SD (UPSTREAM FACE)	30	2	36	25.40	34.30
SD (DOWNSTREAM FACE)	11	B	24	0.00	16.00
ULD (UPSTREAM FACE)	38	B	24	35.10	40.70
ULD (DOWNSTREAM FACE)	35	B	24	32.50	37.40
NLD (UPSTREAM FACE)	35	B	24	32.50	37.30
PLD (UPSTREAM FACE)	35	B	24	32.80	36.90



EC 17 SD PERMANENT RIPRAP OUTLET PROTECTION

NOT TO SCALE



NOTES:

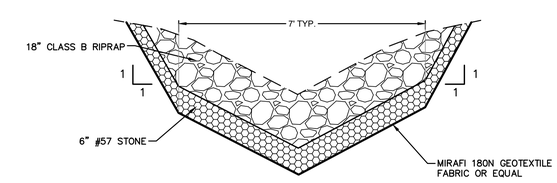
1. CLEAR THE AREA OF ALL DEBRIS WHICH MIGHT HINDER EXCAVATION AND DISPOSAL OF SPOIL.
2. GRADE SHALLOW DEPRESSION UNIFORMLY TOWARDS THE INLET WITH SIDE SLOPES NO GREATER THAN 2:1. GRADE A 1 FOOT WIDE LEVEL AREA SET 4" BELOW THE AREA ADJACENT TO THE INLET.
3. INSTALL CLASS B OR CLASS 1 RIPRAP IN A CIRCLE AROUND THE INLET. THE MINIMUM CREST WIDTH OF THE RIPRAP SHOULD BE 18" WITH A MINIMUM BOTTOM WIDTH OF 7.5 FEET. THE MINIMUM HEIGHT OF THE STONE IS 2 FEET.
4. THE OUTSIDE FACE OF THE RIPRAP IS THEN LINED WITH 12" OF NCDOT #5 OR #57 WASHED STONE.

MAINTENANCE REQUIREMENTS:

1. INSPECT THE BARRIER AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (½ INCH OR GREATER) RAINFALL EVENT AND MAKE REPAIRS AS NEEDED IMMEDIATELY.
2. REMOVE SEDIMENT AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR SUBSEQUENT RAINS.
3. WHEN THE CONTRIBUTING DRAINAGE AREA HAS BEEN ADEQUATELY STABILIZED, REMOVE ALL MATERIALS AND ANY UNSTABLE SOIL, AND EITHER SALVAGE OR DISPOSE OF IT PROPERLY. BRING THE DISTURBED AREA TO PROPER GRADE. THEN SMOOTH AND COMPACT IT. APPROPRIATELY STABILIZE ALL BARE AREAS AROUND THE INLET.

EC 14 ROCK DOUGHNUT INLET PROTECTION

NOT TO SCALE



EC 18 GROIN PROTECTION RIPRAP

NOT TO SCALE

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

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NC Firm License # C-0459
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON Jan 14, 2021

Schnabel ENGINEERING
LICENSE NUMBER C-2599
SCHNABEL ENGINEERING SOUTH, PC
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T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

AS NOTED

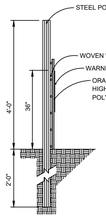
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

EROSION AND SEDIMENTATION CONTROL DETAILS 4 OF 5

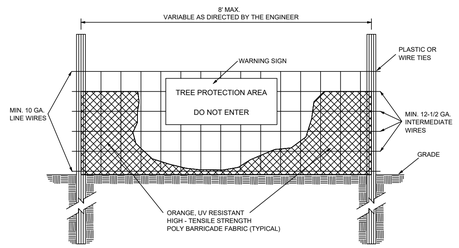
SHEET G-13

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTION\RECONSTRUCT\DRAWINGS\SHEETS\G-10 - 14 - EROSION AND SEDIMENTATION CONTROL DETAILS.DWG PLOT DATE 1/12/2021 3:12 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT

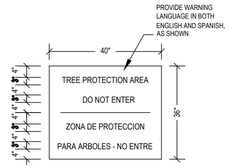


SIDE VIEW



FRONT VIEW

NOTE: FOR TREE PROTECTION ONLY



WARNING SIGN DETAIL

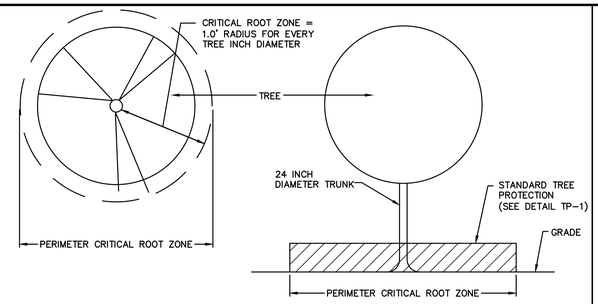
NOTES:

1. TREE PROTECTION FENCING MUST BE INSTALLED AT A MINIMUM RADIUS OF THE CRITICAL ROOT ZONE (SEE DETAIL TPP-02 FOR EXAMPLES)
2. THE TREE PROTECTION FENCING MUST REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE APPROVED BY URBAN FORESTRY STAFF.
3. APPROVED IMPACT PROTECTION DEVICES MUST BE REMOVED AFTER CONSTRUCTION WHEN APPLICABLE.
4. SIGNS SHALL BE PLACED AT 50' MAXIMUM INTERVALS. PLACE A SIGN AT EACH END OF LINEAR TREE PROTECTION AND 50' ON CENTER FOR THE REMAINDER.
5. FOR TREE PROTECTION AREAS LESS THAN 200' IN PERIMETER, PROVIDE NO LESS THAN ONE SIGN PER PROTECTED AREA.
6. ATTACH SIGNS SECURELY TO FENCE POSTS AND FABRIC.
7. ADDITIONAL SIGNS MAY BE REQUIRED BY CITY OF RALEIGH BASED ON ACTUAL FIELD CONDITIONS.
8. SIGNS ARE TO BE MADE OF DURABLE, WEATHERPROOF MATERIAL WITH LETTERS A MINIMUM OF 3" HIGH, CLEARLY LEGIBLE AND SPACED AS SHOWN.

—x——x— PLAN SYMBOL

TP 1 STANDARD TREE PROTECTION DETAIL

NOT TO SCALE

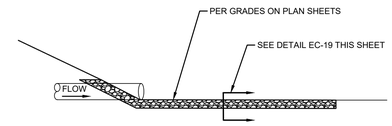


PLAN VIEW

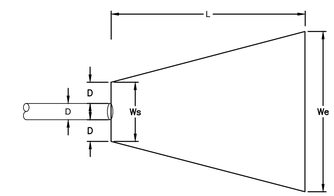
ELEVATION VIEW

TP 3 STANDARD TREE PROTECTION FENCE LAYOUT

NOT TO SCALE



SECTION VIEW



PLAN VIEW

MAINTENANCE REQUIREMENTS

INSPECT PLUNGE POOL STRUCTURES WEEKLY AND AFTER SIGNIFICANT (½ INCH OR GREATER) RAINFALL EVENTS TO SEE OF ANY EROSION AROUND OR BELOW THE RIP RAP HAS TAKEN PLACE, OR IF STONES HAVE BEEN DISLODGED. IMMEDIATELY MAKE ALL NEEDED REPAIRS TO PREVENT DAMAGE.

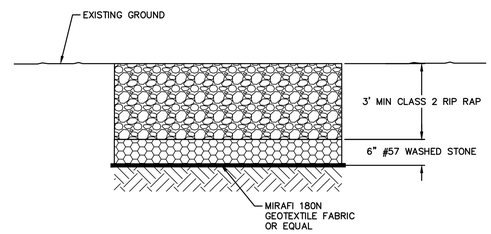
EC 20 PERMANENT RIPRAP OUTLET PROTECTION

NOT TO SCALE

SPILLWAY OUTLETS PROTECTION

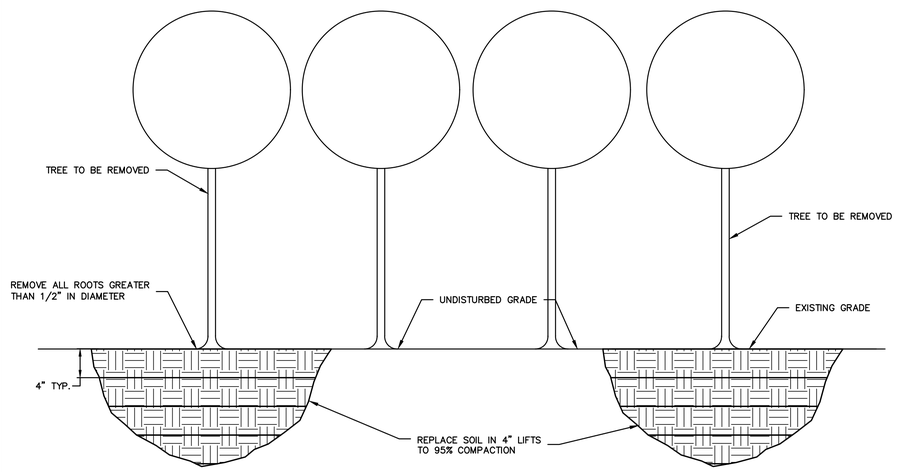
DAM	LENGTH, L (FT)	START WIDTH, Ws (FT)	END WIDTH, We (FT)	MINIMUM THICKNESS (IN)	RIPRAP CLASS
ULD	36	42	66	36	2
NLD	36	24	48	36	2
PLD	30	15	35	36	2

NOTE: MINIMUM DIMENSIONS SHOWN IN THIS TABLE, SEE PLANS FOR RIPRAP EXTENT



EC 19 RIP RAP DETAIL

NOT TO SCALE



NOTES:

1. ALL ROOT REMOVAL OR EXCAVATION IN EXCESS OF 4' SHALL BE APPROVED AND MONITORED BY ENGINEER OR AUTHORIZED REPRESENTATIVE.
2. SCHEDULE REMOVAL OF A SEQUENCE OF FIVE TREES (MAXIMUM) AT ANY ONE TIME BEFORE ALL RESULTING DISTURBED AREAS ARE REPAIRED AND COMPLETELY STABILIZED. PHASED TREE REMOVAL WILL BE CONDUCTED IN A MANNER THAT INDIVIDUAL TREES WILL NOT BE REMOVED FROM WITHIN A 40 FOOT RADIUS RELATIVE TO ONE ANOTHER PRIOR TO COMPLETION OF BACKFILLING AND COMPACTION OF THE DISTURBED AREAS.
3. BACKFILL AND COMPACT (FOUR-INCH MAXIMUM LIFTS) TO 95 PERCENT STANDARD PROCTOR; SEED AND MULCH DISTURBED AREAS WITHIN 48 HOURS OF INITIAL DISTURBANCE.

TP 2 TREE REMOVAL DETAIL

NOT TO SCALE

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Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

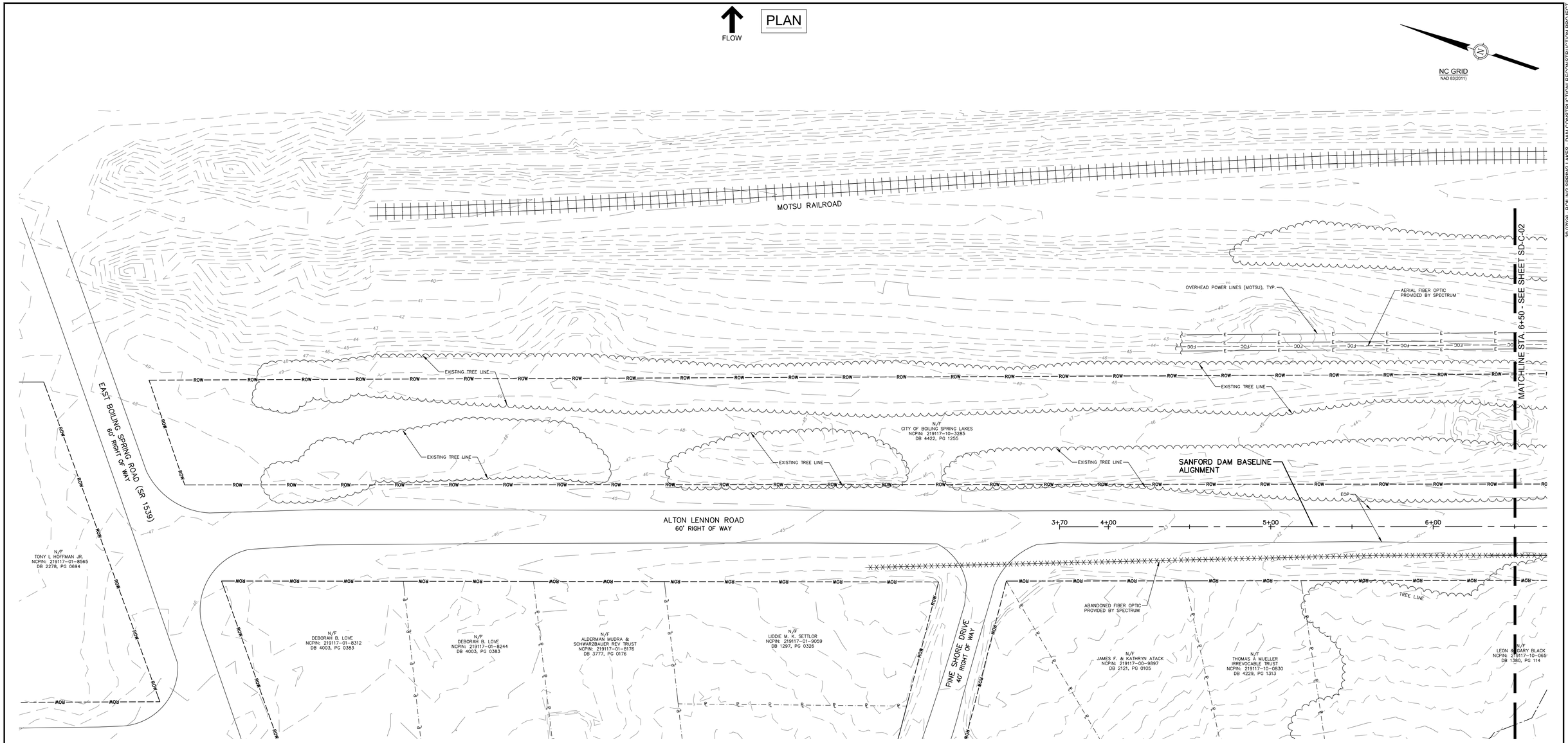
AS NOTED

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	S. MEEKINS	JANUARY, 2021	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

EROSION AND SEDIMENTATION
CONTROL DETAILS 5 OF 5

SHEET

G-14



Line Table: Alignments

Line #	Length	Direction	Start Station	End Station	Start Point (E,N)	End Point (E,N)
L1	1627.66	S18° 47' 22.17"E	6+00.00	22+27.66	(2291154.58, 110737.97)	(2291678.84,109197.06)
L2	597.34	S18° 30' 35.59"E	22+27.66	28+25.00	(2291678.84, 109197.06)	(2291868.48,108630.62)

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

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

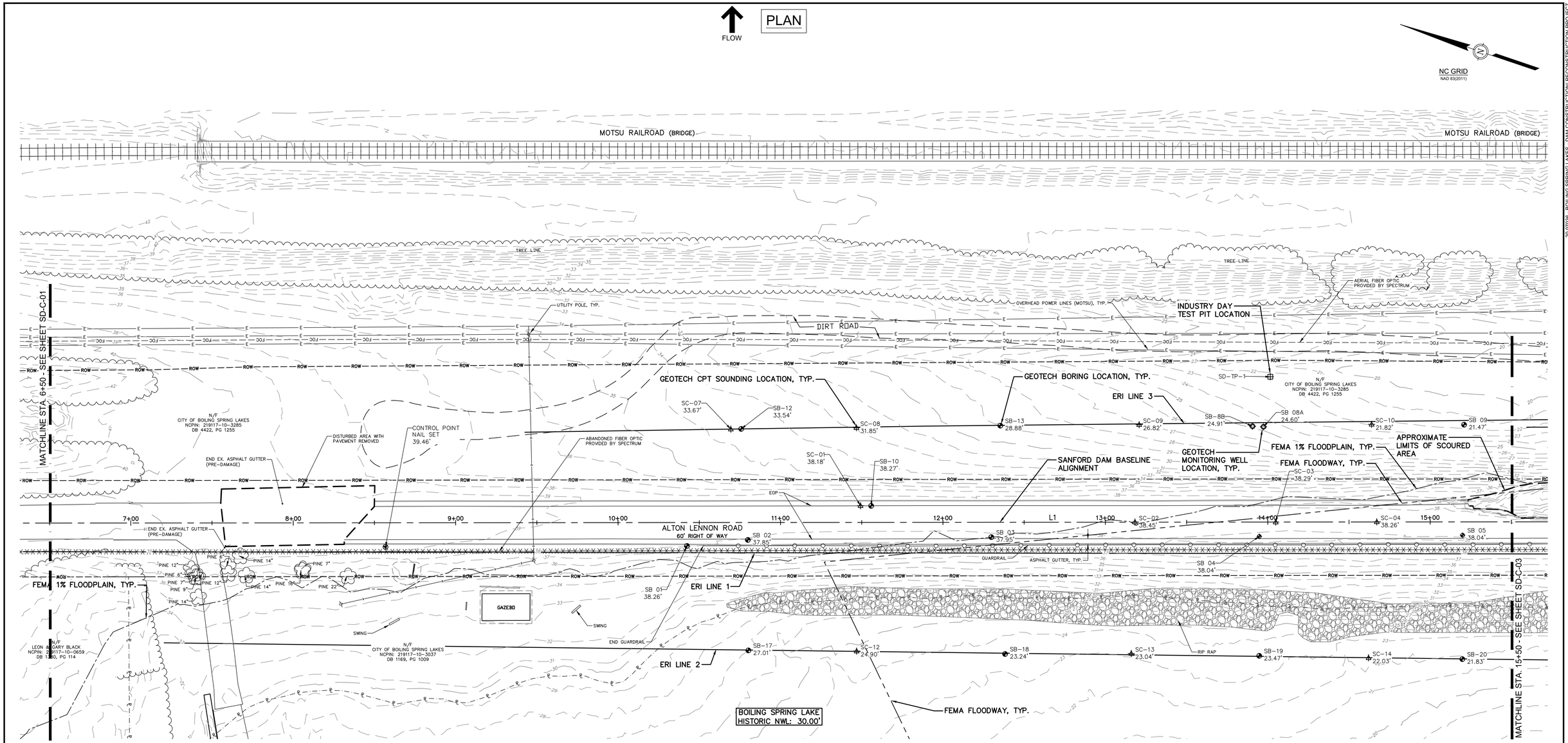
GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	EXISTING CONDITIONS 1 OF 3		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
SD-C-01

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTION\RECONSTRUCT\DRAWINGS\SHEETS\SD-C-01 & 02 SANFORD DAM EXISTING CONDITIONS.DWG PLOT DATE 1/14/2021 2:28 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

EXISTING CONDITIONS 2 OF 3

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	S. MEEKINS	JANUARY, 2021	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

SHEET
SD-C-02

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT

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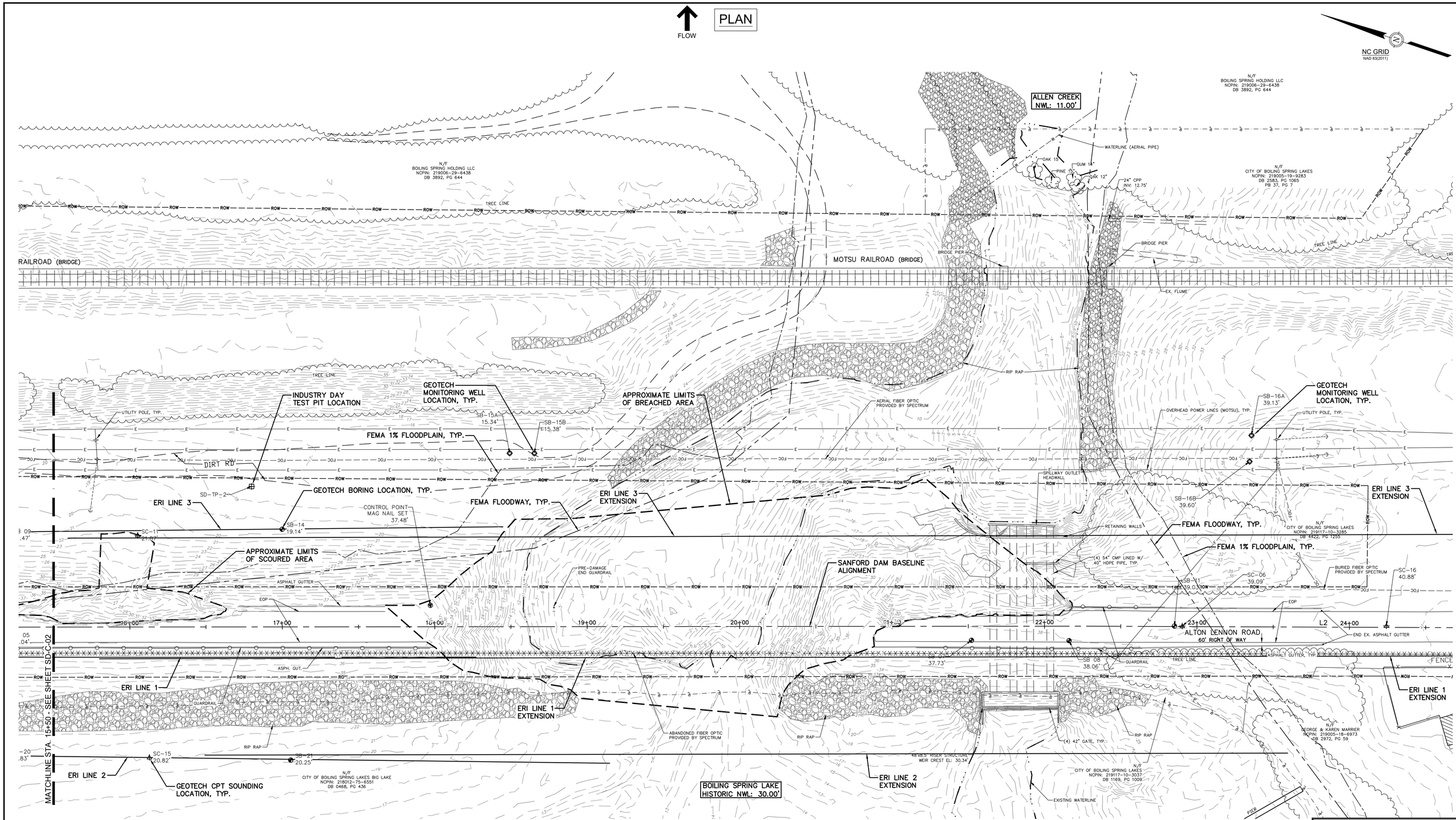

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Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

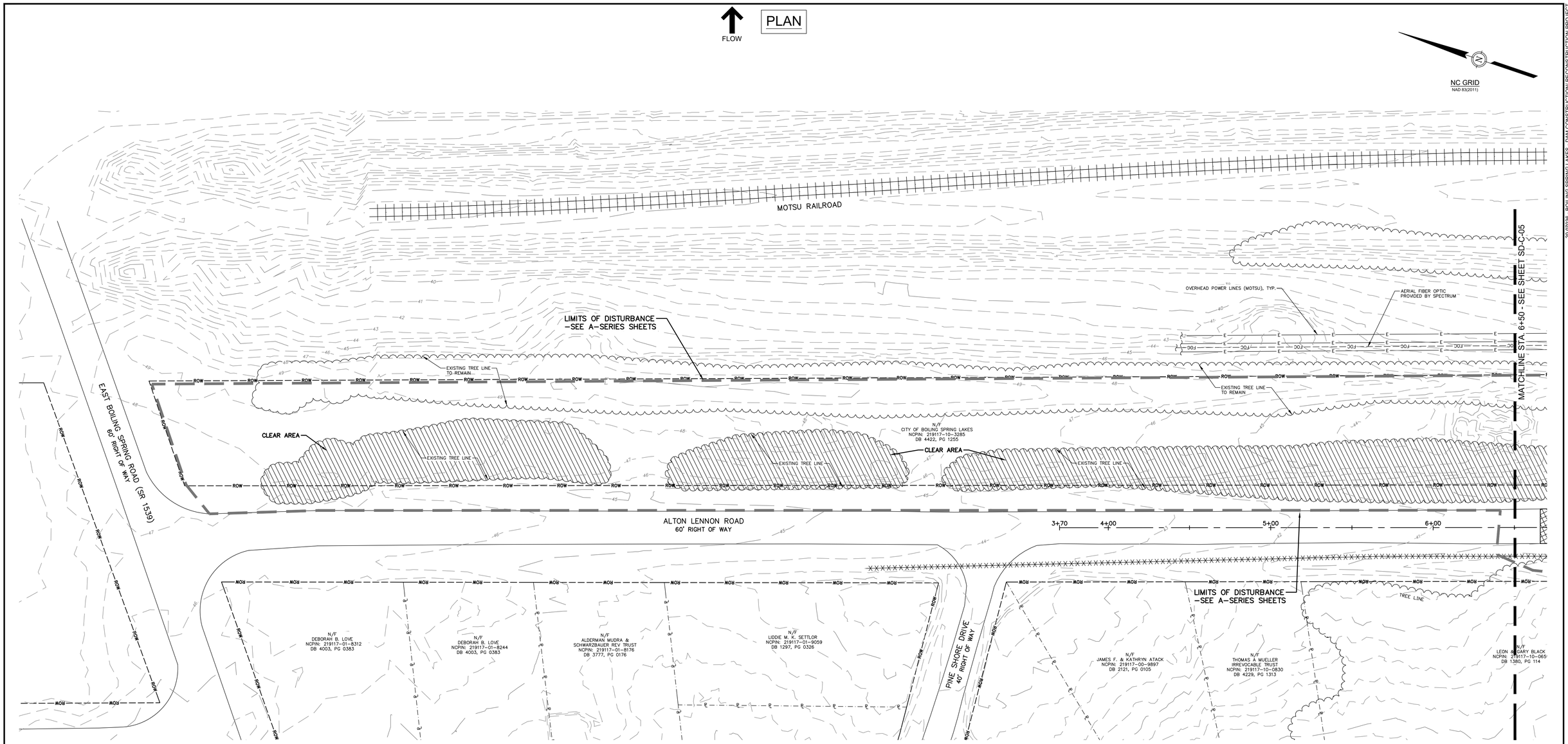
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

EXISTING CONDITIONS 3 OF 3

SHEET
SD-C-03

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTIONRECONSTRUCIDRAWINGS\SHEETS\SD-C-01 & 02 SANFORD DAM EXISTING CONDITIONS.DWG PLOT DATE 1/14/2021 2:26 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



DEMOLITION PLAN LEGEND

- SURFACES TO BE DEMOLISHED (PAVEMENT, CONCRETE, RIP RAP, ETC.)
- TREES TO BE REMOVED

PERMIT SUBMITTAL
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Jan 14, 2022

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

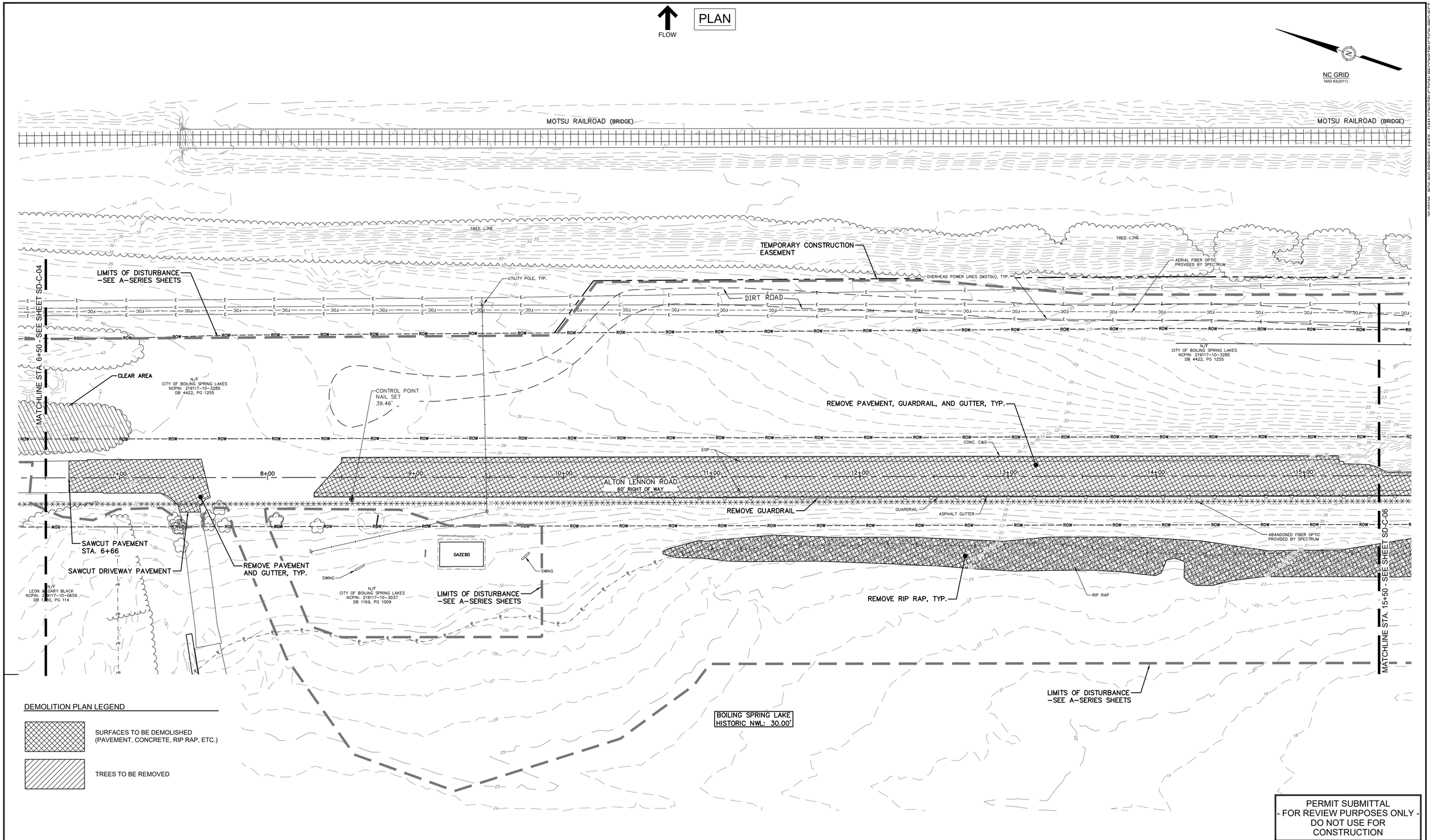
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

DEMOLITION PLAN 1 OF 3

SHEET
SD-C-04

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTIONRECONSTRUCIDRAWINGS\SHEETS\SD-C-03 & 04 SANFORD DAM DEMOLITION PLAN.DWG PLOT DATE 1/14/2021 8:00 AM SPENCER MEEKINS

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



DEMOLITION PLAN LEGEND

SURFACES TO BE DEMOLISHED (PAVEMENT, CONCRETE, RIP RAP, ETC.)

TREES TO BE REMOVED

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

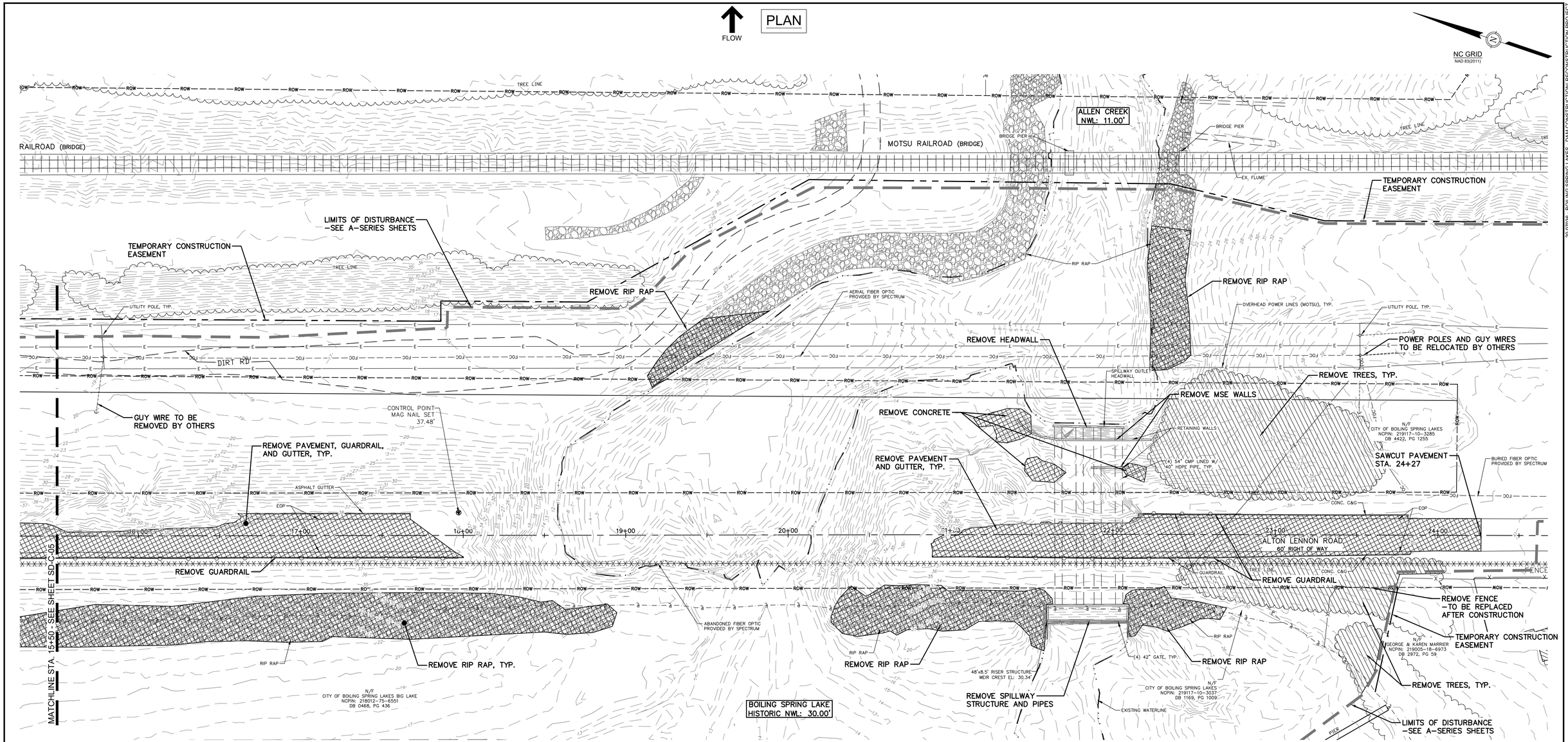
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER	DEMOLITION PLAN 2 OF 3		SHEET
M. NORTON	S. MEEKINS			SD-C-05
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTION\RECONSTRUC\DRAWINGS\SHEETS\SD-C-03 & 04 SANFORD DAM DEMOLITION PLAN.DWG PLOT DATE 1/14/2021 8:00 AM SPENCER MEEKINS

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



DEMOLITION PLAN LEGEND

- SURFACES TO BE DEMOLISHED (PAVEMENT, CONCRETE, RIP RAP, ETC.)
- TREES TO BE REMOVED

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

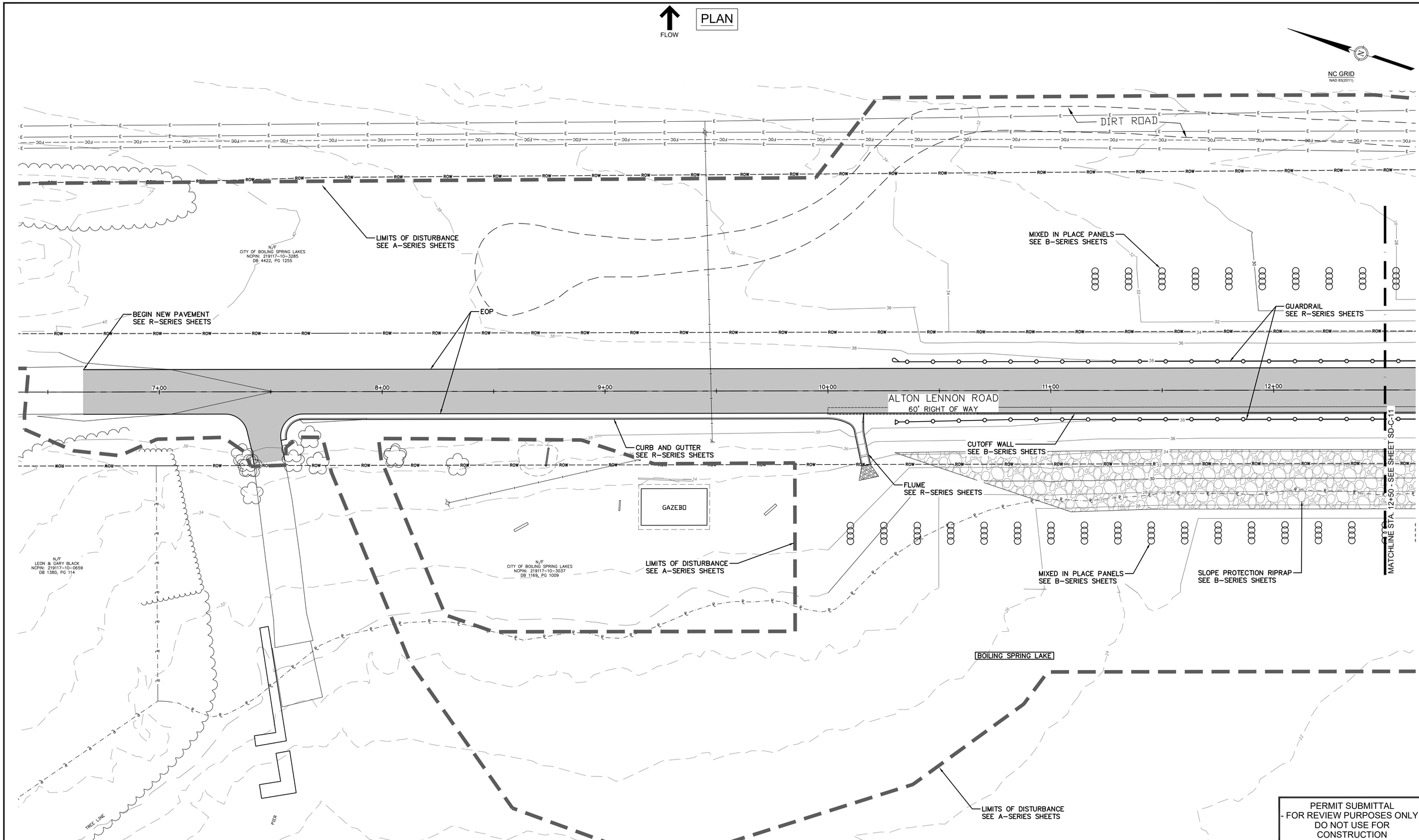
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

DEMOLITION PLAN 3 OF 3

SHEET
SD-C-06

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTION\RECONSTRUC\DRAWINGS\SHEETS\SD-C-03 & 04 SANFORD DAM DEMOLITION PLAN.DWG PLOT DATE 1/14/2021 2:32 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

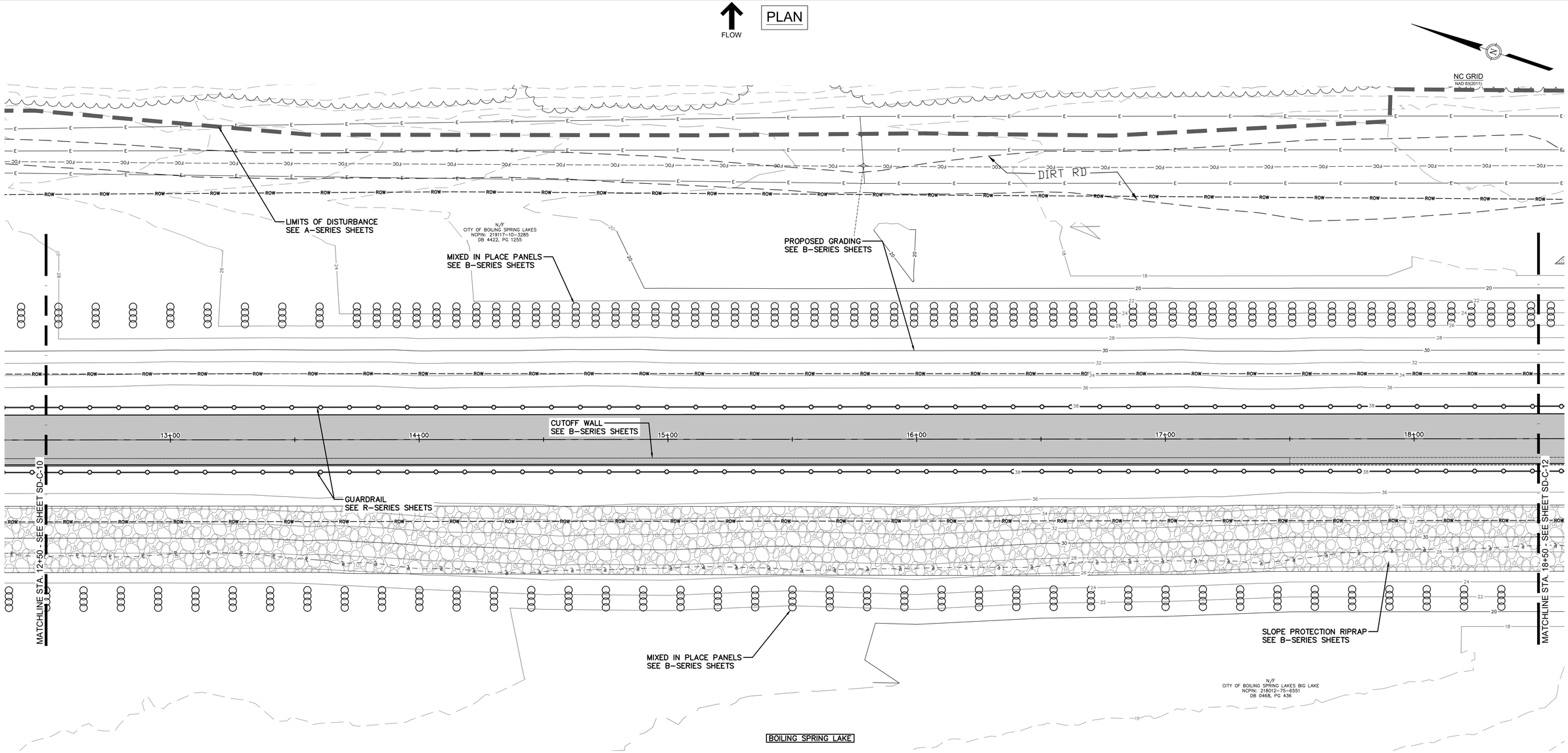
GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	FINAL SITE PLAN STA. 6+50 - STA. 12+50		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
SD-C-10

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTIONRECONSTRUCTIONDRAWINGS\SHEETS\SD-C-10 - 12 SANFORD DAM FINAL SITE PLAN.DWG PLOT DATE 1/14/2021 8:01 AM SPENCER MEEKINS

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

FINAL SITE PLAN STA. 12+50 - STA. 18+50

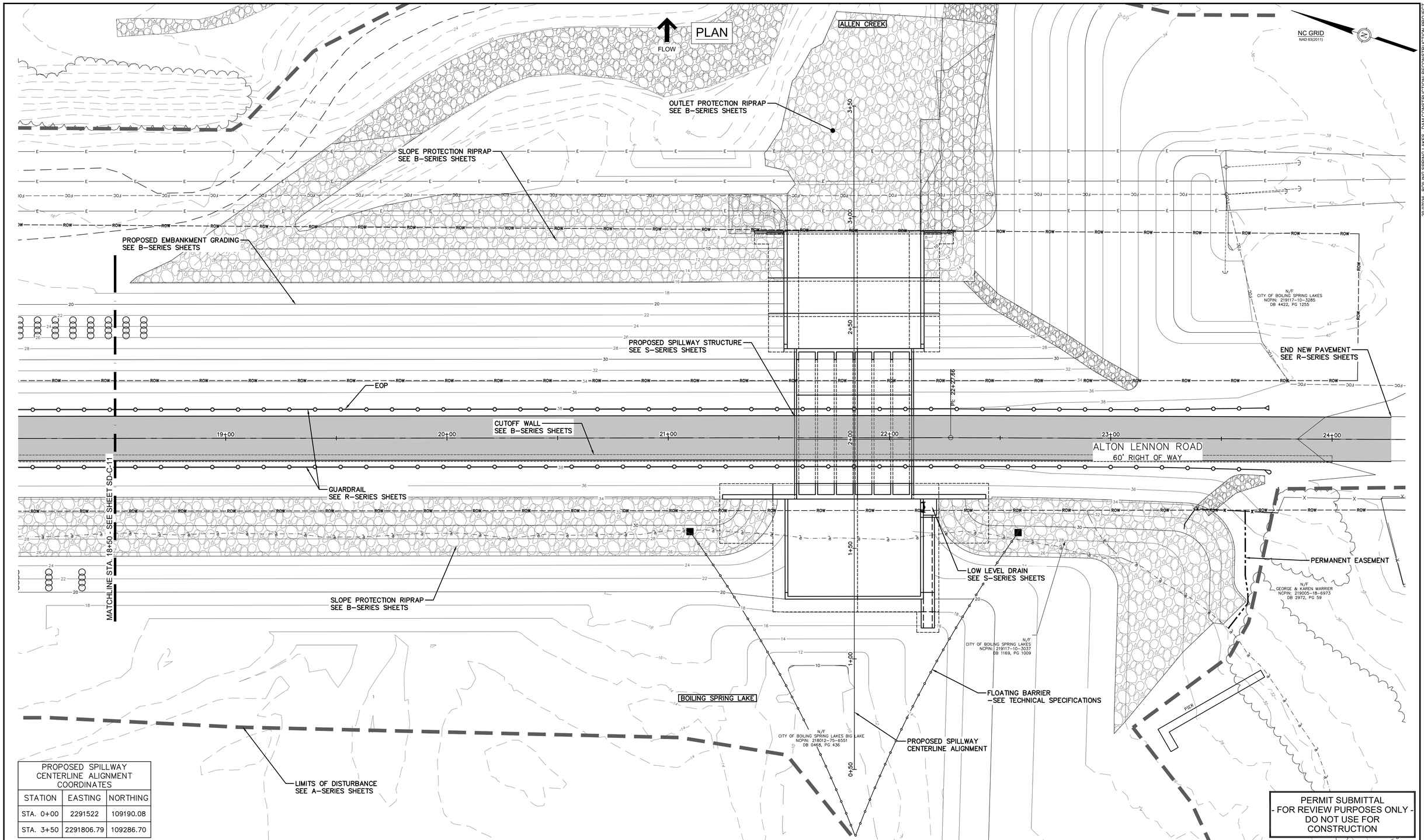
DATE	PROJECT #	FUNDING #
JANUARY, 2021	20.07036	N/A

SHEET

SD-C-11

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTION\RECONSTRUCI\DRAWINGS\SHEETS\SD-C-10 - 12 SANFORD DAM FINAL SITE PLAN.DWG PLOT DATE 1/14/2021 2:38 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



PROPOSED SPILLWAY CENTERLINE ALIGNMENT COORDINATES		
STATION	EASTING	NORTHING
STA. 0+00	2291522	109190.08
STA. 3+50	2291806.79	109286.70

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030624 MICHAEL A. HANSON 2/1/21

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

FINAL SITE PLAN STA. 18+50 - STA. 24+00

OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
SD-C-12

SEQUENCE NOTES:

CONSTRUCTION STAGE 1:

1. FLAG LIMITS OF DISTURBANCE AND INSTALL PROJECT SIGNAGE AND TEMPORARY SITE SECURITY AND SAFETY MEASURES.
2. SURVEY AND VERIFY EXISTING CONDITIONS.
3. INSTALL E&SC MEASURES.
4. PERFORM CLEARING AND GRUBBING AND PERFORM UTILITY MODIFICATIONS.
5. PREPARE STAGING AREAS AND TEMPORARY FACILITIES, INCLUDING BUT NOT LIMITED TO MATERIALS AND EQUIPMENT LAYDOWN AREA(S), STOCKPILE AREAS, PARKING AREA(S), CONSTRUCTION AND ENGINEERING FIELD OFFICES, LABORATORY FACILITIES, AND TEMPORARY ELECTRICAL AND PLUMBING SERVICES.
6. REMOVE EXISTING UPSTREAM EMBANKMENT SLOPE PROTECTION RIPRAP. REMOVE RIPRAP WITHIN THE PROPOSED EXCAVATION FOOTPRINT. STOCKPILE FOR REUSE.
7. INSTALL PARTIAL STAGE 1 UPSTREAM SHEET PILE COFFERDAM AND DOWNSTREAM COFFERDAM. LEAVE AN OPENING IN BOTH COFFERDAMS TO ALLOW FLOW THROUGH EXISTING SPILLWAY.
8. INSTALL TEMPORARY DIVERSION CONDUITS , INCLUDING INLET AND OUTLET PROTECTION.
9. INSTALL REMAINDER OF SHEET PILES FOR UPSTREAM AND DOWNSTREAM COFFERDAMS AND ROUTE BASE FLOW THROUGH TEMPORARY DIVERSION CONDUITS.
10. INSTALL DEWATERING SYSTEM AND BEGIN DEWATERING OPERATIONS.
11. DEMOLISH EXISTING SPILLWAY AND CREATE EXCAVATION.
12. RECONSTRUCT DAMAGED EMBANKMENT SECTION BETWEEN APPROXIMATE STATIONS 15+00 AND 17+00 AS SHOWN ON SD-B DRAWINGS.
13. DURING THE COURSE OF THE WORK ABOVE, PERFORM CUTOFF WALL DEMONSTRATION SECTION BETWEEN STATIONS 10+00 AND 11+00, PERFORM DMM TEST ELEMENTS AT LOCATION PROPOSED BY CONTRACTOR AND APPROVED BY ENGINEER, AND INSTALL UPSTREAM AND DOWNSTREAM MIP PANELS, INCLUDING INSTALLATION AND REMOVAL OF ASSOCIATED TEMPORARY WORK PLATFORMS.

CONSTRUCTION STAGE 2:

1. PREPARE FOUNDATION ROCK SURFACE, AND INSTALL COARSE DRAINFILL AND LEVELING CONCRETE AS SHOWN ON THE SD B-SERIES DRAWINGS.
2. CONSTRUCT THE EMBANKMENT UP TO EL 16 BETWEEN TEMPORARY STREAM DIVERSION CONDUITS AND LEFT SIDE OF EXCAVATION. DURING EMBANKMENT CONSTRUCTION, CONSTRUCT DOWNSTREAM RIPRAP SLOPE PROTECTION AND ELEMENTS OF THE PROPOSED SPILLWAY WHICH HAVE PROPOSED SUBGRADE BELOW EL 16.
3. REMOVE DEWATERING SYSTEM.
4. REMOVE DOWNSTREAM COFFERDAM.
5. INSTALL CUTOFF WALL BETWEEN STATIONS 18+50 AND 22+50, INCLUDING ASSOCIATED TEMPORARY WORK PLATFORM REQUIRED FOR ACCESSING AND INSTALLING THE CUTOFF WALL. WHILE INSTALLING THIS SECTION OF CUTOFF WALL, CONSTRUCT TEMPORARY WORK PLATFORM REQUIRED FOR INSTALLING CUTOFF WALL BETWEEN STATIONS 11+00 AND 17+50.

CONSTRUCTION STAGE 3:

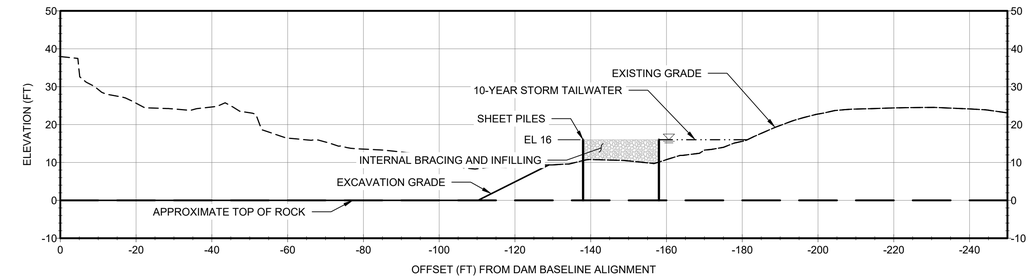
1. INSTALL CUTOFF WALL BETWEEN STATIONS 11+00 AND 17+50. REMOVE ASSOCIATED TEMPORARY WORKS UPON COMPLETION.
2. CONSTRUCT SPILLWAY CULVERTS AND REMAINDER OF SPILLWAY INLET STRUCTURE, WITH THE EXCEPTION OF THE UPSTREAM LEFT WEIR WALL SECTION, AS SHOWN ON DRAWINGS.
3. CONSTRUCT EMBANKMENT UP TO EL 25 BETWEEN TEMPORARY STREAM DIVERSION CONDUITS AND LEFT SIDE OF EXCAVATION.
4. REMOVE STAGE 1 UPSTREAM SHEET PILE COFFERDAM.
5. INSTALL STAGE 3 UPSTREAM COFFERDAM, AND REROUTE FLOW THROUGH GAP IN SPILLWAY INLET WEIR WALL AND NEW LOW-LEVEL DRAIN.
6. REMOVE TEMPORARY STREAM DIVERSION CONDUITS AND EXTEND EMBANKMENT (WITH TOP AT EL 25) TO RIGHT ABUTMENT.
7. REMOVE STAGE 3 UPSTREAM COFFERDAM.
8. INSTALL CUTOFF WALL BETWEEN STATIONS 22+50 AND 23+25, INCLUDING CONSTRUCTION AND REMOVAL OF TEMPORARY WORK PLATFORM.

CONSTRUCTION STAGE 4:

1. CONSTRUCT EMBANKMENT UP TO EL 36.
2. INSTALL CUTOFF WALL BETWEEN STATIONS 17+50 AND 18+50 AND BETWEEN STATIONS 23+25 AND 24+00, INCLUDING CONSTRUCTION AND REMOVAL OF TEMPORARY WORK PLATFORMS.
3. DEMOLISH EXISTING ROADWAY AND GRADE TO PROPOSED ROADWAY SUBGRADE.
4. CONSTRUCT EMBANKMENT TO THE FINAL PROPOSED GRADE, INCLUDING ROADWAY, RIPRAP GROIN PROTECTION, AND UPSTREAM RIPRAP SLOPE PROTECTION, AS SHOWN ON THE DRAWINGS, WITH EXCEPTION OF GUARDRAILS.
5. INSTALL GEOTECHNICAL INSTRUMENTATION, SUBSEQUENTLY INSTALL GUARDRAILS.
6. CONSTRUCT STAGE 4 COFFERDAM AROUND MISSING SPILLWAY INLET WEIR WALL SECTION, SUCH THAT FLOW IS ROUTED THROUGH ONLY THE LOW-LEVEL DRAIN.
7. CONSTRUCT THE MISSING SPILLWAY INLET WEIR WALL SECTION, AND REMOVE STAGE 4 COFFERDAM.
8. PERFORM FINE GRADING, PLACE TOPSOIL, AND APPLY PERMANENT SEEDING AND MULCHING.
9. REMOVE E&SC MEASURES.

GENERAL NOTES:

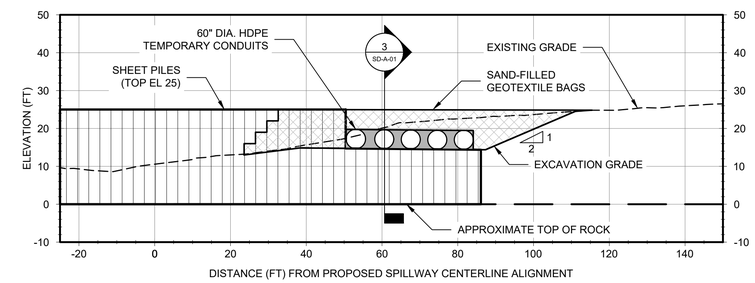
1. CONCEPTS FOR TEMPORARY WORK PLATFORMS WERE DEVELOPED TO DEMONSTRATE VIABLE OPTIONS FOR FACILITATING EQUIPMENT ACCESS. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF ALL TEMPORARY SUPPORT FACILITIES, AND SHALL SUBMIT SUCH DESIGN DETAILS IN ACCORDANCE WITH THE SPECIFICATIONS.
2. E&SC MEASURES WERE DESIGNED WITH THE ASSUMPTIONS THAT TEMPORARY PLATFORM MATERIALS WILL NOT PRODUCE SEDIMENT-LADEN RUNOFF AND THAT SPOILS FROM INSTALLATION OF CUTOFF WALL AND MIP PANELS WILL BE CONTAINED, COLLECTED, AND DISPOSED BY THE CONTRACTOR.
3. APPROXIMATE TOP OF ROCK IS SHOWN AT EL 0, BUT MAY VARY ACROSS THE SITE.



FLOW

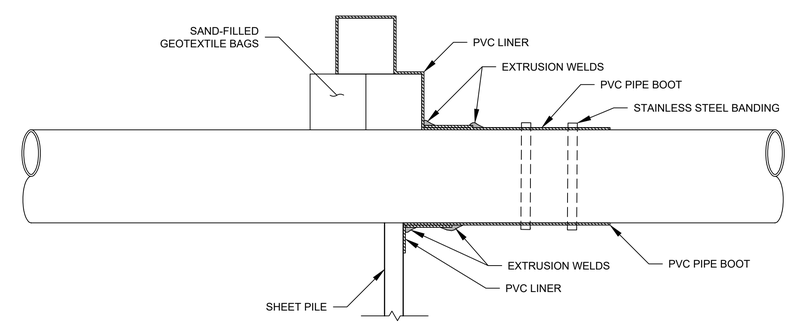
1 STAGE 1 CONCEPTUAL DOWNSTREAM COFFERDAM TYPICAL SECTION

20 0 10 20 40
GRAPHIC SCALE DIVISION VALUE = 20 FEET



2 TEMPORARY STREAM DIVERSION CONCEPT INLET ELEVATION

20 0 10 20 40
GRAPHIC SCALE DIVISION VALUE = 20 FEET



3 DIVERSION PIPE COFFERDAM LINER CONCEPT DETAIL

NOT TO SCALE

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

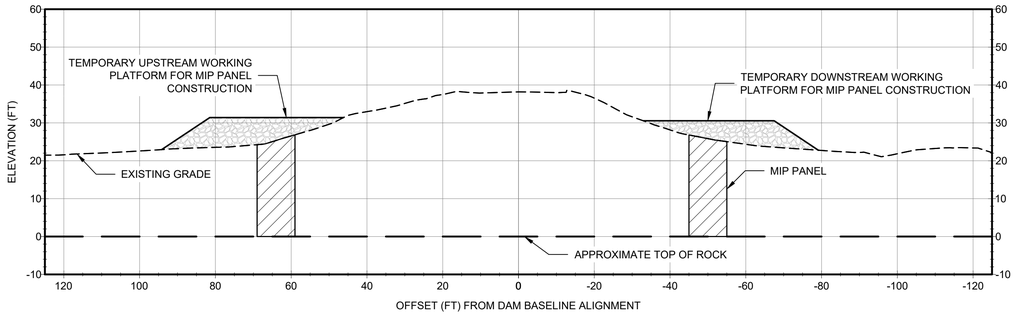
AS NOTED

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
T. FITZGERALD	R. CALDERON	JANUARY 2021	19C21022	N/A
PROJECT MANAGER	REVIEWER			
A. PAISLEY	T. FITZGERALD			

SEQUENCE DETAILS SHEET 1 OF 2

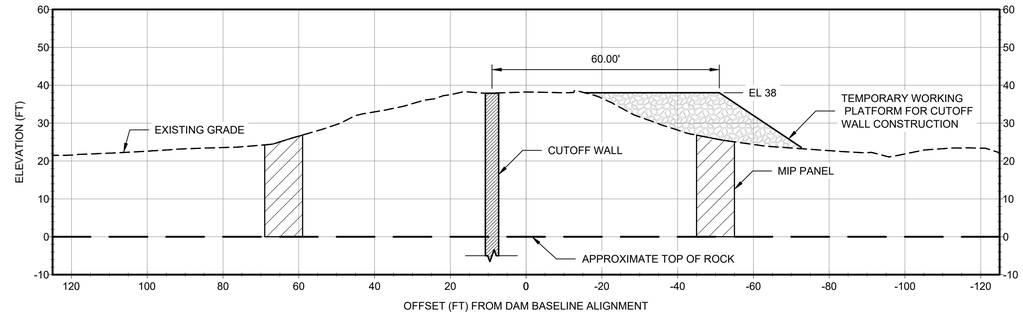
SHEET

SD-A-01



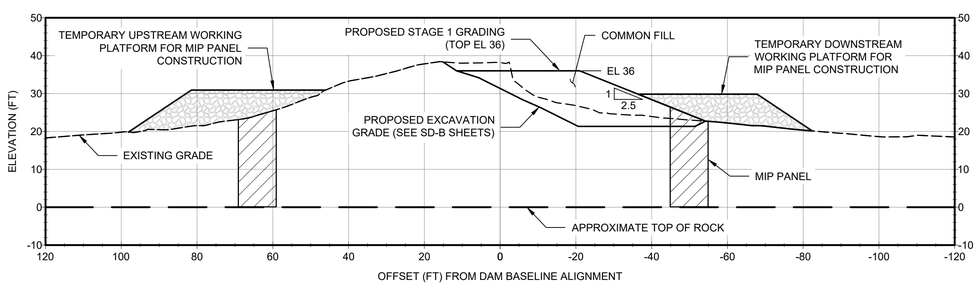
FLOW

1 STAGE 1 MIP WORKING PLATFORM SECTIONS AT STATION 14+00



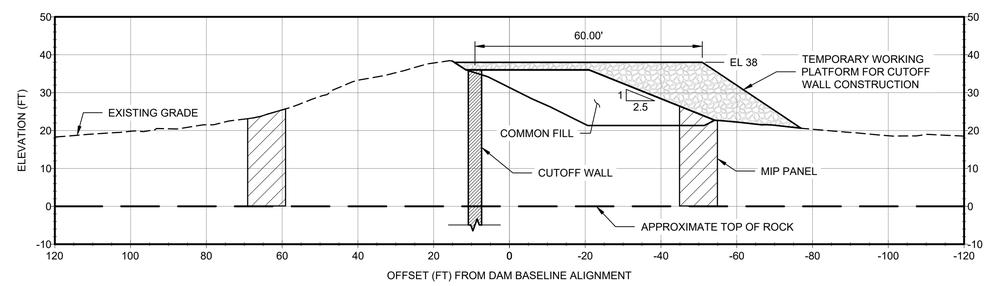
FLOW

3 STAGE 2 CUTOFF WALL WORKING PLATFORM SECTION AT STATION 14+00



FLOW

2 STAGE 1 MIP WORKING PLATFORM SECTIONS AT STATION 16+00



FLOW

4 STAGE 2 CUTOFF WALL WORKING PLATFORM SECTION AT STATION 16+00

NOTE: CUTOFF WALLS SHOWN IN DETAILS 3 AND 4 THIS SHEET ARE SHOWN FOR REFERENCE BUT ARE NOT INSTALLED UNTIL STAGE 3.

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

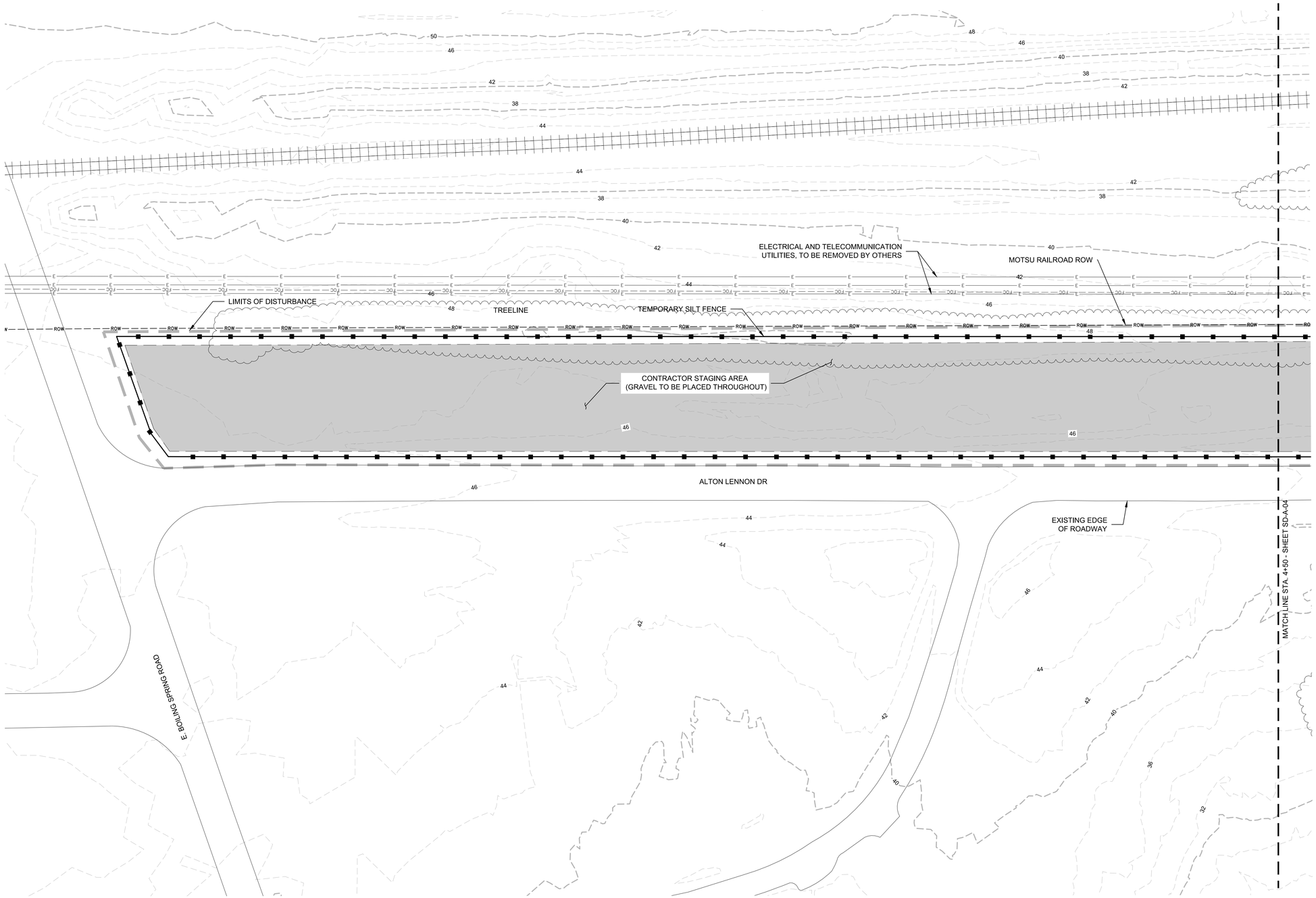
BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
T. FITZGERALD	R. CALDERON	SEQUENCE DETAILS SHEET 2 OF 2		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

SHEET
SD-A-02



1 STAGE 1 SEQUENCING AND E&SC PLAN SHEET 1 OF 4

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

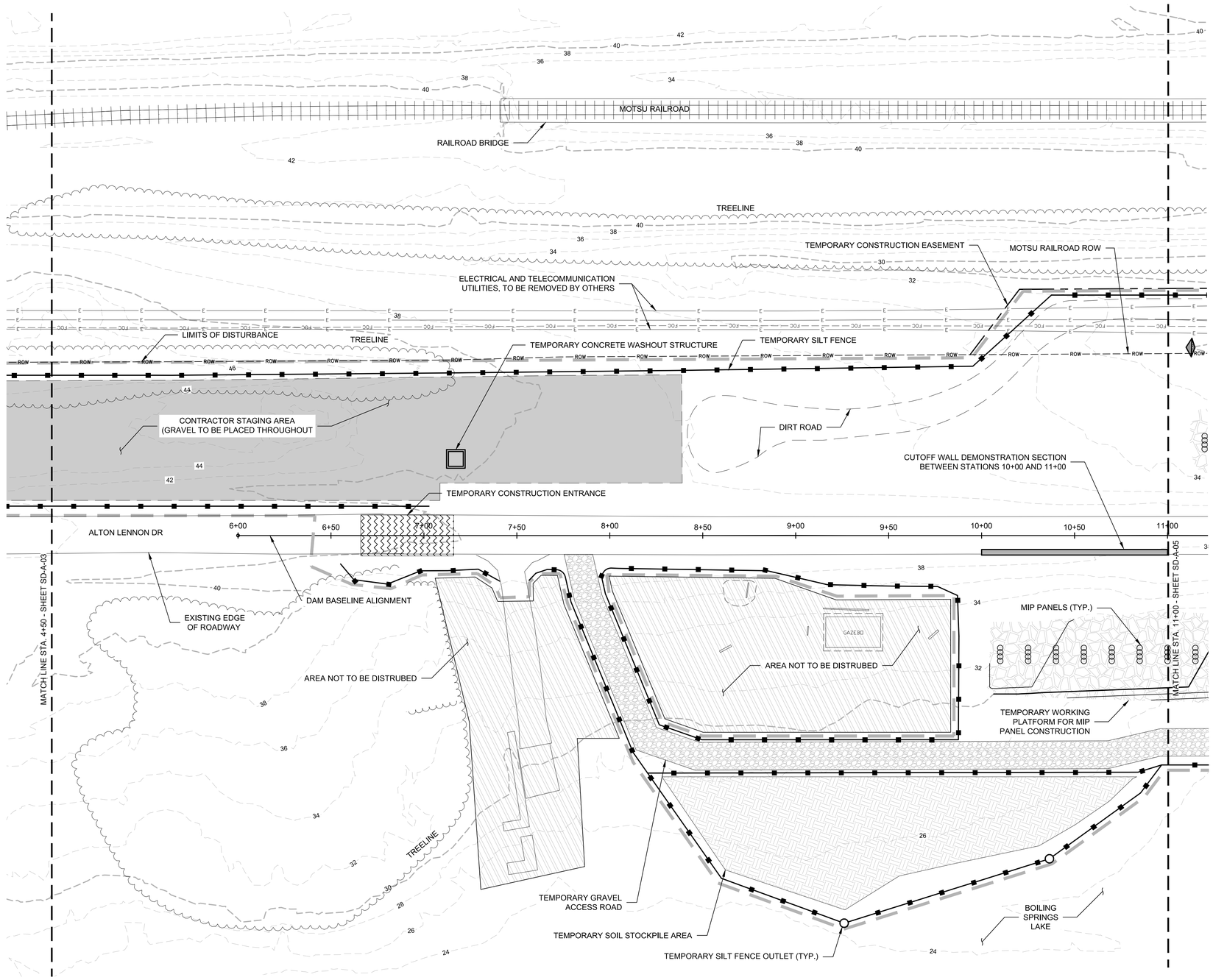
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 1 SEQUENCING AND E&SC PLAN
SHEET 1 OF 4

SHEET
SD-A-03



1 STAGE 1 SEQUENCING AND E&SC PLAN SHEET 2 OF 4

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

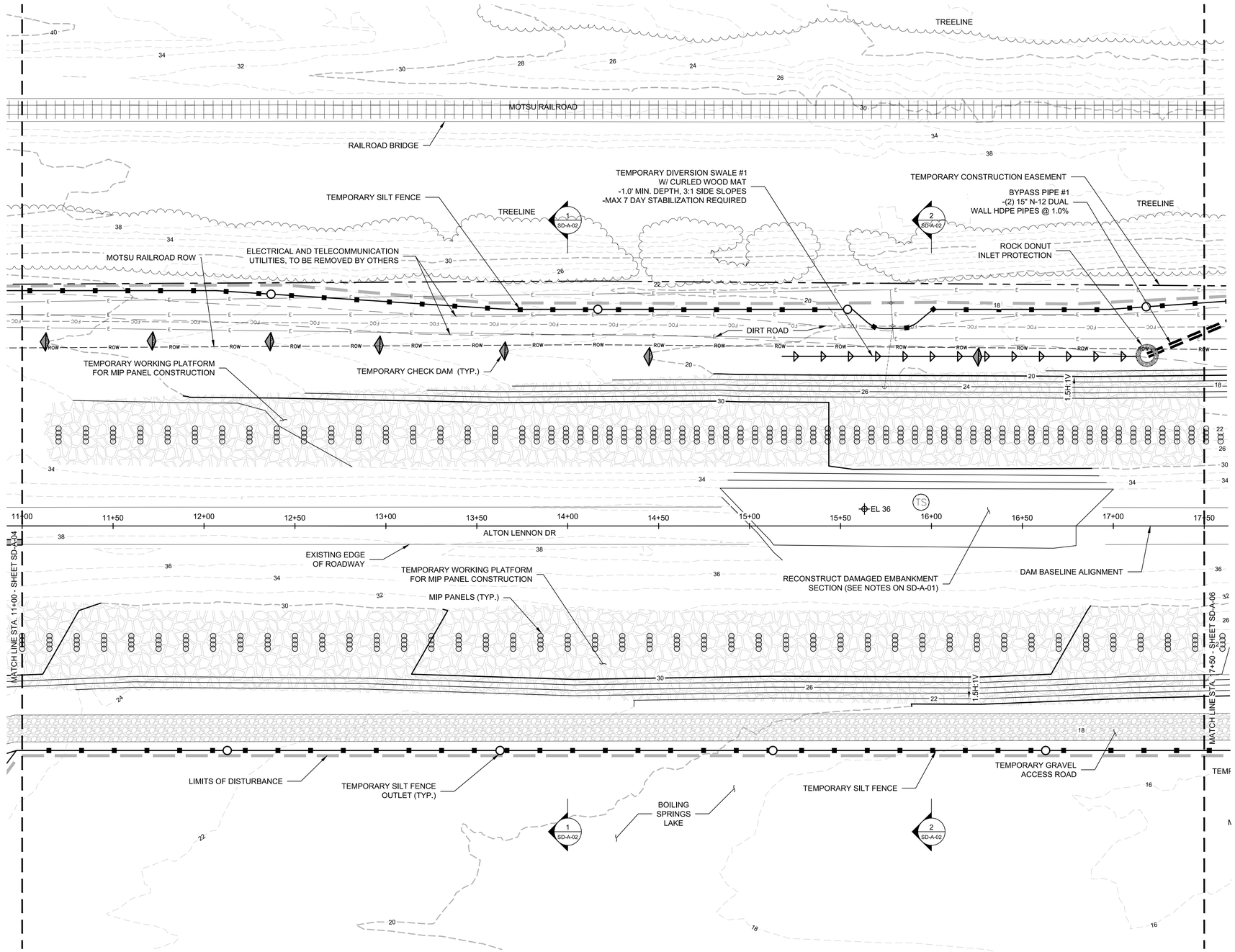
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 1 SEQUENCING AND E&SC PLAN
SHEET 2 OF 4

SHEET
SD-A-04



1 STAGE 1 SEQUENCING AND E&SC PLAN SHEET 3 OF 4

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

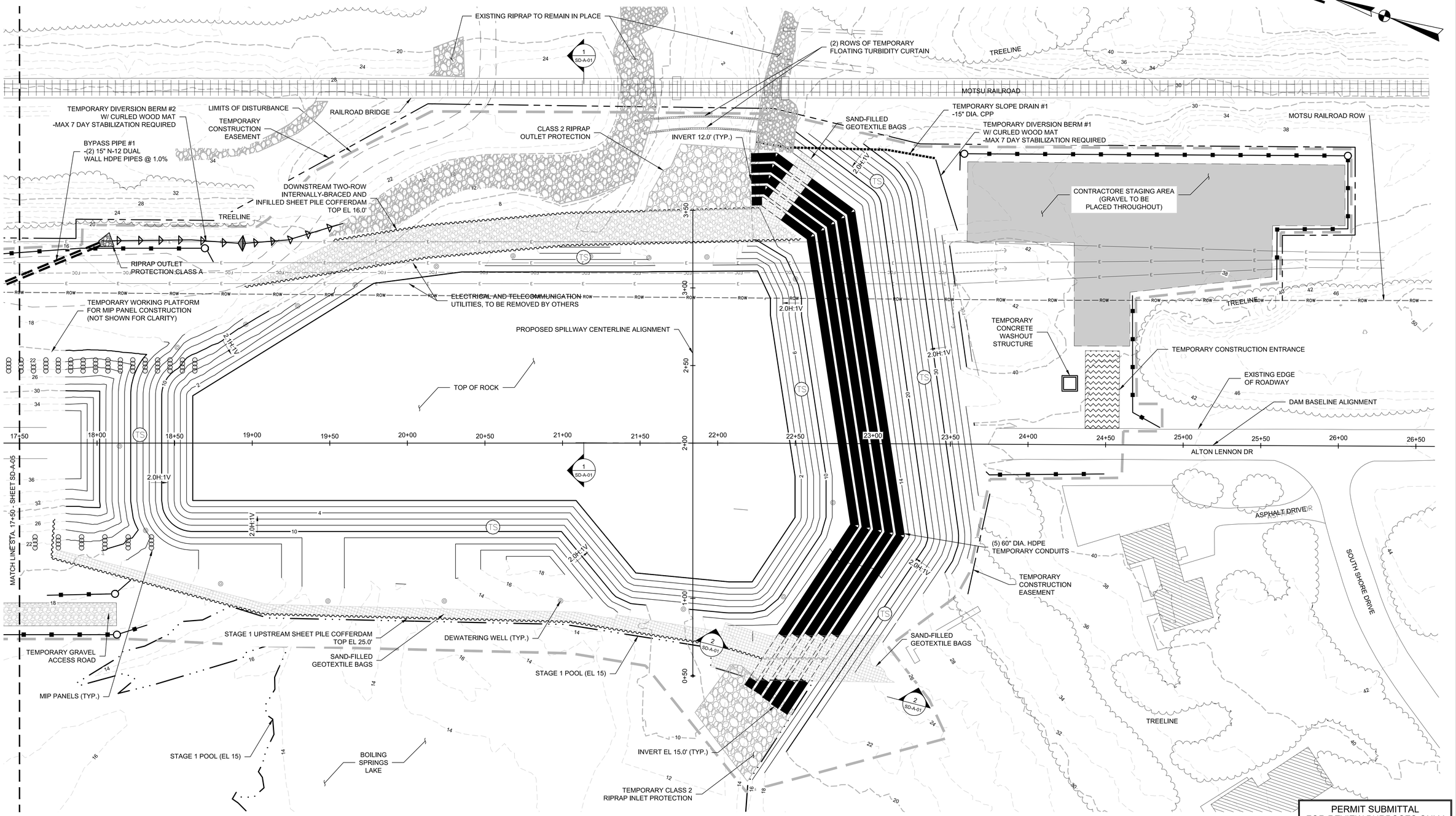
OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 1 SEQUENCING AND E&SC PLAN
SHEET 3 OF 4

SHEET
SD-A-05

G:\2019\GREENSBORO\19C21022_00_BOILING_SPRING_LAKES_DAMS\03_SE_PRODUCTS\08-CAD\DRAWINGS\05-FINAL_DESIGN\SD-A-01_03-STAGE1-ECS-SEQ.DWG PLOT DATE 1/13/2021 3:23 PM AUSTIN SPENCER

19C21022 - BOILING SPRING LAKES - DAM CONSTRUCTION/ RECONSTRUCTION PROJECT



1 STAGE 1 SEQUENCING AND E&SC PLAN SHEET 4 OF 4

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

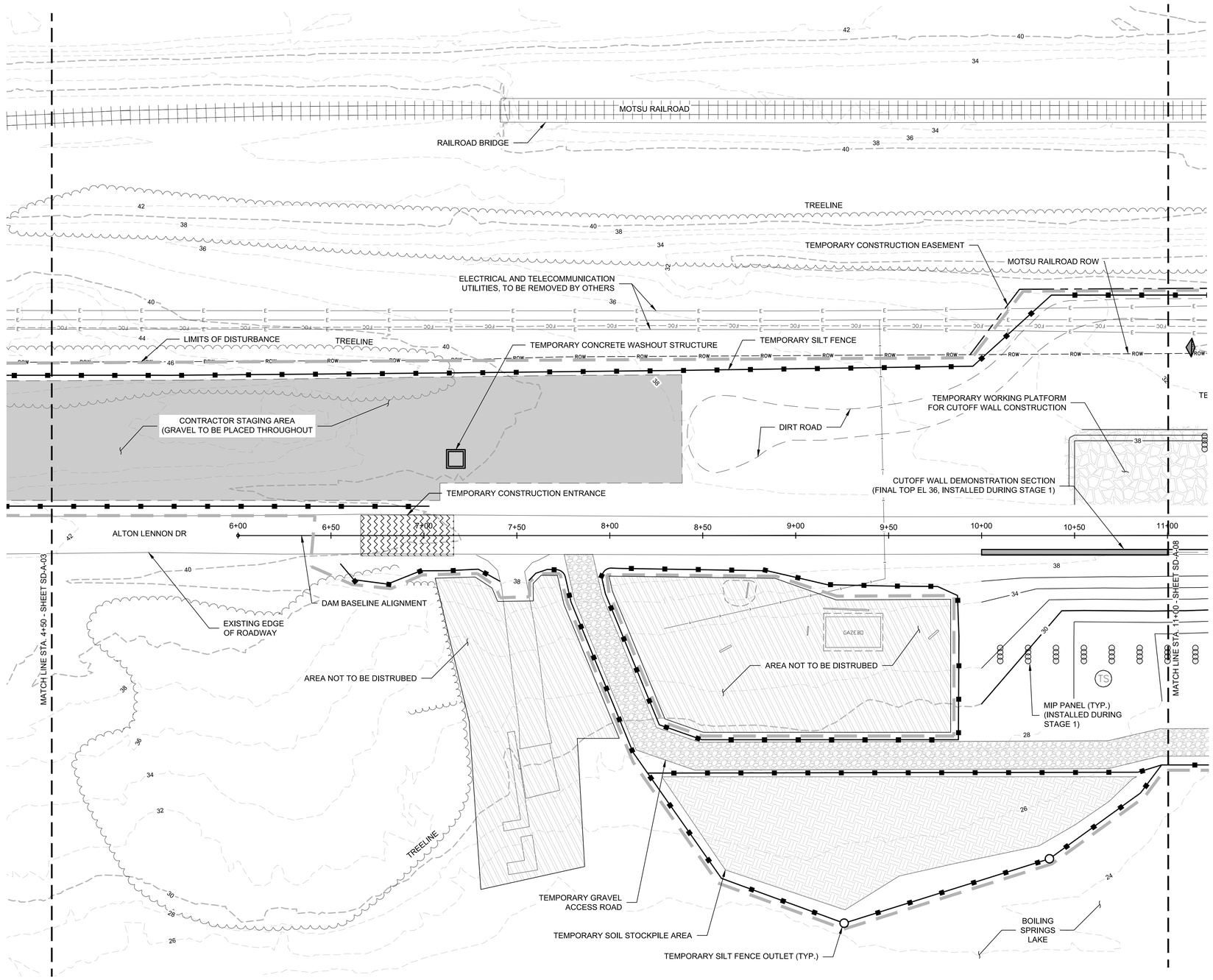
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

STAGE 1 SEQUENCING AND E&SC PLAN
SHEET 4 OF 4

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

SHEET
SD-A-06



1 STAGE 2 SEQUENCING AND E&SC PLAN SHEET 1 OF 3

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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

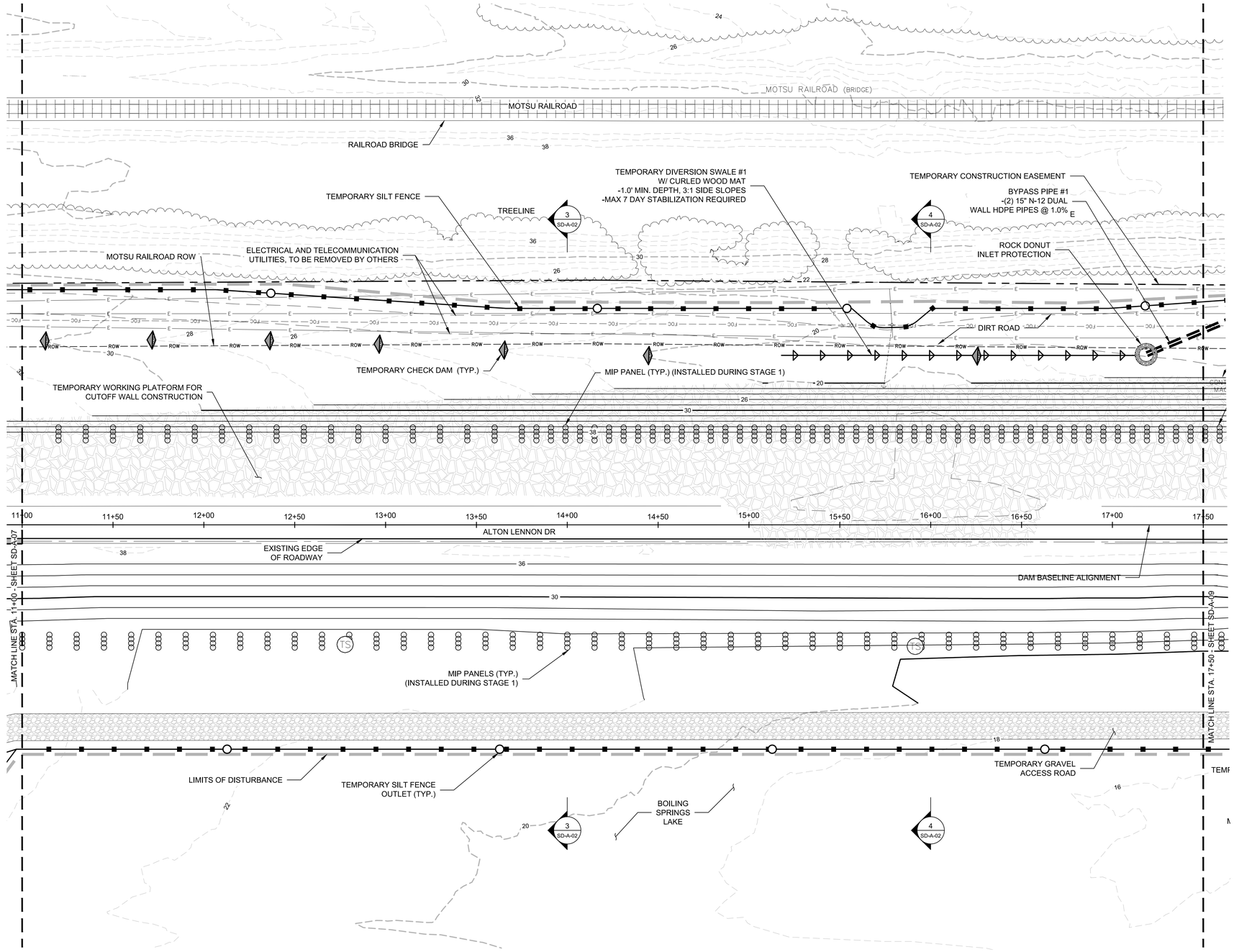
GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER
T. FITZGERALD	R. CALDERON
PROJECT MANAGER	REVIEWER
A. PAISLEY	T. FITZGERALD

STAGE 2 SEQUENCING AND E&SC PLAN
SHEET 1 OF 3

DATE	PROJECT #	FUNDING #
JANUARY 2021	19C21022	N/A

SHEET
SD-A-07



1 STAGE 2 SEQUENCING AND E&SC PLAN SHEET 2 OF 3

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1/15/2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

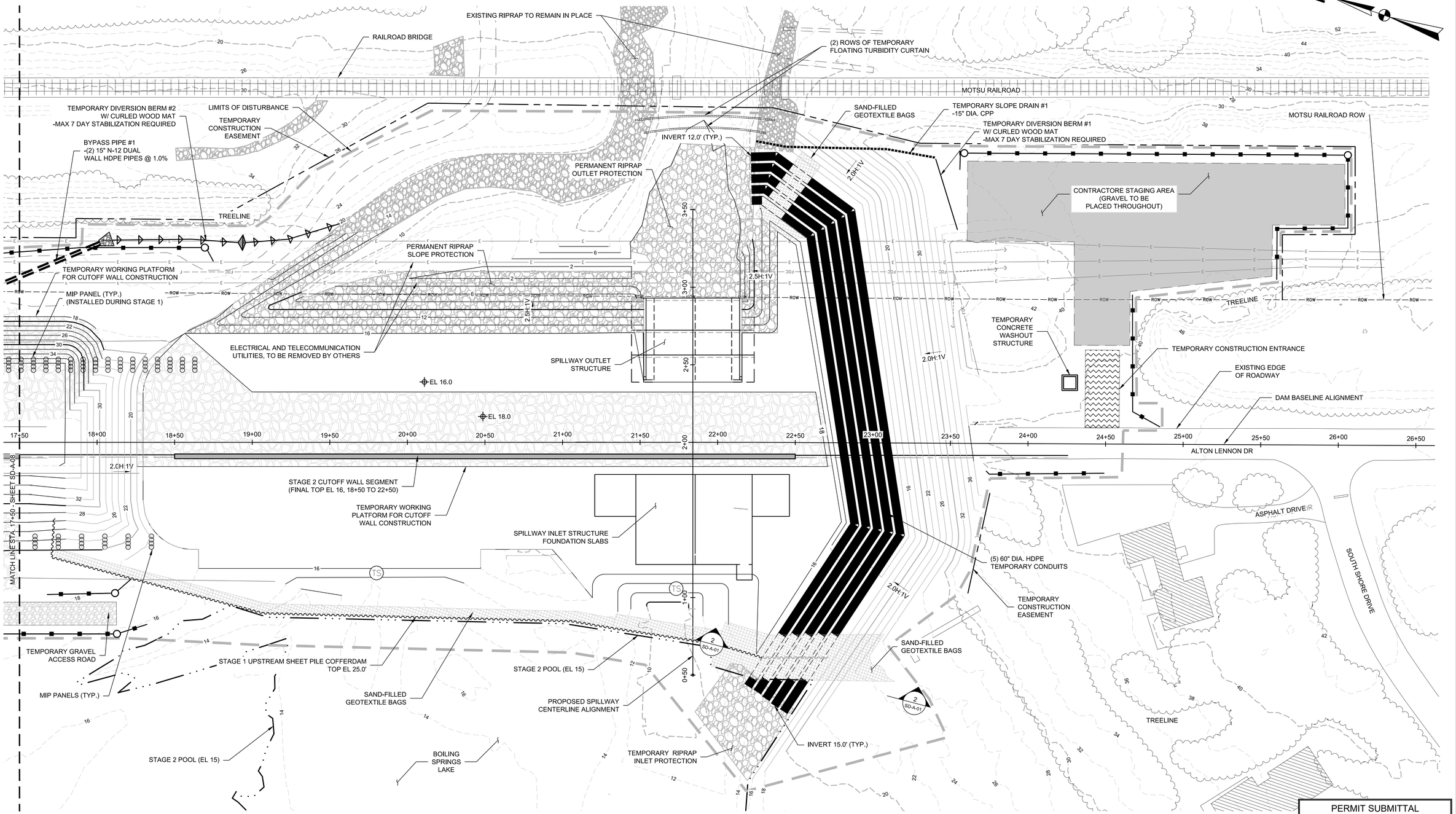
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 2 SEQUENCING AND E&SC PLAN
SHEET 2 OF 3

SHEET
SD-A-08



1 STAGE 2 SEQUENCING AND E&SC PLAN SHEET 3 OF 3

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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

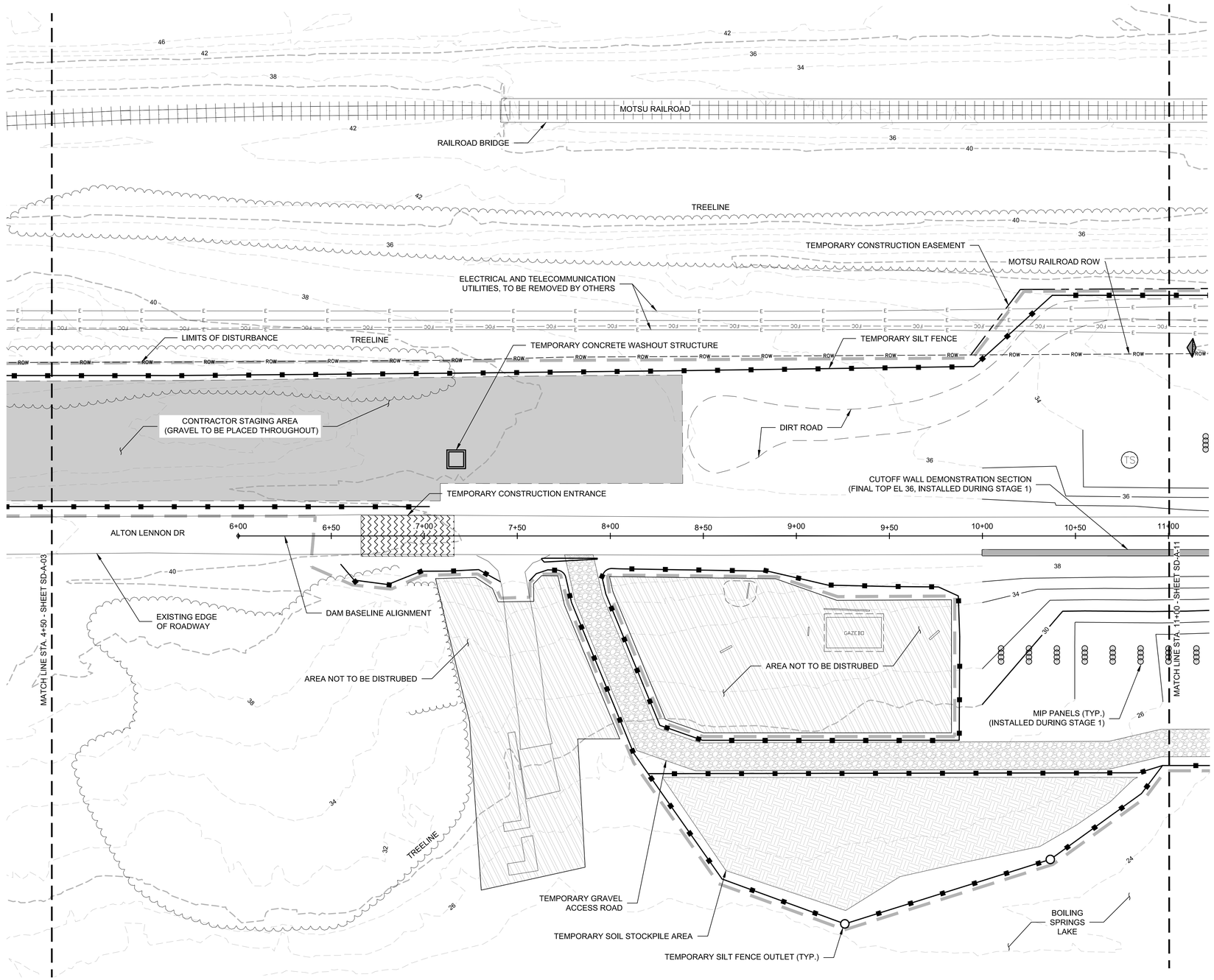
STAGE 2 SEQUENCING AND E&SC PLAN SHEET 3 OF 3

SHEET SD-A-09

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

G:\2019\GREENSBORO\19C21022_00_BOILING_SPRING_LAKES_DAMS\03_SE_PRODUCTS\08-CAD\DRAWINGS\05-FINAL_DESIGN\SD-A-04_09-STAGE2-ECS-SEQ.DWG PLOT DATE 1/13/2021 3:26 PM AUSTIN SPENCER

19C21022 - BOILING SPRING LAKES - DAM CONSTRUCTION/ RECONSTRUCTION PROJECT



1 STAGE 3 SEQUENCING AND E&SC PLAN SHEET 1 OF 3

PERMIT SUBMITTAL
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NORTH CAROLINA PROFESSIONAL SEAL 039129 ENGINEER ADAM C. PAISLEY 1/15/2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/ RECONSTRUCTION PROJECT

BOILING SPRING LAKES

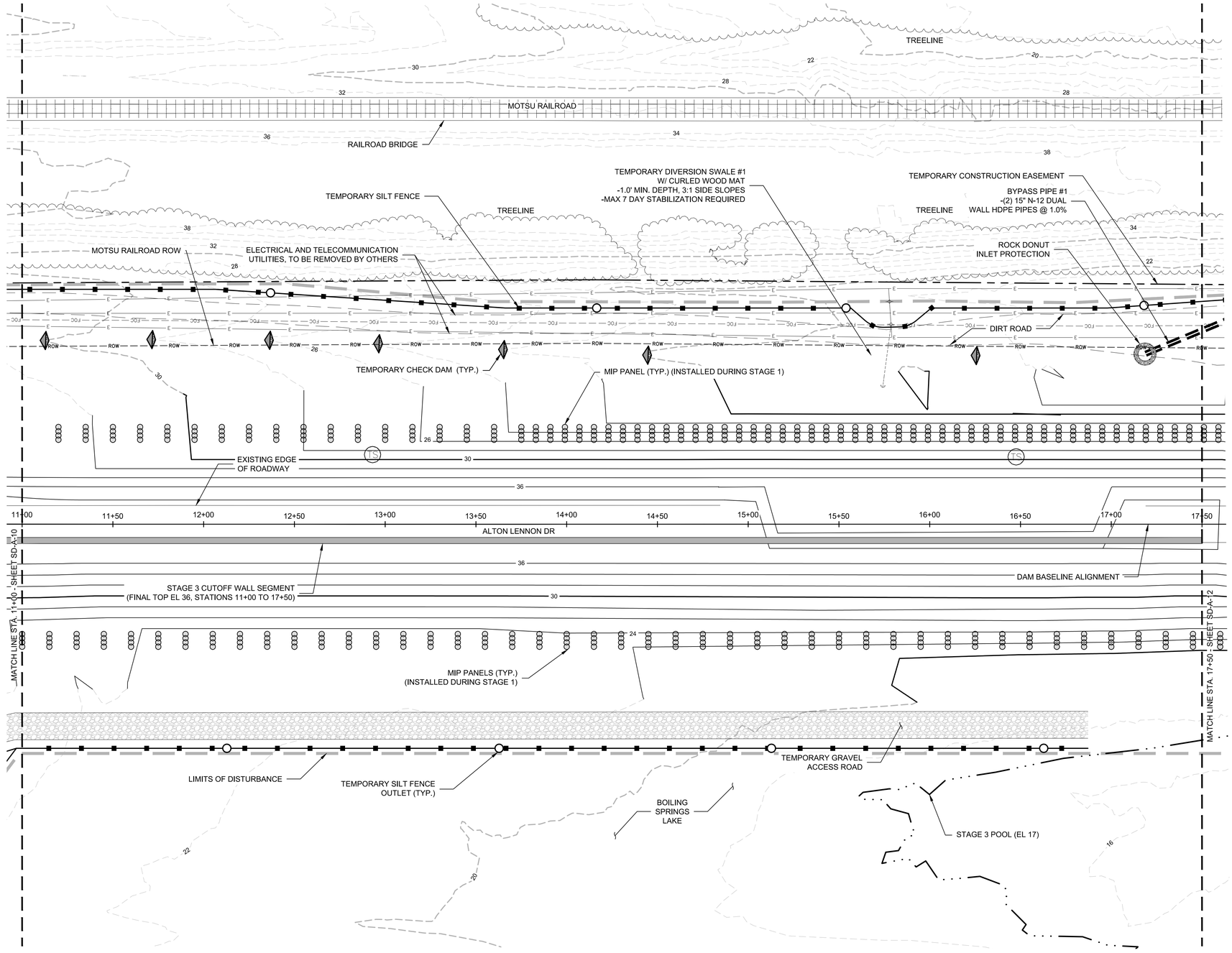
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 3 SEQUENCING AND E&SC PLAN SHEET 1 OF 3

SHEET SD-A-10



1 STAGE 3 SEQUENCING AND E&SC PLAN SHEET 2 OF 3

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

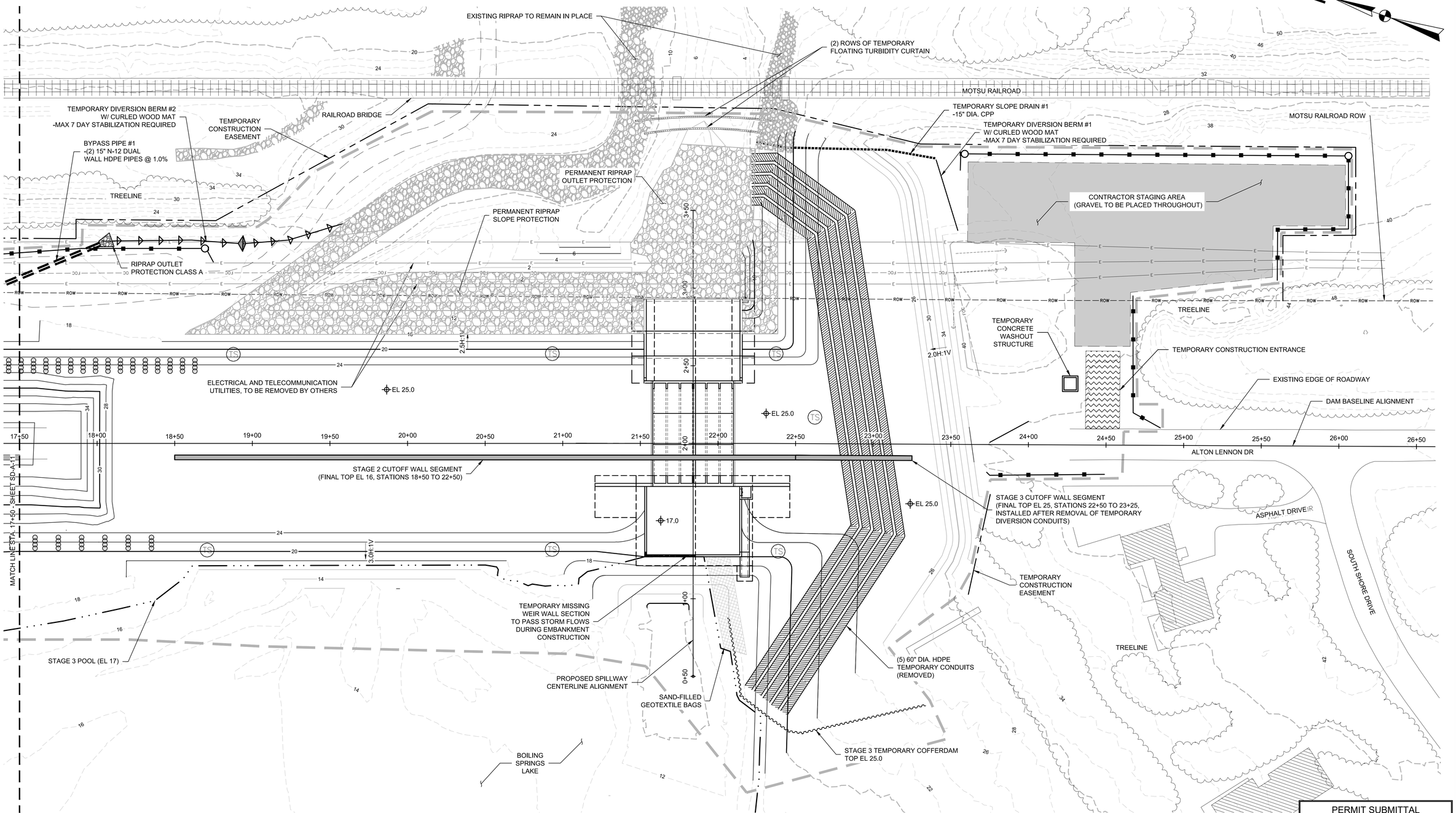
GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER
T. FITZGERALD	R. CALDERON
PROJECT MANAGER	REVIEWER
A. PAISLEY	T. FITZGERALD

STAGE 3 SEQUENCING AND E&SC PLAN
SHEET 2 OF 3

DATE	PROJECT #	FUNDING #
JANUARY 2021	19C21022	N/A

SHEET
SD-A-11



1 STAGE 3 SEQUENCING AND E&SC PLAN SHEET 3 OF 3

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

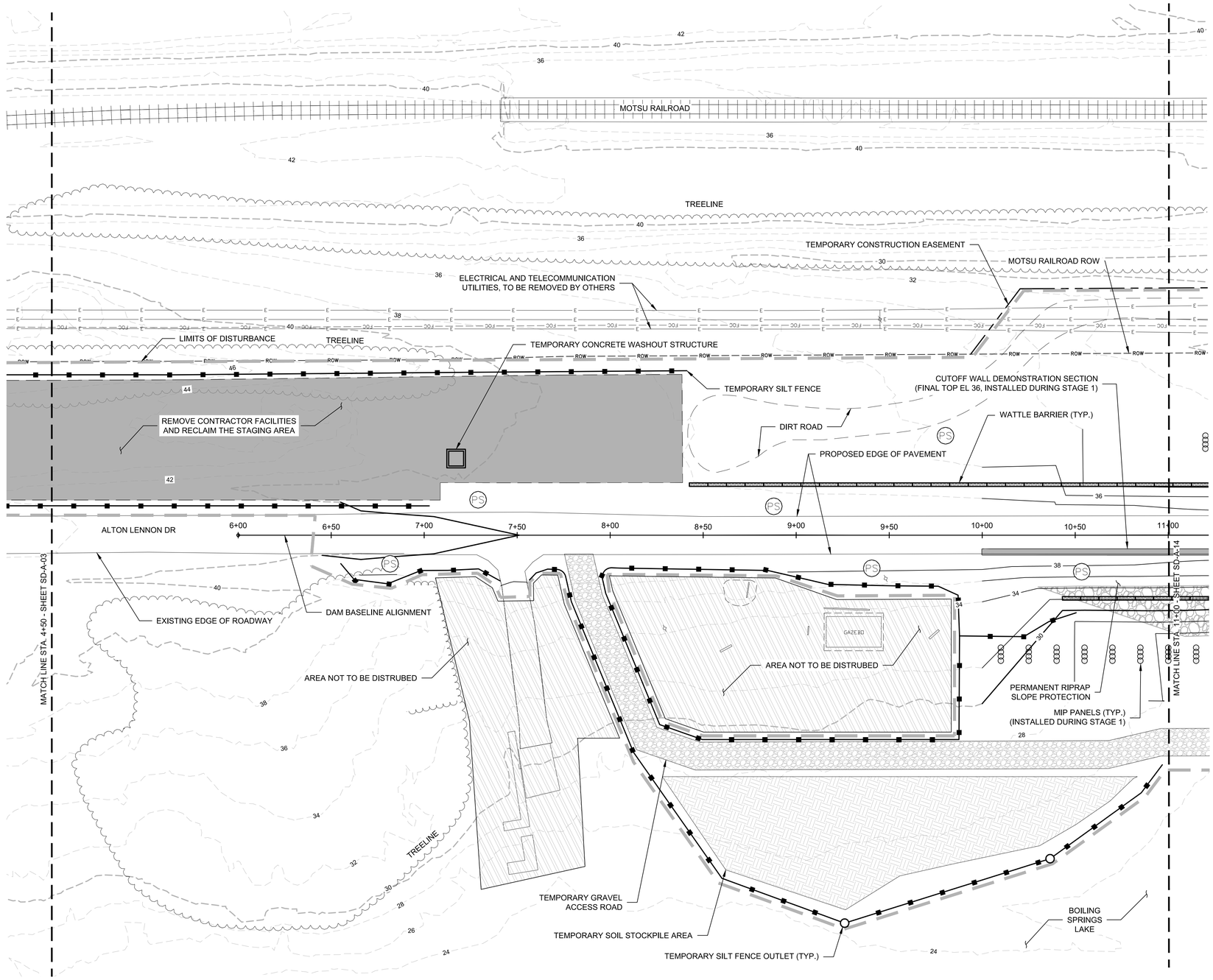
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 3 SEQUENCING AND E&SC PLAN
SHEET 3 OF 3

SHEET
SD-A-12



1 STAGE 4 SEQUENCING AND E&SC PLAN SHEET 1 OF 3

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

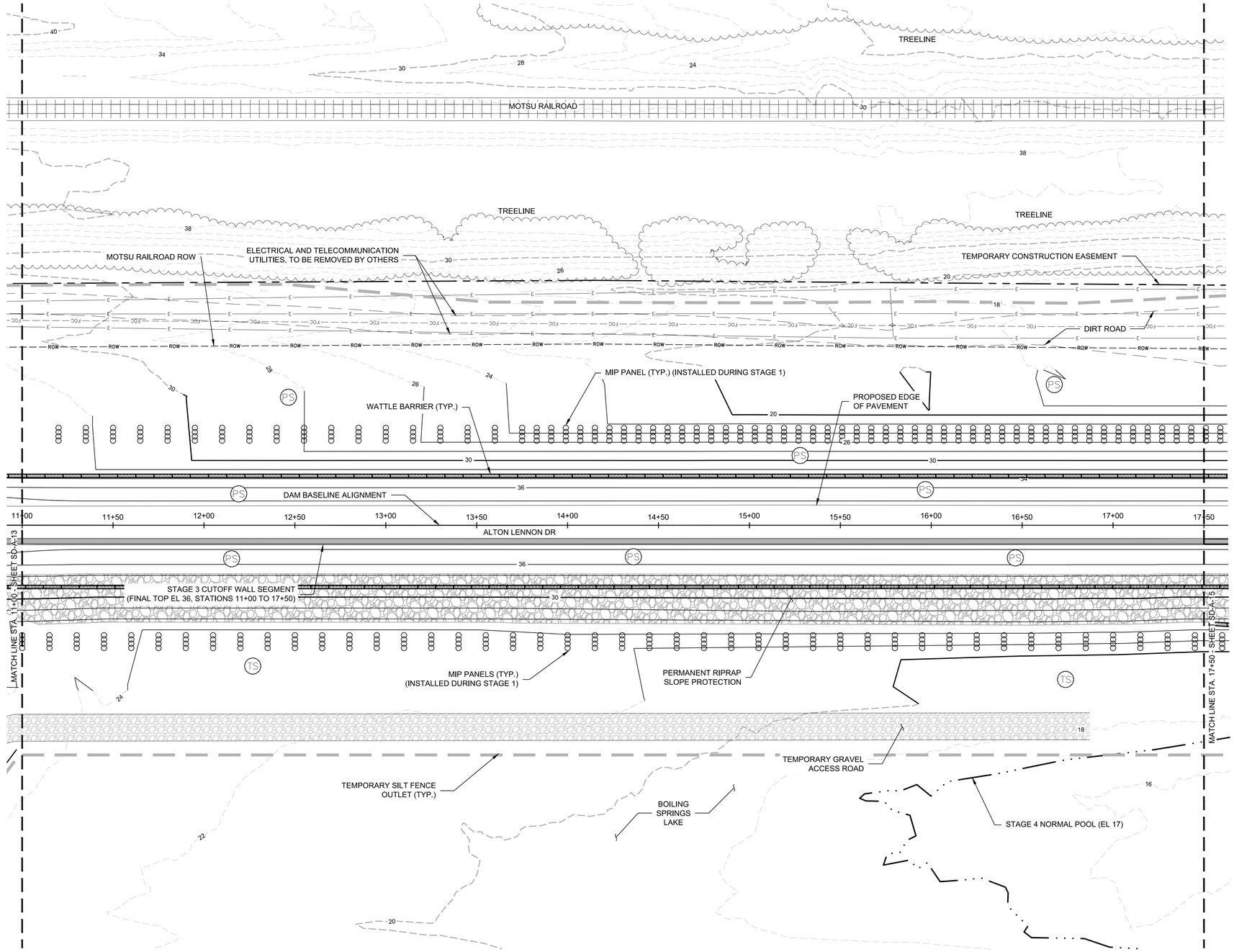
STAGE 4 SEQUENCING AND E&SC PLAN
SHEET 1 OF 3

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
T. FITZGERALD	R. CALDERON	JANUARY 2021	19C21022	N/A
PROJECT MANAGER	REVIEWER			
A. PAISLEY	T. FITZGERALD			

SHEET
SD-A-13

G:\2019\GREENSBORO\19C21022_00_BOILING_SPRING_LAKES_DAMS\03_SE_PRODUCTS\08-CAD\DRAWINGS\05-FINAL_DESIGN\SD-A-10_12-STAGE4-ECS-SEQ.DWG PLOT DATE 1/13/2021 3:27 PM AUSTIN SPENCER

19C21022 - BOILING SPRING LAKES - DAM CONSTRUCTION/ RECONSTRUCTION PROJECT



1 STAGE 4 SEQUENCING AND E&SC PLAN SHEET 2 OF 3

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SEAL 1/15/2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

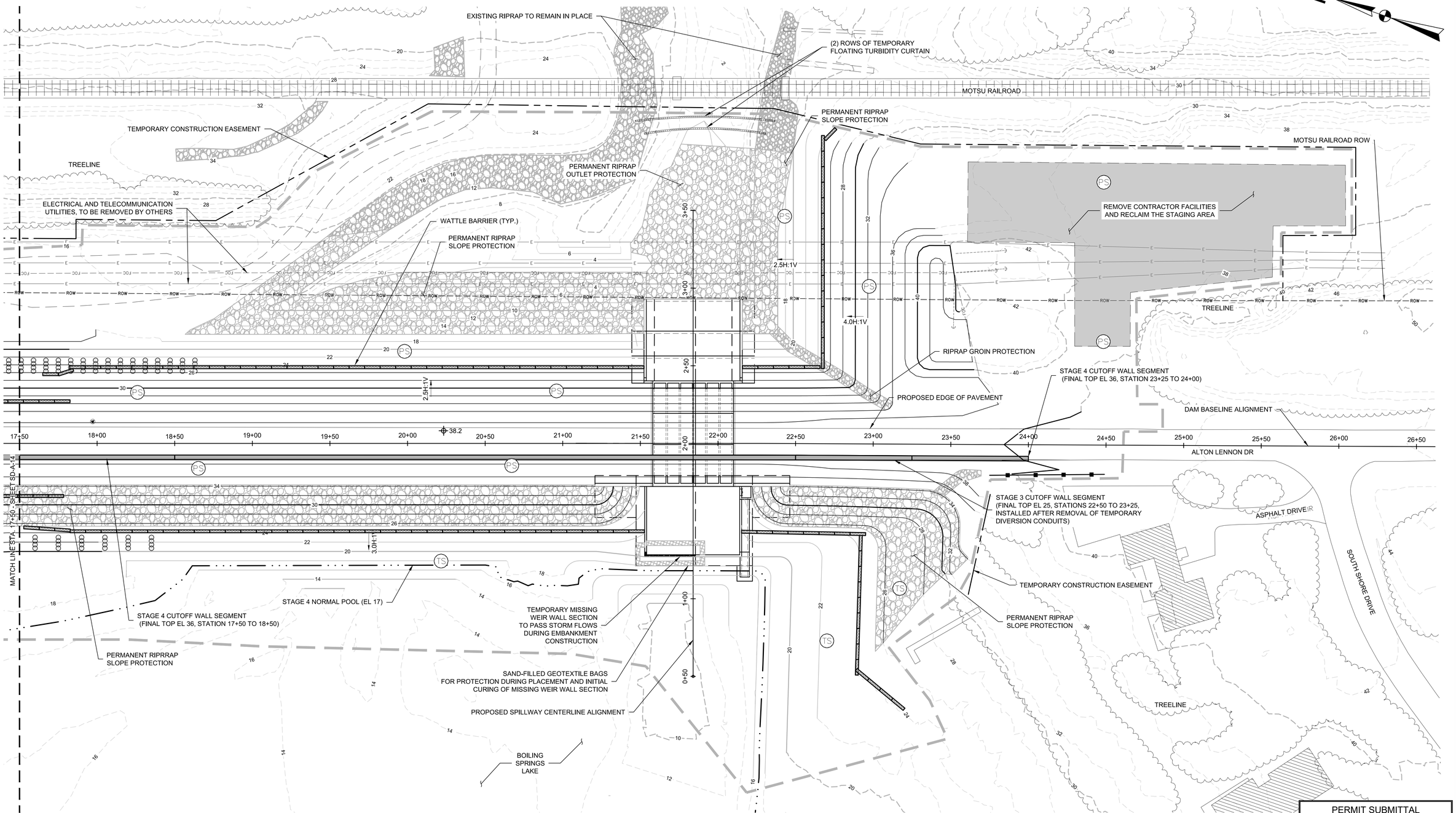
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 4 SEQUENCING AND E&SC PLAN
SHEET 2 OF 3

SHEET
SD-A-14



1 STAGE 4 SEQUENCING AND E&SC PLAN SHEET 3 OF 3

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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

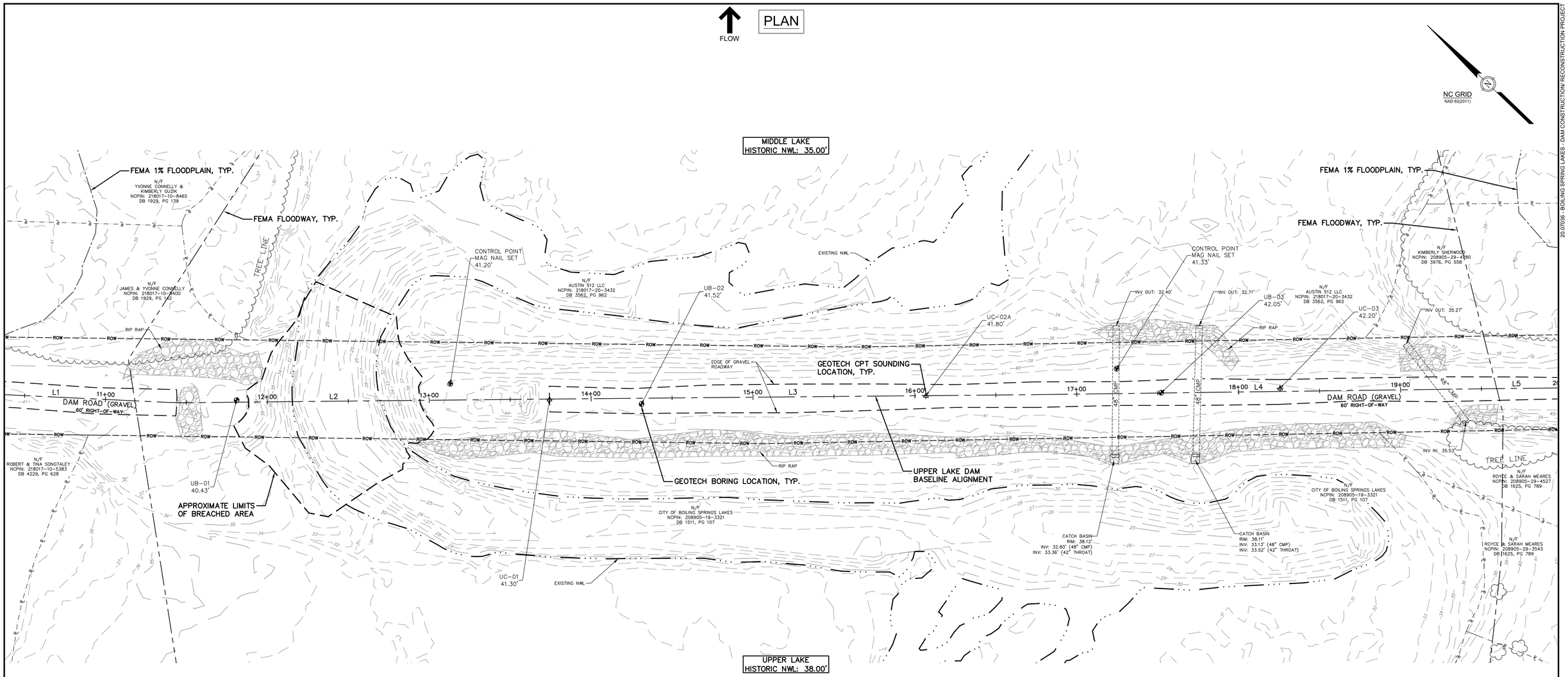
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 4 SEQUENCING AND E&SC PLAN
SHEET 3 OF 3

SHEET
SD-A-15



Line Table: Alignments						
Line #	Length	Direction	Start Station	End Station	Start Point (E,N)	End Point (E,N)
L1	138.06	S41° 17' 14.89"E	10+00.00	11+38.06	(2281719.74,100386.41)	(2281810.84,100282.67)
L2	224.81	S44° 34' 28.26"E	11+49.53	13+74.34	(2281818.65,100274.27)	(2281976.43,100114.13)
L3	300.81	S44° 31' 12.58"E	13+74.34	16+75.16	(2281976.43,100114.13)	(2282187.35,99899.65)
L4	274.64	S44° 45' 02.21"E	16+75.16	19+49.80	(2282187.35,99899.65)	(2282380.71,99704.60)
L5	43.80	S44° 38' 52.30"E	19+49.80	19+93.60	(2282380.71,99704.60)	(2282411.49,99673.44)
L6	406.40	S44° 34' 22.71"E	19+93.60	24+00.00	(2282411.49,99673.44)	(2282696.71,99383.94)

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

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

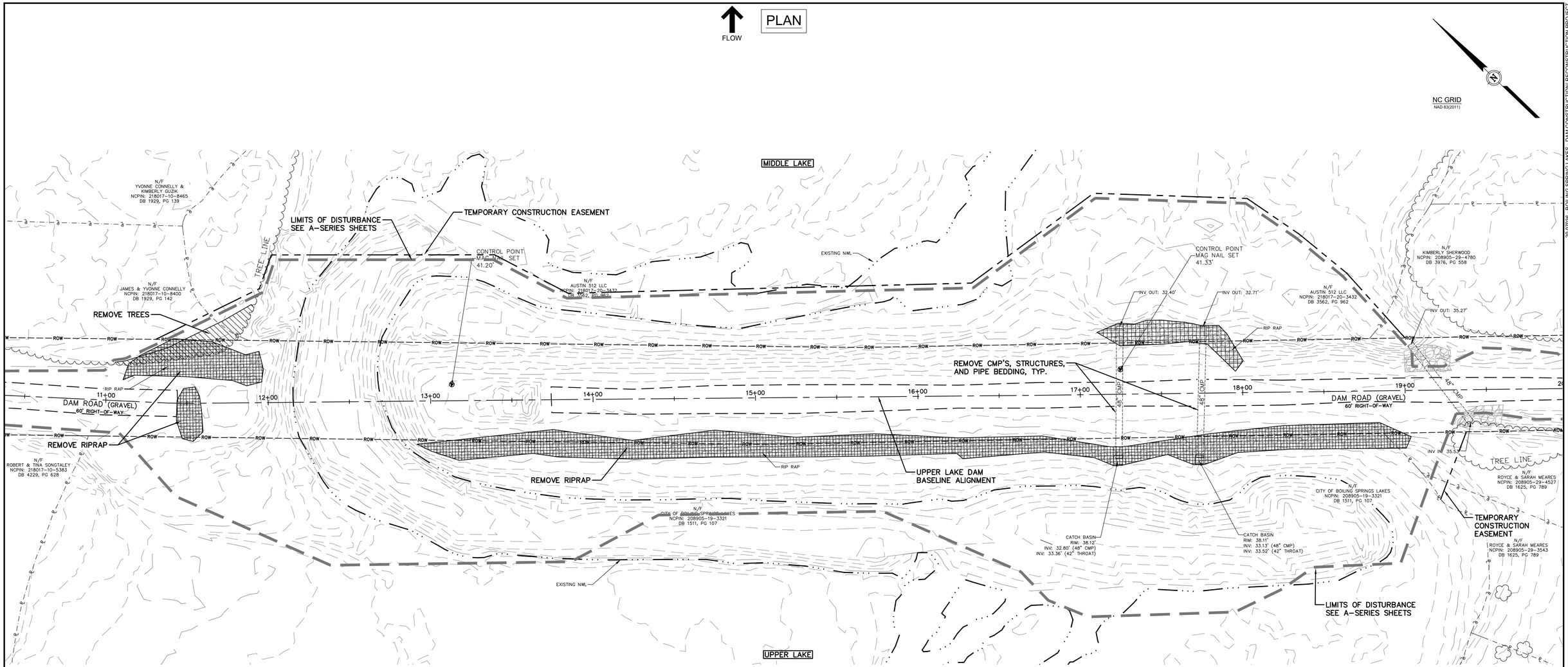
BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	EXISTING CONDITIONS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
ULD-C-01



DEMOLITION PLAN LEGEND

TREES TO BE REMOVED

RIPRAP TO BE REMOVED

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030624 MICHAEL A. HANSON Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

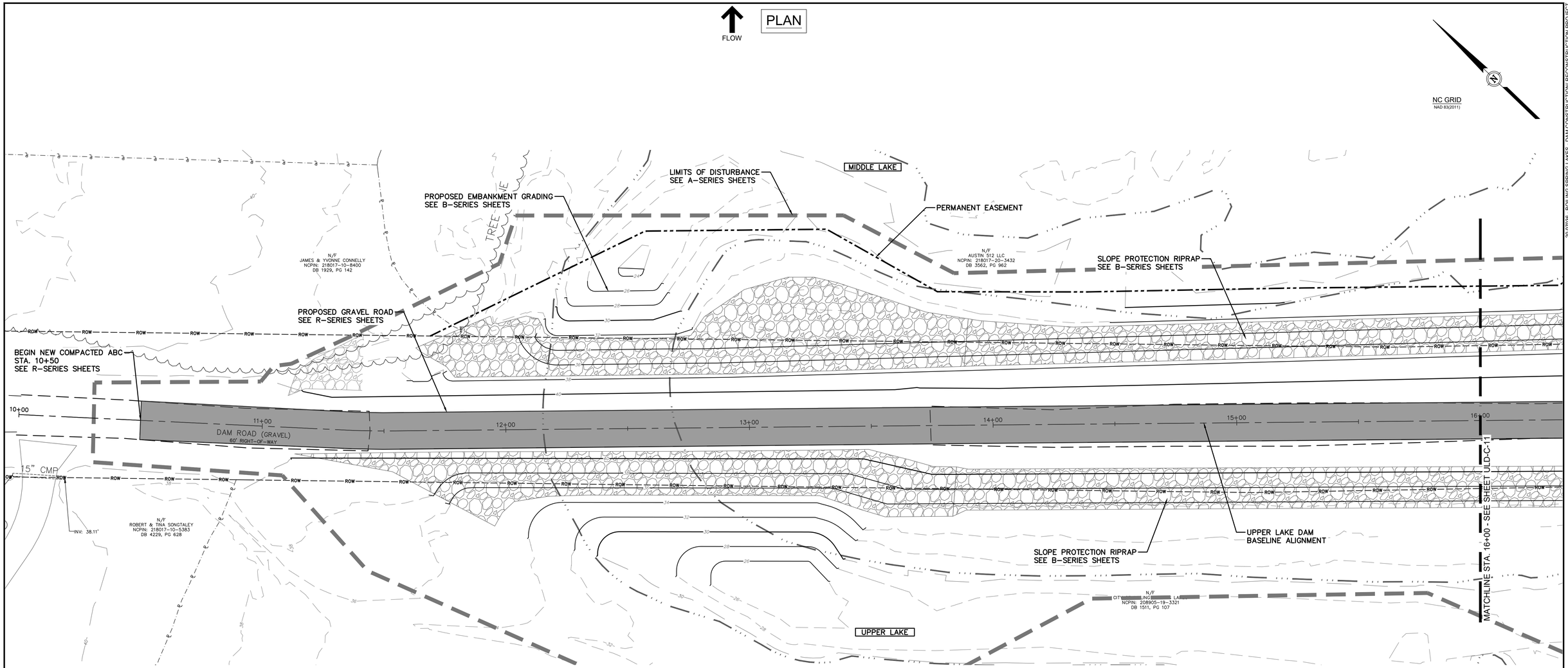
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	S. MEEKINS	JANUARY, 2021	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

DEMOLITION PLAN

SHEET
ULD-C-02



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NC Firm License # C-0459
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030824 MICHAEL A. HANSON

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

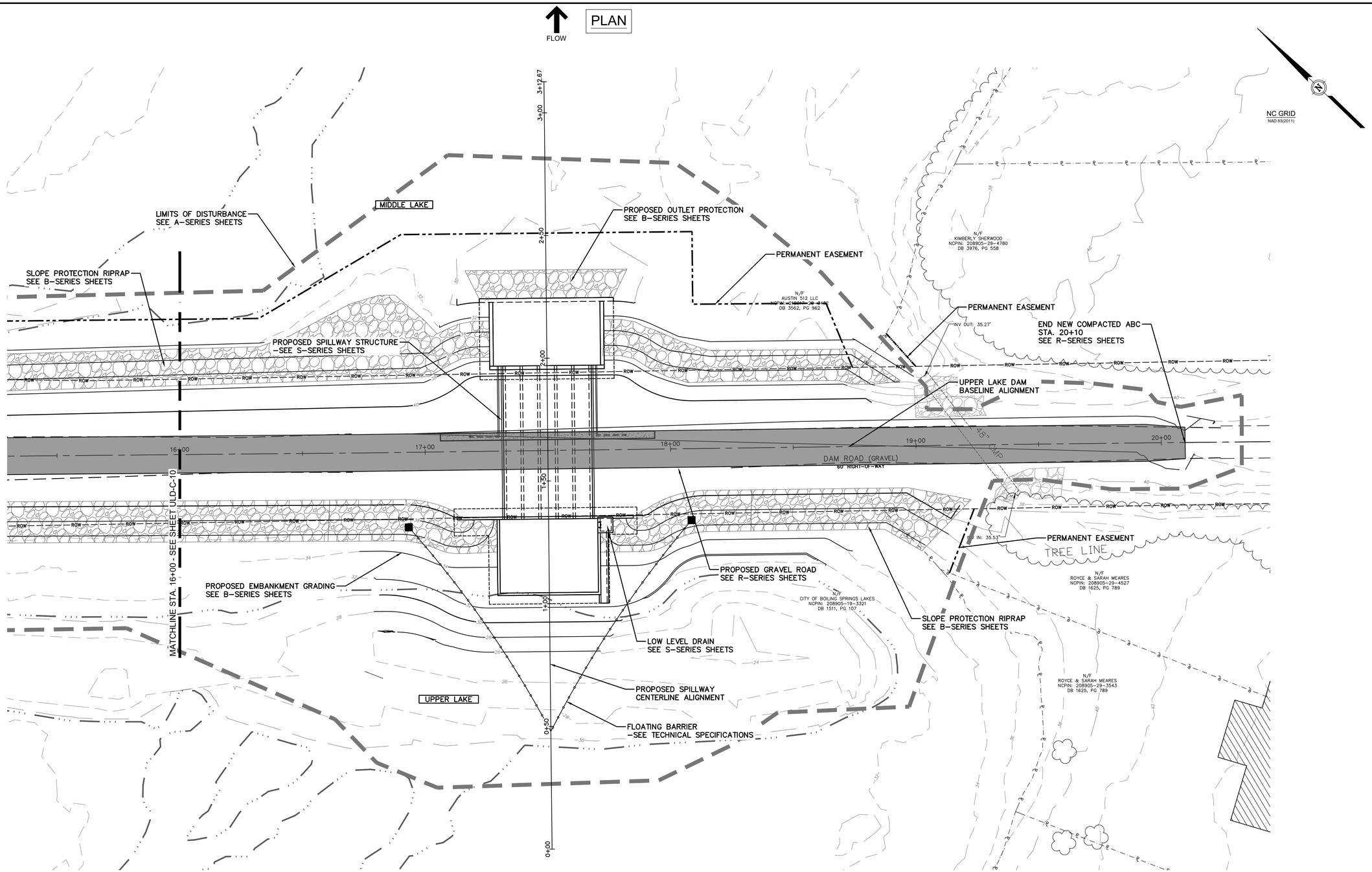
GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	FINAL SITE PLAN STA. 10+00 - STA. 16+00		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
ULD-C-10

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTION\RECONSTRUCT\DRAWINGS\SHEETS\ULD-C-10 - 11 FINAL SITE PLAN.DWG PLOT DATE 2/2/2021 9:29 AM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



PROPOSED SPILLWAY CENTERLINE ALIGNMENT COORDINATES		
STATION	EASTING	NORTHING
STA. 0+00	2282124.42	99732.45
STA. 3+13	2282347.02	99952.01

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NORTH CAROLINA PROFESSIONAL SEAL 030624 ENGINEER MICHAEL A. HANSON
2-1-21

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 20 FEET

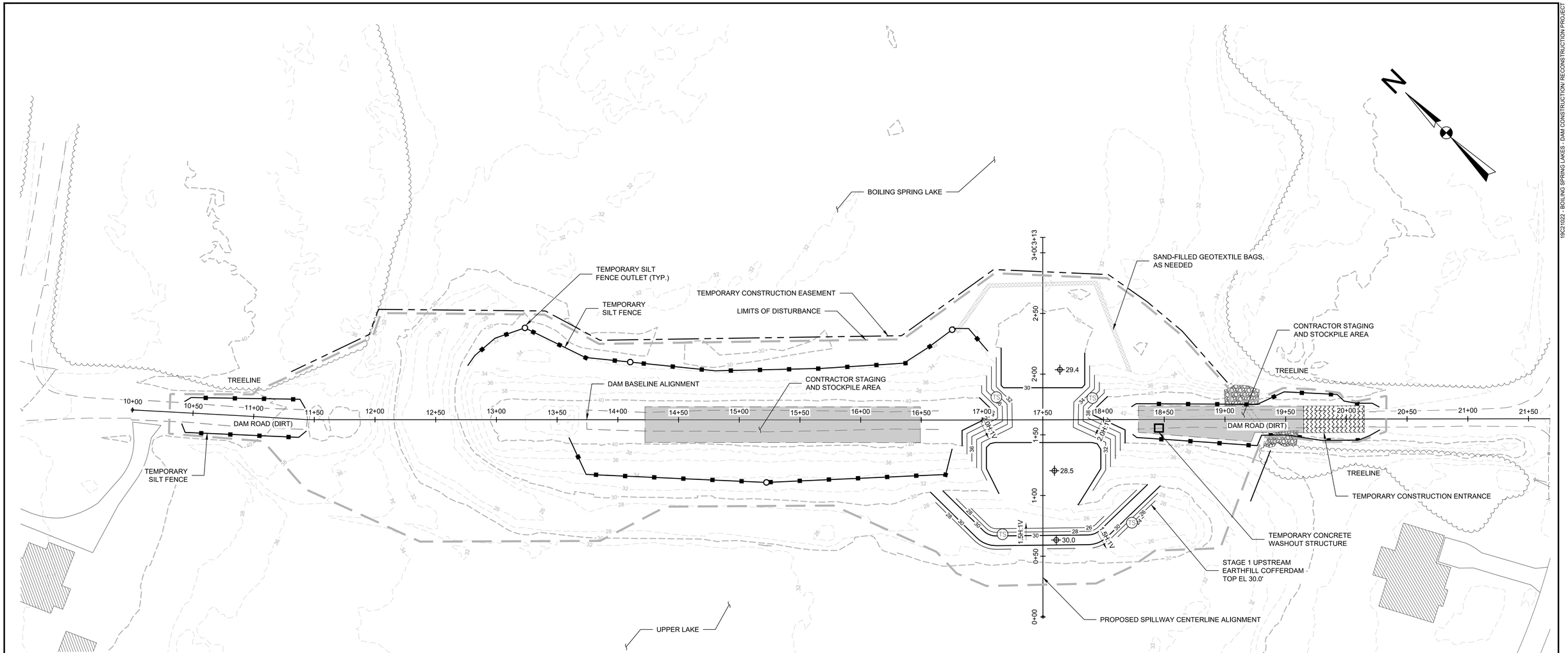
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

FINAL SITE PLAN STA. 16+00 - STA. 20+00

SHEET
ULD-C-11

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTIONRECONSTRUCI\DRAWINGS\SHEETS\ULD-C-10 - 11 FINAL SITE PLAN.DWG PLOT DATE 2/2/2021 9:29 AM CAROLINE HEATHCOAT



SEQUENCE NOTES:

CONSTRUCTION STAGE 1:

1. FLAG LIMITS OF DISTURBANCE AND INSTALL PROJECT SIGNAGE AND TEMPORARY SITE SECURITY AND SAFETY MEASURES.
2. SURVEY AND VERIFY EXISTING CONDITIONS.
3. INSTALL E&SC MEASURES.
4. PREPARE STAGING AREAS AND TEMPORARY FACILITIES, INCLUDING BUT NOT LIMITED TO MATERIALS AND EQUIPMENT LAYDOWN AREA(S), STOCKPILE AREAS, AND PARKING AREA(S).
5. REMOVE AND STOCKPILE TOPSOIL AND RIPRAP SLOPE PROTECTION FROM AREAS TO BE DISTURBED AS PART OF CONSTRUCTION.
6. INSTALL STAGE 1 COFFERDAMS MAINTAIN FLOW THROUGH BREACH.
7. EXCAVATE FOR SPILLWAY REPLACEMENT AND DEMOLISH EXISTING SPILLWAY CONDUITS.
8. PREPARE SPILLWAY FOUNDATION SURFACE, INCLUDING INSTALLATION OF DEWATERING MEASURES AND PLACEMENT OF MUDMAT.

FLOW

1 STAGE 1 SEQUENCE AND E&SC PLAN

GENERAL NOTES:

1. SEE G-SERIES SHEETS FOR E&SC MEASURE DETAILS.
2. SEQUENCING AND CONCEPTUAL CONTROL OF WATER LAYOUTS SHOWN ON A-SERIES SHEETS WERE DESIGNED BY SCHNABEL ENGINEERING, P.C. AND ARE PRESENTED UNDER THE PROFESSIONAL ENGINEER SEAL ON THIS SHEET. E&SC MEASURES AND LAYOUT SHOWN ON THE A-SERIES SHEETS WERE DESIGNED BY MCGILL ASSOCIATES, P.A. AND ARE PRESENTED UNDER THE PROFESSIONAL ENGINEER SEAL ON SHEET G-02.

PERMIT SUBMITTAL
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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

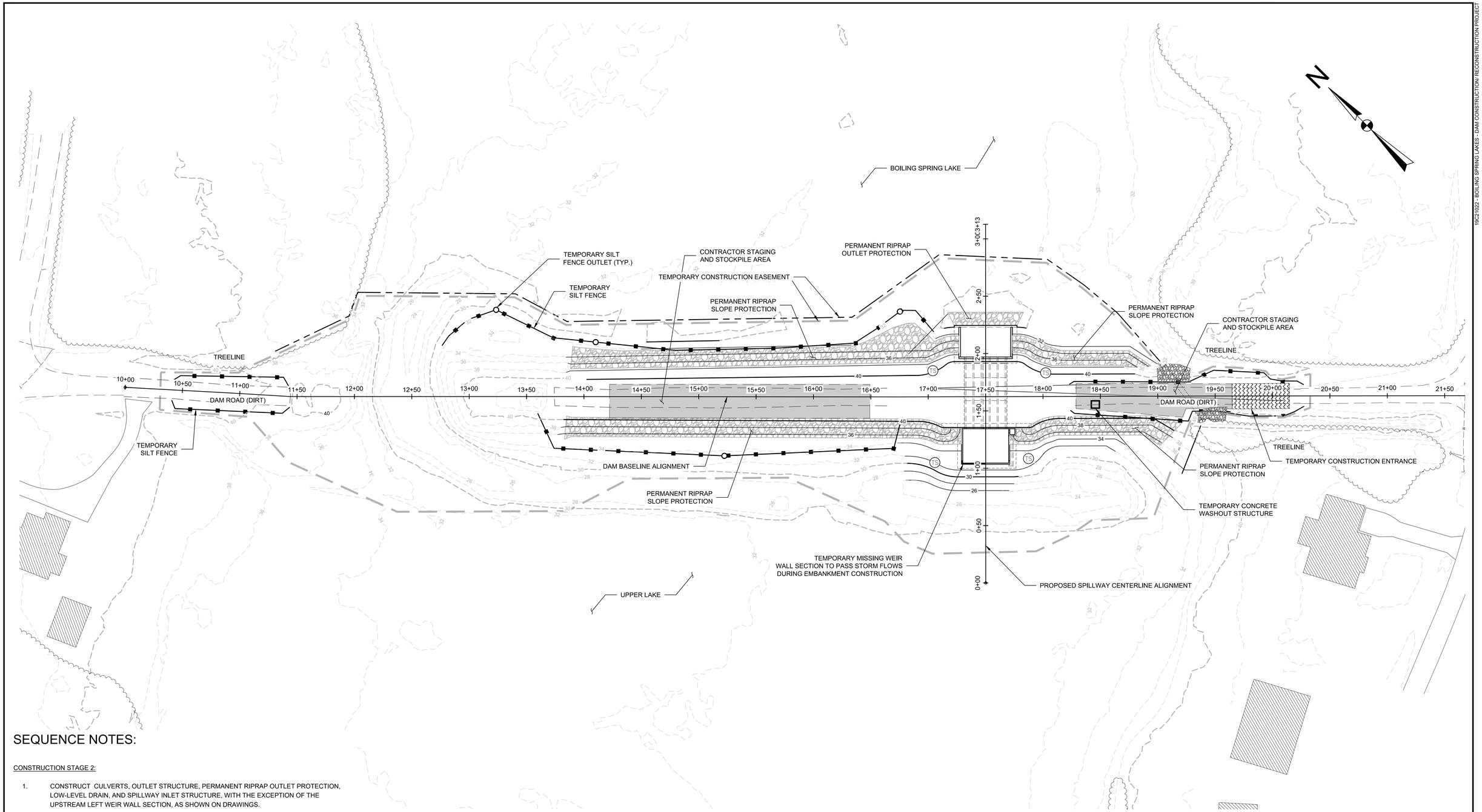
BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 40 0 20 40 80 — DIVISION VALUE = 40 FEET

OFFICE MANAGER	DESIGNER			
T. FITZGERALD	R. CALDERON	STAGE 1 SEQUENCE AND E&SC PLAN		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

SHEET
ULD-A-01



SEQUENCE NOTES:

CONSTRUCTION STAGE 2:

1. CONSTRUCT CULVERTS, OUTLET STRUCTURE, PERMANENT RIPRAP OUTLET PROTECTION, LOW-LEVEL DRAIN, AND SPILLWAY INLET STRUCTURE, WITH THE EXCEPTION OF THE UPSTREAM LEFT WEIR WALL SECTION, AS SHOWN ON DRAWINGS.
2. CONSTRUCT EMBANKMENT IN AREA OF NEW SPILLWAY UP TO ROADWAY SUBGRADE. DURING EMBANKMENT CONSTRUCTION, CONSTRUCT PROPOSED PERMANENT RIPRAP SLOPE PROTECTION.
3. REMOVE STAGE 1 COFFERDAMS.

FLOW

1 STAGE 2 SEQUENCE AND E&SC PLAN

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1/15/2021

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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

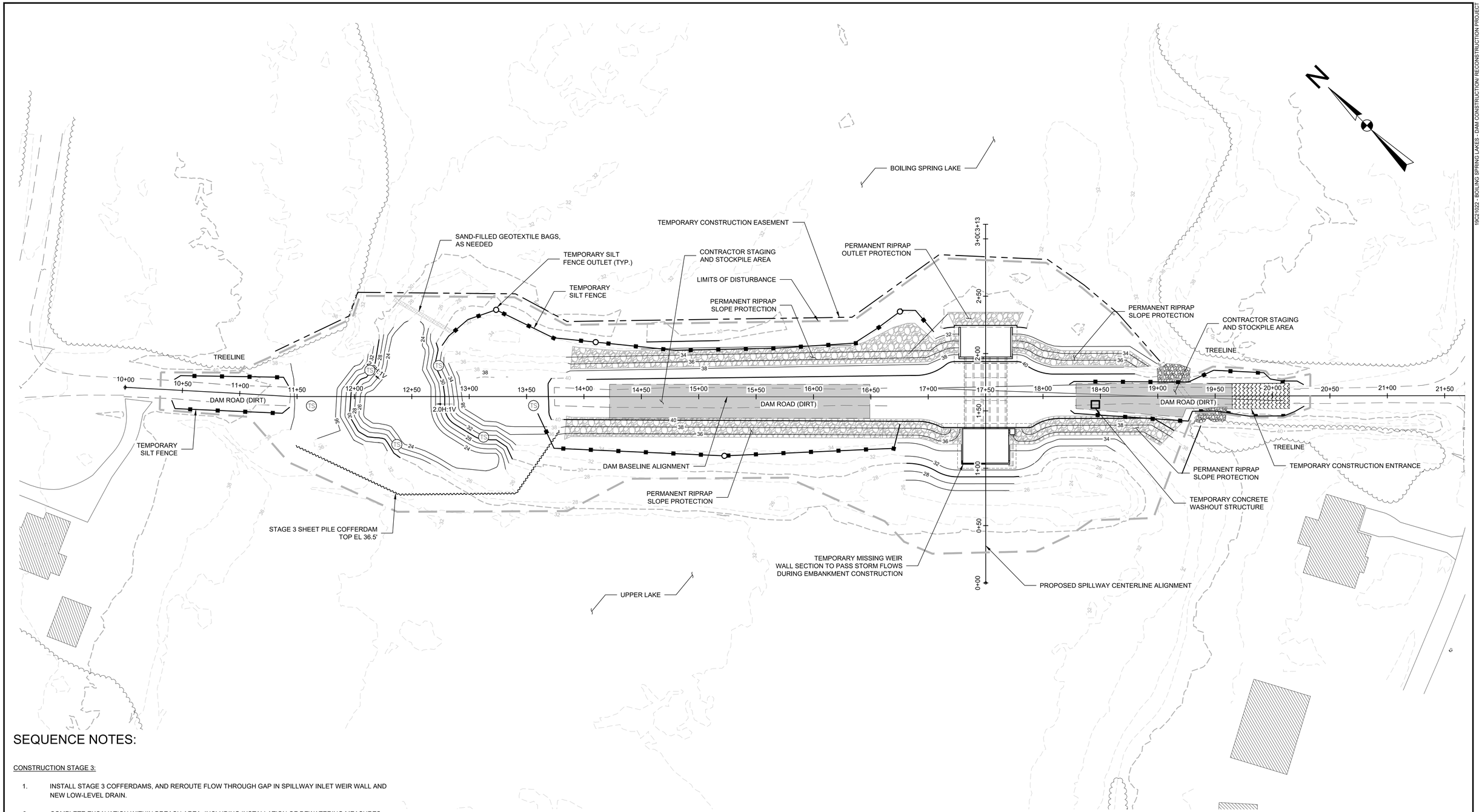
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 40 0 20 40 80 — DIVISION VALUE = 40 FEET

STAGE 2 SEQUENCE AND E&SC PLAN

OFFICE MANAGER	DESIGNER			
T. FITZGERALD	R. CALDERON			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

SHEET
ULD-A-02



SEQUENCE NOTES:

CONSTRUCTION STAGE 3:

1. INSTALL STAGE 3 COFFERDAMS, AND REROUTE FLOW THROUGH GAP IN SPILLWAY INLET WEIR WALL AND NEW LOW-LEVEL DRAIN.

2. COMPLETE EXCAVATION WITHIN BREACH AREA, INCLUDING INSTALLATION OF DEWATERING MEASURES.

FLOW

1 STAGE 3 SEQUENCE AND E&SC PLAN

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BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 40 0 20 40 80 — DIVISION VALUE = 40 FEET

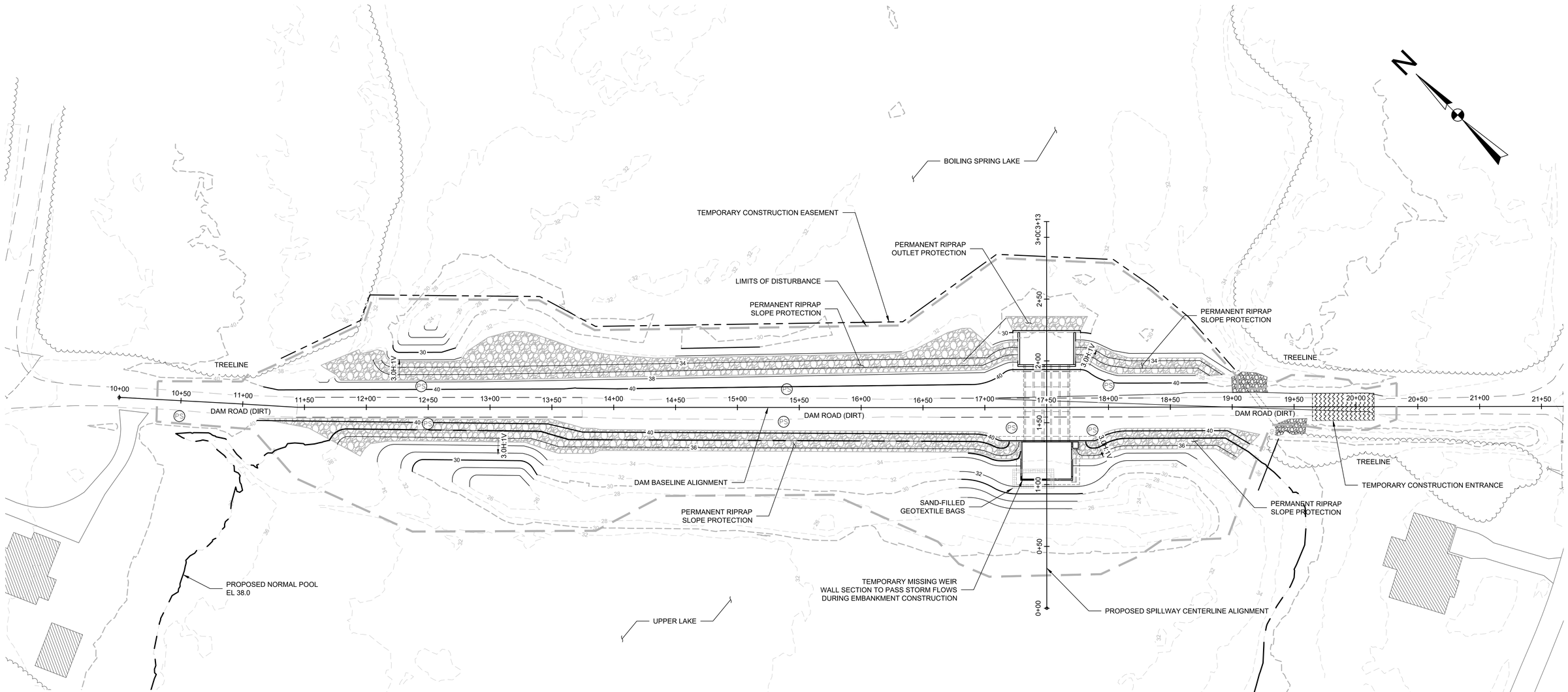
OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 3 SEQUENCE AND E&SC PLAN

SHEET
ULD-A-03

G:\2019\GREENSBORO\19C21022_00_BOILING_SPRING_LAKES_DAMS\03_SE_PRODUCTS\09-CAD\DRAWINGS\05-FINAL_DESIGN\ULD-A-03_04-STAGES-ECS-SEQ.DWG PLOT DATE 1/12/2021 10:56 AM AUSTIN SPENCER

19C21022 - BOILING SPRING LAKES - DAM CONSTRUCTION/ RECONSTRUCTION PROJECT



SEQUENCE NOTES:

CONSTRUCTION STAGE 4:

1. CONSTRUCT EMBANKMENT IN BREACH AREA UP TO ROADWAY SUBGRADE. DURING EMBANKMENT CONSTRUCTION, CONSTRUCT THE RIPRAP SLOPE PROTECTION.
2. REMOVE STAGE 3 COFFERDAMS.
3. RECLAIM STAGING AND STOCKPILE AREAS.
4. BLOCK BASE FLOW FROM MISSING SPILLWAY INLET WEIR WALL SECTION, SUCH THAT FLOW IS ROUTED THROUGH ONLY THE LOW-LEVEL DRAIN.
5. CONSTRUCT THE MISSING SPILLWAY INLET WEIR WALL SECTION.
6. CONSTRUCT NEW ROADWAY SECTIONS, PERFORM FINE GRADING, PLACE TOPSOIL, AND APPLY PERMANENT SEEDING AND MULCHING.
7. REMOVE E&SC MEASURES.

FLOW

1 STAGE 4 SEQUENCE AND E&SC PLAN

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

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Suite 103
Shallotte, NC 28470
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NORTH CAROLINA PROFESSIONAL SEAL 039129 ENGINEER ADAM C. PAISLEY
1/15/2021

Schnabel ENGINEERING
LICENSE NUMBER C-2599
11A Oak Branch Drive / Greensboro, NC / 27407
T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

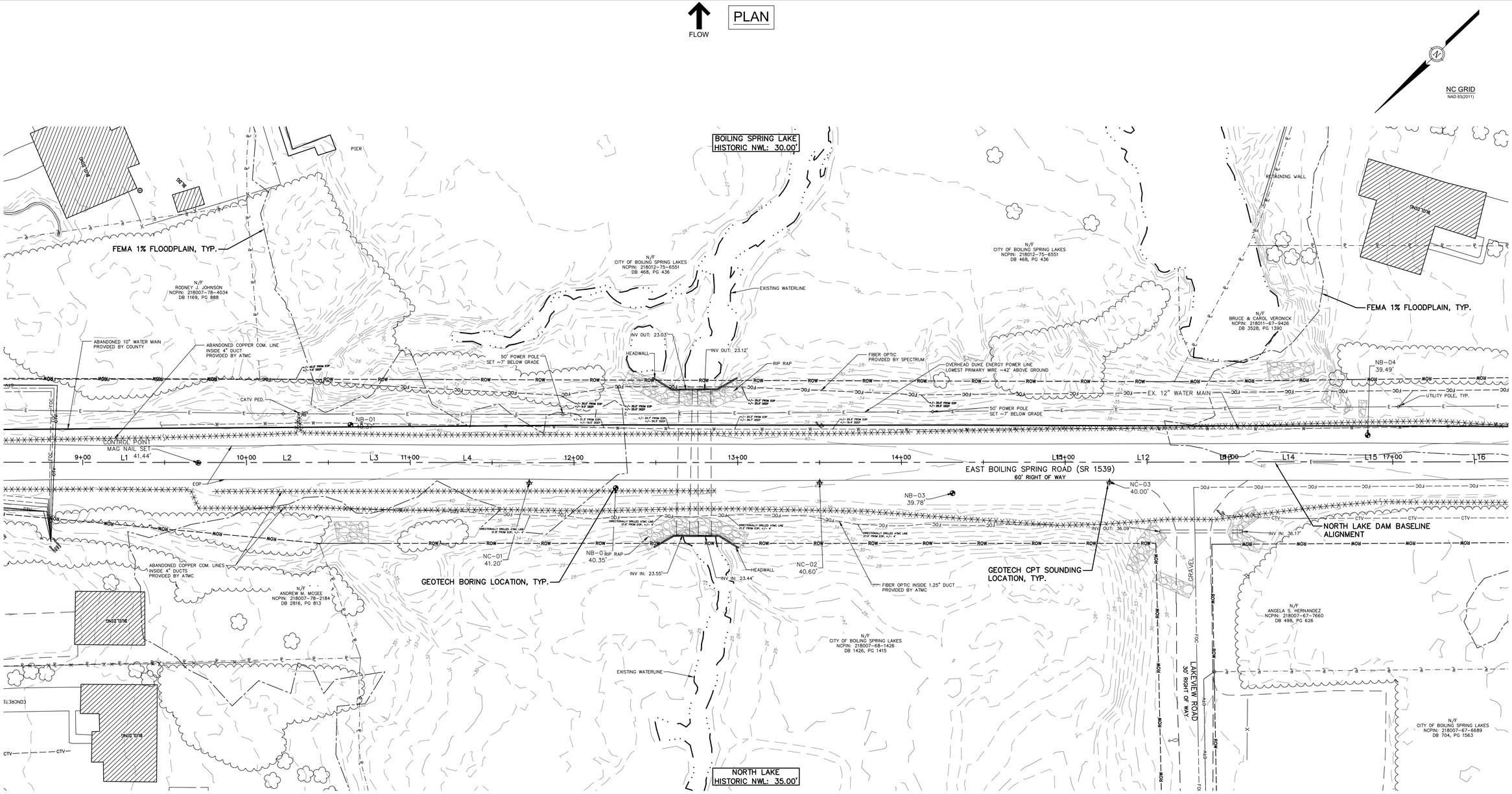
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE 40 0 20 40 80 — DIVISION VALUE = 40 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 4 SEQUENCE AND E&SC PLAN

SHEET
ULD-A-04



Line Table: Alignments						
Line #	Length	Direction	Start Station	End Station	Start Point (E,N)	End Point (E,N)
L1	149.44	S43° 29' 41.69"W	8+50.56	10+00.00	(2287407.23, 108158.24)	(2287304.37, 108049.82)
L2	49.90	S43° 18' 09.74"W	10+00.00	10+49.90	(2287304.37, 108049.82)	(2287270.14, 108013.51)
L3	56.08	S43° 27' 04.75"W	10+49.90	11+05.98	(2287270.14, 108013.51)	(2287231.57, 107972.80)
L4	58.11	S43° 37' 04.47"W	11+05.98	11+64.09	(2287231.57, 107972.80)	(2287191.49, 107930.73)
L11	53.93	S43° 24' 54.80"W	14+68.22	15+22.16	(2286982.70, 107709.59)	(2286945.64, 107670.41)
L12	51.28	S43° 21' 50.94"W	15+22.16	15+73.43	(2286945.64, 107670.41)	(2286910.43, 107633.13)

Line Table: Alignments						
Line #	Length	Direction	Start Station	End Station	Start Point (E,N)	End Point (E,N)
L13	49.72	S43° 11' 38.98"W	15+73.43	16+23.15	(2286910.43, 107633.13)	(2286876.40, 107596.89)
L14	26.85	S43° 32' 45.15"W	16+23.15	16+50.00	(2286876.40, 107596.89)	(2286857.90, 107577.42)
L15	73.62	S43° 26' 01.87"W	16+50.00	17+23.62	(2286857.90, 107577.42)	(2286807.28, 107523.96)
L16	58.77	S43° 15' 42.62"W	17+23.62	17+82.38	(2286807.28, 107523.96)	(2286767.01, 107481.17)

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

PERMIT SUBMITTAL
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NORTH CAROLINA PROFESSIONAL SEAL 030824 ENGINEER MICHAEL A. HANSON
Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE 30 0 15 30 60 — DIVISION VALUE = 30 FEET

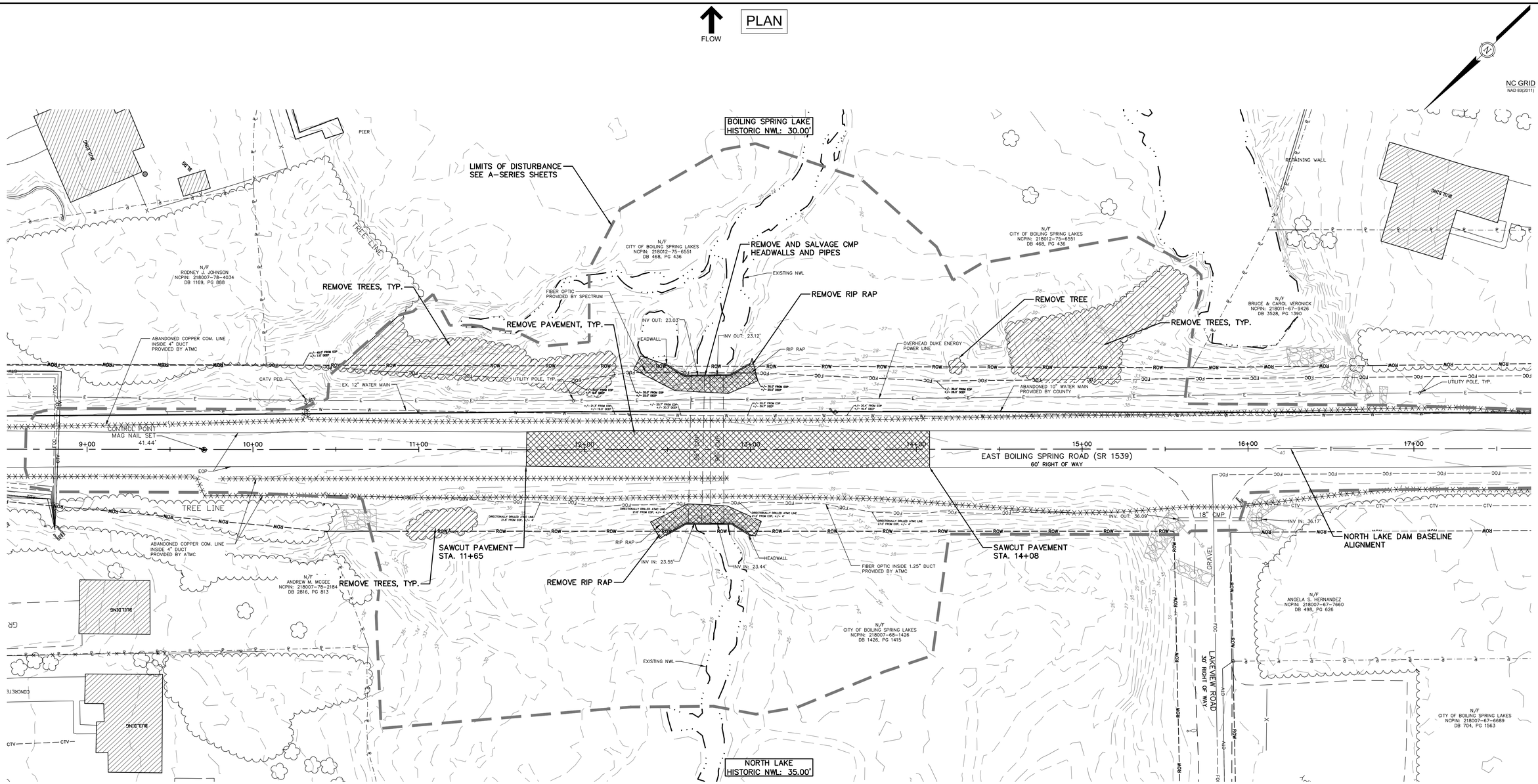
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

EXISTING CONDITIONS

SHEET
NLD-C-01

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTION\RECONSTRUC\DRAWINGS\SHEETS\NLD-C-01 EXISTING CONDITIONS.DWG PLOT DATE 1/12/2021 2:26 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



DEMOLITION PLAN LEGEND

SURFACES TO BE DEMOLISHED
(PAVEMENT, CONCRETE, RIP RAP, ETC.)

TREES TO BE REMOVED

PERMIT SUBMITTAL
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

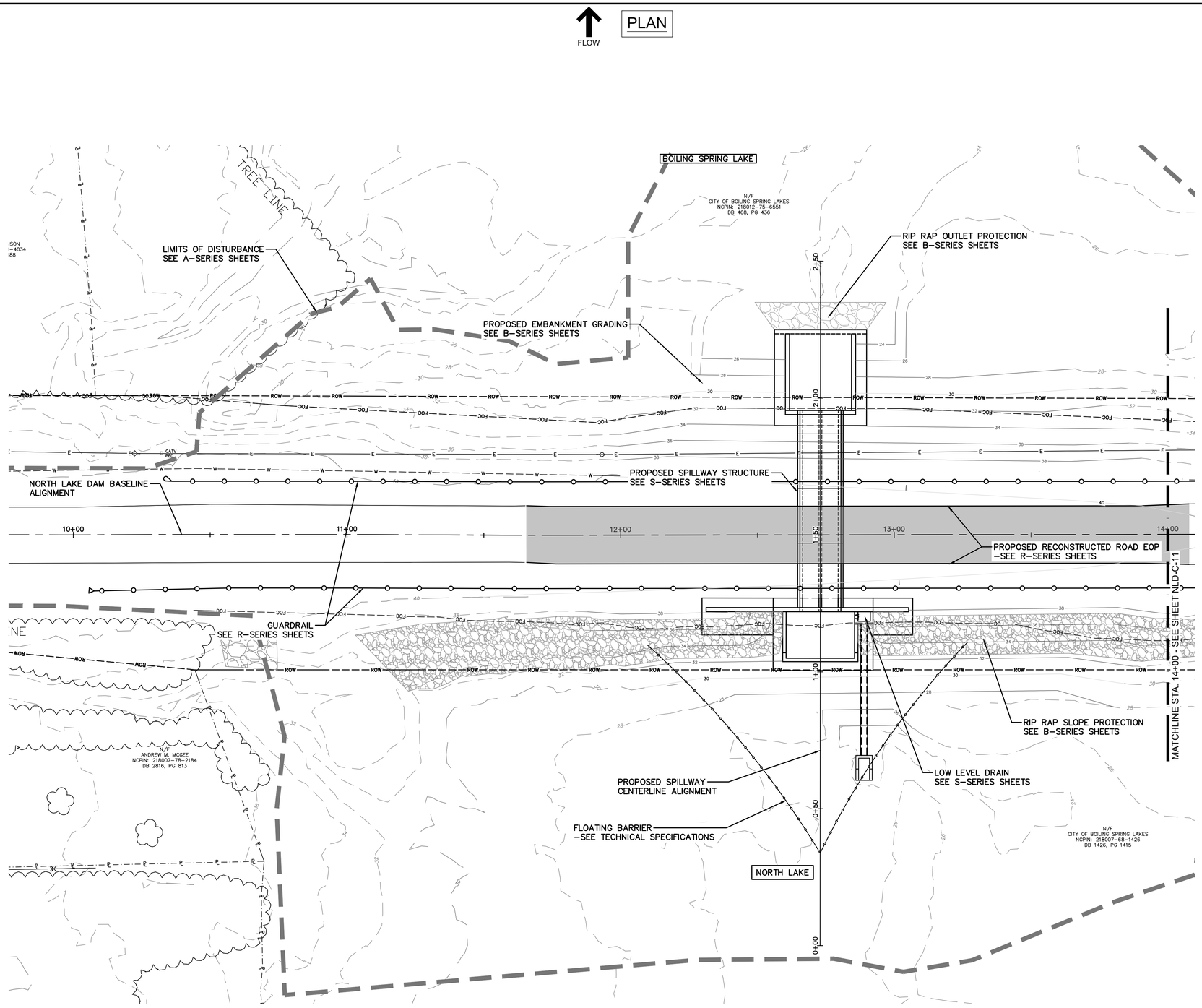
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

DEMOLITION PLAN

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	S. MEEKINS	JANUARY, 2021	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

SHEET
NLD-C-02



PROPOSED SPILLWAY CENTERLINE ALIGNMENT COORDINATES		
STATION	EASTING	NORTHING
STA. 0+00	2287007.81	107954.73
STA. 2+50	2287189.29	107782.78

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
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CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030024 MICHAEL A. HANSON
Jan 12, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

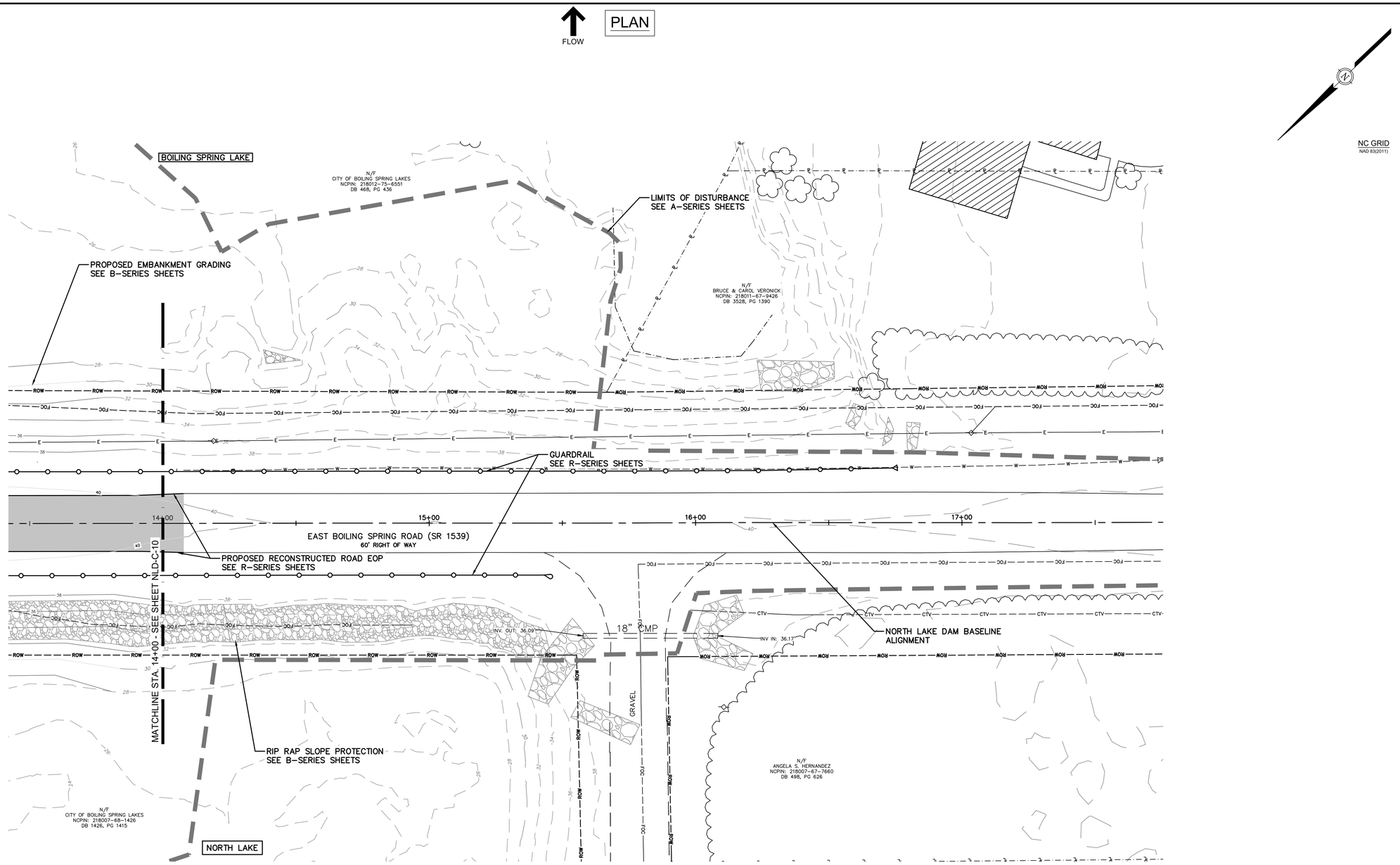
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

FINAL SITE PLAN STA. 10+00 - STA. 14+00

OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

SHEET
NLD-C-10



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

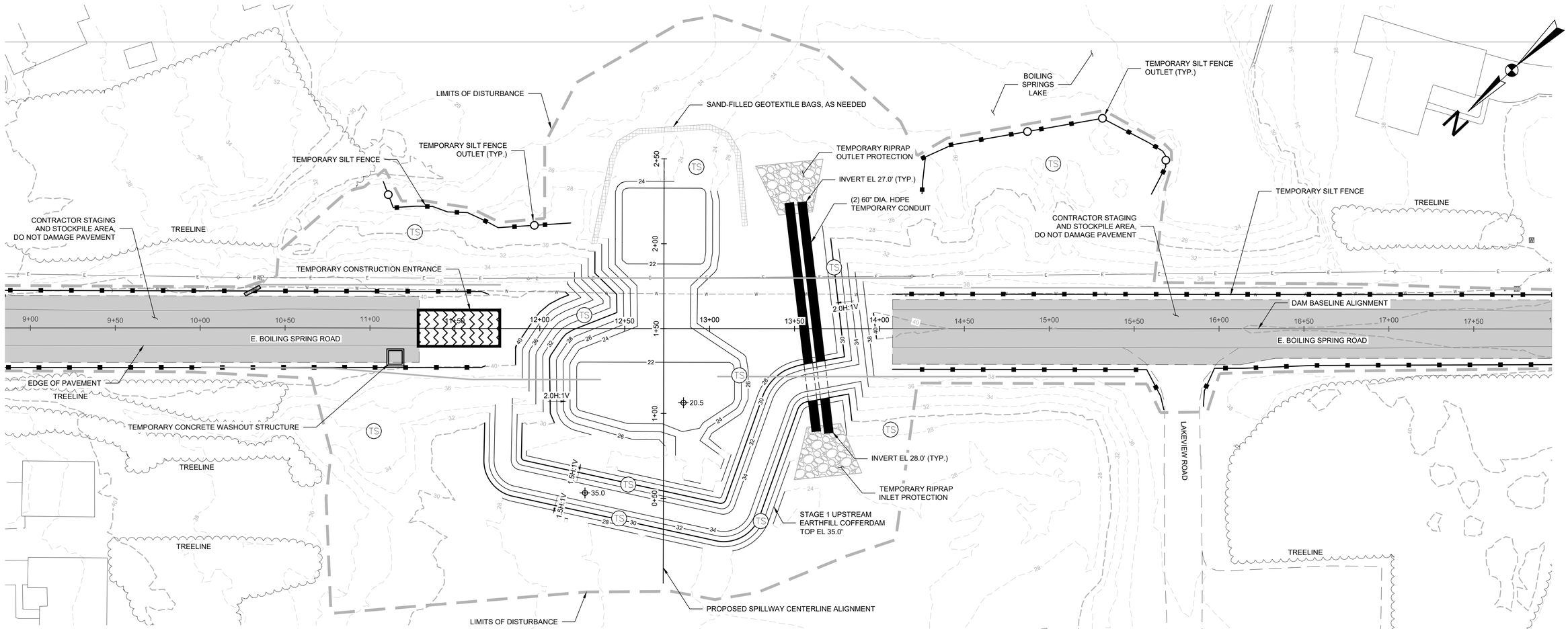
GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

FINAL SITE PLAN STA. 14+00 - STA. 17+50

OFFICE MANAGER	DESIGNER			SHEET
M. NORTON	S. MEEKINS			NLD-C-11
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTIONRECONSTRUCTIONDRAWINGS\SHEETS\NLD-C-10 - 11 NORTH LAKE DAM FINAL SITE PLAN.DWG PLOT DATE 1/12/2021 2:28 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



SEQUENCE NOTES:

CONSTRUCTION STAGE 1:

1. CLOSE EAST BOILING SPRING ROAD AND ESTABLISH TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH APPROVED TRAFFIC CONTROL PLAN.
2. FLAG LIMITS OF DISTURBANCE AND INSTALL PROJECT SIGNAGE AND TEMPORARY SITE SECURITY AND SAFETY MEASURES.
3. SURVEY AND VERIFY EXISTING CONDITIONS.
4. INSTALL E&SC MEASURES.
5. PERFORM CLEARING AND GRUBBING, PERFORM UTILITY MODIFICATIONS, AND DEMOLISH ROADWAY.
6. PREPARE STAGING AREAS AND TEMPORARY FACILITIES, INCLUDING BUT NOT LIMITED TO MATERIALS AND EQUIPMENT LAYDOWN AREA(S), STOCKPILE AREAS, AND PARKING AREA(S).
7. REMOVE AND STOCKPILE TOPSOIL AND RIPRAP SLOPE PROTECTION FROM AREAS TO BE DISTURBED AS PART OF CONSTRUCTION.
8. INSTALL TEMPORARY STREAM DIVERSION CONDUITS, INCLUDING INLET AND OUTLET PROTECTION.
9. INSTALL STAGE 1 UPSTREAM AND DOWNSTREAM COFFERDAMS, AND ROUTE FLOW THROUGH TEMPORARY STREAM DIVERSION CONDUITS.
10. EXCAVATE FOR SPILLWAY REPLACEMENT, DEMOLISH EXISTING SPILLWAY, AND INSTALL DEWATERING MEASURES.

FLOW

1 STAGE 1 SEQUENCING AND E&SC PLAN

GENERAL NOTE: SEE G-SERIES SHEETS FOR E&SC MEASURE DETAILS.

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

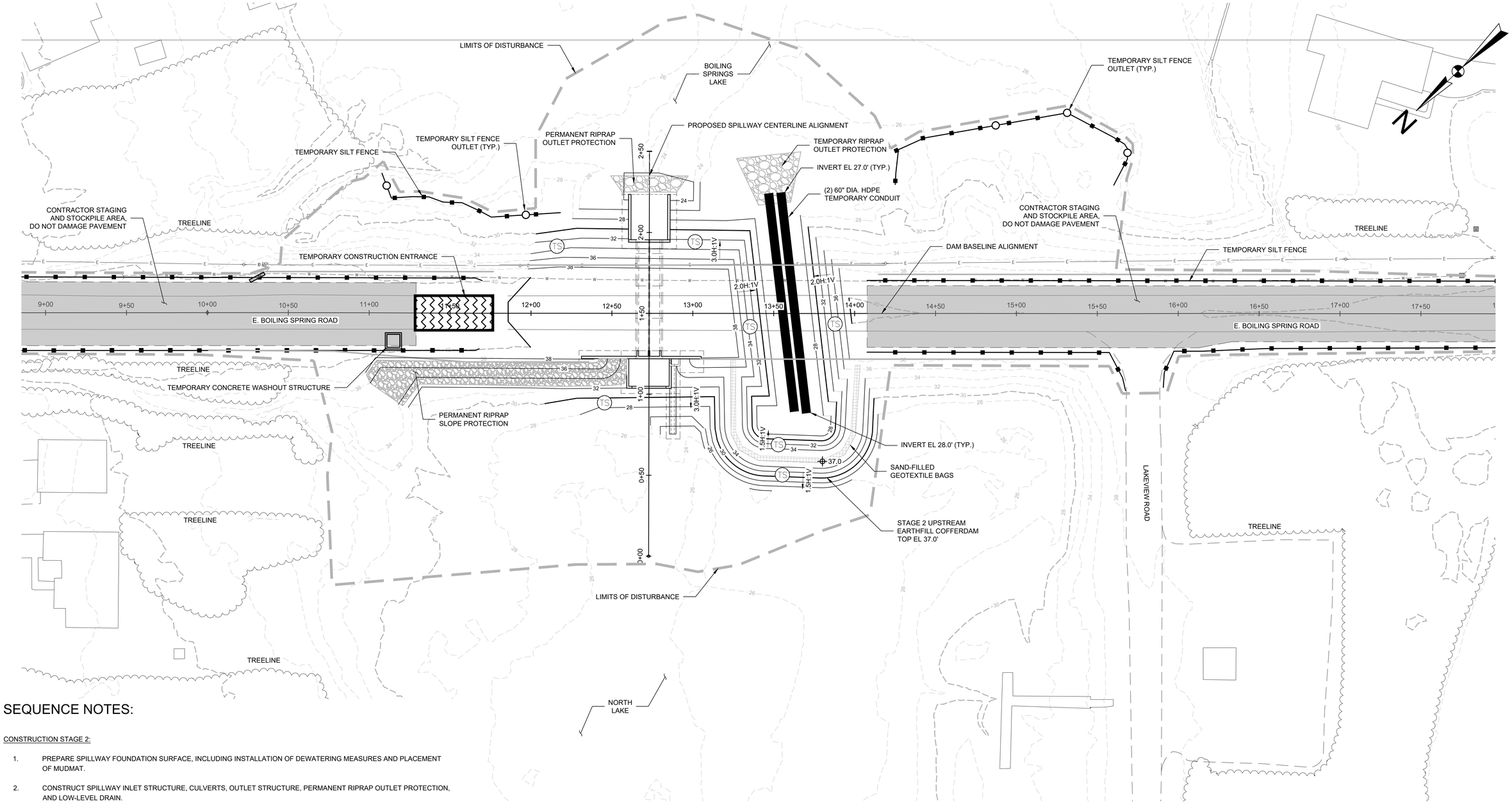
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 1 SEQUENCING AND E&SC PLAN

SHEET
NLD-A-01



SEQUENCE NOTES:

CONSTRUCTION STAGE 2:

1. PREPARE SPILLWAY FOUNDATION SURFACE, INCLUDING INSTALLATION OF DEWATERING MEASURES AND PLACEMENT OF MUDMAT.
2. CONSTRUCT SPILLWAY INLET STRUCTURE, CULVERTS, OUTLET STRUCTURE, PERMANENT RIPRAP OUTLET PROTECTION, AND LOW-LEVEL DRAIN.
3. CONSTRUCT EMBANKMENT UP TO ROADWAY SUBGRADE BETWEEN TEMPORARY STREAM DIVERSION CONDUITS AND LEFT SIDE OF EXCAVATION. DURING EMBANKMENT CONSTRUCTION, CONSTRUCT THE RIPRAP SLOPE PROTECTION TO LEFT OF SPILLWAY.
4. REMOVE STAGE 1 UPSTREAM AND DOWNSTREAM COFFERDAMS.
5. INSTALL STAGE 2 UPSTREAM COFFERDAM, AND REROUTE BASE FLOW THROUGH NEW LOW-LEVEL DRAIN.

FLOW

1 STAGE 2 SEQUENCING AND E&SC PLAN

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1/15/2021

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LICENSE NUMBER C-2599
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

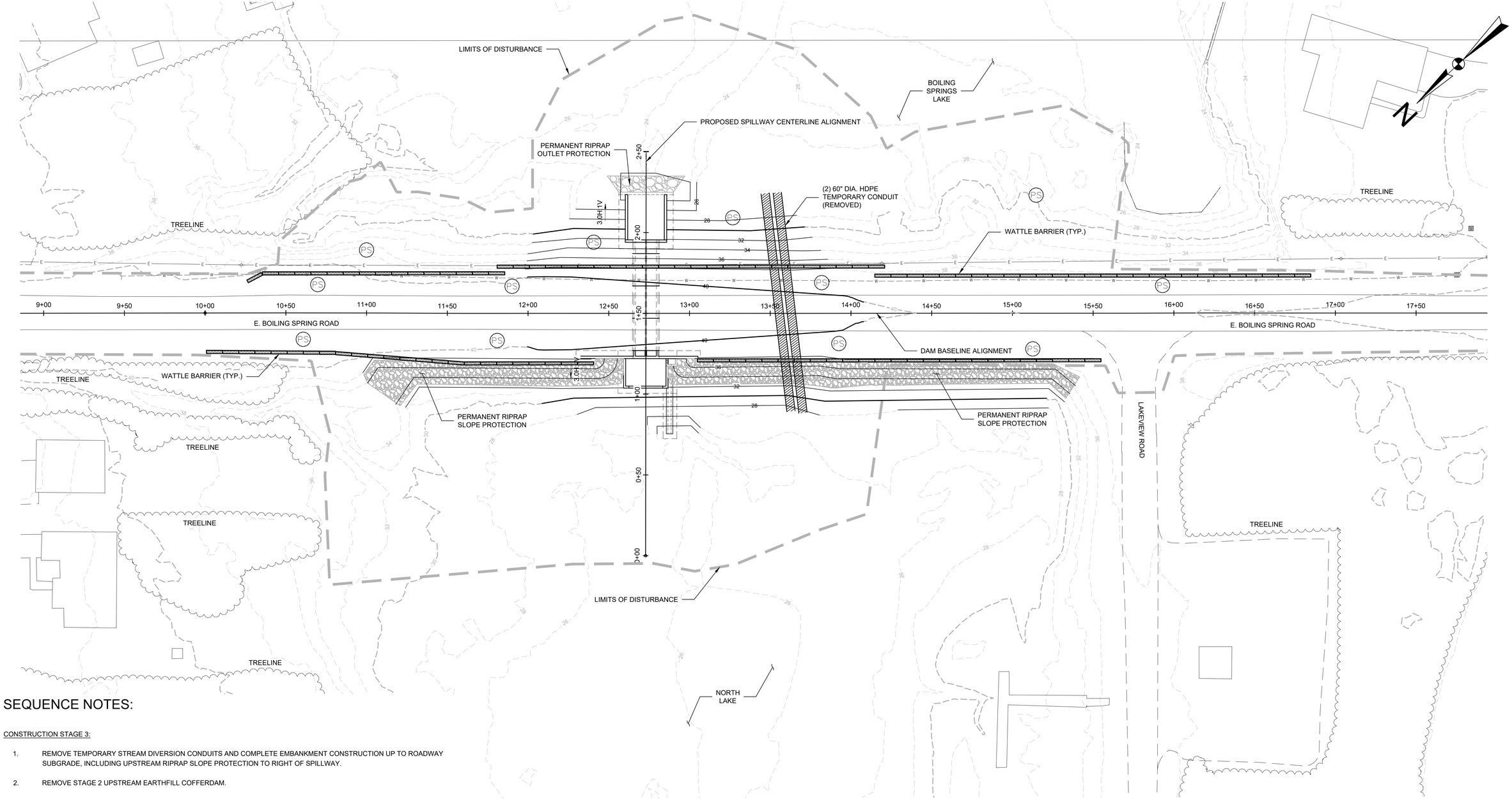
30 0 15 30 60
GRAPHIC SCALE DIVISION VALUE = 30 FEET

STAGE 2 SEQUENCING AND E&SC PLAN

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

SHEET
NLD-A-02

G:\2019\GREENSBORO\19C21022_00_BOILING_SPRING_LAKES_DAMS\03_SE_PRODUCTS\08-CAD\DRAWINGS\05-FINAL_DESIGN\NLD-A-02-STAGE2-ECS-SEQ.DWG PLOT DATE 1/4/2021 1:17 PM AUSTIN.SPENCER



SEQUENCE NOTES:

CONSTRUCTION STAGE 3:

1. REMOVE TEMPORARY STREAM DIVERSION CONDUITS AND COMPLETE EMBANKMENT CONSTRUCTION UP TO ROADWAY SUBGRADE, INCLUDING UPSTREAM RIPRAP SLOPE PROTECTION TO RIGHT OF SPILLWAY.
2. REMOVE STAGE 2 UPSTREAM EARTHFILL COFFERDAM.
3. RECLAIM STAGING AND STOCKPILE AREAS.
4. CONSTRUCT EMBANKMENT TO THE FINAL PROPOSED GRADE, INCLUDING ROADWAY, AS SHOWN ON THE DRAWINGS.
5. PERFORM FINE GRADING, PLACE TOPSOIL, AND APPLY PERMANENT SEEDING AND MULCHING.
6. REMOVE E&SC MEASURES.
7. REMOVE TRAFFIC CONTROL MEASURES AND REOPEN EAST BOILING SPRING ROAD IN ACCORDANCE WITH APPROVED TRAFFIC CONTROL PLAN.

FLOW

1 STAGE 3 SEQUENCING AND E&SC PLAN

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
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NORTH CAROLINA PROFESSIONAL SEAL 039129 ENGINEER ADAM C. PAISLEY 1/15/2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

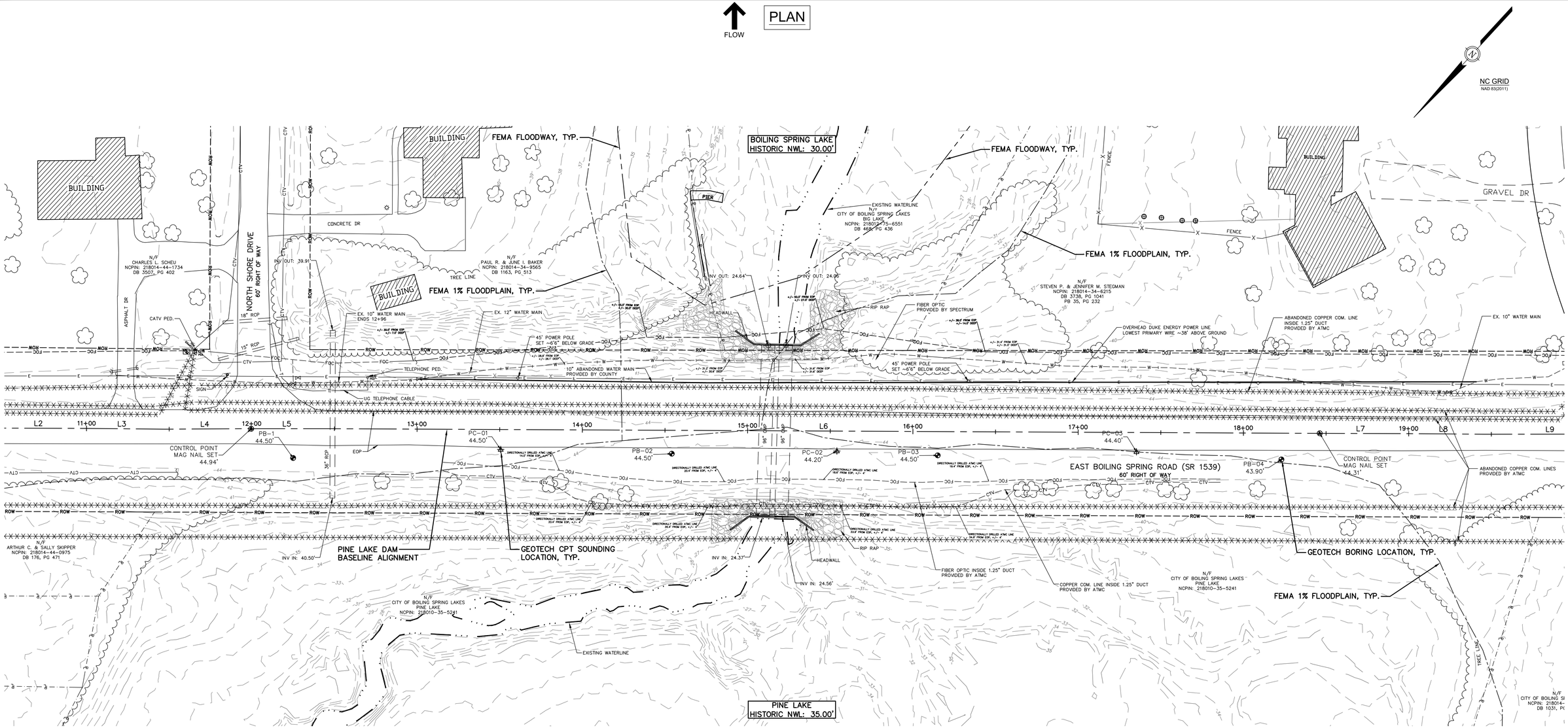
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 3 SEQUENCING AND E&SC PLAN

SHEET
NLD-A-03



Line Table: Alignments

Line #	Length	Direction	Start Station	End Station	Start Point (E,N)	End Point (E,N)
L1	46.39	S47° 19' 00.21"W	10+00.00	10+46.39	(2284127.61, 104902.78)	(2284093.50, 104871.32)
L2	48.98	S47° 29' 31.65"W	10+46.39	10+95.37	(2284093.50, 104871.32)	(2284057.40, 104838.23)
L3	51.96	S47° 49' 37.13"W	10+95.37	11+47.33	(2284057.40, 104838.23)	(2284018.89, 104803.35)
L4	48.71	S46° 58' 19.96"W	11+47.33	11+96.05	(2284018.89, 104803.35)	(2283983.28, 104770.11)
L5	50.36	S47° 16' 48.19"W	11+96.05	12+46.41	(2283983.28, 104770.11)	(2283946.28, 104735.94)
L6	599.30	S47° 33' 33.70"W	12+46.41	18+45.71	(2283946.28, 104735.94)	(2283504.01, 104331.52)
L7	50.37	S47° 26' 39.85"W	18+45.71	18+96.08	(2283504.01, 104331.52)	(2283466.90, 104297.45)
L8	49.87	S47° 45' 01.89"W	18+96.08	19+45.95	(2283466.90, 104297.45)	(2283429.99, 104263.92)
L9	79.03	S47° 14' 06.44"W	19+45.95	20+24.98	(2283429.99, 104263.92)	(2283371.97, 104210.26)

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

PERMIT SUBMITTAL
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NORTH CAROLINA PROFESSIONAL SEAL 030624 ENGINEER MICHAEL A. HANSON
Jan 14, 2022

Schnabel ENGINEERING
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

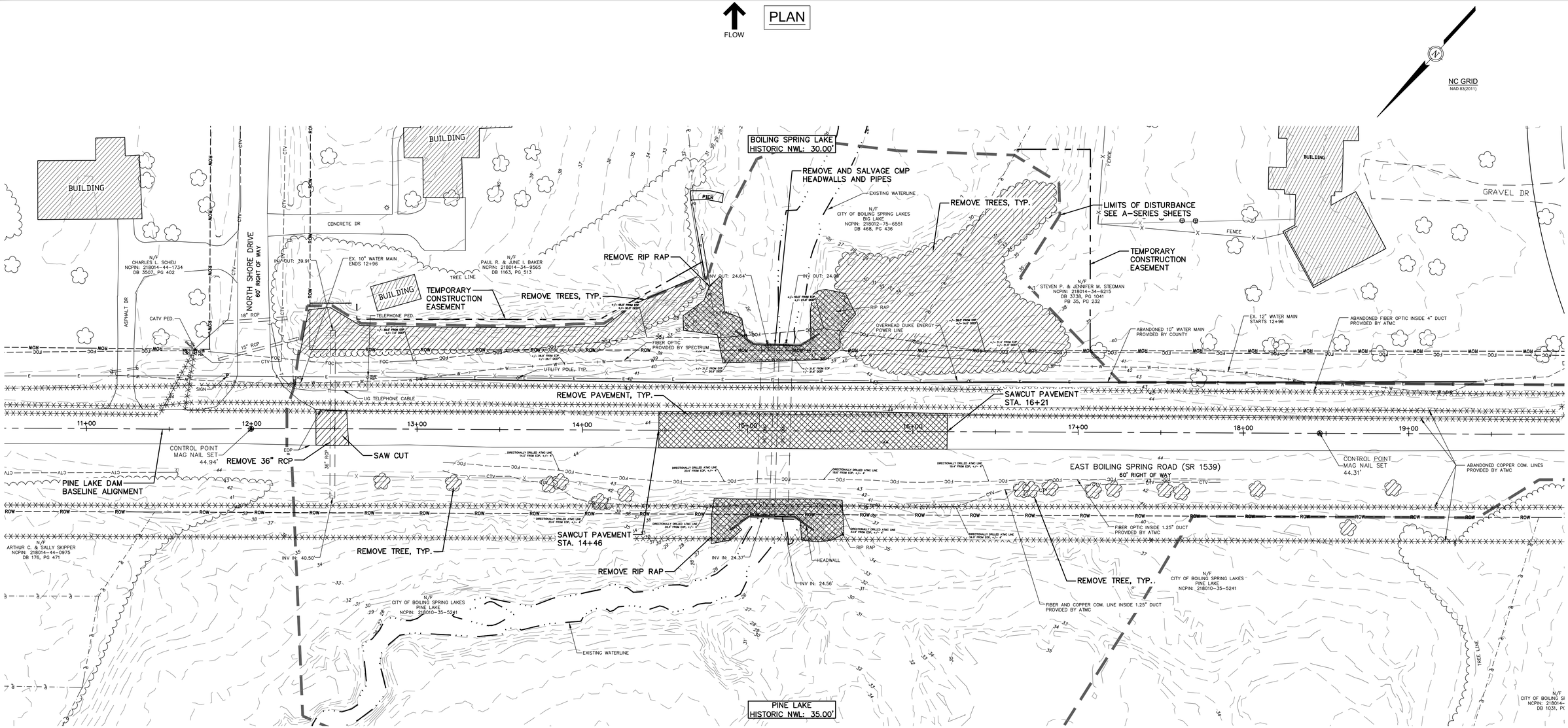
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 30 FEET (30 0 15 30 60)

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	S. MEEKINS	JANUARY, 2021	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

EXISTING CONDITIONS

SHEET
PLD-C-01



DEMOLITION PLAN LEGEND

SURFACES TO BE DEMOLISHED
(PAVEMENT, CONCRETE, RIP RAP, ETC.)

TREES TO BE REMOVED

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Jan 14, 2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

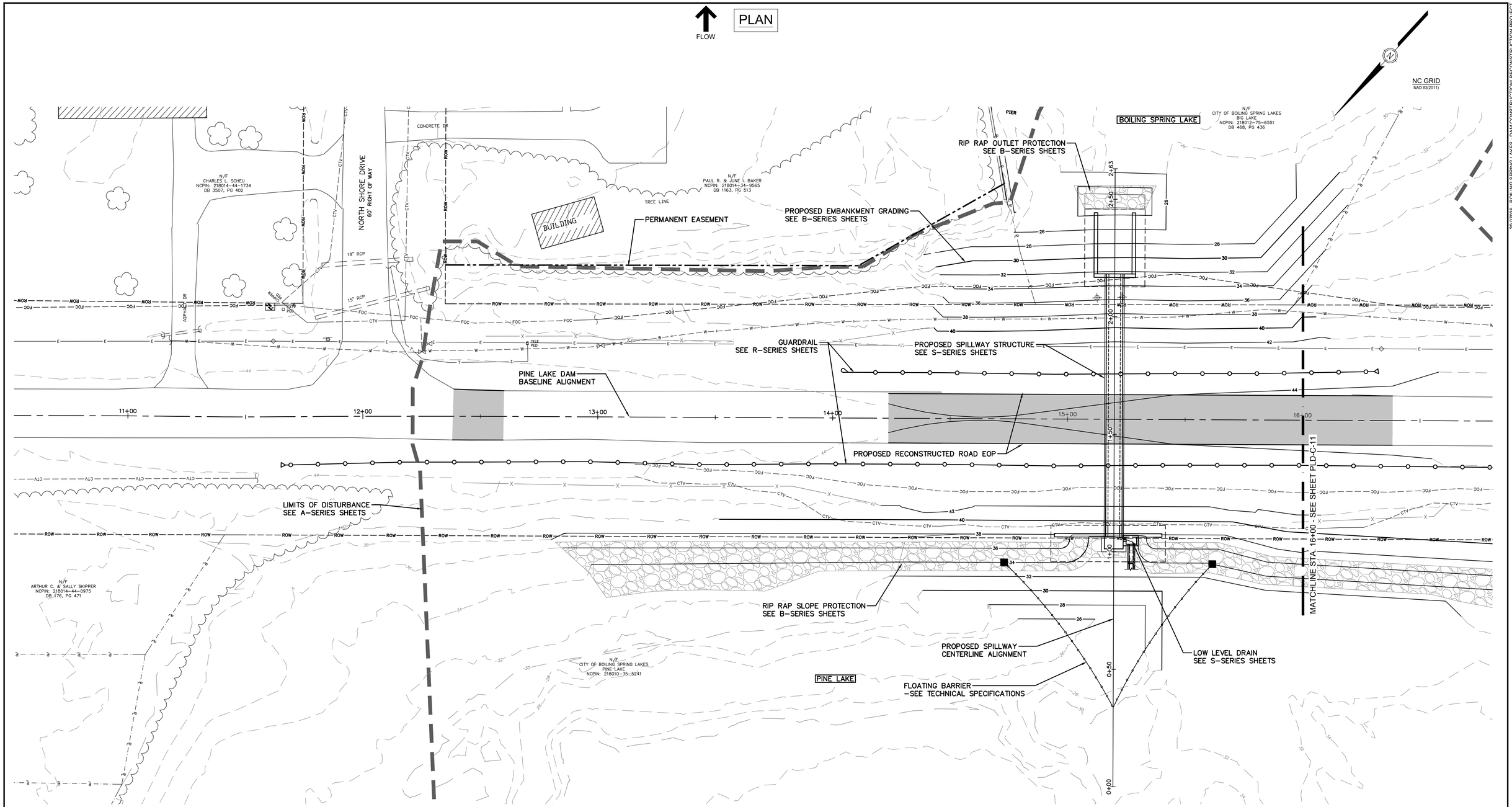
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

OFFICE MANAGER	DESIGNER	DEMOLITION PLAN			SHEET
M. NORTON	S. MEEKINS				PLD-C-02
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #	
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A	

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTIONRECONSTRUCUDRAWINGS\SHEETS\PLD-C-02 DEMOLITION PLAN.DWG PLOT DATE 1/12/2021 4:11 PM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



PROPOSED SPILLWAY CENTERLINE ALIGNMENT COORDINATES		
STATION	EASTING	NORTHING
STA. 0+00	2283638.85	104666.72
STA. 2+63	2283816.67	104472.66

PERMIT SUBMITTAL
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 20824 MICHAEL A. HANSON Jan 14, 2021

Schnabel ENGINEERING
LICENSE NUMBER C-2599
SCHNABEL ENGINEERING SOUTH, PC
11A Oak Branch Drive / Greensboro, NC / 27407
T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

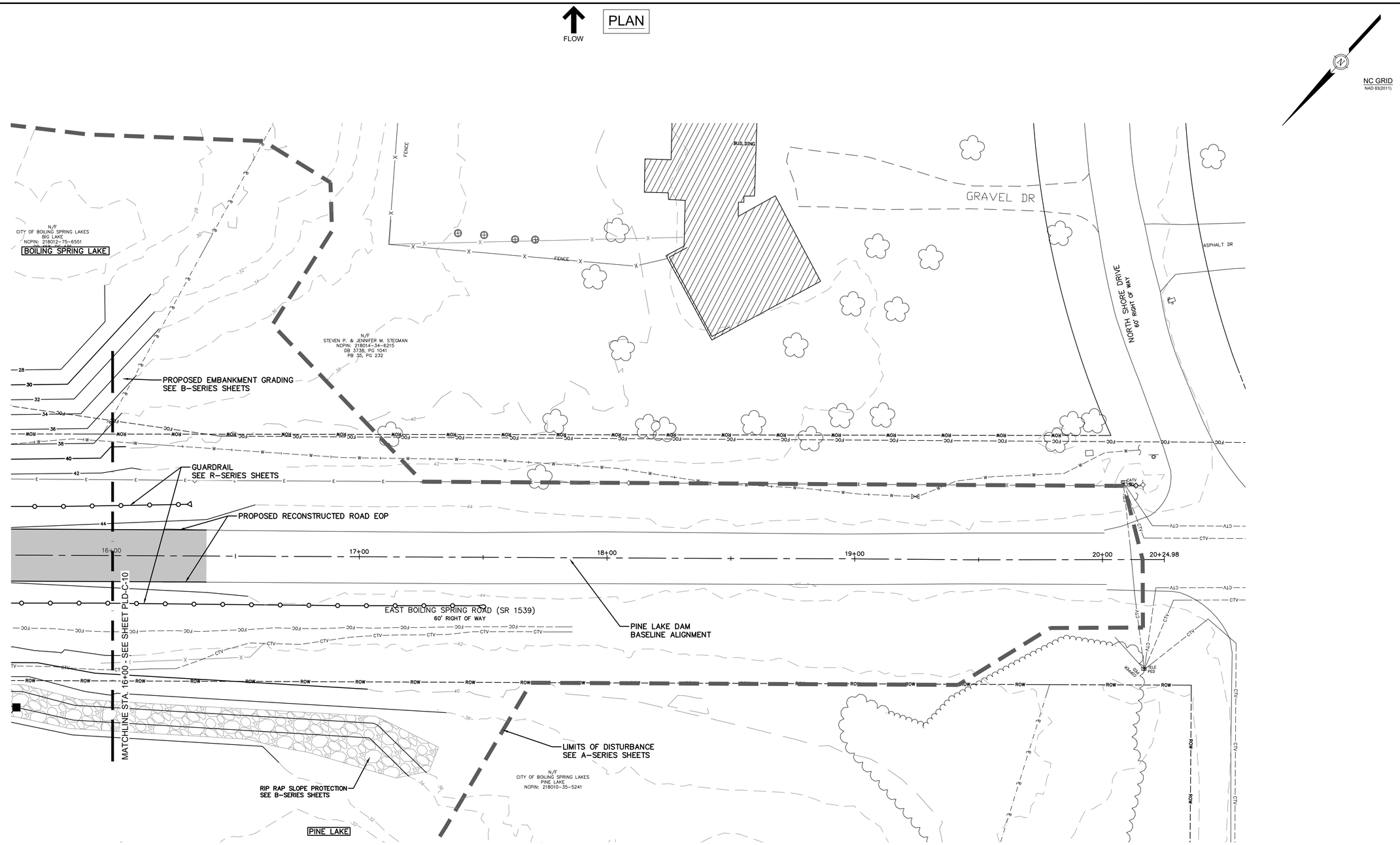
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

FINAL SITE PLAN STA. 11+00 - STA. 16+50

SHEET
PLD-C-10

P:\2020\20.07036-BOLINGSPRL-DAMS CONSTRUCTIONRECONSTRUCI\DRAWINGS\SHEETS\PLD-C-10 - 11 PINE LAKE DAM FINAL SITE PLAN.DWG PLOT DATE 2/2/2021 9:27 AM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



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NORTH CAROLINA PROFESSIONAL SEAL 030624 ENGINEER MICHAEL A. HANSON
3-1-21

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

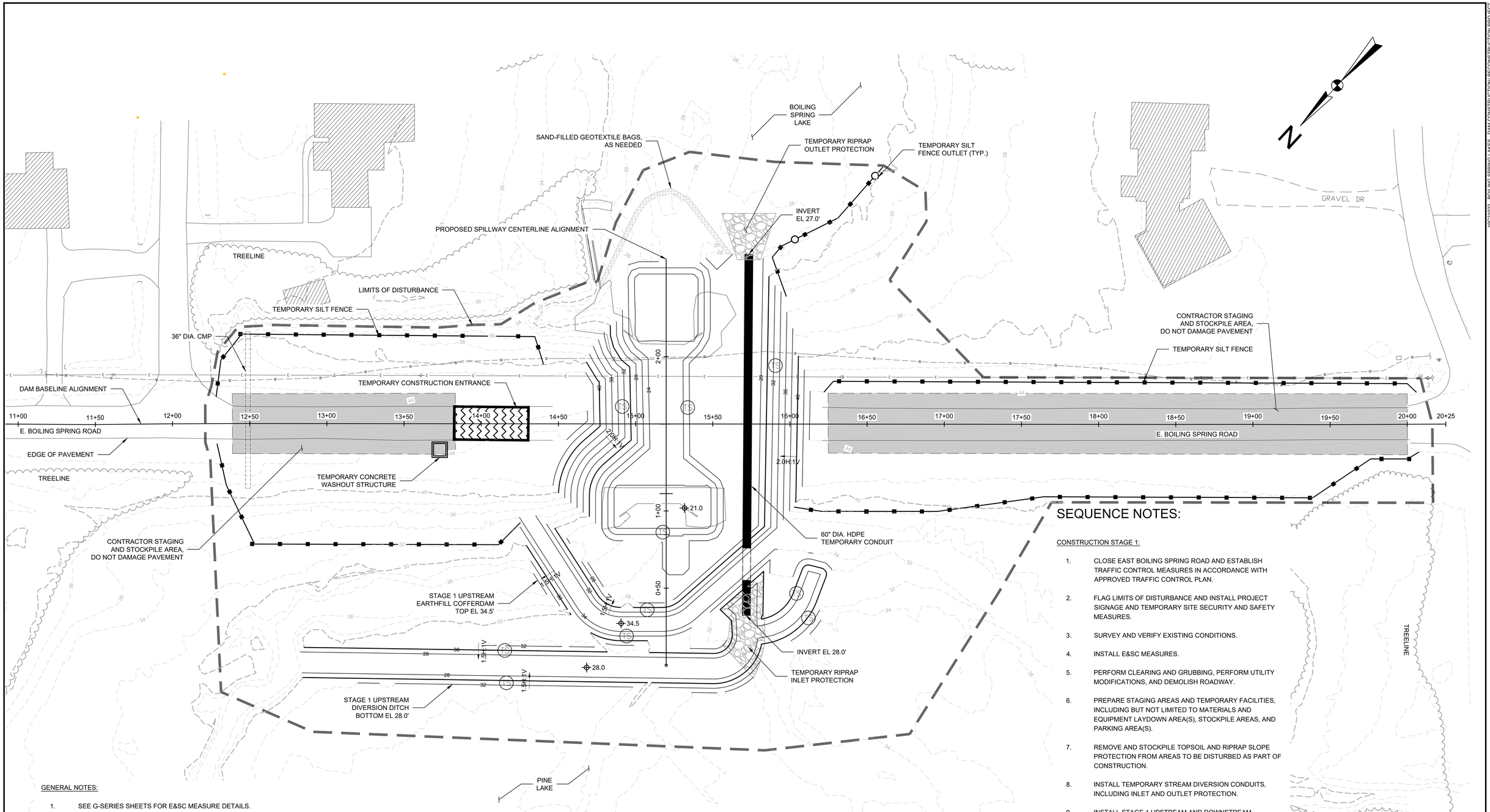
OFFICE MANAGER	DESIGNER		
M. NORTON	S. MEEKINS		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JANUARY, 2021	20.07036	N/A

FINAL SITE PLAN STA. 16+50 - STA. 20+25

SHEET
PLD-C-11

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTION\RECONSTRUC\DRAWINGS\SHEETS\PLD-C-10 - 11 PINE LAKE DAM FINAL SITE PLAN.DWG PLOT DATE 2/2/2021 9:27 AM CAROLINE HEATHCOAT

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT



1 STAGE 1 SEQUENCE AND E&SC PLAN

SEQUENCE NOTES:

CONSTRUCTION STAGE 1:

1. CLOSE EAST BOILING SPRING ROAD AND ESTABLISH TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH APPROVED TRAFFIC CONTROL PLAN.
2. FLAG LIMITS OF DISTURBANCE AND INSTALL PROJECT SIGNAGE AND TEMPORARY SITE SECURITY AND SAFETY MEASURES.
3. SURVEY AND VERIFY EXISTING CONDITIONS.
4. INSTALL E&SC MEASURES.
5. PERFORM CLEARING AND GRUBBING, PERFORM UTILITY MODIFICATIONS, AND DEMOLISH ROADWAY.
6. PREPARE STAGING AREAS AND TEMPORARY FACILITIES, INCLUDING BUT NOT LIMITED TO MATERIALS AND EQUIPMENT LAYDOWN AREA(S), STOCKPILE AREAS, AND PARKING AREA(S).
7. REMOVE AND STOCKPILE TOPSOIL AND RIPRAP SLOPE PROTECTION FROM AREAS TO BE DISTURBED AS PART OF CONSTRUCTION.
8. INSTALL TEMPORARY STREAM DIVERSION CONDUITS, INCLUDING INLET AND OUTLET PROTECTION.
9. INSTALL STAGE 1 UPSTREAM AND DOWNSTREAM COFFERDAMS, AND ROUTE FLOW THROUGH TEMPORARY STREAM DIVERSION CONDUITS.
10. EXCAVATE FOR SPILLWAY REPLACEMENT, DEMOLISH EXISTING SPILLWAY, AND INSTALL DEWATERING MEASURES.

GENERAL NOTES:

1. SEE G-SERIES SHEETS FOR E&SC MEASURE DETAILS.
2. SEQUENCING AND CONCEPTUAL CONTROL OF WATER LAYOUTS SHOWN ON A-SERIES SHEETS WERE DESIGNED BY SCHNABEL ENGINEERING, P.C. AND ARE PRESENTED UNDER THE PROFESSIONAL ENGINEER SEAL ON THIS SHEET. E&SC MEASURES AND LAYOUT SHOWN ON THE A-SERIES SHEETS WERE DESIGNED BY MCGILL ASSOCIATES, P.A. AND ARE PRESENTED UNDER THE PROFESSIONAL ENGINEER SEAL ON SHEET G-02.

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1/15/2021

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

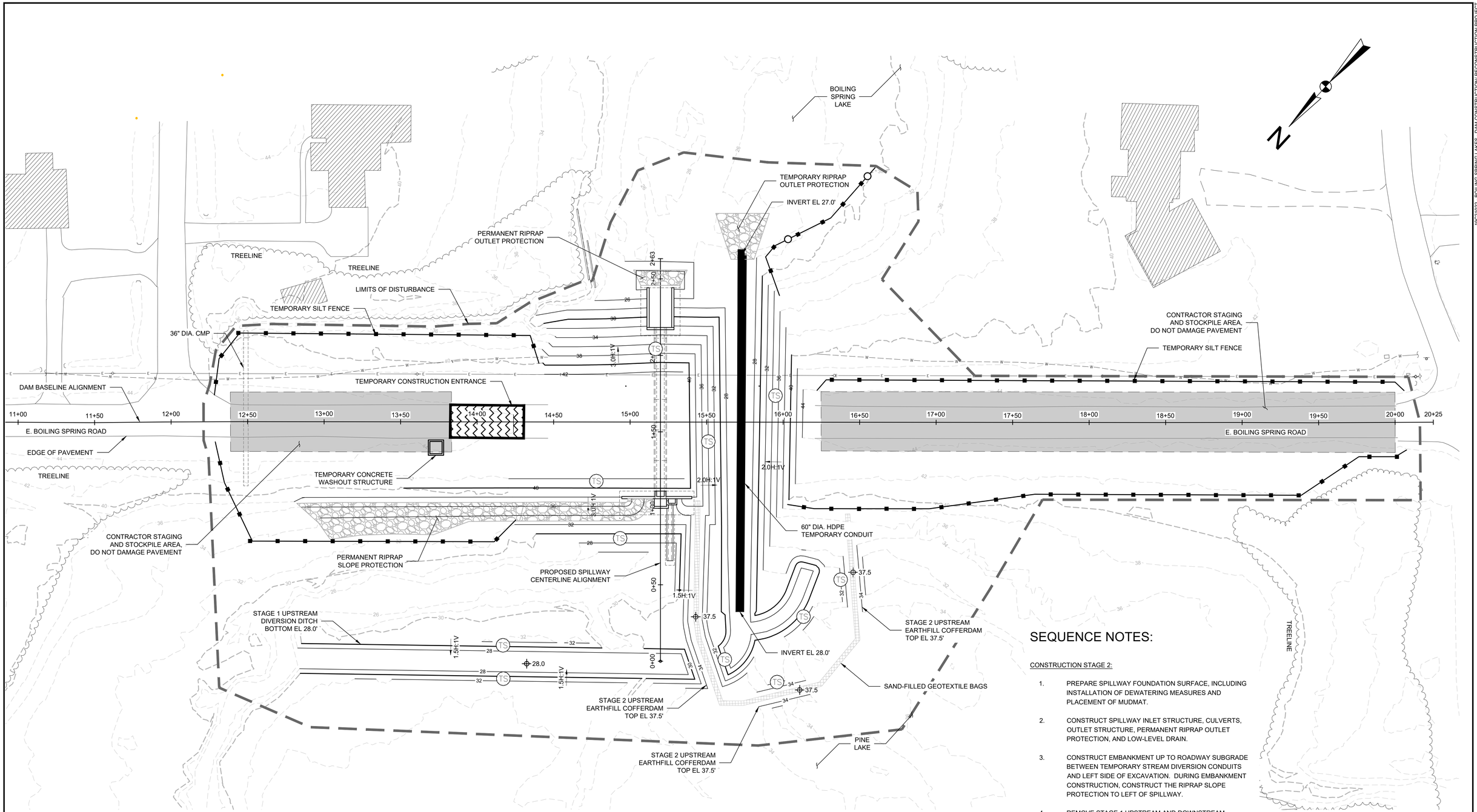
GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

STAGE 1 SEQUENCE AND E&SC PLAN

OFFICE MANAGER	DESIGNER			SHEET
T. FITZGERALD	R. CALDERON			PLD-A-01
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

G:\2019\GREENSBORO\19C21022_00_BOILING_SPRING_LAKES_DAMS\03_SE_PRODUCTS\08-CAD\DRAWINGS\05-FINAL_DESIGN\PLD-A-01-STAGE1-ECS-SEQ.DWG PLOT DATE 1/13/2021 9:46 AM AUSTIN SPENCER

19C21022 - BOILING SPRING LAKES - DAM CONSTRUCTION/ RECONSTRUCTION PROJECT



1 STAGE 2 SEQUENCE AND E&SC PLAN

SEQUENCE NOTES:

CONSTRUCTION STAGE 2:

1. PREPARE SPILLWAY FOUNDATION SURFACE, INCLUDING INSTALLATION OF DEWATERING MEASURES AND PLACEMENT OF MUDMAT.
2. CONSTRUCT SPILLWAY INLET STRUCTURE, CULVERTS, OUTLET STRUCTURE, PERMANENT RIPRAP OUTLET PROTECTION, AND LOW-LEVEL DRAIN.
3. CONSTRUCT EMBANKMENT UP TO ROADWAY SUBGRADE BETWEEN TEMPORARY STREAM DIVERSION CONDUITS AND LEFT SIDE OF EXCAVATION. DURING EMBANKMENT CONSTRUCTION, CONSTRUCT THE RIPRAP SLOPE PROTECTION TO LEFT OF SPILLWAY.
4. REMOVE STAGE 1 UPSTREAM AND DOWNSTREAM COFFERDAMS.
5. INSTALL STAGE 2 UPSTREAM COFFERDAM, AND REROUTE BASE FLOW THROUGH NEW LOW-LEVEL DRAIN.

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NORTH CAROLINA PROFESSIONAL SEAL 039129 ENGINEER ADAM C. PAISLEY
SEAL 1/15/2021

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T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

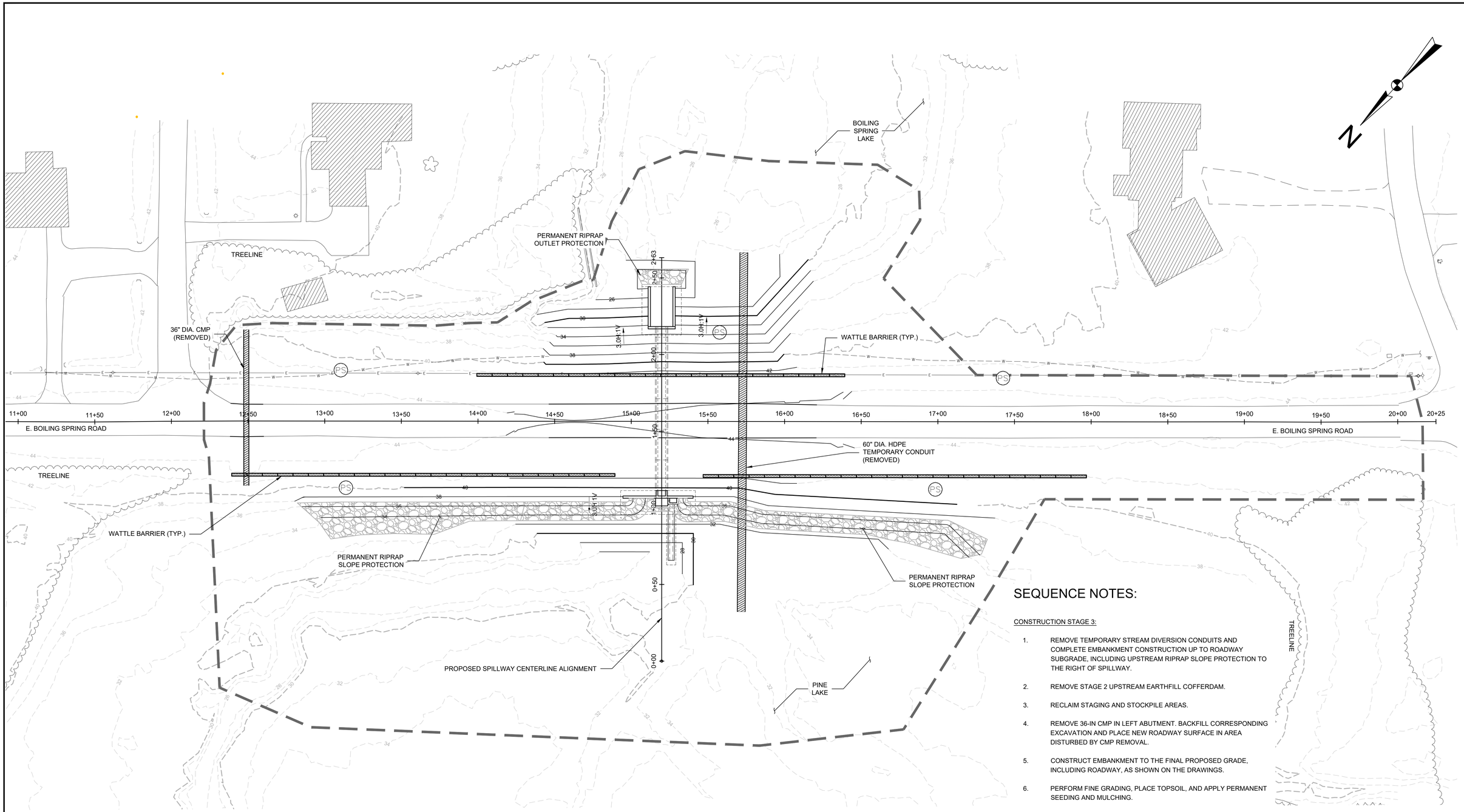
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

STAGE 2 SEQUENCE AND E&SC PLAN

OFFICE MANAGER	DESIGNER			
T. FITZGERALD	R. CALDERON			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

SHEET
PLD-A-02



FLOW

1 STAGE 3 SEQUENCE AND E&SC PLAN

SEQUENCE NOTES:

CONSTRUCTION STAGE 3:

1. REMOVE TEMPORARY STREAM DIVERSION CONDUITS AND COMPLETE EMBANKMENT CONSTRUCTION UP TO ROADWAY SUBGRADE, INCLUDING UPSTREAM RIPRAP SLOPE PROTECTION TO THE RIGHT OF SPILLWAY.
2. REMOVE STAGE 2 UPSTREAM EARTHFILL COFFERDAM.
3. RECLAIM STAGING AND STOCKPILE AREAS.
4. REMOVE 36-IN CMP IN LEFT ABUTMENT. BACKFILL CORRESPONDING EXCAVATION AND PLACE NEW ROADWAY SURFACE IN AREA DISTURBED BY CMP REMOVAL.
5. CONSTRUCT EMBANKMENT TO THE FINAL PROPOSED GRADE, INCLUDING ROADWAY, AS SHOWN ON THE DRAWINGS.
6. PERFORM FINE GRADING, PLACE TOPSOIL, AND APPLY PERMANENT SEEDING AND MULCHING.
7. REMOVE E&SC MEASURES.
8. REMOVE TRAFFIC CONTROL MEASURES AND REOPEN EAST BOILING SPRING ROAD IN ACCORDANCE WITH APPROVED TRAFFIC CONTROL PLAN.

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

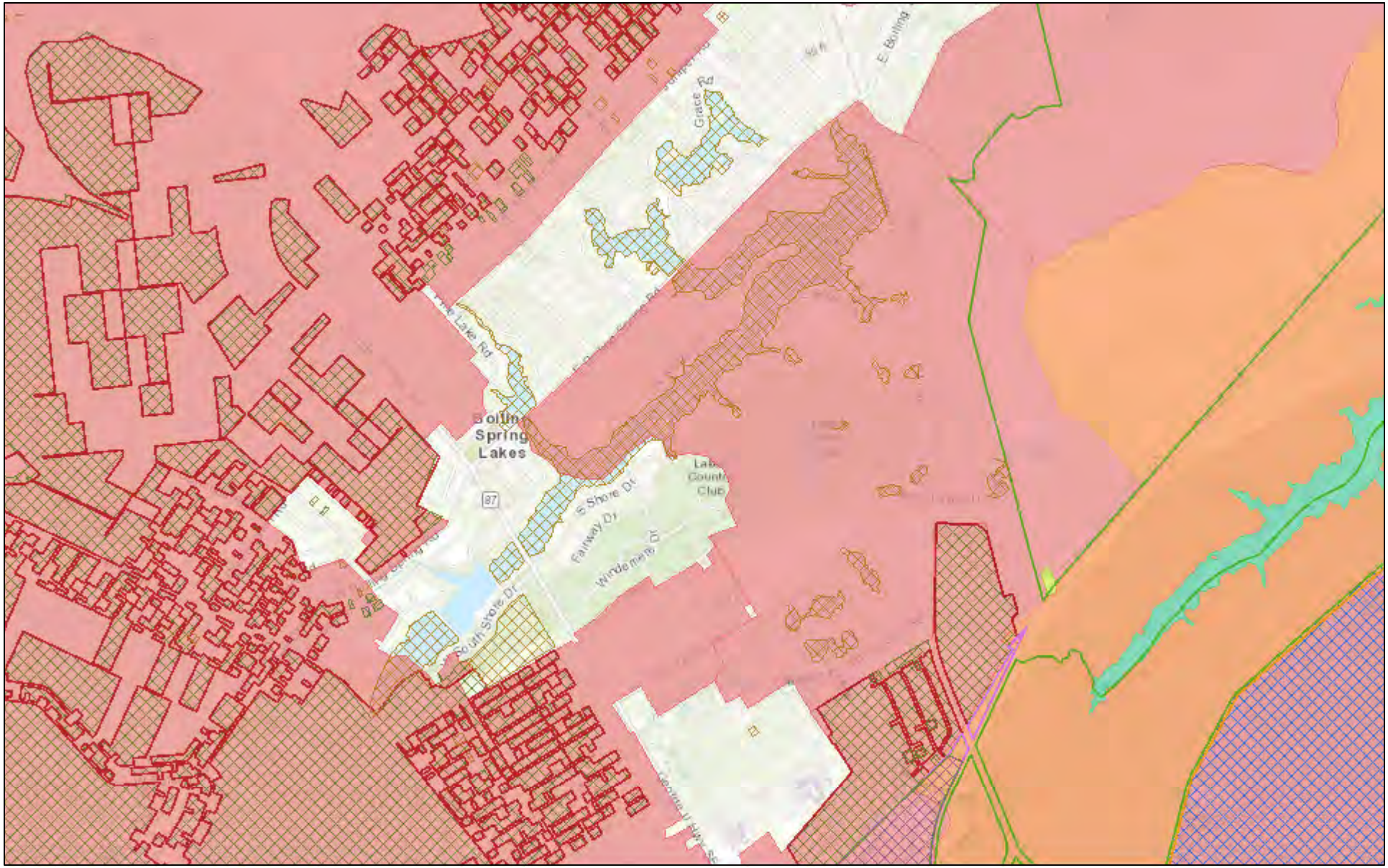
OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
A. PAISLEY	T. FITZGERALD	JANUARY 2021	19C21022	N/A

STAGE 3 SEQUENCE AND E&SC PLAN

SHEET
PLD-A-03

APPENDIX A-4

NATURAL HERITAGE CONSERVATION AREAS



March 1, 2021

1:43,936

0 0.375 0.75 1.5 mi

0 0.5 1 2 km

Managed Areas

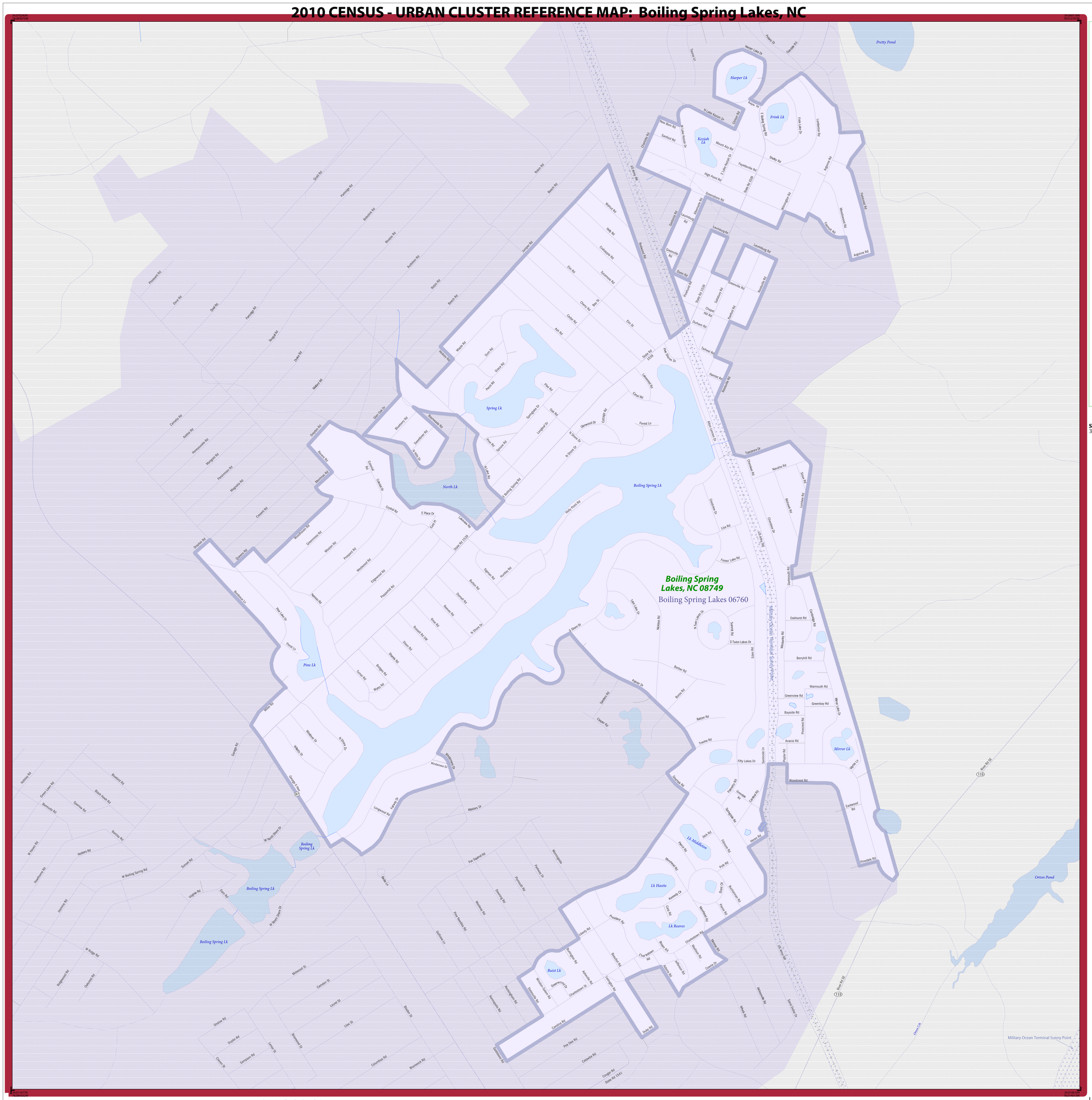
- Dedicated Nature Preserve
- Registered Heritage Area
- Conservation Easement
- Other Protection
- Federal Ownership
- State Ownership
- Local Government Ownership
- Private

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

APPENDIX A-5

URBAN CLUSTER MAP

2010 CENSUS - URBAN CLUSTER REFERENCE MAP: Boiling Spring Lakes, NC



LEGEND

SYMBOL DESCRIPTION	SYMBOL	LABEL STYLE
International		CANADA
Federal American Indian Reservation		L'ANSE RES 1880
Off-Reservation Trust Land		T1880
Urbanized Area		Dover, DE 24580
Urban Cluster		*Tooele, VT 88057*
State (or statistically equivalent entity)		NEW YORK 36
County (or statistically equivalent entity)		ERIE 029
Minor Civil Division (MCD) [1,2]		Bristol town 07485
Consolidated City		MILFORD 47500
Incorporated Place [1,3]		Davis 18100
Census Designated Place (CDP) [3]		*Incline Village 35100*

DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL
Interstate	95	Water Body	*Pleasant Lake*
U.S. Highway	2	Military	Fort Belvoir
State Highway	4	Outside Subject Area	
Other Road	Marsh Ln		
Railroad	Southern RR		
Perennial Stream	*Tumbling Cr*		
Intermittent Stream	*Piney Cr*		

Where international, state, county, and/or MCD boundaries coincide, the map shows the boundary symbol for only the highest-ranking of these boundaries.

1 A '*' following an MCD name denotes a false MCD. A '*' following a place name indicates that a false MCD exists with the same name and FIPS code as the place; the false MCD label is not shown.

2 MCD boundaries are shown in the following states in which some or all MCDs function as general-purpose governmental units: Connecticut, Illinois, Indiana, Kansas, Maine, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Dakota, Vermont, and Wisconsin. (Note that Illinois and Nebraska have some counties covered by nongovernmental precincts and Missouri has most counties covered by nongovernmental townships.)

3 Place label color corresponds to the place fill color.
Label colors: Davis Davis Davis Davis Davis

SUBJECT AREA COUNTIES ON MAP SHEET
37019 Brunswick

All legal boundaries and names are as of January 1, 2010. Urban areas are based on results from the 2010 Decennial Census. The boundaries on this map are for Census Bureau statistical data collection and tabulation purposes only; their depiction and designation for statistical purposes does not constitute a determination of jurisdictional authority or rights of ownership or entitlement.

Geographic Vintage: 2010 Census (reference date: January 1, 2010)
Data Source: U.S. Census Bureau's MAF/TIGER database (TAB10)
Map Created by Geography Division: March 09, 2012

U.S. DEPARTMENT OF COMMERCE Economics and Statistics Administration U.S. Census Bureau

Projection: Albers Equal Area Conic
Datum: NAD 83
Spheroid: GRS 80
1st Standard Parallel: 34 13 30
2nd Standard Parallel: 36 06 55
Central Meridian: -79 51 40
Latitude of Projection's Origin: 33 45 09
False Easting: 0
False Northing: 0

0 0.2 0.4 0.6 0.8 1 Kilometers
0 933 1866 2799 3732 4665 Feet
The plotted map scale is 1:8897

N W E S

United States Census Bureau

PARENT SHEET 1

Total Sheets: 1
- Index Sheets: 0
- Parent Sheets: 1

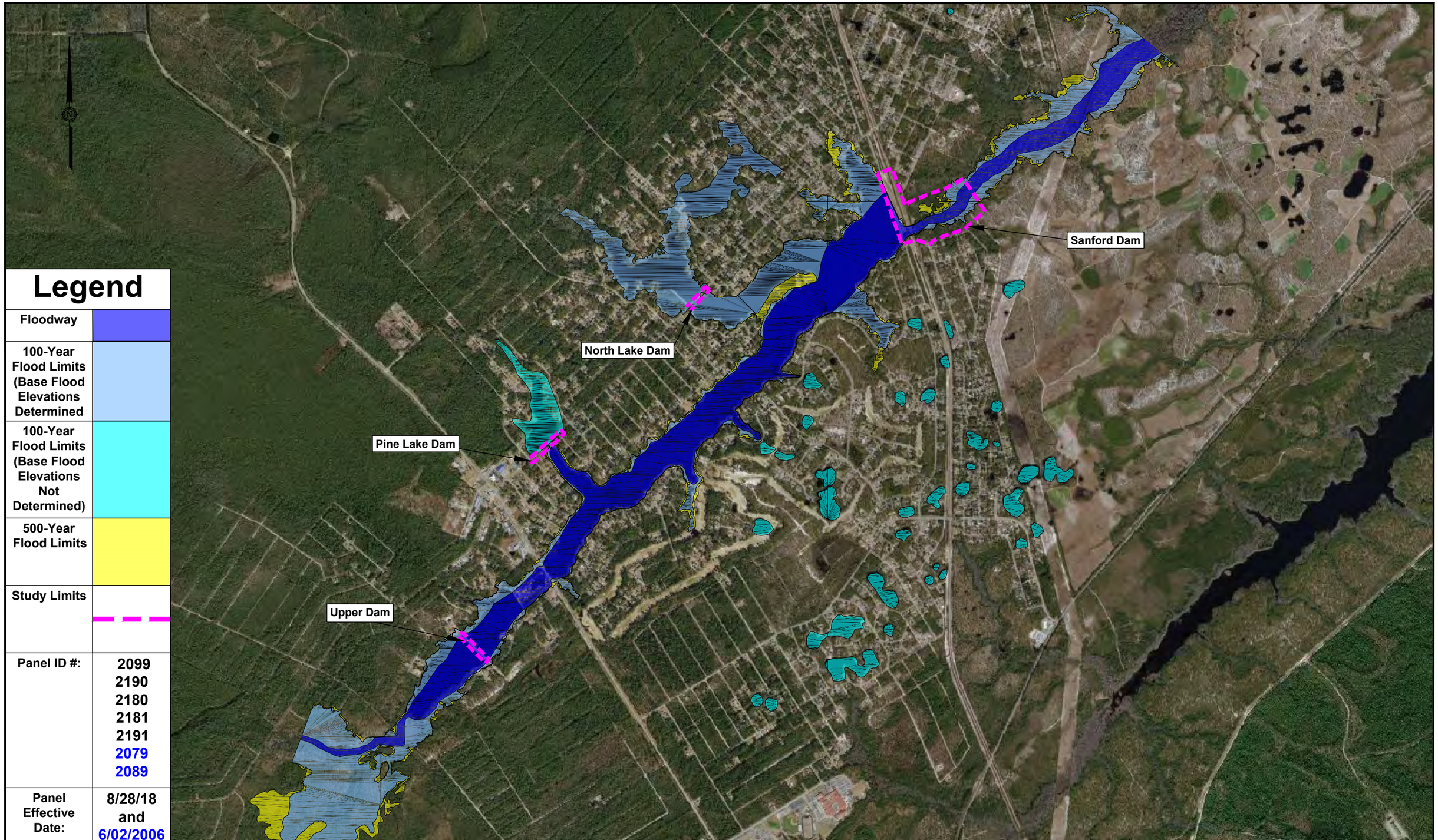
UC NAME: Boiling Spring Lakes, NC
UC CODE: 08749
ENTITY TYPE: Urban Cluster (UC)
ST: North Carolina (37)

A-5

2010 CENSUS UC REF MAP (PARENT)
23230874900I

APPENDIX A-6

FLOODPLAIN MAP



Legend

Floodway	
100-Year Flood Limits (Base Flood Elevations Determined	
100-Year Flood Limits (Base Flood Elevations Not Determined)	
500-Year Flood Limits	
Study Limits	
Panel ID #:	2099 2190 2180 2181 2191 2079 2089
Panel Effective Date:	8/28/18 and 6/02/2006

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DATE 8/23/2019	PROJECT # 19.07042
OFFICE MANAGER MC	DESIGNER AL
PROJECT MANAGER MH	REVIEWER JS

DAM REPAIRS

CITY OF BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

2000 0 1000 2000 4000

GRAPHIC SCALE DIVISION VALUE = 2000 FEET

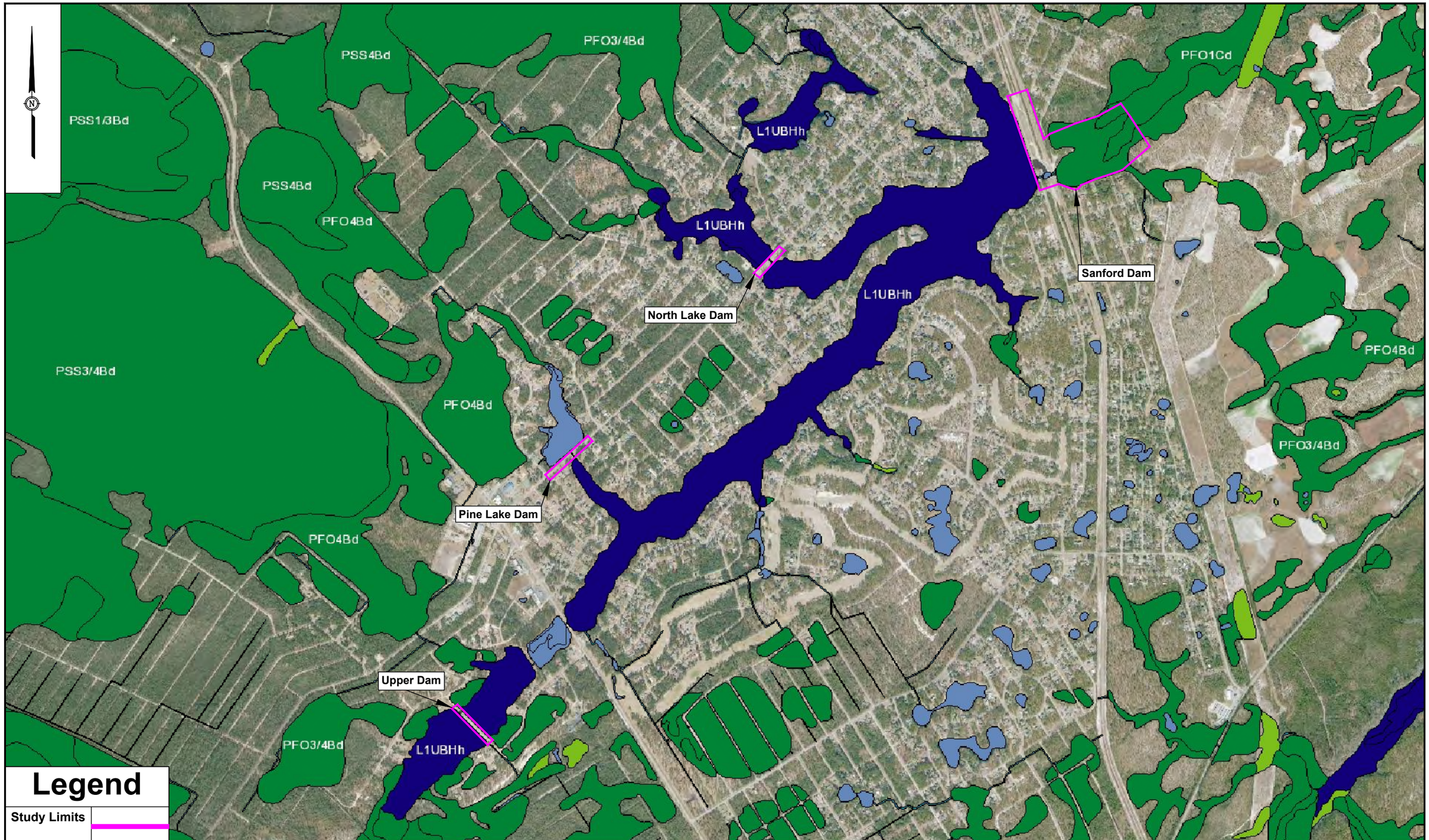
FLOODPLAIN MAP

FIGURES

A-6

APPENDIX A-7

NATIONAL WETLANDS INVENTORY MAP



P:\2019\19.07042-BOILINGSPRLNC-DAM DESIGN\DESIGN\REPORTS & PLANNING\PRELIM ENV ANALYSIS REPORT\APPENDICES\FIGURES.DWG PLOT DATE 3/29/2021 2:54 PM ALEX LOWDERMILK

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828.328.2024
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mcgillassociates.com

DATE 3/29/2021	PROJECT # 20.07036
OFFICE MANAGER MC	DESIGNER AL
PROJECT MANAGER MH	REVIEWER JS

DAM REPAIRS

CITY OF BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

1500 0 750 1500 3000

GRAPHIC SCALE DIVISION VALUE = 1500 FEET

NATIONAL WETLANDS INVENTORY MAP

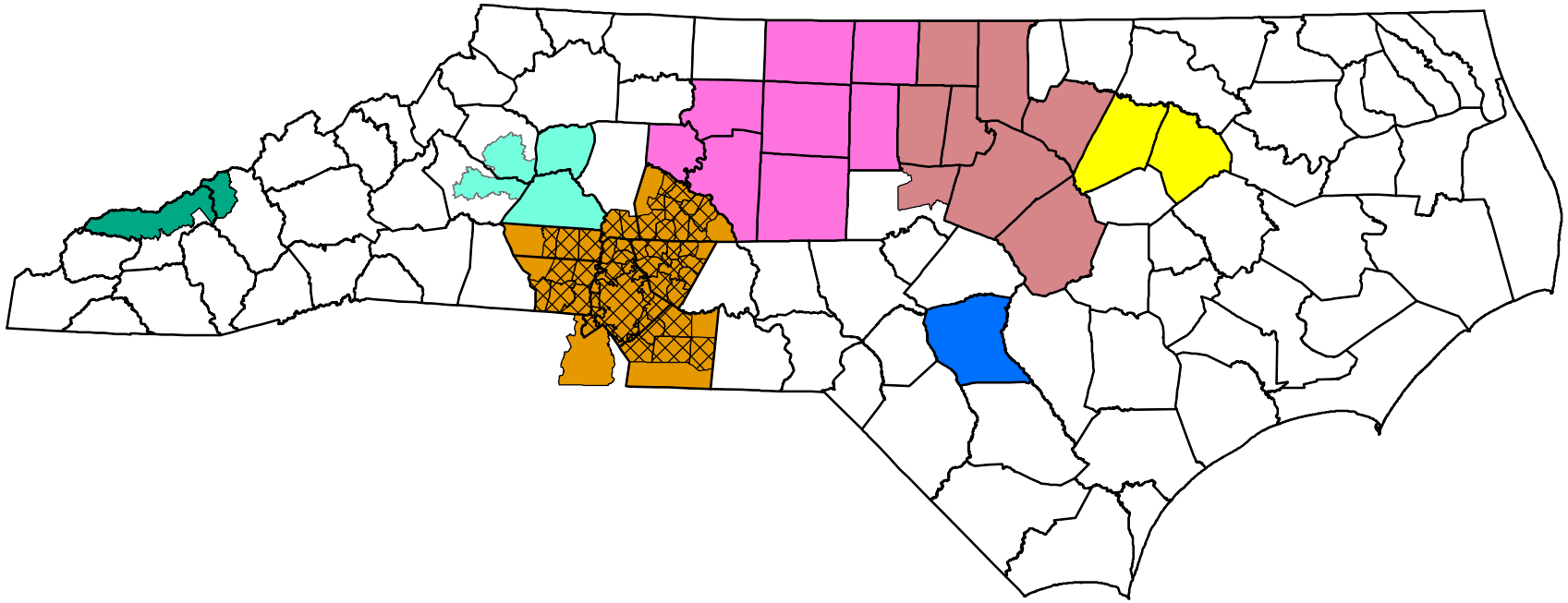
FIGURES

A-7

APPENDIX A-8

NON-ATTAINMENT MAP

North Carolina's Current Ozone Designation Status

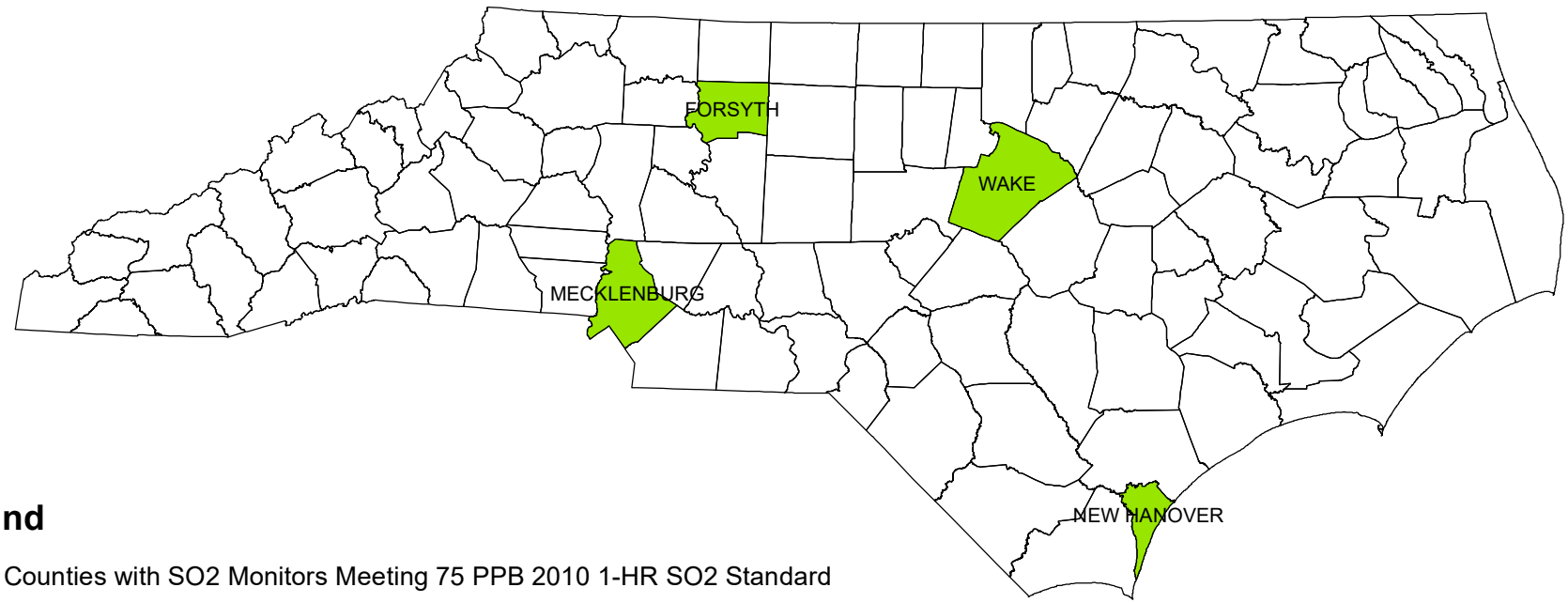


Legend

- Charlotte-Gastonia-RockHill 2008 Ozone Attainment/Maintenance August 27, 2015
- Charlotte-Gastonia-Rock Hill, NC-SC; 1997 Ozone Attainment/Maintenance January 2, 2014
- Fayetteville, NC; EAC, Desginated as 1997 Ozone Attainment April 15, 2008
- Greensboro-Winston Salem-High Point, NC;EAC,Designated as 1997 Ozone Attainment April 15, 2008
- Haywood and Swain Counties (Great Smoky Mountains NP);Designated as 1997 Ozone Attainment/Maintenance January 6, 2010
- Hickory-Morganton-Lenoir, NC;EAC, Designated as 1997 Ozone Attainment April 15, 2008
- Raleigh-Durham-Chapel Hill, NC;Designated as 1997 Ozone Attainment/Maintenance December 26, 2007
- Rocky Mount, NC; Redesignated as 1997 Ozone Attainment/Maintenance January 5, 2007
- Attainment/Unlcassified

NCDENR - DAQ
Map valid: 26 Aug 2015
Not to Scale (KO)

North Carolina's Current Sulfur Dioxide (SO_2) Designation Status



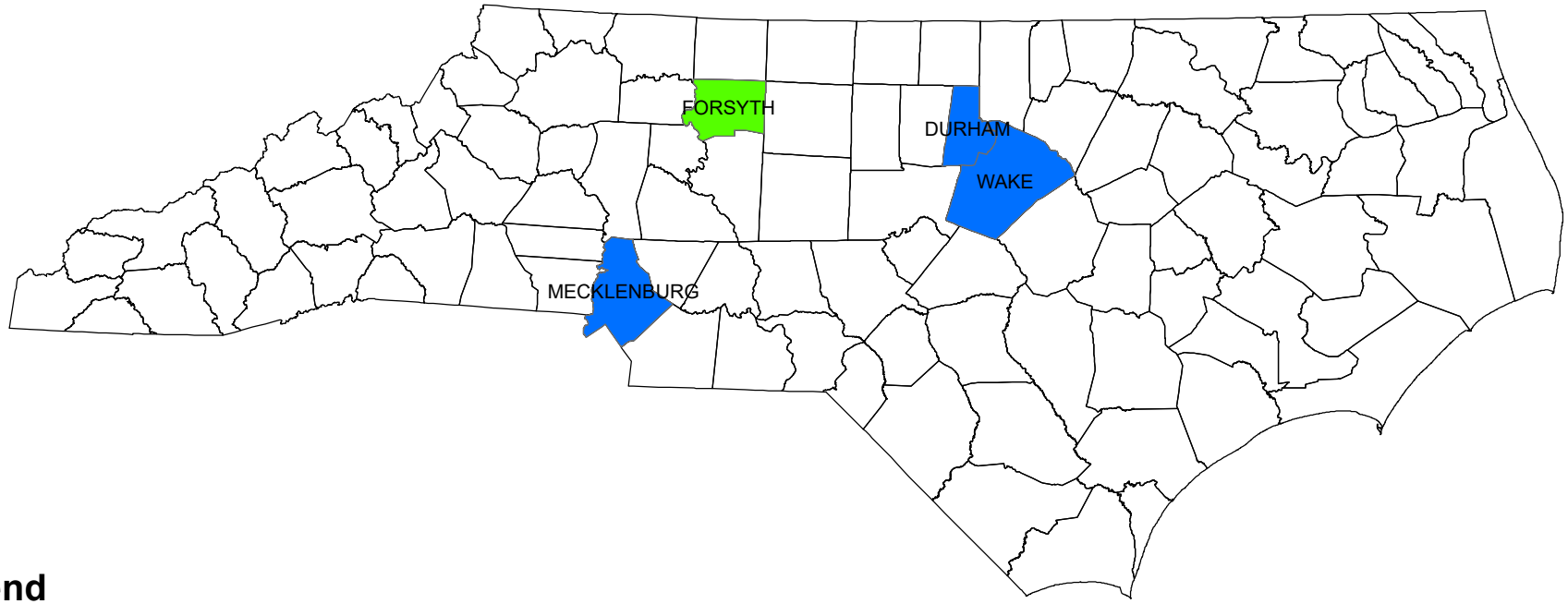
Legend

Counties with SO2 Monitors Meeting 75 PPB 2010 1-HR SO2 Standard

Entire State Designation Deferred by EPA to a Later Date

NCDENR - DAQ
Map valid: 29 April 2014
Not to Scale (KO)

North Carolina's Current 1994 Carbon Monoxide Designation Status

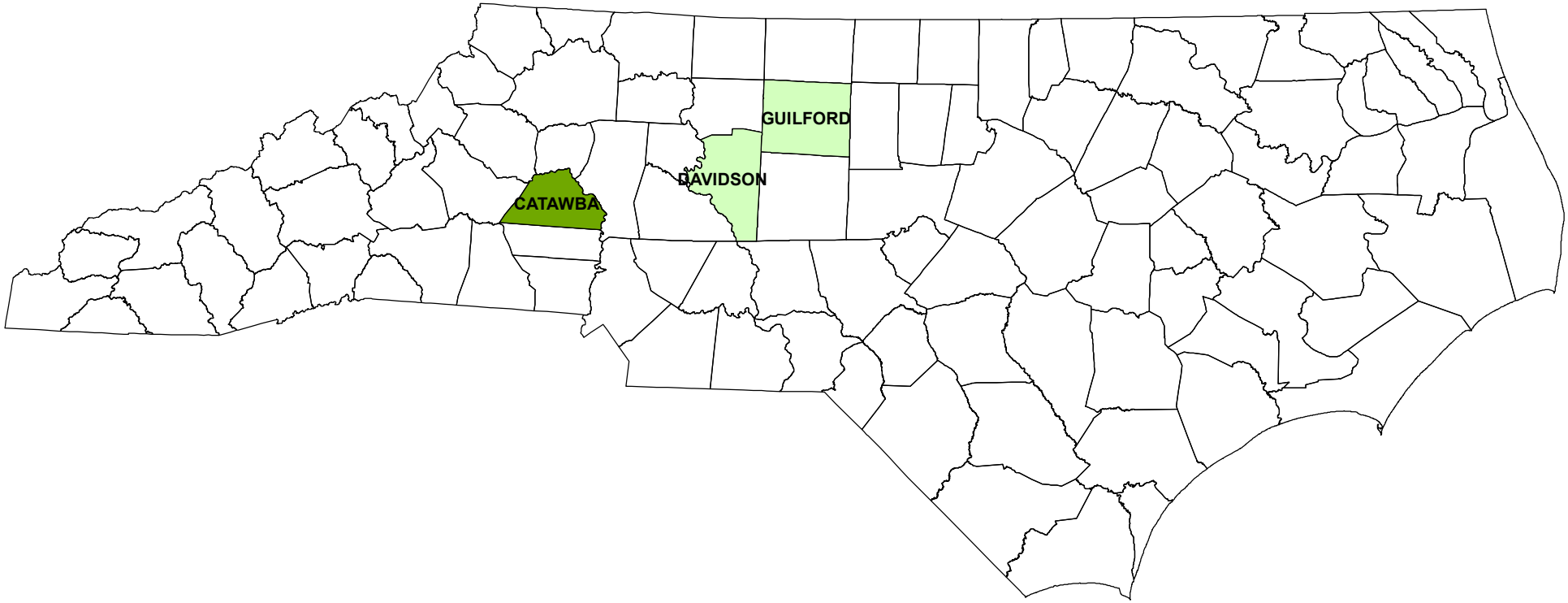


Legend

- Forsyth County Attainment May 23, 2015
- Mecklenburg, Durham and Wake Counties Attainment September 18, 2015
- Attainment/Unlcassifiable

NCDEQ - DAQ
Map valid: 3 Feb 2015
Not to Scale (KO)

North Carolina's Current Annual Fine Particulate Matter (PM2.5) Designation Status



Legend

- Catawba County Redesignated Attainment/Maintenance for 1997 PM2.5 Standard, December 19, 2011
- Davidson and Guilford Counties Redesignated Attainment/Maintenance for 1997 PM2.5 Standard December 19, 2011
- Attainment/Unclassified

NCDENR - DAQ
Map valid: 29 April 2014
Not to Scale (KO)

APPENDIX A-9

NCSHPO MAP

NCHPO HPOWEB MAP

3/29/2021 3:13:27 PM

1:36,112

0 0.25 0.5 1 mi

0 0.4 0.8 1.6 km

State of North Carolina DOT, Esri, HERE, Garmin, INCREMENT P, NGA, USGS

Study Limits

Local districts & boundaries

Local individual resources & centerpoints

Local Landmark

Local Landmark, Gone

Local HD Center Point

Surveyed Only individual resources & centerpoints

Surveyed Only

Surveyed in NRHD

Surveyed Only, Gone

Surveyed in NRHD, Gone

Blockface- Multiple properties

North Carolina State Historic Preservation Office

State of North Carolina DOT, Esri, HERE, Garmin, INCREMENT P, NGA, USGS | Participating NC Counties, NCCGIA, NC OneMap, US EPA | Esri, HERE |

APPENDIX A-10

PRIME AND IMPORTANT FARMLAND SOILS REPORT

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Brunswick County, North Carolina

Boiling Spring Lakes Dams

March 1, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:28,400 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Brunswick County, North Carolina
Survey Area Data: Version 24, Jun 2, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 31, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BDC	Baymeade and Marvyn soils, 6 to 12 percent slopes	8.9	16.2%
DO	Dorovan muck	18.9	34.3%
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	3.9	7.2%
KrB	Kureb fine sand, 1 to 8 percent slopes	15.9	28.8%
Lo	Leon fine sand	0.1	0.2%
Ma	Mandarin fine sand	3.1	5.7%
W	Water	4.2	7.6%
Totals for Area of Interest		**55.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Brunswick County, North Carolina

BDC—Baymeade and Marvyn soils, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 3w6p
Elevation: 20 to 160 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Baymeade and similar soils: 50 percent
Marvyn and similar soils: 30 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baymeade

Setting

Landform: Ridges on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and sandy marine deposits

Typical profile

A - 0 to 2 inches: fine sand
E/Bh - 2 to 30 inches: fine sand
Bt - 30 to 40 inches: fine sandy loam
C - 40 to 80 inches: loamy fine sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 48 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Hydric soil rating: No

Description of Marvyn

Setting

Landform: Ridges on marine terraces

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and clayey marine deposits

Typical profile

H1 - 0 to 12 inches: loamy sand
H2 - 12 to 52 inches: sandy clay loam
H3 - 52 to 80 inches: loamy sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Muckalee, undrained

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

DO—Dorovan muck

Map Unit Setting

National map unit symbol: 3w6z
Elevation: 20 to 160 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Dorovan and similar soils: 80 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dorovan

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Woody organic material

Typical profile

Oe - 0 to 5 inches: muck
Oa - 5 to 85 inches: muck
2Cg - 85 to 95 inches: loamy sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water capacity: Very high (about 13.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

GoA—Goldsboro fine sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2v74z
Elevation: 20 to 160 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 280 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Goldsboro and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Goldsboro

Setting

Landform: Broad interstream divides on marine terraces, flats on marine terraces
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy marine deposits

Typical profile

Ap - 0 to 10 inches: fine sandy loam
E - 10 to 14 inches: fine sandy loam
Bt - 14 to 46 inches: sandy clay loam
Btg - 46 to 63 inches: sandy clay loam
C - 63 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Hydric soil rating: No

Minor Components

Norfolk

Percent of map unit: 7 percent
Landform: Broad interstream divides on marine terraces, flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Lynchburg

Percent of map unit: 6 percent
Landform: Flats on marine terraces, broad interstream divides on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

KrB—Kureb fine sand, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 3w75
Elevation: 20 to 160 feet

Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Kureb and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kureb

Setting

Landform: Rims on carolina bays, ridges on marine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands and/or sandy fluviomarine deposits

Typical profile

A - 0 to 3 inches: fine sand
E - 3 to 26 inches: sand
C/Bh - 26 to 89 inches: sand

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Leon

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Murville, undrained

Percent of map unit: 2 percent
Landform: Depressions on marine terraces, flats on marine terraces
Down-slope shape: Concave
Across-slope shape: Concave

Hydric soil rating: Yes

Lo—Leon fine sand

Map Unit Setting

National map unit symbol: 3w77
Elevation: 20 to 160 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Leon and similar soils: 80 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leon

Setting

Landform: Flats on marine terraces
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy fluviomarine deposits and/or eolian sands

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 17 inches: fine sand
Bh - 17 to 51 inches: fine sand
E' - 51 to 59 inches: fine sand
B'h - 59 to 95 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Murville, undrained

Percent of map unit: 5 percent
Landform: Depressions on marine terraces, flats on marine terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Ma—Mandarin fine sand

Map Unit Setting

National map unit symbol: 3w7b
Elevation: 20 to 160 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Mandarin and similar soils: 80 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mandarin

Setting

Landform: Flats on marine terraces
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy fluviomarine deposits and/or eolian sands

Typical profile

A - 0 to 3 inches: sand
E - 3 to 27 inches: sand
Bh - 27 to 49 inches: sand
E' - 49 to 60 inches: sand
B'h - 60 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B/D
Hydric soil rating: No

Minor Components

Leon

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Murville, undrained

Percent of map unit: 2 percent
Landform: Depressions on marine terraces, flats on marine terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydric soil rating: No

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Land Classifications

This folder contains a collection of tabular reports that present a variety of soil groupings. The reports (tables) include all selected map units and components for each map unit. Land classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Prime and other Important Farmlands

This table lists the map units in the survey area that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. The water supply is dependable and of adequate quality. Prime farmland is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some of the soils identified in the table as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Report—Prime and other Important Farmlands

Prime and other Important Farmlands–Brunswick County, North Carolina		
Map Symbol	**Map Unit Name**	**Farmland Classification**
BDC	Baymeade and Marvyn soils, 6 to 12 percent slopes	Not prime farmland
DO	Dorovan muck	Not prime farmland
GoA	Goldsboro fine sandy loam, 0 to 2 percent slopes	All areas are prime farmland
KrB	Kureb fine sand, 1 to 8 percent slopes	Not prime farmland
Lo	Leon fine sand	Farmland of unique importance
Ma	Mandarin fine sand	Not prime farmland
W	Water	Not prime farmland

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

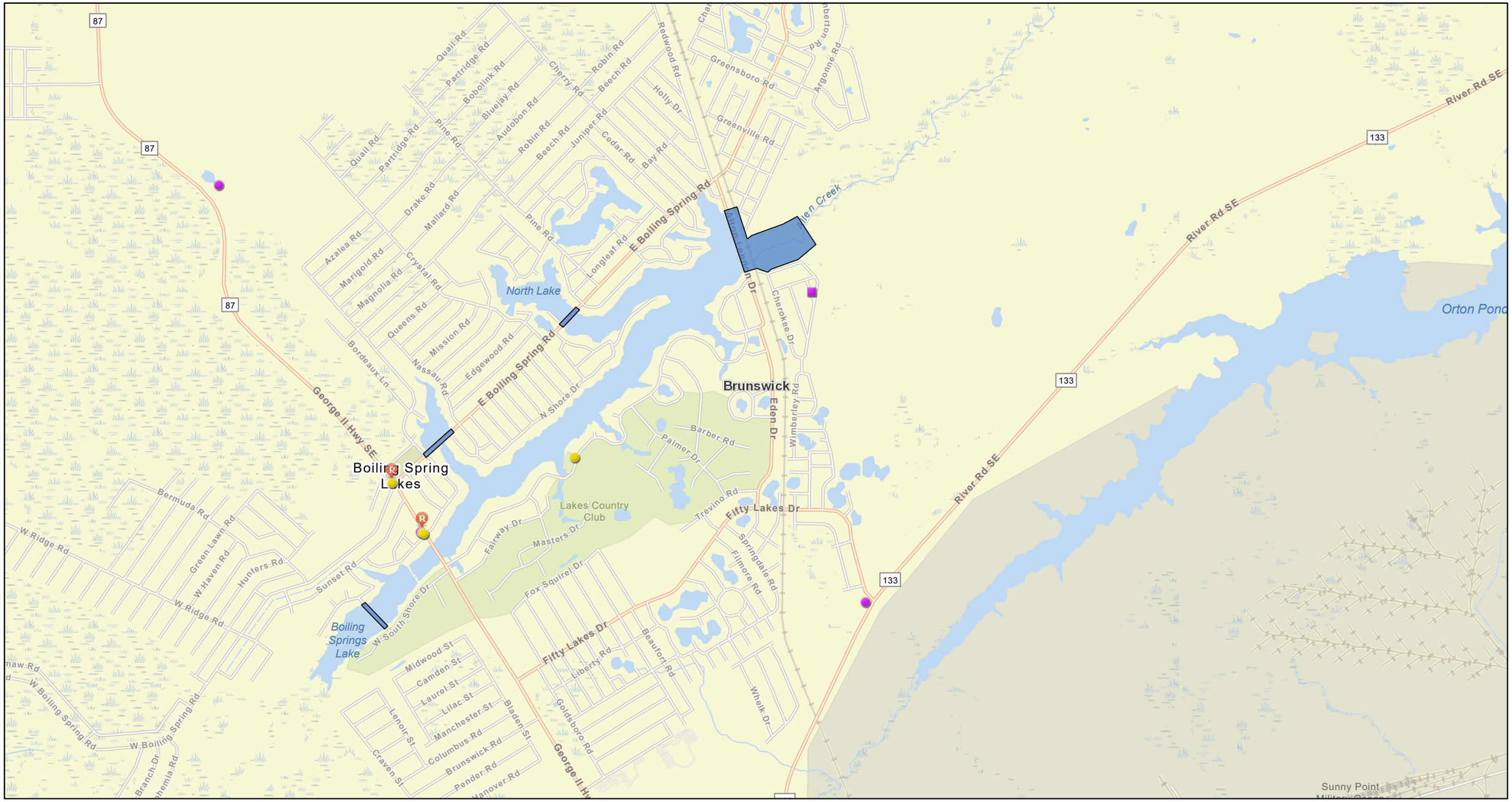
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX A-11

NCDEQ – DIVISION OF WASTE MANAGEMENT SITE LOCATOR MAP

NCDEQ Division of Waste Management Site Locator Map



3/3/2021, 4:24:08 PM

1:36,112

0 0.38 0.75 1.5 mi

0 0.5 1 2 km

Study Areas

Inactive Hazardous Sites

Pre-Regulatory Landfill Sites

UST Incidents

UST Active Facilities

Land Use Restriction and/or Notices

Notice and Restriction

County Boundary

NCDOT GIS Unit, State of North Carolina DOT, Esri, HERE, Garmin, SafeGraph, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

NC Division of Waste Management

APPENDIX B

SUPPORTING DOCUMENTS

1. INFORMATION FOR PLANNING AND CONSULTATION (IPAC)
2. NCNHP DATABASE SEARCH
3. US CENSUS DATA, EPA EJSCREEN REPORT, LOW-INCOME AND MINORITY DATA

APPENDIX B-1

INFORMATION FOR PLANNING AND CONSULTATION (IPAC)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
Phone: (919) 856-4520 Fax: (919) 856-4556

In Reply Refer To: October 07, 2019
Consultation Code: 04EN2000-2020-SLI-0020
Event Code: 04EN2000-2020-E-00062
Project Name: Boiling Springs Lake Dams project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The species list generated pursuant to the information you provided identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the species' life histories and habitats and information on completing a biological assessment or

evaluation and can be found on our web page at http://www.fws.gov/raleigh. Please check the web site often for updated information or changes

If your project contains suitable habitat for any of the federally-listed species known to be present within the county where your project occurs, the proposed action has the potential to adversely affect those species. As such, we recommend that surveys be conducted to determine the species' presence or absence within the project area. The use of North Carolina Natural Heritage program data should not be substituted for actual field surveys.

If you determine that the proposed action may affect (i.e., likely to adversely affect or not likely to adversely affect) a federally-protected species, you should notify this office with your determination, the results of your surveys, survey methodologies, and an analysis of the effects of the action on listed species, including consideration of direct, indirect, and cumulative effects, before conducting any activities that might affect the species. If you determine that the proposed action will have no effect (i.e., no beneficial or adverse, direct or indirect effect) on federally listed species, then you are not required to contact our office for concurrence (unless an Environmental Impact Statement is prepared). However, you should maintain a complete record of the assessment, including steps leading to your determination of effect, the qualified personnel conducting the assessment, habitat conditions, site photographs, and any other related articles.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

Not all Threatened and Endangered Species that occur in North Carolina are subject to section 7 consultation with the U.S Fish and Wildlife Service. Atlantic and shortnose sturgeon, sea turtles,when in the water, and certain marine mammals are under purview of the National Marine Fisheries Service. If your project occurs in marine, estuarine, or coastal river systems you should also contact the National Marine Fisheries Service, http://www.nmfs.noaa.gov/

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office. If you have any questions or comments, please contact John Ellis of this office at john_ellis@fws.gov.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Raleigh Ecological Services Field Office
Post Office Box 33726
Raleigh, NC 27636-3726
(919) 856-4520

Project Summary

Consultation Code: 04EN2000-2020-SLI-0020

Event Code: 04EN2000-2020-E-00062

Project Name: Boiling Springs Lake Dams project

Project Type: DAM

Project Description: Repair of four dams within the Boiling Springs Lake system.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/34.04804959625184N78.03479865862069W

Counties: Brunswick, NC

Endangered Species Act Species

There is a total of 15 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
West Indian Manatee *Trichechus manatus* There is **final** critical habitat for this species. Your location is outside the critical habitat. ***This species is also protected by the Marine Mammal Protection Act, and may have additional consultation requirements.*** Species profile: https://ecos.fws.gov/ecp/species/4469	Threatened

Birds

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Red-cockaded Woodpecker *Picoides borealis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614	Endangered
Wood Stork *Mycteria americana* Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8477	Threatened

Reptiles

NAME	STATUS
American Alligator *Alligator mississippiensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/776	Similarity of Appearance (Threatened)
Green Sea Turtle *Chelonia mydas* Population: North Atlantic DPS There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle *Eretmochelys imbricata* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3656	Endangered
Kemp's Ridley Sea Turtle *Lepidochelys kempii* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle *Dermochelys coriacea* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle *Caretta caretta* Population: Northwest Atlantic Ocean DPS There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1110	Threatened

Snails

NAME	STATUS
Magnificent Ramshorn *Planorbella magnifica* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6216	Candidate

Flowering Plants

NAME	STATUS
Cooley's Meadowrue *Thalictrum cooleyi* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3281	Endangered
Rough-leaved Loosestrife *Lysimachia asperulaefolia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2747	Endangered
Seabeach Amaranth *Amaranthus pumilus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8549	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

APPENDIX B-2

NCNHP DATABASE SEARCH

NC DEPARTMENT OF
NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**
Susi Hamilton, **Secretary**
Walter Clark, **Director, Land and Water Stewardship**

NCNHDE-10048

August 16, 2019

Jon Swaim
McGill Associates, PA
1013 State Farm Road
Boone, NC 28607
RE: Boiling Springs Lakes Dam Repairs; 1907042.000

Dear Jon Swaim:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

A query of the NCNHP database indicates that there are records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. These results are presented in the attached 'Documented Occurrences' tables and map.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is documented within the project area or indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

Also please note that the NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or an occurrence of a Federally-listed species is documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Intersecting the Project Area
Boiling Springs Lakes Dam Repairs
Project No. 1907042.000
August 16, 2019
NCNHDE-10048

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	27168	Cypress--Gum Swamp (Blackwater Subtype)	---	2009-02-16	A	2-High	---	---	G4?	S4
Natural Community	12390	Pond Pine Woodland (Typic Subtype)	---	2017-03-24	B	3-Medium	---	---	G3	S3
Natural Community	2428	Sandy Pine Savanna (Rush Featherling Subtype)	---	2017-03-24	B	3-Medium	---	---	G1	S1
Reptile	10454	Deirochelys reticularia reticularia	Eastern Chicken Turtle	1977-07	H?	3-Medium	---	Special Concern	G5T5	S2S3
Vascular Plant	14083	Dionaea muscipula	Venus Flytrap	23 June 2018	A	3-Medium	---	Special Concern Vulnerable	G2	S2

Natural Areas Documented Within Project Area

Site Name	Representational Rating	Collective Rating
Boiling Spring Lakes Limesink Complex	R2 (Very High)	C1 (Exceptional)
Blue Pond/Allen Creek	R1 (Exceptional)	C2 (Very High)

Managed Areas Documented Within Project Area*

Managed Area Name	Owner	Owner Type
North Carolina Coastal Land Trust Easement	North Carolina Coastal Land Trust	Private
Brunswick County Open Space	Brunswick County: multiple local government	Local Government

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally-listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on August 16, 2019; source: NCNHP, Q3 Jul 2019. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Bird	36564	Peucaea aestivalis	Bachman's Sparrow	2014-05-23	E	3-Medium	---	Special Concern	G3	S3B,S2N
Bird	21524	Peucaea aestivalis	Bachman's Sparrow	2017-05-17	E	3-Medium	---	Special Concern	G3	S3B,S2N
Bird	11348	Picoides borealis	Red-cockaded Woodpecker	2018-06-08	E	3-Medium	Endangered	Endangered	G3	S2
Bird	37799	Setophaga virens waynei	Wayne's Black-throated Green Warbler	1939-05-19	H	5-Very Low	---	Endangered	G5T1	S2B
Dragonfly or Damselfly	33738	Somatochlora georgiana	Coppery Emerald	2004-Pre	H?	5-Very Low	---	Significantly Rare	G3G4	S2?
Freshwater Fish	38088	Enneacanthus chaetodon	Blackbanded Sunfish	2017-10-05	E	3-Medium	---	Significantly Rare	G3G4	S3
Moss	23040	Sphagnum fallax	Pretty Peatmoss	1975-06-12	H	4-Low	---	Significantly Rare Peripheral	G5	S2
Natural Community	27168	Cypress--Gum Swamp (Blackwater Subtype)	---	2009-02-16	A	2-High	---	---	G4?	S4
Natural Community	10208	High Pocosin (Evergreen Subtype)	---	2008-05-30	A	2-High	---	---	G3	S3S4
Natural Community	5709	Pine/Scrub Oak Sandhill (Coastal Fringe Subtype)	---	2017-03-24	AB	4-Low	---	---	G2	S2
Natural Community	12390	Pond Pine Woodland (Typic Subtype)	---	2017-03-24	B	3-Medium	---	---	G3	S3
Natural Community	13072	Pond Pine Woodland (Typic Subtype)	---	1998	C	3-Medium	---	---	G3	S3
Natural Community	2428	Sandy Pine Savanna (Rush Featherling Subtype)	---	2017-03-24	B	3-Medium	---	---	G1	S1

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	6846	Small Depression Drawdown Meadow (Typic Subtype)	---	1991-07-18	C?	4-Low	---	---	G2?	S2S3
Natural Community	24622	Small Depression Drawdown Meadow (Typic Subtype)	---	2006	C	3-Medium	---	---	G2?	S2S3
Natural Community	30811	Small Depression Pond (Open Lily Pond Subtype)	---	1991-07-18	C?	4-Low	---	---	G3?	S3
Natural Community	30860	Small Depression Pond (Open Lily Pond Subtype)	---	2006	C	3-Medium	---	---	G3?	S3
Natural Community	30812	Small Depression Pond (Typic Marsh Subtype)	---	1991-07-18	C?	4-Low	---	---	G3?	S3
Natural Community	30813	Small Depression Shrub Border	---	1991-07-18	C?	4-Low	---	---	G3?	S3
Natural Community	30411	Wet Pine Flatwoods (Sand Myrtle Subtype)	---	2017-03-24	B	3-Medium	---	---	G2?	S1
Natural Community	19436	Wet Pine Flatwoods (Sand Myrtle Subtype)	---	2010	BC	3-Medium	---	---	G2?	S1
Natural Community	13502	Wet Pine Flatwoods (Typic Subtype)	---	2010-05-06	B	3-Medium	---	---	G3	S3
Natural Community	13353	Wet Pine Flatwoods (Typic Subtype)	---	2010-05-06	C	3-Medium	---	---	G3	S3
Natural Community	29139	Xeric Sandhill Scrub (Typic Subtype)	---	2010-05-06	D	3-Medium	---	---	G3?	S3S4
Reptile	3970	Alligator mississippiensis	American Alligator	2018-02-26	E	4-Low	Threatened Similar Appearance	Threatened	G5	S3
Reptile	10252	Crotalus adamanteus	Eastern Diamondback Rattlesnake	2009-09	E	4-Low	---	Endangered	G4	S1
Reptile	10454	Deirochelys reticularia reticularia	Eastern Chicken Turtle	1977-07	H?	3-Medium	---	Special Concern	G5T5	S2S3
Reptile	27325	Heterodon simus	Southern Hognose Snake	2009-03-29	E	2-High	---	Threatened	G2	S2

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Reptile	3920	Masticophis flagellum	Coachwhip	1946-Pre	H	4-Low	---	Significantly Rare	G5	S3
Reptile	37552	Sistrurus miliarius miliarius	Carolina Pigmy Rattlesnake	1965-06	H	4-Low	---	Special Concern	G5T4T5	S3
Vascular Plant	31525	Amorpha confusa	Savanna Indigo-bush	2012-09-20	D	2-High	---	Threatened	G3T3	S3
Vascular Plant	29742	Amorpha confusa	Savanna Indigo-bush	2019-06-10	E	2-High	---	Threatened	G3T3	S3
Vascular Plant	722	Asclepias pedicellata	Savanna Milkweed	2013-06-06	B	3-Medium	---	Special Concern Vulnerable	G4	S3
Vascular Plant	11592	Dionaea muscipula	Venus Flytrap	2017-06-08	A	3-Medium	---	Special Concern Vulnerable	G2	S2
Vascular Plant	7662	Dionaea muscipula	Venus Flytrap	2017-06	A	3-Medium	---	Special Concern Vulnerable	G2	S2
Vascular Plant	14083	Dionaea muscipula	Venus Flytrap	23 June 2018	A	3-Medium	---	Special Concern Vulnerable	G2	S2
Vascular Plant	28240	Dionaea muscipula	Venus Flytrap	2018-06-06	C	2-High	---	Special Concern Vulnerable	G2	S2
Vascular Plant	4460	Dionaea muscipula	Venus Flytrap	1971-05	X	3-Medium	---	Special Concern Vulnerable	G2	S2
Vascular Plant	6758	Dionaea muscipula	Venus Flytrap	2015-06-03	BC	3-Medium	---	Special Concern Vulnerable	G2	S2
Vascular Plant	29747	Dionaea muscipula	Venus Flytrap	2011-06-15	D	2-High	---	Special Concern Vulnerable	G2	S2
Vascular Plant	23617	Dionaea muscipula	Venus Flytrap	2015-06-03	CD	2-High	---	Special Concern Vulnerable	G2	S2
Vascular Plant	31511	Dionaea muscipula	Venus Flytrap	2017-06-08	Br	2-High	---	Special Concern Vulnerable	G2	S2

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	31526	Dionaea muscipula	Venus Flytrap	2012-09-20	C	2-High	---	Special Concern Vulnerable	G2	S2
Vascular Plant	27343	Dionaea muscipula	Venus Flytrap	2009-02-09	Di	2-High	---	Special Concern Vulnerable	G2	S2
Vascular Plant	35928	Dionaea muscipula	Venus Flytrap	2015-06-03	D	2-High	---	Special Concern Vulnerable	G2	S2
Vascular Plant	2422	Drosera filiformis	Threadleaf Sundew	1975-06	F	5-Very Low	---	Special Concern Vulnerable	G4	S2
Vascular Plant	9117	Eleocharis elongata	Florida Spikerush	1993-09-05	A	3-Medium	---	Endangered	G5?	S1
Vascular Plant	16093	Eupatorium leptophyllum	Limesink Dog-fennel	1990-10-19	A	3-Medium	---	Endangered	G4G5	S2
Vascular Plant	9590	Eupatorium leptophyllum	Limesink Dog-fennel	2006-09-05	A	3-Medium	---	Endangered	G4G5	S2
Vascular Plant	24543	Eupatorium leptophyllum	Limesink Dog-fennel	2006-09-05	E	2-High	---	Endangered	G4G5	S2
Vascular Plant	18781	Lachnocaulon minus	Brown Bogbutton	1999-02-28	A	3-Medium	---	Threatened	G3G4	S2
Vascular Plant	24782	Lachnocaulon minus	Brown Bogbutton	1994-07-14	E	2-High	---	Threatened	G3G4	S2
Vascular Plant	24811	Lachnocaulon minus	Brown Bogbutton	1994-10-12	E	2-High	---	Threatened	G3G4	S2
Vascular Plant	19442	Ludwigia suffruticosa	Shrubby Seedbox	1993-09-05	A	3-Medium	---	Threatened	G5	S2
Vascular Plant	15805	Ludwigia suffruticosa	Shrubby Seedbox	1994-05-23	A	3-Medium	---	Threatened	G5	S2
Vascular Plant	24551	Ludwigia suffruticosa	Shrubby Seedbox	2006-09-05	E	2-High	---	Threatened	G5	S2
Vascular Plant	24552	Ludwigia suffruticosa	Shrubby Seedbox	2006-09-05	E	2-High	---	Threatened	G5	S2
Vascular Plant	7313	Lysimachia asperulifolia	Rough-leaf Loosestrife	2017-06-07	A	3-Medium	Endangered	Endangered	G3	S3
Vascular Plant	29749	Lysimachia asperulifolia	Rough-leaf Loosestrife	2011-06-13	BC	3-Medium	Endangered	Endangered	G3	S3
Vascular Plant	30366	Lysimachia asperulifolia	Rough-leaf Loosestrife	2012-02-04	D	2-High	Endangered	Endangered	G3	S3
Vascular Plant	15298	Myriophyllum laxum	Loose Water-milfoil	1968-08 09	H	3-Medium	---	Endangered	G3	S2
Vascular Plant	15827	Myriophyllum laxum	Loose Water-milfoil	1950-06	H	3-Medium	---	Endangered	G3	S2
Vascular Plant	11587	Myriophyllum laxum	Loose Water-milfoil	1994-07-14	C	3-Medium	---	Endangered	G3	S2

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	9065	Platanthera integra	Yellow Fringeless Orchid	1948-08	H	4-Low	---	Special Concern Vulnerable	G3G4	S2
Vascular Plant	6719	Rhynchospora pleiantha	Coastal Beaksedge	1994-05-23	A	3-Medium	---	Threatened	G2G3	S2
Vascular Plant	13257	Rhynchospora pleiantha	Coastal Beaksedge	1993-09-05	A	3-Medium	---	Threatened	G2G3	S2
Vascular Plant	15636	Scleria verticillata	Savanna Nutrush	1933-10-08	H	5-Very Low	---	Significantly Rare Peripheral	G5	S2
Vascular Plant	23487	Utricularia cornuta	Horned Bladderwort	1992-09-05	B	2-High	---	Threatened	G5	S1S2
Vascular Plant	23492	Utricularia cornuta	Horned Bladderwort	1990-10-19	B	3-Medium	---	Threatened	G5	S1S2

Natural Areas Documented Within a One-mile Radius of the Project Area

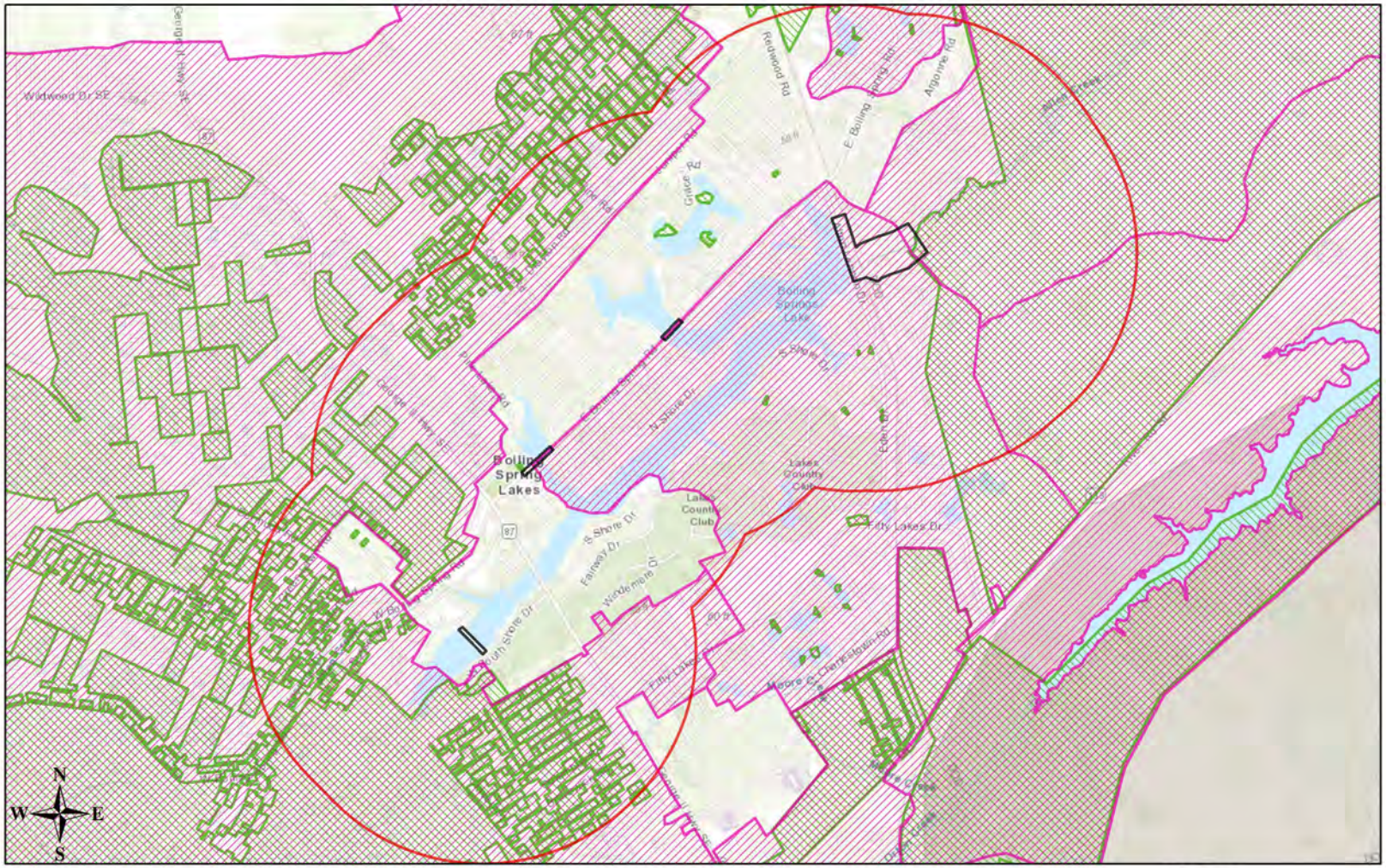
Site Name	Representational Rating	Collective Rating
Boiling Spring Lakes Limesink Complex	R2 (Very High)	C1 (Exceptional)
Orton Sandhills and Limesinks	R2 (Very High)	C2 (Very High)
Boiling Spring Lakes Wetland Complex	R1 (Exceptional)	C1 (Exceptional)
Blue Pond/Allen Creek	R1 (Exceptional)	C2 (Very High)
Pretty Pond Limesink Complex	R1 (Exceptional)	C2 (Very High)

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
North Carolina Coastal Land Trust Easement	North Carolina Coastal Land Trust	Private
Boiling Spring Lakes Plant Conservation Preserve	NC Department of Agriculture, Plant Conservation Program	State
Boiling Spring Lakes Plant Conservation Preserve Dedicated Nature Preserve	NC Department of Agriculture, Plant Conservation Program	State
Brunswick County Open Space	Brunswick County: multiple local government	Local Government
Pretty Pond Limesink Complex Natural Heritage Preserve	NC DNCR, Natural Heritage Program	State
Pretty Pond Limesink Complex Preserve Dedicated Nature Preserve	NC DNCR, Natural Heritage Program	State
Boiling Spring Lakes Preserve	The Nature Conservancy	Private

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on August 16, 2019; source: NCNHP, Q3 Jul 2019. Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-10048: Boiling Springs Lakes Dam Repairs



August 16, 2019

- Project Boundary
- Buffered Project Boundary
- NHP Natural Area (NHNA)
- Managed Area (MAREA)

1:41,548

0 0.35 0.7 1.4 mi

0 0.5 1 2 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

APPENDIX B-3

US CENSUS DATA, EPA EJSCREEN REPORT, LOW-INCOME AND MINORITY DATA

EJSCREEN Census 2010 Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Sanford Dam

Summary	Census 2010
Population	3
Population Density (per sq. mile)	112
People of Color Population	1
% People of Color Population	18%
Households	3
Housing Units	3
Land Area (sq. miles)	0.03
% Land Area	88%
Water Area (sq. miles)	0.00
% Water Area	12%

Population by Race	Number	Percent
Total	3	-------
Population Reporting One Race	3	98%
White	3	86%
Black	0	10%
American Indian	0	0%
Asian	0	0%
Pacific Islander	0	0%
Some Other Race	0	1%
Population Reporting Two or More Races	0	2%
Total Hispanic Population	0	5%
Total Non-Hispanic Population	3	95%
White Alone	2	82%
Black Alone	0	10%
American Indian Alone	0	0%
Non-Hispanic Asian Alone	0	0%
Pacific Islander Alone	0	0%
Other Race Alone	0	0%
Two or More Races Alone	0	2%

Population by Sex	Number	Percent
Male	1	49%
Female	2	51%

Population by Age	Number	Percent
Age 0-4	0	7%
Age 0-17	1	25%
Age 18+	2	75%
Age 65+	0	10%

Households by Tenure	Number	Percent
Total	3	
Owner Occupied	2	80%
Renter Occupied	1	20%

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, Census 2010 Summary File 1.

EJSCREEN Report (Version 2020)

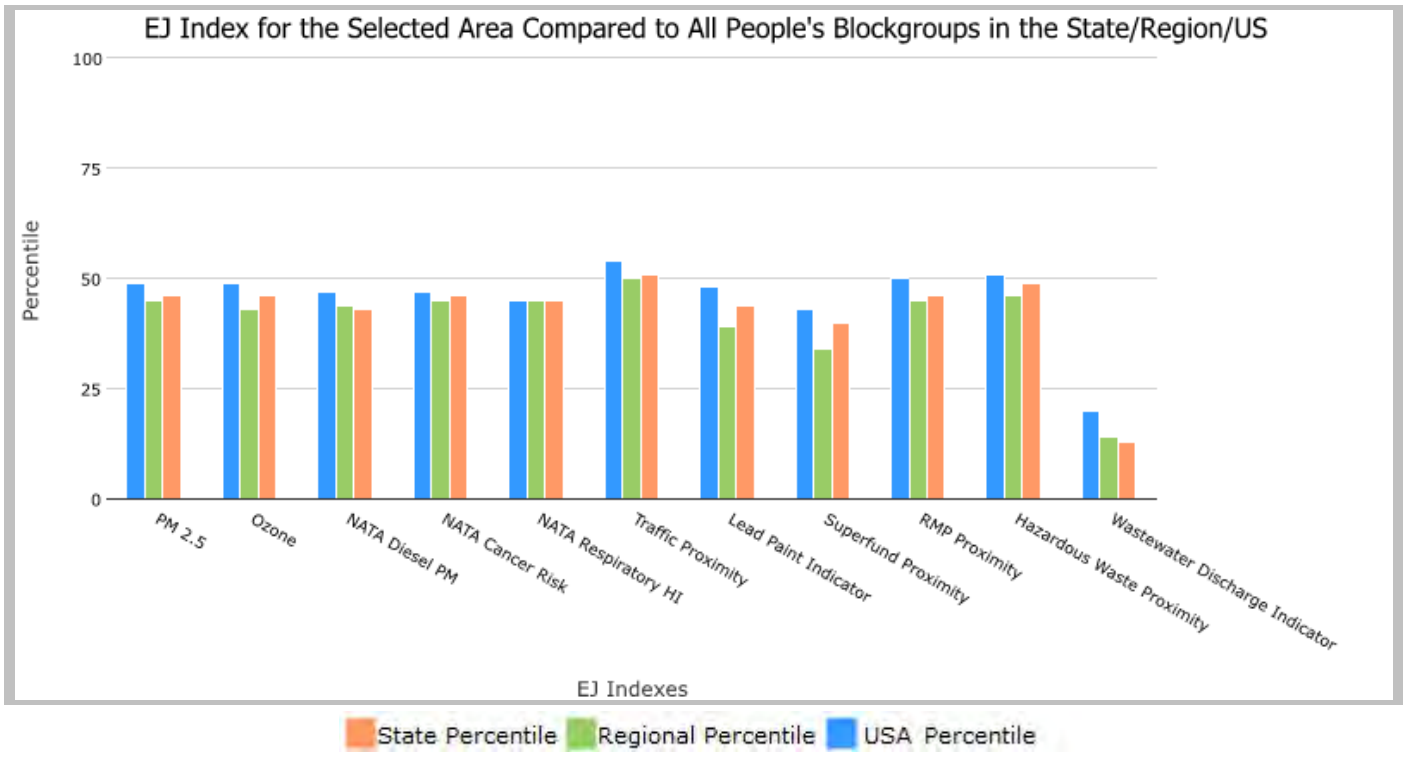
the User Specified Area, NORTH CAROLINA, EPA Region 4

Approximate Population: 2

Input Area (sq. miles): 0.07

Sanford Dam

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	46	45	49
EJ Index for Ozone	46	43	49
EJ Index for NATA* Diesel PM	43	44	47
EJ Index for NATA* Air Toxics Cancer Risk	46	45	47
EJ Index for NATA* Respiratory Hazard Index	45	45	45
EJ Index for Traffic Proximity and Volume	51	50	54
EJ Index for Lead Paint Indicator	44	39	48
EJ Index for Superfund Proximity	40	34	43
EJ Index for RMP Proximity	46	45	50
EJ Index for Hazardous Waste Proximity	49	46	51
EJ Index for Wastewater Discharge Indicator	13	14	20



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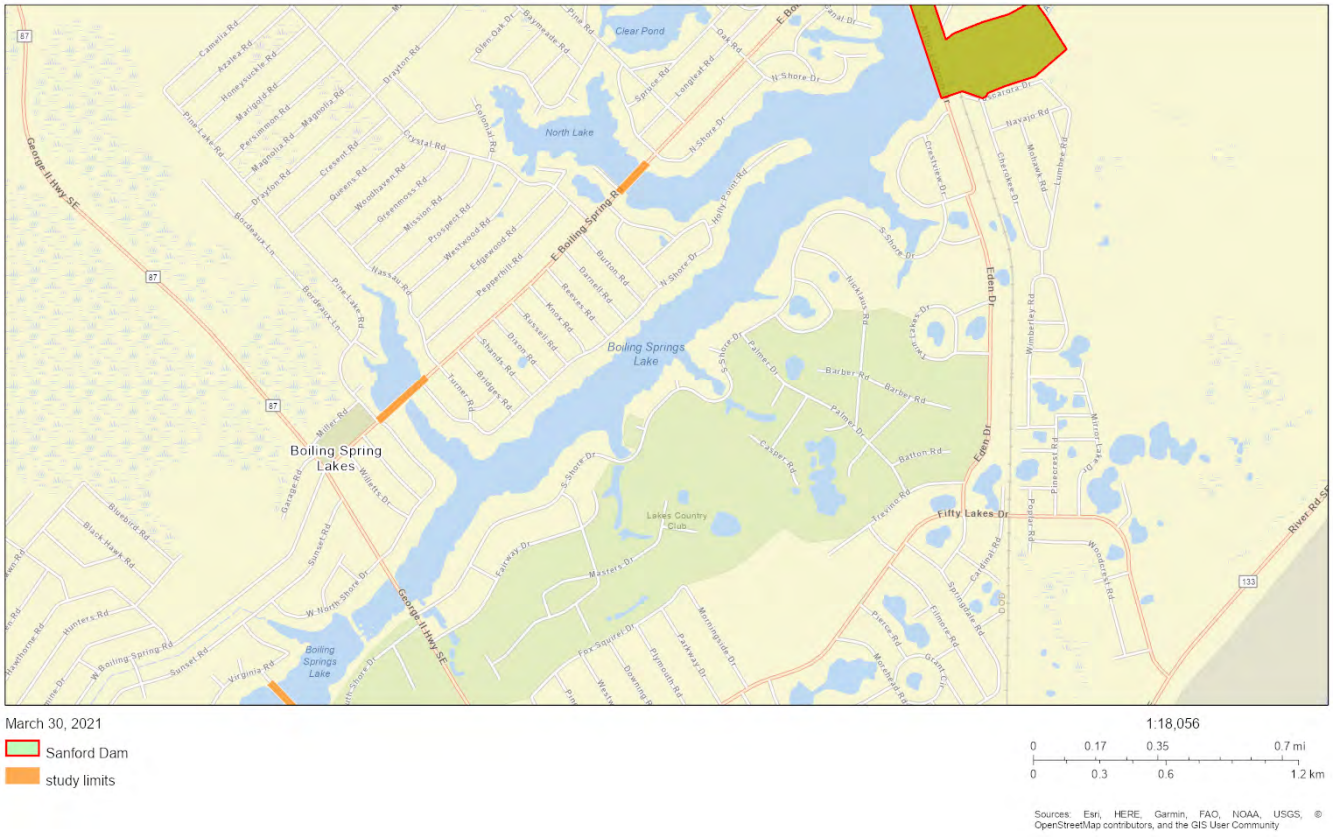
EJSCREEN Report (Version 2020)

the User Specified Area, NORTH CAROLINA, EPA Region 4

Approximate Population: 2

Input Area (sq. miles): 0.07

Sanford Dam



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0

EJSCREEN Report (Version 2020)

the User Specified Area, NORTH CAROLINA, EPA Region 4

Approximate Population: 2

Input Area (sq. miles): 0.07

Sanford Dam

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in µg/m^3)	6.87	8.25	4	8.57	0	8.55	12
Ozone (ppb)	37.2	42.9	1	38	42	42.9	17
NATA* Diesel PM (µg/m^3)	0.238	0.309	39	0.417	<50th	0.478	<50th
NATA* Cancer Risk (lifetime risk per million)	28	34	15	36	<50th	32	<50th
NATA* Respiratory Hazard Index	0.4	0.46	21	0.52	<50th	0.44	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	0.00081	230	8	350	5	750	4
Lead Paint Indicator (% Pre-1960 Housing)	0.033	0.16	26	0.15	34	0.28	23
Superfund Proximity (site count/km distance)	0.046	0.082	51	0.083	56	0.13	39
RMP Proximity (facility count/km distance)	0.11	0.39	28	0.6	23	0.74	18
Hazardous Waste Proximity (facility count/km distance)	0.11	1.3	15	0.91	19	5	14
Wastewater Discharge Indicator (toxicity-weighted concentration/m distance)	0.0014	0.16	81	0.65	77	9.4	68
Demographic Indicators							
Demographic Index	29%	36%	43	37%	42	36%	48
People of Color Population	14%	37%	22	39%	24	39%	27
Low Income Population	44%	36%	67	36%	66	33%	73
Linguistically Isolated Population	0%	2%	52	3%	51	4%	45
Population With Less Than High School Education	16%	13%	68	13%	68	13%	72
Population Under 5 years of age	8%	6%	72	6%	72	6%	70
Population over 64 years of age	16%	15%	56	17%	55	15%	59

* The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Sanford Dam

Summary of ACS Estimates	2014 - 2018
Population	2
Population Density (per sq. mile)	89
People of Color Population	0
% People of Color Population	14%
Households	3
Housing Units	3
Housing Units Built Before 1950	0
Per Capita Income	25,302
Land Area (sq. miles) (Source: SF1)	0.03
% Land Area	88%
Water Area (sq. miles) (Source: SF1)	0.00
% Water Area	12%

	2014 - 2018 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	2	100%	550
Population Reporting One Race	2	97%	1,299
White	2	86%	443
Black	0	9%	168
American Indian	0	0%	37
Asian	0	0%	38
Pacific Islander	0	0%	12
Some Other Race	0	1%	601
Population Reporting Two or More Races	0	3%	179
Total Hispanic Population	0	0%	611
Total Non-Hispanic Population	2		
White Alone	2	86%	437
Black Alone	0	9%	168
American Indian Alone	0	0%	12
Non-Hispanic Asian Alone	0	0%	38
Pacific Islander Alone	0	0%	12
Other Race Alone	0	1%	19
Two or More Races Alone	0	3%	179
Population by Sex			
Male	1	49%	339
Female	1	51%	285
Population by Age			
Age 0-4	0	8%	118
Age 0-17	0	15%	236
Age 18+	2	85%	366
Age 65+	0	16%	149

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2014 - 2018 ·

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Sanford Dam

	2014 - 2018 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	2	100%	306
Less than 9th Grade	0	5%	89
9th - 12th Grade, No Diploma	0	12%	203
High School Graduate	0	24%	172
Some College, No Degree	1	48%	214
Associate Degree	0	21%	171
Bachelor's Degree or more	0	12%	133
Population Age 5+ Years by Ability to Speak English			
Total	2	100%	529
Speak only English	2	100%	408
Non-English at Home[1+2+3+4]	0	0%	296
[1]Speak English "very well"	0	0%	167
[2]Speak English "well"	0	0%	137
[3]Speak English "not well"	0	0%	144
[4]Speak English "not at all"	0	0%	20
[3+4]Speak English "less than well"	0	0%	145
[2+3+4]Speak English "less than very well"	0	0%	199
Linguistically Isolated Households*			
Total	0	0%	12
Speak Spanish	0	0%	12
Speak Other Indo-European Languages	0	0%	12
Speak Asian-Pacific Island Languages	0	0%	12
Speak Other Languages	0	0%	12
Households by Household Income			
Household Income Base	3	100%	180
< $15,000	0	12%	98
$15,000 - $25,000	0	3%	52
$25,000 - $50,000	1	34%	150
$50,000 - $75,000	1	23%	157
$75,000 +	1	28%	126
Occupied Housing Units by Tenure			
Total	3	100%	180
Owner Occupied	2	78%	182
Renter Occupied	1	22%	149
Employed Population Age 16+ Years			
Total	2	100%	351
In Labor Force	2	75%	392
Civilian Unemployed in Labor Force	0	4%	66
Not In Labor Force	1	25%	204

Data Note: Datail may not sum to totals due to rounding. Hispanic population can be of anyrace.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS)
*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: User-specified polygonal location
Ring (buffer): 0-miles radius
Description: Sanford Dam

	2014 - 2018 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	N/A	N/A	N/A
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic popultion can be of any race.
N/A meansnot available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2014 - 2018.
*Population by Language Spoken at Home is available at the census tract summary level and up.

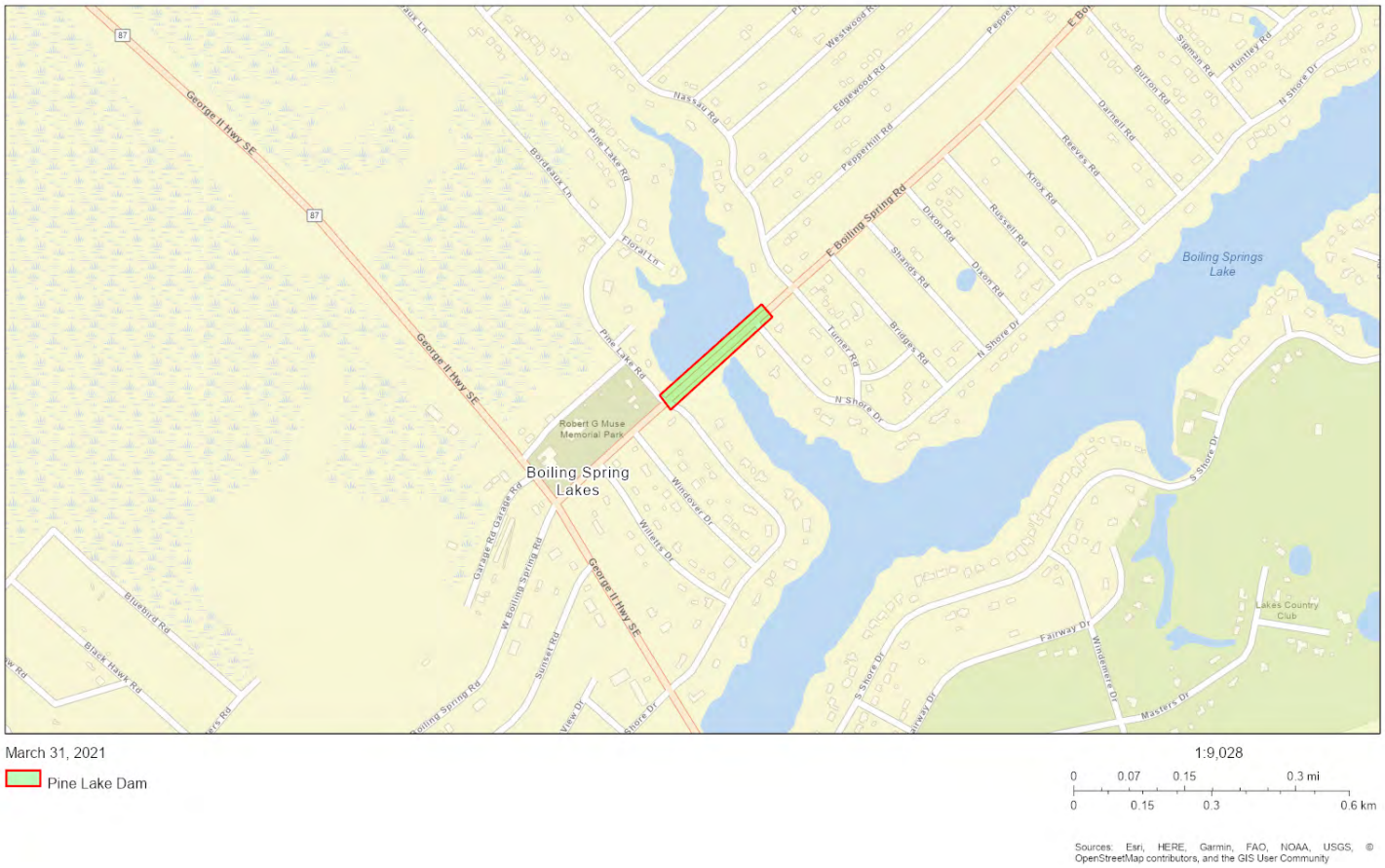
Save as PDF

EJSCREEN Report ()

The area is too small or sparsely populated to generate an EJSCREEN report.

State Percentile Regional Percentile National Percentile

This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.



March 31, 2021

Pine Lake Dam

1:9,028

0 0.07 0.15 0.3 mi

0 0.15 0.3 0.6 km

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

*The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: https://www.epa.gov/national-air-toxics-assessment.

For additional information, see: www.epa.gov/environmentaljustice (http://www.epa.gov/environmentaljustice)

EJSCREEN is a screening tool for pre-decisional use only. It can help identify areas that may warrant additional consideration, analysis, or outreach. It does not provide a basis for decision-making, but it may help identify potential areas of EJ concern. Users should keep in mind that screening tools are subject to substantial uncertainty in their demographic and environmental data, particularly when looking at small geographic areas. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports. This screening tool does not provide data on every environmental impact and demographic factor that may be relevant to a particular location. EJSCREEN outputs should be supplemented with additional information and local knowledge before taking any action to address potential EJ concerns.

Save as PDF

EJSCREEN Report ()

The area is too small or sparsely populated to generate an EJSCREEN report.

State Percentile Regional Percentile National Percentile

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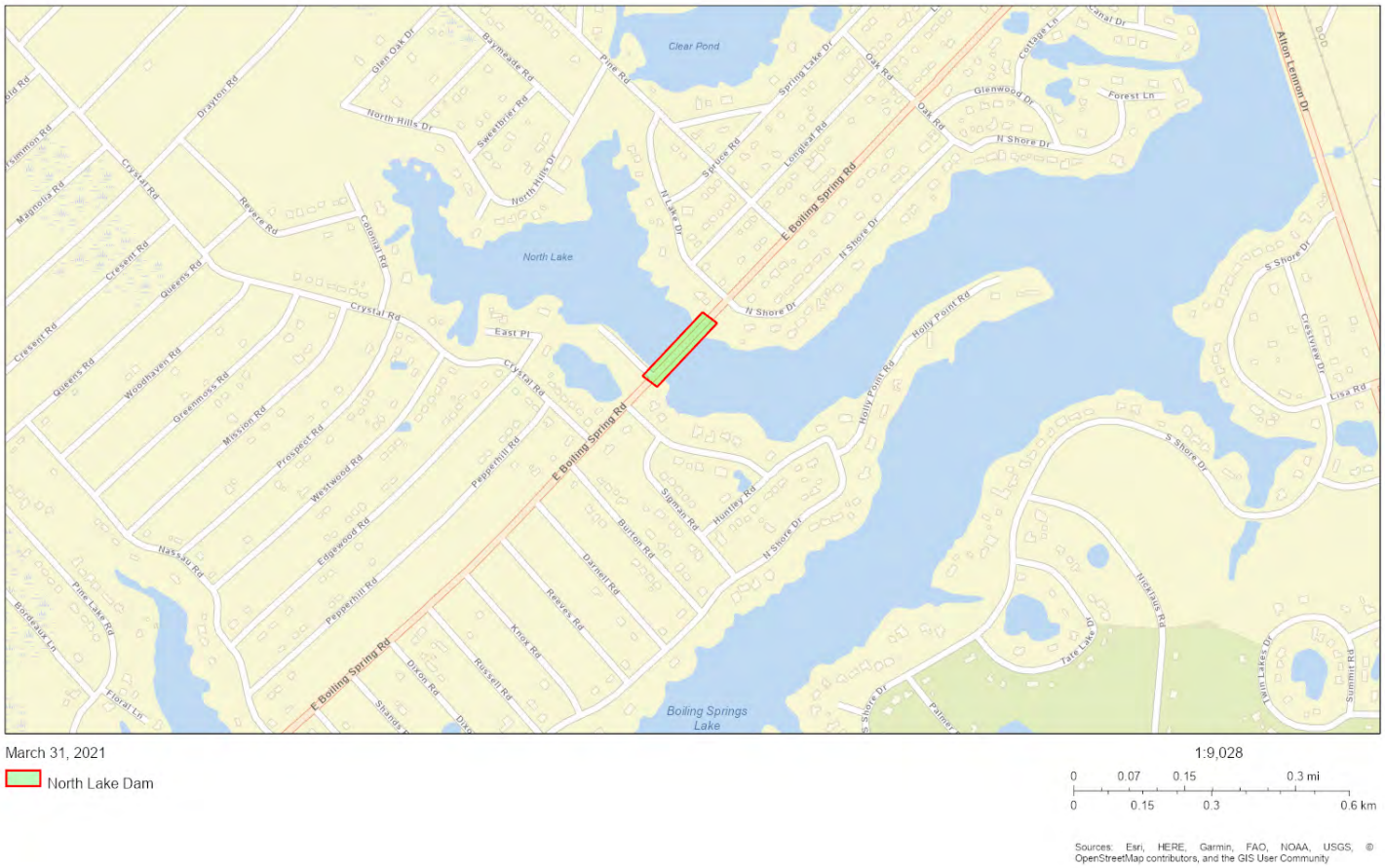

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March 31, 2021

Upper Lake Dam

1:9,028

0 0.07 0.15 0.3 mi

0 0.15 0.3 0.6 km

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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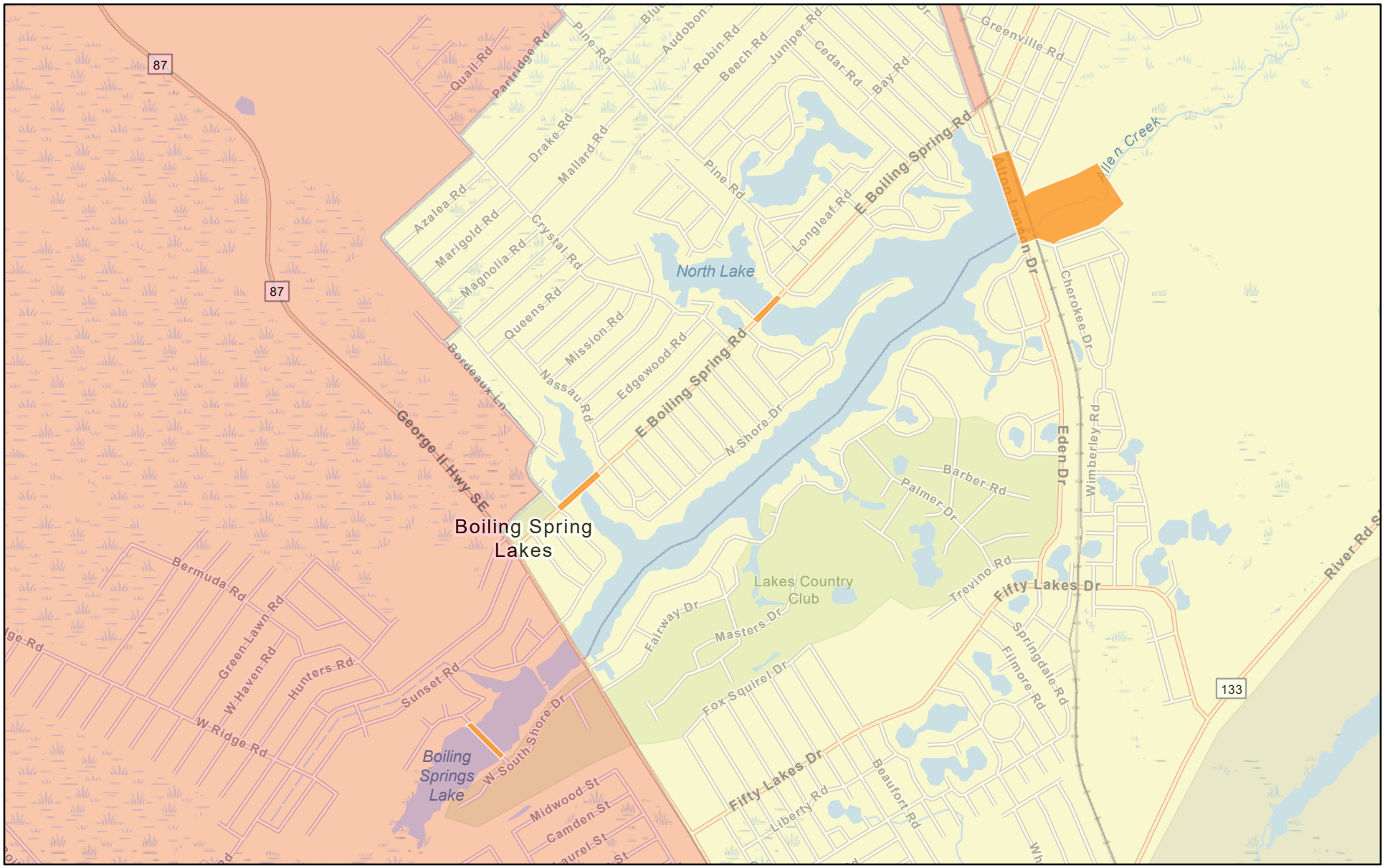
Percentage Low Income Population



3/2/2021

study areas by Block Group

> 50 – 100

0 – 50

1:36,000

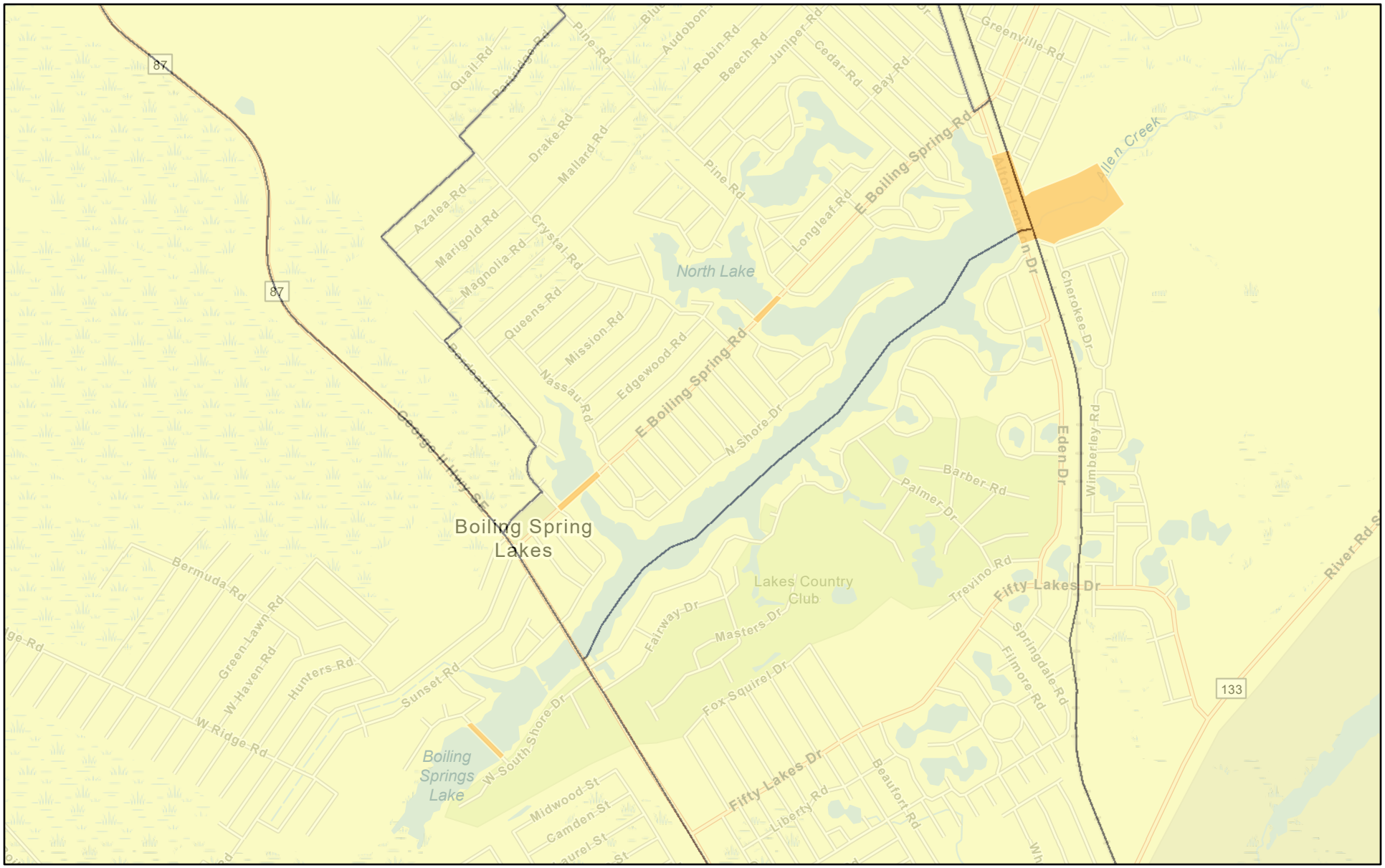
0 0.25 0.5 1 mi

0 0.4 0.8 1.6 km

EPA, State of North Carolina DOT, Esri, HERE, Garmin, SafeGraph,

McGill Associates, P.A.

Percentage People of Color Population



3/2/2021

by Block Group

> 50 – 100

study areas

0 – 50

1:36,000

0 0.25 0.5 1 mi

0 0.4 0.8 1.6 km

EPA, State of North Carolina DOT, Esri, HERE, Garmin, SafeGraph,

McGill Associates, P.A.

APPENDIX C

COORDINATION, CONSULTATION, AND CORRESPONDENCE

1. BRUNSWICK COUNTY SCOPING & RESPONSE
2. USDA – PRIVATE PARTY NOTICE TO APPLICANT OF RURAL HOUSING SERVICE LOAN RESPONSE
3. US FISH & WILDLIFE SERVICE SCOPING & RESPONSE
4. NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE SCOPING & RESPONSE
5. NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY – DIVISION OF COASTAL MANAGEMENT FEDERAL CONSISTENCY
6. CATAWBA INDIAN NATION TRIBAL HISTORIC PRESERVATION OFFICE SCOPING & RESPONSE
7. US ARMY CORPS OF ENGINEERS SECTION 404 PERMIT
8. NC STATE ENVIRONMENTAL REVIEW CLEARINGHOUSE SCOPING & RESPONSE PACKAGE
9. FLOODPLAIN DOCUMENTATION - 8-STEP PROCESS, PUBLIC NOTICES

APPENDIX C-1

BRUNSWICK COUNTY SCOPING & RESPONSE

February 15, 2021

Mr. Randell Woodruff, County Manager
Brunswick County
David R. Sandifer Building, 3rd Floor
30 Government Center Drive NE
Bolivia, North Carolina 28422

RE: Scoping Request
Boiling Springs Lakes Construction/Reconstruction Project
City of Boiling Spring Lakes, North Carolina

Dear Mr. Woodruff:

The City of Boiling Spring Lakes is in the process of performing an environmental review pursuant to the National Environmental Policy Act for the USDA, Rural Development in order that it may assess the environmental impacts of the above referenced project in Brunswick County, NC. Please find enclosed figures identifying the referenced project location and extent. McGill Associates, PA is requesting comments from your office regarding Brunswick County interests in the project or project area.

The lake system consists of four existing dam sites – Sanford Dam, Pine Lake Dam, Upper Dam, and North Lake Dam. The four dams were breached and/or outlet structures were damaged during Hurricane Florence in September of 2018. The goal of the project is to re-establish the impounded lakes upstream of the City-owned dams breached by Hurricane Florence. McGill was retained to design and submit the permit applications for the repairs of the City-owned dams to include restoration of the earthen embankment and installation of spillways and seepage control elements that meet current codes and standards. Proposed plans call for the repair and/or replacement of the earthen dams, concrete risers, and other infrastructure.

Please provide any comments regarding concerns or other issues of significance that may affect this project. We look forward to your comments on this matter. If you have any questions, feel free to contact me at our office phone number of (828) 328-2024 or my email address jon.swaim@mcgillassociates.com.

Sincerely,
MCGILL ASSOCIATES, PA

JON SWAIM
Project Manager / Environmental Services

P:\2020\20.07036-BoilingSprL-Dams ConstructionReconstruc\Design\Reports & Planning\USDA\Scoping

List of attachments:

1. LOCATION MAP
2. USGS MAP

From: John Nichols
Sent: Monday, February 15, 2021 3:17 PM
To: Jon Swaim
Cc: Randell Woodruff; Kirstie Dixon; Elliot Swain; William Pinnix
Subject: RE: City of Boiling Spring Lakes Dam Construction/Reconstruction Project

Mr. Swaim,

Thank you for the opportunity to comment on the project and its impacts. Brunswick County operates an extensive water system throughout the city with limited feeds into the east side of Boiling Spring Lakes. The main lines are currently located within and/or below the earthen roadways/dams that impound the lakes, or in the case of the Sanford Dam, on the downstream side. During Hurricane Florence, the water mains at these dam locations were washed away with the embankments. Emergency construction work was performed immediately afterward to replace the damaged mains with new mains installed using direction drilling techniques to place the mains well below the washed out embankments. We respectfully request that during construction these mains to be properly located and protected to avoid damage. Also, please ensure that the new dam designs do not result in negative impacts to the useful life of these facilities.

Please note, other county departments may have comments in addition to the one herein related to water and sewer utilities. Please contact me if you have any questions.

Regards,

John Nichols, PE, CPESC
910-253-2653

From: Randell Woodruff <randell.woodruff@brunswickcountync.gov>
Sent: Monday, February 15, 2021 12:20 PM
To: Kirstie Dixon <Kirstie.Dixon@brunswickcountync.gov>; John Nichols <John.Nichols@brunswickcountync.gov>; Elliot Swain <elliot.swain@brunswickcountync.gov>; William Pinnix <William.Pinnix@brunswickcountync.gov>
Subject: FW: City of Boiling Spring Lakes Dam Construction/Reconstruction Project

FYI – Please provide any comments for the NEPA process

From: Jon Swaim <jon.swaim@mcgillassociates.com>
Sent: Monday, February 15, 2021 12:11 PM
To: Randell Woodruff <randell.woodruff@brunswickcountync.gov>
Subject: City of Boiling Spring Lakes Dam Construction/Reconstruction Project

From: William Pinnix
Sent: Friday, February 26, 2021 3:58 PM
To: John Nichols; Jon Swaim
Cc: Randell Woodruff; Kirstie Dixon; Elliot Swain
Subject: RE: City of Boiling Spring Lakes Dam Construction/Reconstruction Project

Mr. Swaim,

No comments from County Engineering as John's reply covers the existing water system.
I am not aware of any current or proposed developer projects that would install new water mains in these areas.

Regards,

William L. Pinnix, P.E.
Director of Engineering
Brunswick County
75 Courthouse Drive, Bldg. I
PO Box 249
Bolivia, North Carolina 28422
Office: 910.253.2408
Cell: 910.409.2557
Fax: 910.253.2704
Email: william.pinnix@brunswickcountync.gov
www.brunswickcountync.gov

From: John Nichols <John.Nichols@brunswickcountync.gov>
Sent: Monday, February 15, 2021 3:17 PM
To: jon.swaim@mcgillassociates.com
Cc: Randell Woodruff <randell.woodruff@brunswickcountync.gov>; Kirstie Dixon <Kirstie.Dixon@brunswickcountync.gov>; Elliot Swain <elliot.swain@brunswickcountync.gov>; William Pinnix <William.Pinnix@brunswickcountync.gov>
Subject: RE: City of Boiling Spring Lakes Dam Construction/Reconstruction Project

Mr. Swaim,

Thank you for the opportunity to comment on the project and its impacts. Brunswick County operates an extensive water system throughout the city with limited feeds into the east side of Boiling Spring Lakes. The main lines are currently located within and/or below the earthen roadways/dams that impound the lakes, or in the case of the Sanford Dam, on the downstream side. During Hurricane Florence, the water mains at these dam locations were washed away with the embankments. Emergency construction work was performed immediately afterward to replace the damaged mains with new mains installed using direction drilling techniques to place the mains well

APPENDIX C-2

USDA – PRIVATE PARTY NOTICE TO APPLICANT OF RURAL HOUSING SERVICE LOAN RESPONSE

United States Department of Agriculture

Rural Development

North Carolina
State Office

4405 Bland Road
Suite 260
Raleigh, NC 27609

Voice 919.873.2099
Fax 844.325.6926

February 15, 2021

(SI 1970-F, Exh B Att 2)

City of Boiling Spring Lakes
Attn: Jeffrey E. Repp, City Manager
9 E. Boiling Spring Road
Southport, NC 28461

RE: Private Party Notice to Applicant of a Rural Housing Service (RHS) Loan, Guaranteed Loan or Grant Regarding the Hazards of Locating Structures within a Floodplain or Critical Action Floodplain, City of Boiling Spring Lakes – Dam Repairs

Dear Mr. Repp,

In accordance with Executive Order 11988, Floodplain Management and USDA Departmental Regulation 9500-3, Land Use Policy, notice is hereby given by USDA RHS that the proposal for City of Boiling Spring Lakes – Dam Repairs, for which a financing may be requested, contains elements located within a floodplain or critical action floodplain. In keeping with Executive Order 11988, and the Agency's implementing regulations, it is the responsibility of the Agency to inform you of the hazards associated with locating structures in a floodplain or critical action floodplain. These hazards include but are not limited to:

> Hazards associated with development within floodplains include the loss of life or limb or damage to or loss of real property, personal property, or other assets. Locating structures within a floodplain should be avoided to the maximum extent practicable as it can adversely impact important floodplain functions such as wildlife habitat, filtering capacity, flood holding capacity, and other critical functions. Locating a structure within floodplains requires coordination with the municipality which regulates floodplains in your state or local jurisdiction and determines if a permit is required.

Flood insurance is not required as condition of you loan closing.

Should you have any questions regarding this notice, please do not to hesitate to contact Tobais Fullwood at tobais.fullwood@usda.gov or (919) 300-4841.

Sincerely,

ANTHONY HIGH

Digitally signed by ANTHONY HIGH
Date: 2021.02.15 21:52:23 -05'00'

ANTHONY W. HIGH
State Environmental Coordinator

APPENDIX C-3

US FISH & WILDLIFE SERVICE SCOPING & RESPONSE

October 8, 2019

Emily Wells
U.S. Fish & Wildlife Service
Raleigh Ecological Services Field Office
P.O. Box 33726
Raleigh, NC 27636-3726

RE: Scoping Request
Boiling Springs Lake
City of Boiling Spring Lakes, Brunswick County, North Carolina

Dear Emily:

The City of Boiling Spring Lakes is in the early stages of repairing four dams within the Boiling Springs Lake system. The lake system consists of four existing dam sites – Sanford Dam, Pine Lake Dam, Upper Dam, and North Lake Dam (see attached Study Limits Map). The four dams were breached and/or outlet structures were damaged during Hurricane Florence in September of 2018. Proposed plans will involve repair and/or replacement of earthen dams, concrete risers, and other infrastructure.

A desktop review was performed to determine what Federally listed threatened and endangered species may occur in the proposed project area or may be affected by the proposed project. The review included database searches conducted through the North Carolina Natural Heritage Program and the USFWS ECOS-IPaC website (see attached consultation letters). A total of fourteen Federally listed threatened and endangered species were identified as being potentially affected by the project. After further review it was determined that only five of those species could potentially occur within the project site based on habitat characteristics.

A survey of potential impacts to five Federally listed threatened and endangered species that may occur within the proposed project limits was conducted by McGill Associates, P.A. on July 30-31, 2019. Biological conclusions for each species are as follows:

> Bald Eagle (*Haliaeetus leucocephalus*) – Habitat exists in the project study area in the form of small open water features and nearby canopy trees. A review of NCNHP records on August 16, 2019 indicates no known Bald Eagle occurrences within 1.0 mile of the study area. A site visit on July 30-31, 2019 found no individuals within the study area. Therefore, a biological conclusion of MAY AFFECT NOT LIKELY TO ADVERSELY AFFECT was rendered.
>
> Red-cockaded woodpecker (*Picoides borealis*) – Habitat exists in the project study area in the form of scattered mature pine trees greater than 19 inches in diameter at breast

height. A review of NCNHP records on August 16, 2019 indicates there are known Red-cockaded woodpecker occurrences within 1.0 mile of the study area. A site visit on July 30-31, 2019 found no individuals or nesting cavities within the study area. Therefore, a biological conclusion of MAY AFFECT NOT LIKELY TO ADVERSELY AFFECT was rendered.

Wood stork (*Mycteria americana*) – Habitat exists in the project study area in the form of freshwater marshes and ponds. A review of NCNHP records on August 16, 2019 indicates no known Wood stork occurrences within 1.0 mile of the study area. A site visit on July 30-31, 2019 found no individuals within the study area. Therefore, a biological conclusion of MAY AFFECT NOT LIKELY TO ADVERSELY AFFECT was rendered.

Cooley's meadowrue (*Thalictrum cooleyi*) – Habitat exists in the project study area in the form of open right-of-way clearings on the dams. A review of NCNHP records on August 16, 2019 indicates no known Cooley's meadowrue occurrences within 1.0 mile of the study area. A site visit during the survey window recommended by the USFWS on July 30-31, 2019 found no individuals within the study area. Therefore, a biological conclusion of MAY AFFECT NOT LIKELY TO ADVERSELY AFFECT was rendered.

Rough-leaved loosestrife (*Lysimachia asperulifolia*) – Habitat exists in the project study area in the form of open right-of-way clearings on the dams. A review of NCNHP records on August 16, 2019 indicates there are known Rough-leaved loosestrife occurrences within 1.0 mile of the study area. A site visit during the survey window recommended by the USFWS on July 30-31, 2019 found no individuals within the study area. Therefore, a biological conclusion of MAY AFFECT NOT LIKELY TO ADVERSELY AFFECT was rendered.

Please let us know if you concur with these biological conclusions and if there are any other issues or concerns that may affect this project. We look forward to your comments on this matter. If you have any questions, feel free to contact me at our office phone number of (828) 386-1920 or my email address jon.swaim@mcgillassociates.com.

Sincerely,
MCGILL ASSOCIATES, PA

JON SWAIM
Project Manager / Environmental Services

P:\2019\19.07042 -BoilingSprLNC-Dam Design\Design\Reports & Planning

List of attachments:

1. STUDY LIMITS MAP
2. USFWS CONSULTATION LETTER
3. NCNHP CONSULTATION LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh ES Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

July 15, 2021

Jon Swaim
McGill Associates, PA
103 State Farm Road
Boone, North Carolina 28607

Re: Modified language for USDA-Boiling Spring Lakes- Multiple Dam Repairs- Brunswick County

Dear Mr. Swaim:

This letter is to inform you that the Service has established an on-line project planning and consultation process which assists developers and consultants in determining whether a federally-listed species or designated critical habitat may be affected by a proposed project. For future projects, please visit the Raleigh Field Office's project planning website at https://www.fws.gov/raleigh/pp.html. If you are only searching for a list of species that may be present in the project's Action Area, then you may use the Service's Information, Planning, and Consultation System (IPaC) website to determine if any listed, proposed, or candidate species may be present in the Action Area and generate a species list. The IPaC website may be viewed at https://ecos.fws.gov/ipac/. The IPaC web site contains a complete and frequently updated list of all endangered and threatened species protected by the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act), a list of federal species of concern[1] that are known to occur in each county in North Carolina, and other resources.

Section 7 of the Act requires that all federal agencies (or their designated non-federal representative), in consultation with the Service, insure that any action federally authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any federally-listed endangered or threatened species. A biological assessment or evaluation may be prepared to fulfill that requirement and in determining whether additional consultation with the Service is necessary. In addition to the federally-protected species list, information on the

[1] The term "federal species of concern" refers to those species which the Service believes might be in need of concentrated conservation actions. Federal species of concern receive no legal protection and their designation does not necessarily imply that the species will eventually be proposed for listing as a federally endangered or threatened species. However, we recommend that all practicable measures be taken to avoid or minimize adverse impacts to federal species of concern.

species' life histories and habitats and information on completing a biological assessment or evaluation and can be found on our web page at http://www.fws.gov/raleigh. Please check the web site often for updated information or changes.

With regard to the above-referenced project, we offer the following remarks. Our comments are submitted pursuant to, and in accordance with, provisions of the Endangered Species Act.

Based on the information provided (including photographs and site specific species surveys) and other information available, we concur that the proposed action may affect but is not likely to adversely affect any federally-listed endangered or threatened species, their formally designated critical habitat, or species currently proposed for listing under the Act at these sites. We believe that the requirements of section 7(a)(2) of the Act have been satisfied for your project. Please remember that obligations under section 7 consultation must be reconsidered if: (1) new information reveals impacts of this identified action that may affect listed species or critical habitat in a manner not previously considered; (2) this action is subsequently modified in a manner that was not considered in this review; or, (3) a new species is listed or critical habitat determined that may be affected by the identified action.

However, the Service is concerned about the potential impacts the proposed action might have on aquatic species. Aquatic resources are highly susceptible to sedimentation. Therefore, we recommend that all practicable measures be taken to avoid adverse impacts to aquatic species, including implementing directional boring methods and stringent sediment and erosion control measures when replacing the failed dams. An erosion and sedimentation control plan should be submitted to and approved by the North Carolina Division of Land Resources, Land Quality Section prior to construction. Erosion and sedimentation controls should be installed and maintained between the construction site and any nearby down-gradient surface waters. In addition, we recommend maintaining natural, vegetated buffers on all streams and creeks adjacent to the project site.

The North Carolina Wildlife Resources Commission has developed a Guidance Memorandum (a copy can be found on our website at (http://www.fws.gov/raleigh) to address and mitigate secondary and cumulative impacts to aquatic and terrestrial wildlife resources and water quality. We recommend that you consider this document in the development of your projects and in completing an initiation package for consultation (if necessary).

We hope you find our web page useful and informative and that following the process described above will reduce the time required, and eliminate the need, for general correspondence for species' lists. If you have any questions or comments, please contact Emily Wells of this office at (919) 856-4520 ext. 25.

Sincerely,

For Pete Benjamin
Field Supervisor

APPENDIX C-4

NORTH CAROLINA STATE HISTORIC PRESERVATION OFFICE SCOPING & RESPONSE

October 28, 2019

Ms. Renee Gledhill-Earley
NC State Historic Preservation Office
4617 Mail Service Center
Raleigh, NC 27699-4617

RE: Scoping Request
Boiling Springs Lake
City of Boiling Spring Lakes, North Carolina

Dear Ms. Gledhill-Earley:

The City of Boiling Spring Lakes is in the early stages of repairing four dams within the Boiling Springs Lake system. The lake system consists of four existing dam sites – Sanford Dam, Pine Lake Dam, Upper Dam, and North Lake Dam. The four dams were breached and/or outlet structures were damaged during Hurricane Florence in September of 2018. Proposed plans call for the repair and/or replacement of the earthen dams, concrete risers, and other infrastructure.

Sanford Dam along Alton Lennon Road (see attached maps) is listed on the HPOWEB GIS Service mapper as:

Boiling Spring Lake Dam
HPO Site ID: BW0545
Status: SO
NRHD status: None
Description: 1961

The original earthen dam of Sanford Dam (Boiling Spring Lake Dam) was breached during Hurricane Florence. Additionally, there was a loss of earthen embankment soils and the partial collapse of the mechanically-stabilized earth walls above the spillway outlets. However, at this time, we do not possess specific knowledge of any damage to the Sanford Dam Spillway that is directly attributable to Hurricane Florence. The original concrete riser has lost structural integrity due to surface deterioration and age, the original discharge capacity was reduced during prior joint repairs and grouting and slope reconstruction behind the spillway structure raise concerns for long-term stability (see attached Photo Sheet). The proposed plans call for the removal of the original concrete riser and design of a new riser/intake structure and spillway.

Please provide any comments regarding concerns or other issues of significance that may affect this project. We look forward to your comments on this matter. If you have any questions, feel free to contact me at our office phone number of (828) 386-1920 or my email address jon.swaim@mcgillassociates.com.

Sincerely,
MCGILL ASSOCIATES, PA

JON SWAIM
Project Manager / Environmental Services

P:\2019\19.07042 -BoilingSprLNC-Dam Design\Design\Reports & Planning

List of attachments:

1. LOCATION/USGS MAP
2. NCHPO MAP
3. PHOTO SHEET

North Carolina Department of Natural and Cultural Resources

State Historic Preservation Office

Ramona M. Bartos, Administrator

Governor Roy Cooper
Secretary Susi H. Hamilton

Office of Archives and History
Deputy Secretary Kevin Cherry

December 3, 2019

Jon Swaim
McGill Associates
1013 State Farm Road
Boone, NC 28607

Re: Repair Sanford Dam, Pine Lake Dam, Upper Dam, & North Lake Dam, Boiling Springs Lake, Brunswick County, ER 19-2947

Dear Mr. Swaim:

Thank you for your email of October 28, 2019, transmitting the revised scoping letter. We have reviewed the submittal and offer the following comments.

The Boiling Springs Lake Dam (BW0545), or Sanford Dam, was constructed in 1961 with the purpose of creating a centerpiece for development of the Boiling Spring Lakes community. The importance of this resource is related to its engineering and use in community planning. The proposed repair/replacement of key elements will return the resource to its historic form and function. We strongly recommend that the earthen dam be replaced in-kind and have no objection to the project as proposed.

During the Brunswick County survey update of 2010, the dam had not yet reached 50 years of age and could not be considered eligible for listing on the National Register of Historic Places. Today, the dam meets the minimum age requirement. If the Town of Boiling Spring Lakes is interested in finding out more about the survey and listing process, please instruct them to contact the NCHPO Survey Specialist assigned to Brunswick County, Hannah Beckman-Black, at 919-814-6577, or Hannah.beckman@ncdcr.gov

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, contact Renee Gledhill-Earley, environmental review coordinator, at 919-814-6579 or environmental.review@ncdcr.gov. In all future communication concerning this project, please cite the above referenced tracking number.

Sincerely,

Renee Gledhill-Earley

for Ramona M. Bartos
Deputy State Historic Preservation Officer

APPENDIX C-5

NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY – DIVISION OF COASTAL MANAGEMENT FEDERAL CONSISTENCY

Debbie Wilson

From: Govoni, Daniel <daniel.govoni@ncdenr.gov>
Sent: Friday, October 1, 2021 1:55 PM
To: Debbie Wilson
Subject: RE: [External] Federal Consistency for Boiling Springs Lake DCM2021053

Hello Debbie,

North Carolina's coastal zone management program consists of, but is not limited to, the Coastal Area Management Act, the State's Dredge and Fill Law, Chapter 7 of Title 15A of North Carolina's Administrative Code, and the land use plan of the County and/or local municipality in which the proposed project is located. It is the objective of the Division of Coastal Management (DCM) to manage the State's coastal resources to ensure that proposed federal actions would be compatible with safeguarding and perpetuating the biological, social, economic, and aesthetic values of the State's coastal waters.

DCM has reviewed the submitted information pursuant to the management objectives and enforceable policies of Subchapters 7H and 7M of Chapter 7 in Title 15A of the North Carolina Administrative Code and concurs that the proposed activity is consistent with North Carolina's approved coastal management program.

Prior to the initiation of the activities described, the applicant should obtain any required State approvals or authorizations, including any authorizations required by the North Carolina Division of Water Resources. Should the proposed action be modified further, a revised consistency determination could be necessary. This might take the form of either a supplemental consistency determination pursuant to 15 CFR 930.46, or a new consistency determination pursuant to 15 CFR 930.36. Likewise, if further project assessments reveal environmental effects not previously considered, a supplemental consistency certification may be required. If you have any questions, please contact me at (252) 808-2808. Thank you for your consideration of the North Carolina Coastal Management Program.

Daniel

Daniel M. Govoni
Policy Analyst
Federal Consistency Coordinator
NC Division of Coastal Management
Department of Environmental Quality

252 808 2808 x233
Daniel.Govoni@ncdenr.gov

Morehead City, NC 28557

APPENDIX C-6

CATAWBA INDIAN NATION TRIBAL HISTORIC PRESERVATION OFFICE SCOPING & RESPONSE

February 10, 2021

Dr. Wenonah G. Haire, Executive Director
THPO and Catawba Cultural Center
1536 Tom Steven Road
Rock Hill, South Carolina 29730

RE: Scoping Request
Boiling Springs Lake
City of Boiling Spring Lakes, North Carolina

Dear Dr. Haire:

The City of Boiling Spring Lakes is in the process of performing an environmental review pursuant to the National Environmental Policy Act for the USDA, Rural Development in order that it may assess the environmental impacts of the above referenced project in Brunswick County, NC. Please find enclosed figures identifying the referenced project location and extent. McGill Associates, P.A. is requesting comments from your office regarding Native American interests or rights to sites located in the project area.

The lake system consists of four existing dam sites – Sanford Dam, Pine Lake Dam, Upper Dam, and North Lake Dam. The four dams were breached and/or outlet structures were damaged during Hurricane Florence in September of 2018. The goal of the project is to re-establish the impounded lakes upstream of the City-owned dams breached by Hurricane Florence. McGill was retained to design and submit the permit applications for the repairs of the City-owned dams to include restoration of the earthen embankment and installation of spillways and seepage control elements that meet current codes and standards. Proposed plans call for the repair and/or replacement of the earthen dams, concrete risers, and other infrastructure.

Please provide any comments regarding concerns or other issues of significance that may affect this project. We look forward to your comments on this matter. If you have any questions, feel free to contact me at our office phone number of (828) 328-2024 or my email address jon.swaim@mcgillassociates.com.

Sincerely,
MCGILL ASSOCIATES, PA

JON SWAIM
Project Manager / Environmental Services

P:\2020\20.07036-BoilingSprL-Dams ConstructionReconstruc\Design\Reports & Planning\USDA\Scoping

List of attachments:

1. LOCATION MAP
2. USGS MAP

Catawba Indian Nation
Tribal Historic Preservation Office
1536 Tom Steven Road
Rock Hill, South Carolina 29730

Office 803-328-2427
Fax 803-328-5791

March 17, 2021

Attention: Jon Swaim
McGill Associates
1240 19th Street Lane NW
Hickory, NC 28601

Re. THPO #	TCNS #	Project Description
2021-371-5		Boiling Springs Lake – City of Boiling Spring Lakes, NC

Dear Mr. Swaim,

The Catawba have no immediate concerns with regard to traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the proposed project area. **However, the Catawba are to be notified if Native American artifacts and / or human remains are located during the ground disturbance phase of this project.**

If you have questions please contact Caitlin Rogers at 803-328-2427 ext. 226, or e-mail Caitlin.Rogers@catawba.com.

Sincerely,

Caitlin Rogers for

Wenonah G. Haire
Tribal Historic Preservation Officer

APPENDIX C-7

US ARMY CORPS OF ENGINEERS SECTION 404 PERMIT

NC DIVISION OF WATER RESOURCES 401 PERMIT

U.S. ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT

Action Id. **SAW-2021-00216** County: **Brunswick County** U.S.G.S. Quad: **Funston**

GENERAL PERMIT (REGIONAL AND NATIONWIDE) VERIFICATION

Permittee: **Jeff Repp**
City Manager (Boiling Spring Lakes)

Address: **9 East Boiling Spring Road**
Southport NC, 28461

Telephone Number: **(910) 363-0025**

E-mail Address: **Jrepp@cityofbsl.org**

Size (acres) **34.79 acres**
Nearest Waterway **Allen Creek**
USGS HUC **03030005**

Nearest Town **Boiling Spring Lakes, NC**
River Basin **Cape Fear**
Coordinates Latitude: **34.0216**
Longitude: **-78.0693**

Location description: **This project will include repair work to the Sanford Dam, North Lake Dam, Pine Lake Dam and the Upper Lake Dam. These (4) dams were severely damaged during Hurricane Florence (September 2018). The dams are located in The City of Boiling Spring Lakes, Brunswick County, NC.**

Description of projects area and activity: **Project impacts include:**

Impact Location	Permanent Open Water & Creek Impacts	Temporary Open Water & Creek Impacts
Allen Creek	**90 LF of rip rap for energy dissipator pad**	**30 LF for equipment access**
Sanford Dam	**0.5 acres (new earthen embankment and new spillway)**	**2.5 acres for access and laydown area**
North Lake Dam	**0.07 acres (new earthen embankment and new spillway)**	**1.3 acres for equipment access and lay down area**
Pine Lake Dam	**0.09 acres (new earthen embankment and new spillway)**	**1.4 acres for equipment access and lay down area**
Upper Lake Dam	**0.08 acres (new earthen embankment and new spillway)**	**0.7 acres for equipment access and lay down area**
Total Impacts	**90 LF Allen Creek** **0.74 acres Open Water**	**30 LF Allen Creek** **5.9 acres Open Water**

***(Impact details and locations on attached plans)**

Applicable Law: ☒ Section 404 (Clean Water Act, 33 USC 1344)
☐ Section 10 (Rivers and Harbors Act, 33 USC 403)

Authorization: Regional General Permit Number and/or Nationwide Permit Number: **3 Maintenance Work**
SEE ATTACHED RGP or NWP GENERAL, REGIONAL AND/OR SPECIAL CONDITIONS

Your work is authorized by the above referenced permit provided it is accomplished in strict accordance with the attached conditions and your submitted application and attached information dated March 18, 2021 Any violation of the attached

conditions or deviation from your submitted plans may subject the permittee to a stop work order, a restoration order, a Class I administrative penalty, and/or appropriate legal action.

This verification will remain valid until the expiration date identified below unless the nationwide and/or regional general permit authorization is modified, suspended or revoked. If, prior to the expiration date identified below, the nationwide and/or regional general permit authorization is reissued and/or modified, this verification will remain valid until the expiration date identified below, provided it complies with all requirements of the modified nationwide permit. If the nationwide and/or regional general permit authorization expires or is suspended, revoked, or is modified, such that the activity would no longer comply with the terms and conditions of the nationwide permit, activities which have commenced (i.e., are under construction) or are under contract to commence in reliance upon the nationwide and/or regional general permit, will remain authorized provided the activity is completed within twelve months of the date of the nationwide and/or regional general permit's expiration, modification or revocation, unless discretionary authority has been exercised on a case-by-case basis to modify, suspend or revoke the authorization.

Activities subject to Section 404 (as indicated above) may also require an individual Section 401 Water Quality Certification. You should contact the NC Division of Water Resources (telephone 919-807-6300) to determine Section 401 requirements.

For activities occurring within the twenty coastal counties subject to regulation under the Coastal Area Management Act (CAMA), prior to beginning work you must contact the N.C. Division of Coastal Management in Wilmington, NC.

This Department of the Army verification does not relieve the permittee of the responsibility to obtain any other required Federal, State or local approvals/permits.

If there are any questions regarding this verification, any of the conditions of the Permit, or the Corps of Engineers regulatory program, please contact **Gary Beecher at (910) 251-4694 or Gary.H.Beecher@usace.army.mil**.

Corps Regulatory Official: GARY H. BEECHER Digitally signed by GARY H. BEECHER Date: 2021.03.18 12:28:36 -04'00' Date: **March 18, 2021**
Expiration Date of Verification: **March 18, 2022**

A. Determination of Jurisdiction:

1. ☒ **There are waters, including wetlands, on the above described project area that may be subject to Section 404 of the Clean Water Act (CWA) (33 USC § 1344) and/or Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403). This preliminary determination is not an appealable action under the Regulatory Program Administrative Appeal Process (Reference 33 CFR Part 331). However, you may request an approved JD, which is an appealable action, by contacting the Corps district for further instruction. Please note, if work is authorized by either a general or nationwide permit, and you wish to request an appeal of an approved JD, the appeal must be received by the Corps and the appeal process concluded prior to the commencement of any work in waters of the United States and prior to any work that could alter the hydrology of waters of the United States.**

2. ☐ There are Navigable Waters of the United States within the above described project area subject to the permit requirements of Section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) and Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

3. ☐ There are waters, including wetlands, within the above described project area that are subject to the permit requirements of Section 404 of the Clean Water Act (CWA) (33 USC § 1344). Unless there is a change in the law or our published regulations, this determination may be relied upon for a period not to exceed five years from the date of this notification.

4. ☐ A jurisdiction determination was not completed with this request. Therefore, this is not an appealable action. However, you may request an approved JD, which is an appealable action, by contacting the Corps for further instruction.

5. ☐ The aquatic resources within the above described project area have been identified under a previous action. Please reference the approved jurisdictional determination issued . Action ID: **SAW-** .

B. Basis For Jurisdictional Determination: **An Approved Jurisdictional Determination was not issued with this permit.**

C. Remarks: **A pre-application meeting took place on October 17, 2019.**

D. Attention USDA Program Participants

This delineation/determination has been conducted to identify the limits of Corps' Clean Water Act jurisdiction for the particular site identified in this request. The delineation/determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA Program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

E. Appeals Information for Approved Jurisdiction Determinations (as indicated in A2 and A3 above).

If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331. Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal this determination you must submit a completed RFA form to the following address:

US Army Corps of Engineers
South Atlantic Division
Attn: Philip Shannin, Appeal Review Officer
60 Forsyth Street SW, Room 10M15
Atlanta, Georgia 30303-8801
Phone: (404) 562-5137

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by N/A.
It is not necessary to submit an RFA form to the Division Office if you do not object to the determination in this correspondence.

Corps Regulatory Official: GARY H. BEECHER Digitally signed by GARY H. BEECHER Date: 2021.03.18 12:28:09 -04'00'

Gary Beecher

Date of JD: **March 18, 2021** Expiration Date of JD: **PJD Does not expire**

The Wilmington District is committed to providing the highest level of support to the public. To help us ensure we continue to do so, please complete our Customer Satisfaction Survey, located online at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Copy furnished via e-mail to:

Consultant:

Jon Swaim
McGill Associates
1240 19th Street Lane, NW
Hickory, NC 28601
(828) 328-2024
Jon.swaim@mcgillassociates.com

SPECIAL CONDITIONS

1. Notification of Construction Commencement and Completion: The permittee shall advise the Corps in writing 30 days prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

2. Work Limits: All work authorized by this permit shall be performed in strict compliance with the attached permit plans dated March 18, 2021, which are a part of this permit. The Permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Any modification to the attached permit plans must be approved by the U.S. Army Corps of Engineers (Corps) prior to any active construction in waters or wetlands.

Action ID Number: **SAW-2021-00216** **County: Brunswick County**

Permittee: **Jeff Repp**
Boiling Spring Lakes

Project Name: **City of Boiling Spring Lakes Dam Reconstruction**

Date Verification Issued: **March 18, 2021**

Project Manager: **Gary Beecher**

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

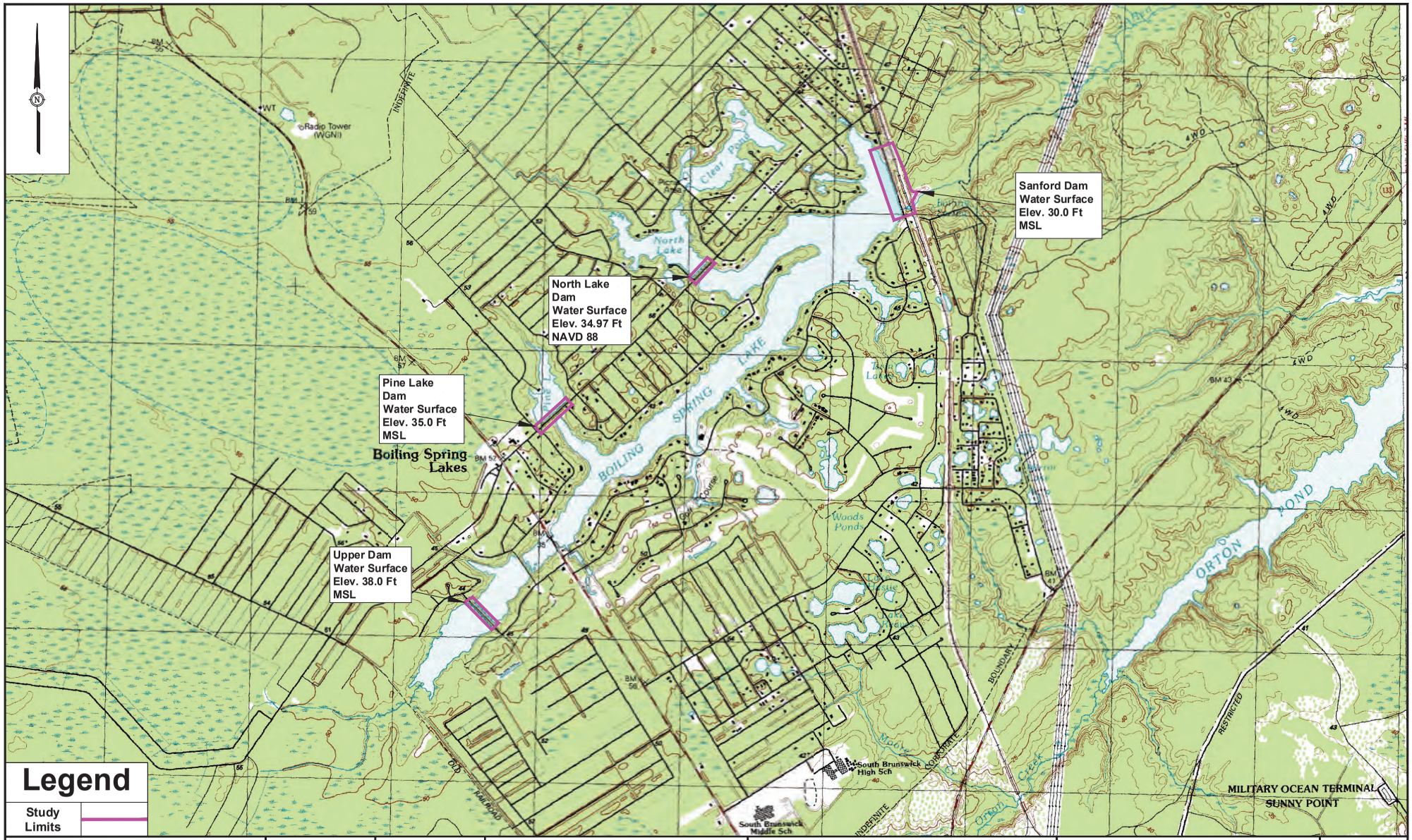
US ARMY CORPS OF ENGINEERS
WILMINGTON DISTRICT
Attn: Gary Beecher

Please note that your permitted activity is subject to a compliance inspection by a U. S. Army Corps of Engineers representative. Failure to comply with any terms or conditions of this authorization may result in the Corps suspending, modifying or revoking the authorization and/or issuing a Class I administrative penalty, or initiating other appropriate legal action.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and condition of the said permit, and required mitigation was completed in accordance with the permit conditions.

_____ _____

Signature of Permittee **Date**



mcgill
1240 19th Street Lane NW
Hickory, NC 28601
828.328.2024
NC Firm License # C-0459
mcgillassociates.com

DATE 1/20/2021	PROJECT # 20.07036
OFFICE MANAGER M. NORTON	DESIGNER A. LOWDERMILK
PROJECT MANAGER M. HANSON	REVIEWER J. SWAIM

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

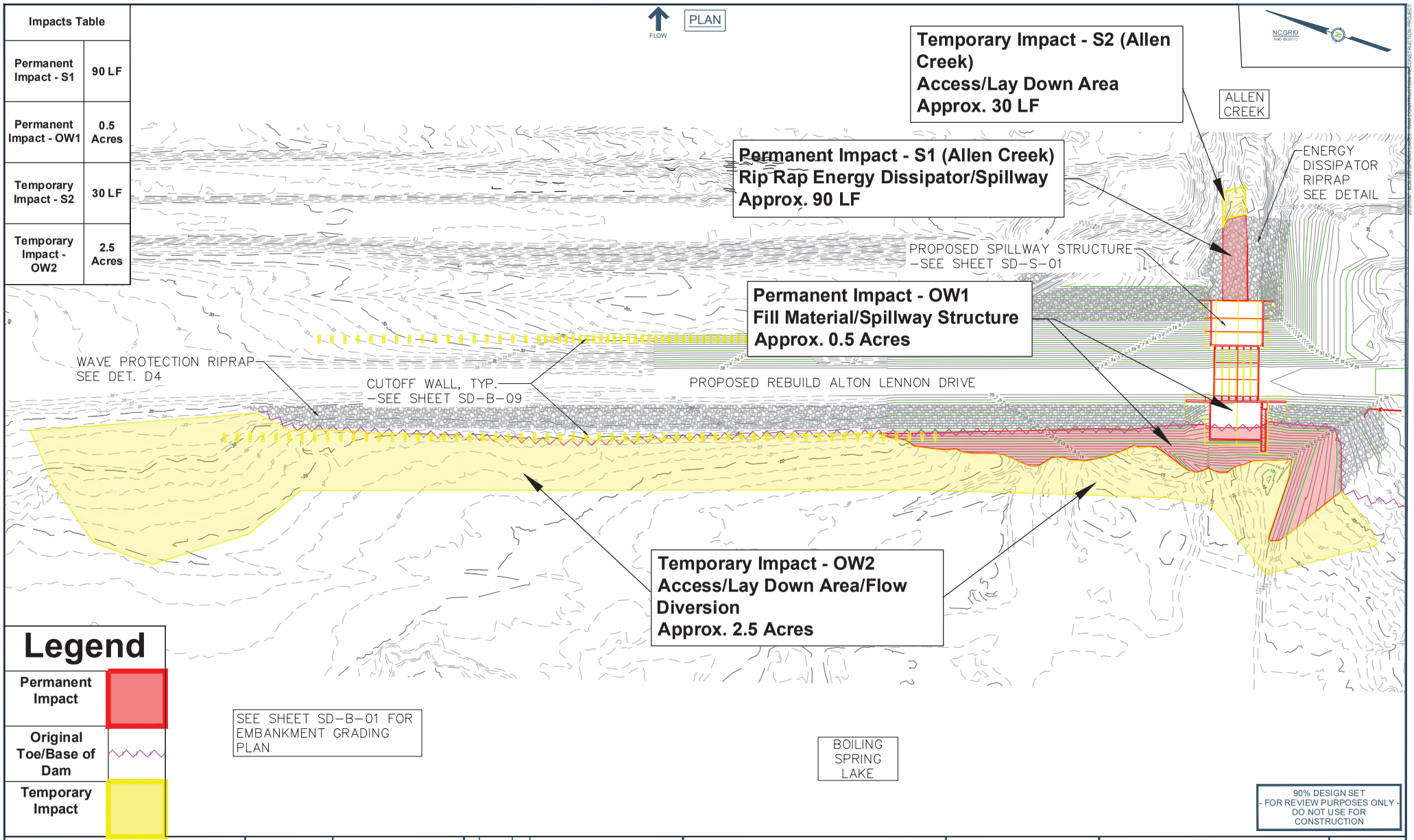
2000 0 1000 2000 4000
GRAPHIC SCALE DIVISION VALUE = 2000 FEET

USGS MAP

FIGURE
2

P:\2020\20.07036-BOILINGSPRI_DAMS CONSTRUCTION\RECONSTRUC\DESIGN\PERMITS\DJD FIGURES.DWG PLOT DATE: 1/20/2021 1:56 PM ALEX LOWDERMILK

Impacts Table	
Permanent Impact - S1	90 LF
Permanent Impact - OW1	0.5 Acres
Temporary Impact - S2	30 LF
Temporary Impact - OW2	2.5 Acres



Legend

Permanent Impact	
Original Toe/Base of Dam	
Temporary Impact	

90% DESIGN SET
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

mcgill
1013 State Farm Road
Boone, NC 28607
828.386.1920
NC Firm License # C-0459
mcgillassociates.com

PRELIMINARY

Schnabel ENGINEERING
LICENCE NUMBER C-2599
11A Oak Branch Drive / Greensboro, NC / 27407
T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/ RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 30 0 15 30 60 — DIVISION VALUE = 30 FEET

SANFORD DAM - IMPACT MAP

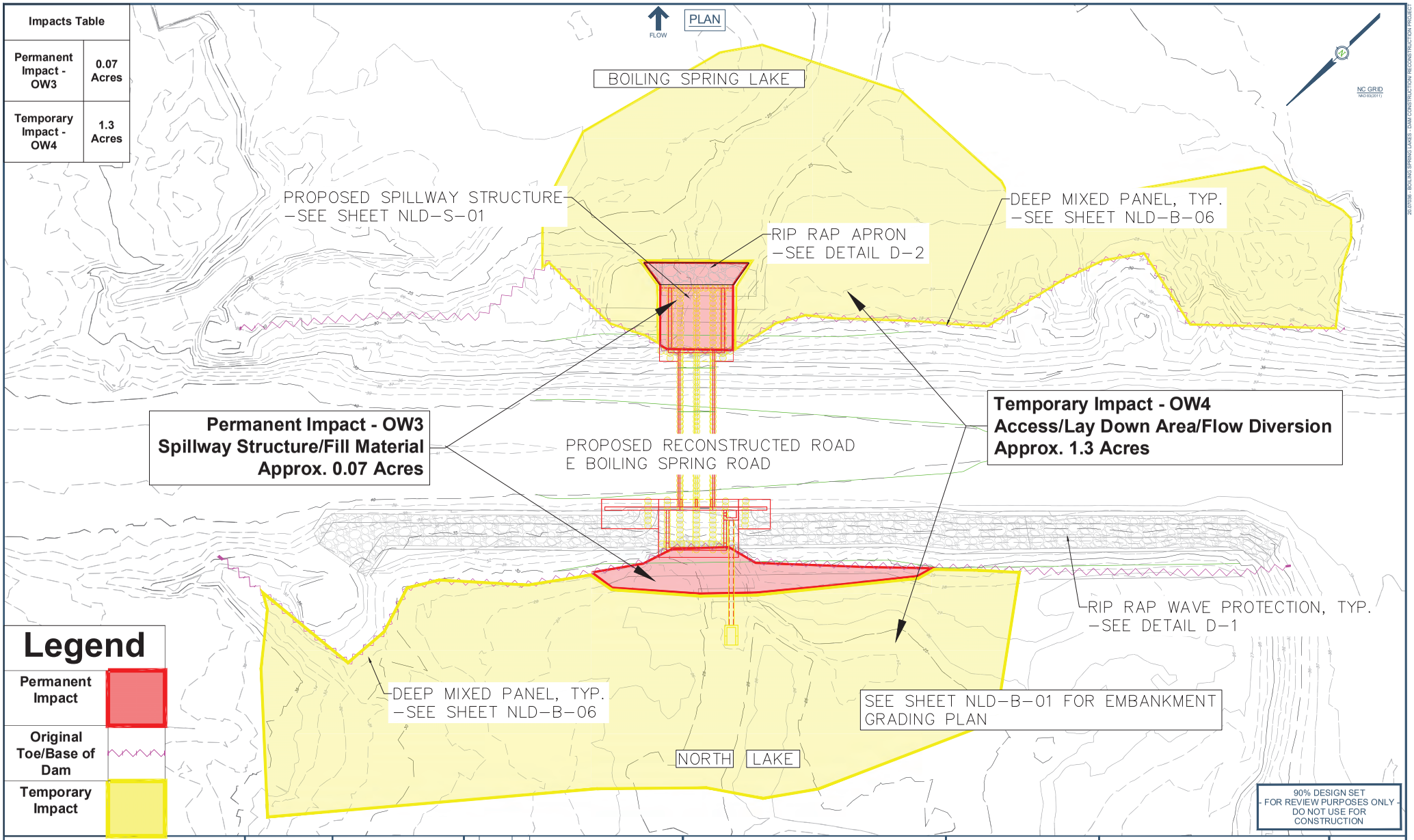
OFFICE MANAGER	DESIGNER			
M. NORTON	J.SWAIM			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	OCTOBER 1, 2020	20.07036	N/A

SHEET

SD-IM

C:\USERS\JONDESK\TOP\MERIAL\SANFORD DAM - IMPACT MAP.DWG PLOT DATE: 12/9/2021 3:05 PM JON SWAIM

Impacts Table	
Permanent Impact - OW3	0.07 Acres
Temporary Impact - OW4	1.3 Acres



90% DESIGN SET
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

mcgill
1013 State Farm Road
Boone, NC 28607
828.386.1920
NC Firm License # C-0459
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11A Oak Branch Drive / Greensboro, NC / 27407
T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 20 FEET

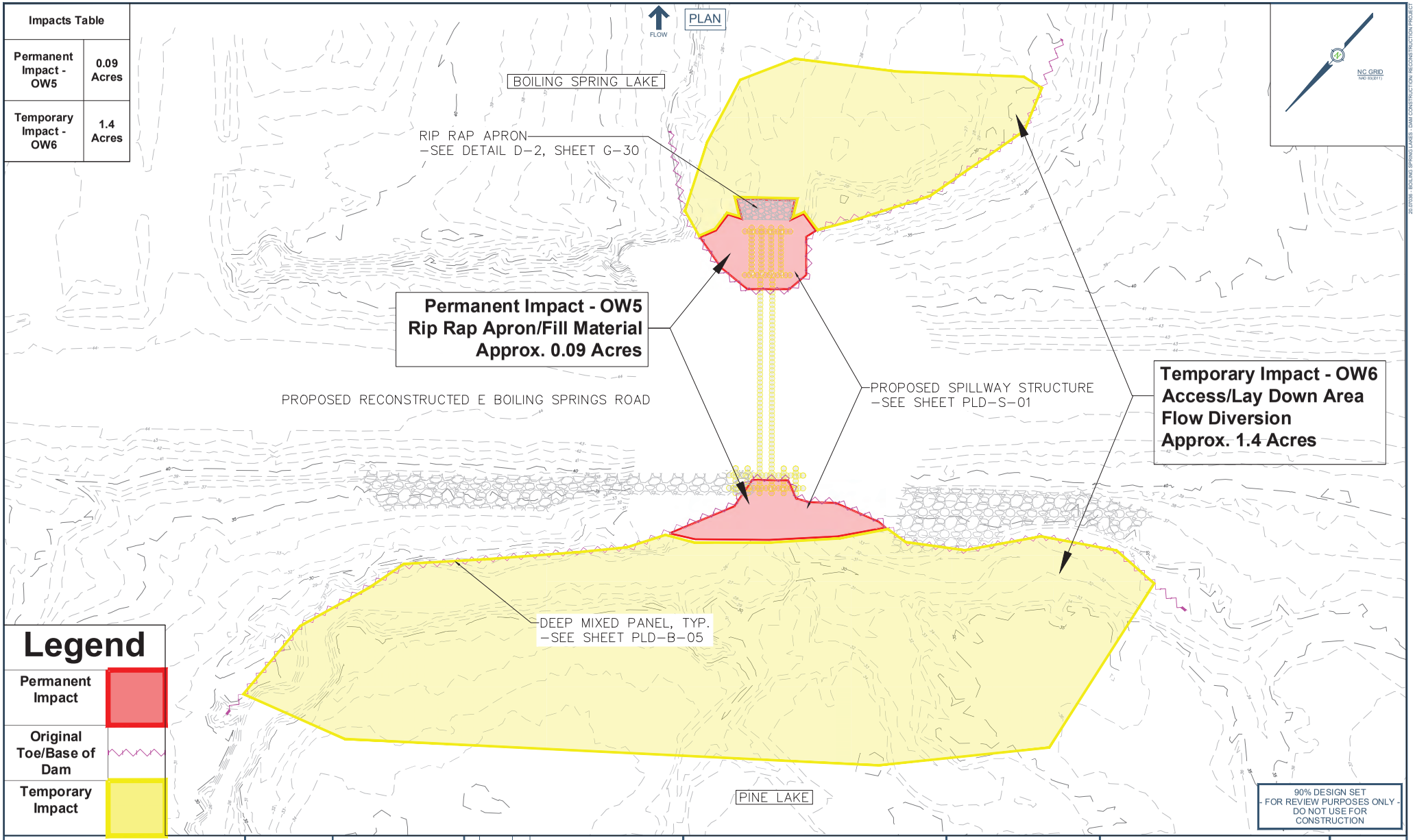
OFFICE MANAGER	DESIGNER			
M. NORTON	J. SWAIM	NORTH LAKE DAM - IMPACT MAP		SHEET
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	OCTOBER 1, 2020	20.07036	N/A

NLD-IM

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTION\RECONSTRUCTION\DESIGN\PERMITS\PCN\IMPACTS MAPS\NORTH LAKE DAM - IMPACT MAP.DWG PLOT DATE: 1/29/2021 3:14 PM JON SWAIM

DESIGN MANAGER: MCGILL ASSOCIATES - DRAWN BY: SCHNABEL ENGINEERING - SCALE: 1:20

Impacts Table	
Permanent Impact - OW5	0.09 Acres
Temporary Impact - OW6	1.4 Acres



Legend

Permanent Impact	
Original Toe/Base of Dam	
Temporary Impact	

90% DESIGN SET
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

mcgill
1013 State Farm Road
Boone, NC 28607
828.386.1920
NC Firm License # C-0459
mcgillassociates.com

PRELIMINARY

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LICENCE NUMBER C-2599
11A Oak Branch Drive / Greensboro, NC / 27407
T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER		
M. NORTON	J. SWAIM		
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	OCTOBER 1, 2020	20.07036	N/A

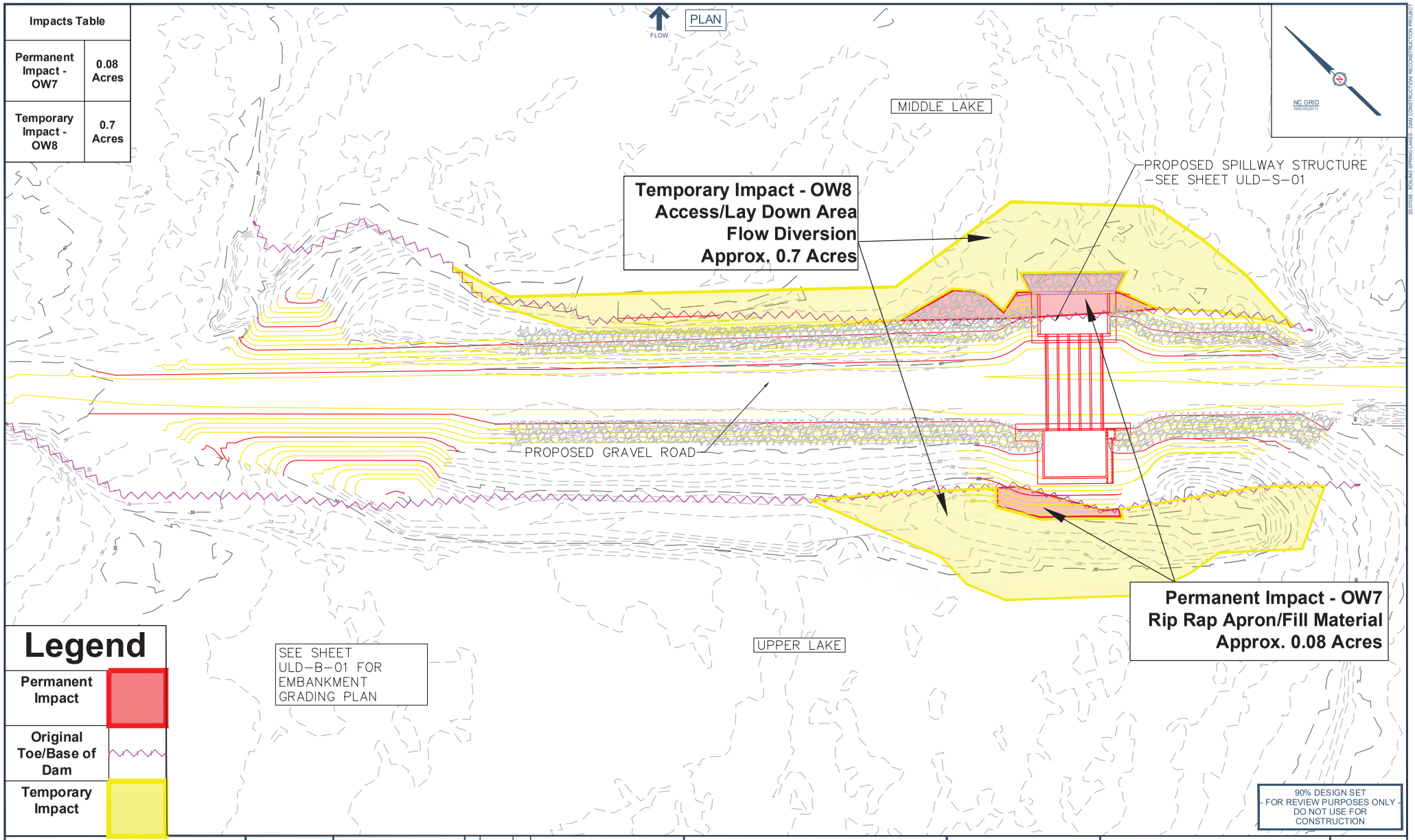
PINE LAKE DAM - IMPACT MAP

SHEET
PLD-IM

P:\2020\20.07036-BOILINGSPRL-DAMS CONSTRUCTION\RECONSTRUCT\DESIGN\PERMITS\PCN\IMPACTS MAPS\PINE LAKE DAM - IMPACT MAP.DWG PLOT DATE: 10/20/2021 4:23 PM JON SWAIM

20.07036 - BOILING SPRING LAKES - DAM CONSTRUCTION RECONSTRUCTION PROJECT

Impacts Table	
Permanent Impact - OW7	0.08 Acres
Temporary Impact - OW8	0.7 Acres



Legend

- Permanent Impact
- Original Toe/Base of Dam
- Temporary Impact

90% DESIGN SET
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

mcgill
1013 State Farm Road
Boone, NC 28607
828.386.1920
NC Firm License # C-0459
mcgillassociates.com

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T/ 336-274-9456 F/ 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER	DATE	PROJECT #	FUNDING #
M. NORTON	J. SWAIM	OCTOBER 1, 2020	20.07036	N/A
PROJECT MANAGER	REVIEWER			
M. HANSON	M. HANSON			

UPPER LAKE DAM - IMPACT MAP

SHEET
ULD-IM

P:\2020\20.07036\ADLIN\GSP\ALDAMS\CONSTRUCT\NREC\CONSTRUCDESIGN\PERMITS\FON\IMPACTS MAPS\UPPER LAKE DAM - IMPACT MAP.DWG PLOT DATE 1/29/2021 5:44 PM JON SWAIM

ROY COOPER
Governor
DIONNE DELLI-GATTI
Secretary
S. DANIEL SMITH
Director

NORTH CAROLINA
Environmental Quality

April 21, 2021

DWR # 2020-1735
Brunswick County

City of Boiling Spring Lakes
Attn: Jeff Repp
9 East Boiling Springs Road
Boiling Spring Lakes, NC 28461

Subject: **APPROVAL OF 401 WATER QUALITY CERTIFICATION WITH ADDITIONAL CONDITIONS**
Boiling Spring Lakes Dam Reconstruction (Sanford, North Lake, Pine Lake, and Upper Lake Dams)

Dear Mr. Repp:

You have our approval for the impacts listed below for the purpose described in your application dated January 29, 2021, received by the Division of Water Resources (Division) January 29, 2021 and payment received February 22, 2021. These impacts are covered by the attached Water Quality General Certification Number 4132 and the conditions listed below. This certification is associated with the use of the Nationwide Permit No. 3 once issued to you by the U.S. Army Corps of Engineers. Please note that you should get any other federal, state or local permits before proceeding with your project, including those required by (but not limited to) Sediment and Erosion Control, Non-Discharge, and Water Supply Watershed regulations.

The Division has determined that the proposed project will comply with water quality requirements provided that you adhere to the conditions listed in the enclosed certification and to the additional conditions itemized below.

The following proposed impacts are hereby approved. No other impacts are approved, including incidental impacts. [15A NCAC 02H .0506(b)]

Type of Impact	**Amount Approved (units) Permanent**	**Amount Approved (units) Temporary**
Stream Allen Creek (Sheet SD-IM, dated Oct. 1, 2020)	90 (linear feet)	30 (linear feet)
404/401 Wetlands	N/A	N/A
Open Waters Sanford Dam (Sheet SD-IM dated Oct. 1, 2020)	0.5 (acres)	2.5 (acres)

North Lake Dam (Sheet NLD-IM, dated Oct. 1, 2020)	0.07 (acres)	1.3 (acres)
Pine Lake Dam (Sheet PLD-IM dated Oct. 1, 2020)	0.09 (acres)	1.4 (acres)
Upper Lake Dam (Sheet ULD-IM dated Oct. 1, 2020)	0.08 (acres)	0.7 (acres)

This approval is for the purpose and design described in your application. The plans and specifications for this project are incorporated by reference as part of this Certification. If you change your project, you must notify the Division and you may be required to submit a new application package with the appropriate fee. If the property is sold, the new owner must be given a copy of this Certification and is responsible for complying with all conditions. [15A NCAC 02H .0507(d)(2)].

If you are unable to comply with any of the conditions of the attached Water Quality General Certification or with the additional conditions itemized below, you must notify the Wilmington Regional Office within 24 hours (or the next business day if a weekend or holiday) from the time the permittee becomes aware of the circumstances.

The permittee shall report to the Wilmington Regional Office any noncompliance with, and/or any violation of, stream or wetland standards [15A NCAC 02B .0200] including but not limited to sediment impacts to streams or wetlands. Information shall be provided orally within 24 hours (or the next business day if a weekend or holiday) from the time the permittee became aware of the non-compliance circumstances.

Additional Conditions:

1. The turbidity standard of 50 NTUs (Nephelometric Turbidity Units) shall not be exceeded as described in 15 A NCAC 02B .0200. Appropriate sediment and erosion control practices must be used to meet this standard.

Citation: 15A NCAC 02B .0211 (21)

Justification: Surface water quality standards require that conditions of waters be suitable for all best uses provided for in state rule (including, at minimum: aquatic life propagation, survival, and maintenance of biological integrity, wildlife, secondary contact recreation, agriculture, and primary contact recreation); and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis.

2. The receiving stream shall be monitored for turbidity and sedimentation throughout the duration of the project. If water quality standards are contravened, activities shall be immediately ceased and the applicant shall contact the Wilmington Regional Office at 910-796-7215.

Citation: 15A NCAC 02B .0211 (21) and (12)

Justification: In order to protect against impairment of water quality standards and best usage of receiving and downstream waters, water quality based management practices must be employed to protect against direct or indirect discharge of waste or other sources of water pollution. Surface

water quality standards require that conditions of waters be suitable for all best uses provided for in state rule (including, at minimum: aquatic life propagation, survival, and maintenance of biological integrity, wildlife, secondary contact recreation, agriculture) and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis.

3. Streamflow must be maintained within the stream channel downstream of the lake/pond at all times including during construction/maintenance activities and pond/lake filling/refilling. A minimum of pond/lake inflow, shall be maintained in the receiving stream.

Citation: 15A NCAC 02B .0211 (2)

Justification: Surface water quality standards require that conditions of waters be suitable for all best uses (including aquatic life propagation, survival, and maintenance of biological integrity) provided for in state rule and that activities must not cause water pollution that precludes any best use on a short-term or long-term basis.

This approval and its conditions are final and binding unless contested. [G.S. 143-215.5]

Statutes by filing a Petition for a Contested Case Hearing (Petition) with the North Carolina Office of Administrative Hearings (OAH) **within sixty (60) calendar days**. Requirements for filing a Petition are set forth in Chapter 150B of the North Carolina General Statutes and Title 26 of the North Carolina Administrative Code. Additional information regarding requirements for filing a Petition and Petition forms may be accessed at http://www.ncoah.com/ or by calling the OAH Clerk's Office at (919) 431-3000.

One (1) copy of the Petition must also be served to the North Carolina Department of Environmental Quality:

William F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center
Raleigh, NC 27699-1601

This letter completes the review of the Division under section 401 of the Clean Water Act and 15A NCAC 02H .0500. Please contact Holley Snider or Tyler Benson at 910-796-7215, Holley.Snider@ncdenr.gov or Tyler.Benson@ncdenr.gov if you have any questions or concerns.

Sincerely,

DocuSigned by:
Morella Sanchez King
E3ABA14AC7DC434...

Morella Sanchez-King
Regional Supervisor
Water Quality Regional Operations Section

Division of Water Resources, NCDEQ – WiRO

Enclosures: GC 4132

cc: Gary Beecher, USACE Wilmington Regulatory Field Office, EC
Jon Swaim, Consultant, EC
DWR 401 & Buffer Permitting Branch file-LF
WiRO

APPENDIX C-8

NC STATE ENVIRONMENTAL REVIEW CLEARINGHOUSE SCOPING & RESPONSE PACKAGE

REQUEST FOR ENVIRONMENTAL SCOPING

For use by USDA-Rural Development in gathering information in preparation of an Environmental Review

Reviewing Agency ID #:

Part 1 *Type or Print in Black Ink*

1. PROJECT INFORMATION

Legal Applicant/Recipient: City of Boiling Spring Lakes			
Street/PO Box: 9 East Boiling Springs Road	City: Boiling Spring Lakes	State: NC	Zip Code: 28461
County: Brunswick	Contact Person: Jeff Repp, City Manager	Phone (include Area Code): 910-363-0025	

Type of Applicant/Recipient: (Enter Appropriate Letter) C

A. State	E. Interstate	I. State Controlled Institution of Higher Learning	M. Non-Profit Organization
B. County	F. Intermunicipal	J. Private University	N. Other (Specify):
C. Municipal	G. Special District	K. Indian Tribe	
D. Township	H. Independent School Dist.	L. Individual	

Project Title: Boiling Spring Lakes Dams Construction/Reconstruction Project	Project Start Date: 2022	Duration: 48 months
Area of Impact (cities, counties, etc.): City of Boiling Spring Lakes, Brunswick County	Estimated number of persons benefiting: 8,000	Has project been reviewed before by State Clearinghouse: ☐ NO ☑ YES project #

Federal Agency to Receive Request (name & complete address):
USDA Rural Development

Type of Application: (Enter Appropriate Letter) a
a. New b. Revision c. Continuation

Tobais Fullwood, Area Specialist
USDA Rural Development
2736 NC Hwy 210
Smithfield, NC 27577
919-300-4841
tobais.fullwood@usda.gov

III. PROJECT NARRATIVE (Purpose, Expected Accomplishments, Major Tasks -- Attach Estimated Line Item Budget)

During Hurricane Florence (September 2018), Sanford Dam suffered major failure due to overtopping and substantial embankment erosion that caused sudden release and loss of the Boiling Spring Lake impoundments. Cascading failures occurred at smaller upstream dams serving the Boiling Spring Lake system: Sanford Dam, Pine Lake Dam, North Lake Dam, and Upper Lake Dam. All the dams were earthen embankments with risers and/or conduits constructed circa 1962. Middle Lake Dam is privately owned. All other dams are owned and maintained by the City of Boiling Spring Lakes. The dams maintained varied water levels for aesthetics and recreational use throughout the City's lake system. The Sanford and Upper Dams traverse Allen Creek while the Pine Lake and North Lake Dams cross tributaries north of Allen Creek. The Pine Lake and North Lake sites can be accessed from Boiling Springs Road, east of Highway 87. The Sanford Dam can be accessed from Alton Lennon Drive off of Boiling Spring Road. The Upper Lake Dam is partially closed to traffic and can be accessed from Dam Road which is west of Highway 87. The project sites occupy the southern tip of the Cape Fear River Basin in Brunswick County, which is a coastal county subject to the rules of policies of the Coastal Resources Commission.
The Pine Lake and North Lake Dams have been temporarily repaired and culverts installed by the NC Department of Transportation allowing for Boiling Springs Road to be open to traffic in both locations. The Upper and Sanford Dams have unrepaired breaches, and roads crossing the dams are closed to traffic. General land use in the vicinity of the property
consists of residential, small commercial, and open undeveloped properties.

The purpose of the proposed project is to re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018. The lake system has historically been the lifeblood and identity of the City of Boiling Spring Lakes community. Benefits for the local community and City if lakes are restored:
1. Restoration of lacustrine fringe wetlands and open water – Large areas of lacustrine and forested wetlands existed along the fringe of the lake system prior to draining. The project would restore these wetlands and shoreline areas which provide habitat for a variety of wetland and aquatic animal and plant species. Approximately 353.3-acres of open water would be restored if the lakes were returned to their original capacity.
2. Restore lakefront properties – At present there are 288 single family use residential properties adjacent to the former lake system waterfront. Restoring the waterfront would likely return these properties to their pre-Florence value and worth.
3. Business growth – Several businesses and public service properties adjacent to or near the lakes would benefit directly or indirectly from restoration. Recreational opportunities provided by the lakes draw tourism to the area which will benefit a variety of local businesses.
4. Recreation opportunities – The restored lakes will once again provide a number of recreational and educational opportunities to both residents and visitors of the City, including boating, waterskiing, hiking, wildlife and bird watching, and fishing.
5. Flood control - Sanford Dam has historically been operated to lower the Boiling Spring Lake level for flood control ahead of major storm events (McGill 2020).

Name & Title (Certifying Representative):	Signature:	Date:
Jon Swaim, Project Manager, McGill Associates, PA		2/10/2021

IF PROJECT INCLUDES CONSTRUCTION/ LAND ALTERATION COMPLETE PART 2 ALSO

**Submit sixteen (16) Copies incl. 8 ½ X 11 project location map (as described on next page) To:

North Carolina Department of Administration
State Clearinghouse
1301 Mail Service Center
Raleigh, North Carolina 27699-1301
(919) 807-2425

ENVIRONMENTAL INFORMATION FOR CONSTRUCTION/DEVELOPMENT PROJECTS

**Supply 16 copies of map (e.g. county, highway, USGS topo (if possible)) of proposed project site & surrounding area. Mark area to be acquired & construction site.

Part 2

A. CURRENT LAND USES (estimated percentages)

a. Urban/Built Up: 40	c. Forest Land:	e. Wetland (Marsh/Swamp):
b. Agricultural:	d. Water:	f. Other (Explain): 60 - Drained lake bed

B. UTILITIES (existing)

Water System: Name [a] Central: a. City/Town: b. County: c. Private:	[ ] Individual: a. Well: b. Other:	Line Size Length: N/A Diameter: N/A	Project Demand Per Day gals
Sewer System: Name [a] Central: a. City/Town: b. County: c. Private:	[ ] Individual: a. Septic: b. Other:	Line Size Length: N/A Diameter: N/A	Project Demand Per Day gals N/A

Street Improvements: [ ] NO [ ] YES, describe:

Alton Lennon Drive and Dam Road will be repaired. Both roads were breached during hurricane Florence.

C. UTILITIES (proposed)

Water System: Name [a] Central: a. City/Town: b. County: c. Private:	[ ] Individual: a. Well: b. Other:	Line Size *Length:* no change Diameter: no change	Project Demand Per Day gals N/A
Sewer System: Name [a] Central: a. City/Town: b. County: c. Private:	[ ] Individual: a. Septic: b. Other:	Line Size *Length:* no change Diameter: no change	Project Demand Per Day gals N/A

Street Improvements: [ ] NO [✔] YES, describe:

Alton Lennon Drive and Dam Road will be repaired. Both roads were breached during hurricane Florence.

D. LAND ALTERATIONS

Alteration (planned use)	Present Use (before change)	Previous Use (historical)	Acres	Percent of Project Area
To Be Acquired	n/a	n/a	0	0
To Be Developed	n/a	n/a	0	0
To Be Originally Cleared	n/a	n/a	0	0
To Be Landscaped	dam slopes	dam slopes	.8	8%
To Be Covered by Impermeable Surface (square feet)	roadway	roadway	.77	8%
To Be Cut (cubic yards)	dams	dams	2	20%
To Be Filled (cubic yards)	dams	dams	3.9	40%

Part 2 (continued)

E. TOPOGRAPHY AND VEGETATIVE TYPES BY ACRE

				Types of Vegetation					
				Forested			Non-Forested		
Slope	Acres	% of Area	Soil Types (use USDA and SCS classification)	Pine	Hardwood	Mixed	Brush	Grassland	Other
0-5%	.7	2	DO, GoA	0	0	0	.4	.3	0
5-10%	18.6	53.4	KrB, Lo, Ma	0	0	0	6.6	12	0
over 10%	.2	.5	BDC	0	0	0	.1	.1	0

F. CULTURAL RESOURCES (archeological, historic, architectural)

1. Please give any known archeological or historic sites on project land:

No known archaeological or historic sites located on the project area. NCHPO has been consulted for Section 106 correspondence. HPO Site ID: BW0545 is within the project area. NCHPO strongly recommend that the earthen dam be replaced in-kind and have no objection to the project as proposed.

2. What kind, if any, site preparation has already been conducted:

NONE

3. Has area been previously surveyed by archeologist? If so give name of principal investigator and date of survey:

No

4. ☑ YES ☐ NO Are buildings/ structures on site now? (abandoned barns, farmhouses, tobacco sheds, bridges, etc.)

If yes, approximate age: > 60 years

Original Sanford Dam Spillway and concrete riser.

5. Will any of these structures be demolished? (indicate which):

Yes, proposed plans call for the removal of the original concrete riser and the design of a new riser/intake structure and spillway.

6. Will any of these structures be rehabilitated or renovated? (indicate which):

Yes. See above.

-

7. Please include photographs of any buildings over 25 years old

See attached.

G. ENVIRONMENT

1. Check if any publicly owned/leased recreational/conservation lands are within one mile radius of the site:

- ☐ State Park or Forest
- ☐ National Park or Forest
- ☑ Municipal Park
- ☐ Wildlife Game Lands or Refuge
- ☐ State Estuarine Reserve
- ☐ State Trails
- ☐ State Rivers
- ☑ Registered Natural Heritage Areas
- ☑ Dedicated State Nature Preserve
- ☐ State or Federal Wilderness Area

2. Stream that surface runoff from project area drains into (illustrate relative position on maps):

Allen Creek

3. ☐ YES ☐ NO Site includes/borders on trout waters classified by DWQ and/or WRC

☑ YES ☑ NO Site includes/borders on estuarine waters

☐ YES ☑ NO Site includes/borders on drinking water source

4. ☑ YES ☐ NO The project will involve impoundment or withdrawal of water. If yes, mark impoundment on map.

If impoundment is planned, the amount of water to be impounded is approximately 15,389,748 acre/feet and 353.3 surface acres.

The impoundment will be created by a dam approximately 30 feet in height.

Part 2 (continued)

G. ENVIRONMENT - continued

5. Describe known mineral deposits of commercial value on site:

There are no known mineral deposits of commercial value on site.

6. Note classes of wildlife known to exist in the general area:

- [x] Bear
- [x] Turkey
- [x] Small Game (squirrel, quail, rabbit, raccoon, dove, etc.
- [x] Deer
- [x] Waterfowl
- [ ] Federal/State Listed Endangered/Threatened Species (osprey, eagle, alligator, red cockaded woodpecker, etc.)

7. Will proposed forestry practices such as burning, clearcutting, or thinning have adverse or desirable effects on any of the above species? Explain:

No. Minimal tree removal will be needed for dam reconstruction.

8. Are proposed pesticides or herbicides known to have adverse effects on humans or any of above species? Which pesticides/herbicides? Which species?

No

9. What alternatives or mitigating actions, if any, have been considered to avoid impacts (i.e. alternative projects, sites, etc.):

Alternatives Analysis
No Impoundment or Flow Control for North Lake, Pine Lake, and Upper Lake Dams Alternative:
This alternative consists of repairing only Sanford Dam allowing a portion of the main lake to refill to its normal (historic) water elevation of 30ft. This alternative would result in less impacts to lake bed areas for construction, and allow for Allen Creek and its tributaries to return to a stream channel structure in upstream areas within Pine Lake, North Lake, and Upper Lake. However, with the Sanford Dam normal water elevation at 30ft, the resulting water elevations within Pine Lake, North Lake, and Upper Lake would be much lower than desired. The Pine Lake and North Lake water elevation would be 5ft lower than original, and Upper Lake water elevation would be 8ft lower than original. The upper three lakes at this elevation would leave many existing private docks land locked, eliminating many waterfront properties, and would leave virtually all of the upstream wetland and shoreline areas drained. In addition, the continued release of sediment from exposed lake bed areas would be an ongoing maintenance issue within the lake and downstream into Allen Creek. Due to these undesirable issues, this alternative was deemed impractical.
No-Action Alternative:
This alternative involves leaving the dam breaches as-is and not restoring the impoundments. While this alternative eliminates the proposed impact to jurisdictional areas from dam construction and the installation of spillways, it will result in additional adverse impacts to historic open waters, and continued release of sediment and bank/shoreline erosion downstream. While at full pool, the Boiling Spring Lakes system contains State listed natural communities, and provides a variety of habitat for native plant and animal species including several Federal and State listed species (see Ecological Benefits of Lake Restoration section below). In addition, the impoundments, which have been present in some shape since the early 1960s, create a vital natural resource and identity for the community. It is used for multiple recreational activities, directly contributes to home and land sales, and provides economic benefits through tourism. Therefore, this alternative was deemed impractical.

10. Description and acreage of branches, creeks, streams, rivers, or wetlands which will be filled as a consequence of the proposed activity:

No wetlands will be filled as a consequence of the proposed activity. Approximately 90 linear feet of Allen Creek will be filled downstream of Sanford Dam for rip rap protection.

11. Will any water courses be altered or placed beneath the ground? [ ] YES [x] NO

If yes, linear feet _____

12. Description of mitigation measures which will be employed to avoid, reduce, or compensate for wetland impacts associated with the proposed activity:

Project design intended to replace existing failed dams and bring them up to current NC Dam Safety and FEMA standards. Disturbed areas caused by equipment access will be kept to a minimum. Materials will be stored in upland areas as much as practical. Improvements are limited to those required to bring the existing dam into compliance with state and federal regulations.Temporary pond bed impacts limited to diversion, access, and lay down areas. Impervious diversion dikes will be used to direct flow through gates and pump water as needed to maintain a dry construction area. Erosion control measures shall be used during construction to minimize impacts to the stream. Silt fence will be installed during construction to limit erosion. A floating turbidity curtain will be used to deter silt suspension and movement of silt particles during construction.

Part 2 (continued)

H. LOCAL IMPACT OF PROJECT

1. Give name, position and office telephone number of an individual in the appropriate local government unit that can confirm the compatibility of the proposed activity with existing and/or proposed land use or economic development plans:

Name:	Position:	Phone:
Jeffrey E. Repp	City Manager, City of Boiling Spring Lakes	910-363-0025

2. In your opinion, what aspect of proposed activity will have the most significant negative environmental impact on site and surrounding area? (consider traffic, noise, aesthetics, odors, loss of acres etc.):

Dam reconstruction will be constructed within the 100 year floodplain, a rip rap dissipator is proposed within Allen Creek resulting in 90 linear feet of permanent stream impacts. Lake bed will be temporarily disturbed during construction for lay down areas and equipment access. Noise and aesthetics will be impacted during construction, but will return to original state post project completion.

3. In your opinion, what aspect of proposed project will have the most significant positive influence on project area?

1. Restoration of lacustrine fringe wetlands and open water – Large areas of lacustrine and forested wetlands existed along the fringe of the lake system prior to draining. The project would restore these wetlands and shoreline areas which provide habitat for a variety of wetland and aquatic animal and plant species. Approximately 353.3-acres of open water would be restored if the lakes were returned to their original capacity.
2. Restore lakefront properties – At present there are 288 single family use residential properties adjacent to the former lake system waterfront. Restoring the waterfront would likely return these properties to their pre- Florence value and worth.
3. Business growth – Several businesses and public service properties adjacent to or near the lakes would benefit directly or indirectly from restoration. Recreational opportunities provided by the lakes draw tourism to the area which will benefit a variety of local businesses.
4. Recreation opportunities – The restored lakes will once again provide a number of recreational and educational opportunities to both residents and visitors of the City, including boating, waterskiing, hiking, wildlife and bird watching, and fishing.
5. Flood control - Sanford Dam has historically been operated to lower the Boiling Spring Lake level for flood control ahead of major storm events.

4. ☑ YES ☐ NO Will an environmental review document (e.g. environmental assessment) be prepared for the funding agency?

If yes, above, has it been prepared yet? ☐ YES ☑ NO

5. Check where effects are applicable. Give numerical estimates in last column, if possible.

			Construction Phase			Operational Phase			
Effect	Increase	Decrease	Minor	Moderate	Major	Minor	Moderate	Major	Estimate
Employment	X				X		X		no. jobs 30
Immigration to County									no. peop a
Tax Base	X				X			X	amount
Sediment		X		X				X	tons/day
Thermal Discharge									max.temp.rise
Chemicals									type(s)
Smoke									sources
Road Closures		X		X				X	no.roads 2
New Roads									total miles
Traffic		X	X					X	no. vehicles 100
Agricultural/Forestry Operations									no. acres
Cultural Resources	X		X					X	

Additional Remarks:

The purpose of the proposed project is to re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018. The lake system has historically been the lifeblood and identity of the City of Boiling Spring Lakes community.

Submit sixteen (16) copies of Parts 1 and 2 with maps (8 ½" x11" reproducible) to:

North Carolina Department of Administration
State Clearinghouse
1301 Mail Service Center
Raleigh, North Carolina 27699-1301
(919) 807-2425

STATE OF NORTH CAROLINA
DEPARTMENT OF ADMINISTRATION

Roy Cooper
GOVERNOR

Mark Edwards
Acting Secretary

March 26, 2021

Jon Swaim
City of Boiling Spring Lakes
c/o McGill Associates
1240 19th Street Lane NW
Hickory, NC 28601-

Re: SCH File # 21-E-0000-0851 Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.

Dear Jon Swaim:

The above referenced environmental impact information has been submitted to the State Clearinghouse under the provisions of the National Environmental Policy Act. According to G.S. 113A-10, when a state agency is required to prepare an environmental document under the provisions of federal law, the environmental document meets the provisions of the State Environmental Policy Act. Attached to this letter for your consideration are comments made by the agencies in the review of this document.

If any further environmental review documents are prepared for this project, they should be forwarded to this office for intergovernmental review.

Should you have any questions, please do not hesitate to call.

Sincerely,

CRYSTAL BEST
State Environmental Review Clearinghouse

Attachments

Mailing Address:
NC DEPARTMENT OF ADMINISTRATION
1301 MAIL SERVICE CENTER
RALEIGH, NC 27699-1301

Telephone: (919)807-2425
Fax: (919)733-9571
COURIER: #51-01-00
Email: state.clearinghouse@doa.nc.gov
Website: www.ncadmin.nc.gov

Location:
116 WEST JONES STREET
RALEIGH, NORTH CAROLINA

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
JAMIE RAGAN
Director

NORTH CAROLINA
Environmental Quality

MEMORANDUM

To: Crystal Best
State Clearinghouse
NC Department of Administration

From: Lyn Hardison
Division of Environmental Assistance and Customer Service
Environmental Assistance and Project Review Coordinator
Washington Regional Office

RE: 21-0851
Scoping - Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.
Brunswick County

Date: March 18, 2021

The Department of Environment Quality has reviewed the proposal for the referenced project. Based on the information provided, two (2) contamination sites were identified within one mile of the project site. In addition, several of our agencies have identified permits that may be required and offered some valuable guidance. The comments are attached for the applicant's review.

The Department will continue to be available to assist the applicant with any question or concerns.

Thank you for the opportunity to respond.

Attachments

ROY COOPER
Governor
DIONNE DELLI-GATTI
Secretary
MICHAEL SCOTT
Director

NORTH CAROLINA
Environmental Quality

Date: March 12, 2021

To: Michael Scott, Director
Division of Waste Management

Through: Janet Macdonald
Inactive Hazardous Sites Branch – Special Projects Unit

From: Bonnie S. Ware
Inactive Hazardous Sites Branch

Subject: NEPA Project # 21-0851, City of Boiling Spring Lakes/USDA-RD, Brunswick County, North Carolina

The Superfund Section has reviewed the proximity of sites under its jurisdiction to the City of Boiling Spring Lakes/USDA-RD project. Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.

Two (2) Superfund Section sites were identified within one mile of the project as shown on the attached report. The Superfund Section recommends that site files be reviewed to ensure that appropriate precautions are incorporated into any construction activities that encounter potentially contaminated soil or groundwater. Superfund Section files can be viewed at: http://deq.nc.gov/waste-management-laserfiche.

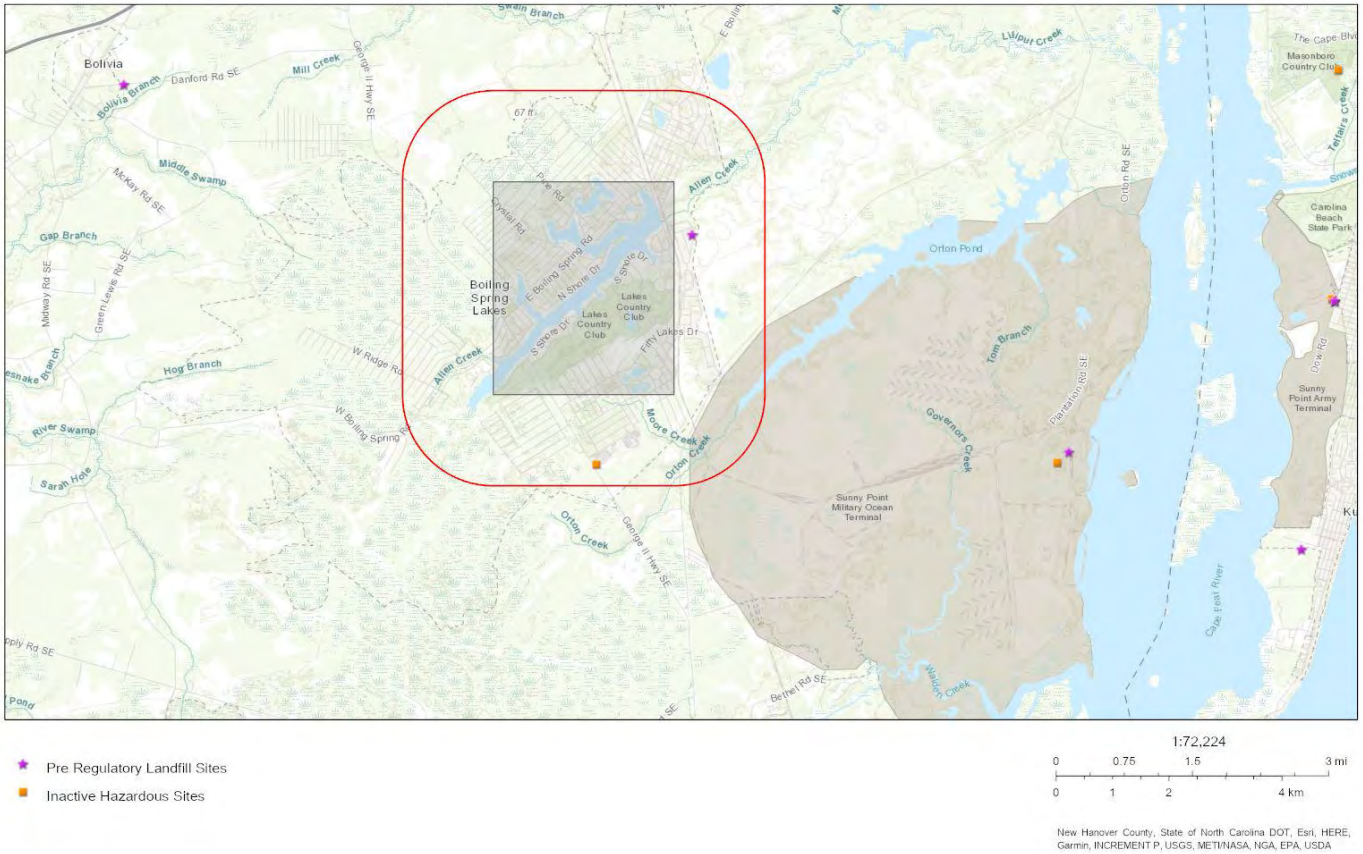
Please contact Janet Macdonald at 919.707.8349 if you have any questions concerning the Superfund Section review portion of this SEPA/NEPA inquiry.

SUPERFUND SECTION SITES ONLY : SEPA/NEPA

Area of Interest (AOI) Information

Area : 10,514.42 acres

Mar 12 2021 9:19:13 Eastern Standard Time



Superfund Section Sites Only : 21-0851 Brunswick County

Summary

Name	Count	Area(acres)	Length(mi)
Certified DSCA Sites	0	N/A	N/A
Federal Remediation Branch Sites	0	N/A	N/A
Inactive Hazardous Sites	1	N/A	N/A
Pre-Regulatory Landfill Sites	1	N/A	N/A
Brownfields Program Sites	0	N/A	N/A

Inactive Hazardous Sites

#	EPAID	SITENAME	Count
1	NONCD0002511	SOUTH BRUNSWICK MIDDLE SCHOOL	1

Pre-Regulatory Landfill Sites

#	EPAID	SITENAME	Count
1	NONCD0000160	Boiling Springs Lakes Dump	1

Department of Environmental Quality
Project Review Form

Project Number: 21-0851 **County: Brunswick** **Date Received: 2-16-2021**

Due Date: 3-12-2021

Project Description: *Scoping - Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.*

This Project is being reviewed as indicated below:

Regional Office	Regional Office Area	In-House Review	
___ Asheville	✓ Air	___ Air Quality	___ Coastal Management
___ Fayetteville	✓ DWR	___ Parks & Recreation	___ Marine Fisheries
___ Mooresville	✓ DWR - Public Water	✓ Waste Mgmt	___ Military Affairs
___ Raleigh	✓ DEMLR (LQ & SW)	___ Water Resources Mgmt (Public Water, Planning & Water Quality Program)	___ DMF-Shellfish Sanitation
___ Washington	✓ DWM-UST	___ DWR-Transportation Unit	✓ Wildlife Maria Dunn
✓ Wilmington			___ Wildlife - DOT
___ Winston-Salem			

Manager Sign-Off/Region:	Date: 3/12/21	In-House Reviewer/Agency: Melodi Deaver, Hazardous Waste Section

Response (check all applicable)

___ No objection to project as proposed. X No Comment

___ Insufficient information to complete review ___ Other (specify or attach comments)

If you have any questions, please contact:

Lyn Hardison at lyn.hardison@ncdenr.gov or (252) 948-3842
943 Washington Square Mall Washington NC 27889
Courier No. 16-04-01

State of North Carolina Department of Environmental Quality
INTERGOVERNMENTAL REVIEW PROJECT COMMENTS

Reviewing Regional Office: WIRO
Project Number: 21-0851 Due Date: 03/12/2021
County: Brunswick

After review of this project it has been determined that the DEQ permit(s) and/or approvals indicated may need to be obtained in order for this project to comply with North Carolina Law. Questions regarding these permits should be addressed to the Regional Office indicated on the reverse of the form. All applications, information and guidelines relative to these plans and permits are available from the same Regional Office.

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
☐	Permit to construct & operate wastewater treatment facilities, non-standard sewer system extensions & sewer systems that do not discharge into state surface waters.	Application 90 days before begins construction or award of construction contracts. On-site inspection may be required. Post-application technical conference usual.	30 days (90 days)
☐	Permit to construct & operate, sewer extensions involving gravity sewers, pump stations and force mains discharging into a sewer collection system	Fast-Track Permitting program consists of the submittal of an application and an engineer's certification that the project meets all applicable State rules and Division Minimum Design Criteria.	30 days (N/A)
☐	NPDES - permit to discharge into surface water and/or permit to operate and construct wastewater facilities discharging into state surface waters.	Application 180 days before begins activity. On-site inspection. Pre-application conference usual. Additionally, obtain permit to construct wastewater treatment facility-granted after NPDES. Reply time, 30 days after receipt of plans or issue of NPDES permit-whichever is later.	90-120 days (N/A)
☐	Water Use Permit	Pre-application technical conference usually necessary.	30 days (N/A)
☐	Well Construction Permit	Complete application must be received and permit issued prior to the installation of a groundwater monitoring well located on property not owned by the applicant, and for a large capacity (>100,000 gallons per day) water supply well.	7 days (15 days)
☒	Dredge and Fill Permit	Application copy must be served on each adjacent riparian property owner. On-site inspection. Pre-application conference usual. Filling may require Easement to Fill from N.C. Department of Administration and Federal Dredge and Fill Permit.	55 days (90 days)
☐	Permit to construct & operate Air Pollution Abatement facilities and/or Emission Sources as per 15 A NCAC (2Q.O100 thru 2Q.0300)	Application must be submitted and permit received prior to construction and operation of the source. If a permit is required in an area without local zoning, then there are additional requirements and timelines (2Q.0113).	90 days
☐	Any open burning associated with subject proposal must be in compliance with 15 A NCAC 2D.1900	N/A	60 days (90 days)
☐	Demolition or renovations of structures containing asbestos material must be in compliance with 15 A NCAC 20.1110 (a) (1) which requires notification and removal prior to demolition. Contact Asbestos Control Group 919-707-5950	Please Note - The Health Hazards Control Unit (HHCU) of the N.C. Department of Health and Human Services, must be notified of plans to demolish a building, including residences for commercial or industrial expansion, even if no asbestos is present in the building.	60 days (90 days)
☒	The Sedimentation Pollution Control Act of 1973 must be properly addressed for any land disturbing activity. An erosion & sedimentation control plan will be required if one or more acres are to be disturbed. Plan must be filed with and approved by applicable Regional Office (Land Quality Section) at least 30 days before beginning activity. A NPDES Construction Stormwater permit (NCG010000) is also usually issued should design features meet minimum requirements. A fee of $65 for the first acre or any part of an acre. An express review option is available with additional fees.		20 days (30 days)
☐	Sedimentation and erosion control must be addressed in accordance with NCDOT's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable Stormwater conveyances and outlets.		(30 days)
☐	Sedimentation and erosion control must be addressed in accordance with _____ Local Government's approved program. Particular attention should be given to design and installation of appropriate perimeter sediment trapping devices as well as stable Stormwater conveyances and outlets.		Based on Local Program
☐	Compliance with 15A NCAC 2H .0126 - NPDES Stormwater Program which regulates three types of activities: Industrial, Municipal Separate Storm Sewer System & Construction activities that disturb ≥1 acre.		30-60 days (90 days)
☐	Compliance with 15A NCAC 2H 1000 -State Stormwater Permitting Programs regulate site development and post-construction stormwater runoff control. Areas subject to these permit programs include all 20 coastal counties, and various other counties and watersheds throughout the state.		45 days (90 days)

Reviewing Regional Office: WIRO
Project Number: 21-0851 Due Date: 03/12/2021
County: Brunswick

	PERMITS	SPECIAL APPLICATION PROCEDURES or REQUIREMENTS	Normal Process Time (statutory time limit)
☐	Mining Permit	On-site inspection usual. Surety bond filed with DEQ Bond amount varies with type mine and number of acres of affected land. Affected area greater than one acre must be permitted. The appropriate bond must be received before the permit can be issued.	30 days (60 days)
☐	Dam Safety Permit	If permit required, application 60 days before begin construction. Applicant must hire N.C. qualified engineer to: prepare plans, inspect construction, and certify construction is according to DEQ approved plans. May also require a permit under mosquito control program. And a 404 permit from Corps of Engineers. An inspection of site is necessary to verify Hazard Classification. A minimum fee of $200.00 must accompany the application. An additional processing fee based on a percentage or the total project cost will be required upon completion.	30 days (60 days)
☐	Oil Refining Facilities	N/A	90-120 days (N/A)
☐	Permit to drill exploratory oil or gas well	File surety bond of $5,000 with DEQ running to State of NC conditional that any well opened by drill operator shall, upon abandonment, be plugged according to DEQ rules and regulations.	10 days N/A
☐	Geophysical Exploration Permit	Application filed with DEQ at least 10 days prior to issue of permit. Application by letter. No standard application form.	10 days N/A
☐	State Lakes Construction Permit	Application fee based on structure size is charged. Must include descriptions & drawings of structure & proof of ownership of riparian property	15-20 days N/A
☒	401 Water Quality Certification	Compliance with the T15A 02H .0500 Certifications are required whenever construction or operation of facilities will result in a discharge into navigable water as described in 33 CFR part 323.	60 days (130 days)
☐	Compliance with Catawba, Goose Creek, Jordan Lake, Randleman, Tar Pamlico or Neuse Riparian Buffer Rules is required. Buffer requirements: http://deq.nc.gov/about/divisions/water-resources/water-resources-permits/wastewater-branch/401-wetlands-buffer-permits/401-riparian-buffer-protection-program		
☐	Nutrient Offset: Loading requirements for nitrogen and phosphorus in the Neuse and Tar-Pamlico River basins, and in the Jordan and Falls Lake watersheds, as part of the nutrient-management strategies in these areas. DWR nutrient offset information: http://deq.nc.gov/about/divisions/water-resources/planning/nonpoint-source-management/nutrient-offset-information		
☒	CAMA Permit for MAJOR development	$250.00 - $475.00 fee must accompany application	75 days (150 days)
☐	CAMA Permit for MINOR development	$100.00 fee must accompany application	22 days (25 days)
☐	Abandonment of any wells, if required must be in accordance with Title 15A. Subchapter 2C.0100.		
☐	Notification of the proper regional office is requested if "orphan" underground storage tanks (USTS) are discovered during any excavation operation.		
☐	Plans and specifications for the construction, expansion, or alteration of a public water system must be approved by the Division of Water Resources/Public Water Supply Section prior to the award of a contract or the initiation of construction as per 15A NCAC 18C .0300 et. seq., Plans and specifications should be submitted to 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. All public water supply systems must comply with state and federal drinking water monitoring requirements. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
☐	If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources/Public Water Supply Section at 1634 Mail Service Center, Raleigh, North Carolina 27699-1634. For more information, contact the Public Water Supply Section, (919) 707-9100.		30 days
☐	Plans and specifications for the construction, expansion, or alteration of the _____ water system must be approved through the _____ delegated plan approval authority. Please contact them at _____ for further information.		

Reviewing Regional Office: WIRO
Project Number: 21-0851 Due Date: 03/12/2021
County: Brunswick

Other Comments (attach additional pages as necessary, being certain to comment authority)

Division	Initials	No comment	Comments	Date Review
DAQ	DAC	☒		3/10/2021
DWR-WQROS (Aquifer & Surface)	&	☐	&	/ /
DWR-PWS	HLC	☒		3/2/2021
DEMLR (LQ & SW)		☐		/ /
DWM – UST	LEP	☐	To view/find petroleum related incidents in the area please use the LINK TO UST Section GIS MAP: http://deq.nc.gov/about/divisions/waste-management/waste-management-rules-data/waste-management-gis-maps	2/22/2021
Other Comments		☐		/ /

REGIONAL OFFICES

Questions regarding these permits should be addressed to the Regional Office marked below.

☐ **Asheville Regional Office**
2090 U.S. 70 Highway
Swannanoa, NC 28778-8211
Phone: 828-296-4500
Fax: 828-299-7043

☐ **Fayetteville Regional Office**
225 Green Street, Suite 714,
Fayetteville, NC 28301-5043
Phone: 910-433-3300
Fax: 910-486-0707

☐ **Mooresville Regional Office**
610 East Center Avenue, Suite 301,
Mooresville, NC 28115
Phone: 704-663-1699
Fax: 704-663-6040

☐ **Raleigh Regional Office**
3800 Barrett Drive,
Raleigh, NC 27609
Phone: 919-791-4200
Fax: 919-571-4718

☐ **Washington Regional Office**
943 Washington Square Mall,
Washington, NC 27889
Phone: 252-946-6481
Fax: 252-975-3716

☒ **Wilmington Regional Office**
127 Cardinal Drive Ext.,
Wilmington, NC 28405
Phone: 910-796-7215
Fax: 910-350-2004

☐ **Winston-Salem Regional Office**
450 Hanes Mill Road, Suite 300,
Winston-Salem, NC 27105
Phone: 336-776-9800
Fax: 336-776-9797

Control No.: 21-E-0000-0851

County.: BRUNSWICK

Date Received: 2/16/2021

Agency Response: 3/18/2021

Review Closed: 3/18/2021

JINTAO WEN

CLEARINGHOUSE COORDINATOR

DPS - DIV OF EMERGENCY MANAGEMENT

Project Information

Type: National Environmental Policy Act ping

Applicant: City of Boiling Spring Lakes

Project Desc.: Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.

As a result of this review the following is submitted:

☐ No Comment ☑ Comments Below ☐ Documents Attached

The proposed project will require a Floodplain Development Permit issued by City of Boiling Spring Lakes. Please coordinate with the City's Floodplain Administrator for permitting. The work within the Floodway or Non-Encroachment Area of the Allen Creek will require a hydraulic analysis to determine the effects on flood levels from the proposed development. Any increase in flood levels during the base flood discharge will require a Conditional Letter of Map Revision (CLOMR) prior to construction. Otherwise, a "No-Rise" certification will be required.

Reviewed By: JINTAO WEN

Date: 3/15/2021

Control No.: 21-E-0000-0851

County.: BRUNSWICK

Date Received: 2/16/2021

Agency Response: 3/18/2021

Review Closed: 3/18/2021

DEVON BORGARDT

Clearinghouse Reviewer

DEPT OF NATURAL & CULTURAL RESOURCE

Project Information

Type: National Environmental Policy Act ping

Applicant: City of Boiling Spring Lakes

Project Desc.: Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.

As a result of this review the following is submitted:

☑ No Comment ☐ Comments Below ☐ Documents Attached

Reviewed By: DEVON BORGARDT

Date: 3/9/2021

Control No.: 21-E-0000-0851

County.: BRUNSWICK

Date Received: 2/16/2021

Agency Response: 3/18/2021

Review Closed: 3/18/2021

JEANNE STONE
CLEARINGHOUSE COORDINATOR
DEPT OF TRANSPORTATION

Project Information

Type: National Environmental Policy Act ping

Applicant: City of Boiling Spring Lakes

Project Desc.: Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.

As a result of this review the following is submitted:

☑ No Comment ☐ Comments Below ☐ Documents Attached

Reviewed By: JEANNE STONE

Date: 2/19/2021

Control No.: 21-E-0000-0851

County.: BRUNSWICK

Date Received: 2/16/2021

Agency Response: 3/18/2021

Review Closed: 3/18/2021

LYN HARDISON
CLEARINGHOUSE COORDINATOR
DEPT OF ENVIRONMENTAL QUALITY

Project Information

Type: National Environmental Policy Act ping

Applicant: City of Boiling Spring Lakes

Project Desc.: Proposed project will re-establish the Boiling Spring Lakes system by repairing the City-owned dams breached by Hurricane Florence in 2018.

As a result of this review the following is submitted:

☐ No Comment ☐ Comments Below ☑ Documents Attached

Reviewed By: LYN HARDISON

Date: 3/18/2021

APPENDIX C-9

FLOODPLAIN DOCUMENTATION - 8-STEP PROCESS, PUBLIC NOTICES

EIGHT-STEP PLANNING PROCESS FOR FLOODPLAIN MANAGEMENT

BOILING SPRING LAKES DAMS CONSTRUCTION/RECONSTRUCTION

Brunswick County, NC

5400 Trinity Avenue, Suite 107
Raleigh, NC 27607

Firm License No.: C-0459

MARCH 2021

PROJECT NO. 20.07036

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

1 Introduction

Executive Order 11988 (Floodplain Management) requires Federal agencies "to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of the floodplain and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative." The order is implemented by U. S. Department of Agriculture, Rural Development instructions Subpart F – Floodplain Management of the Code of Federal Regulations (CFR) Title 7, Subtitle B, Chapter XVIII, Subchapter H, Part 1970 (7 CFR 1970-F). 7 CFR 1970.256 includes an Eight-Step Decision Making Process that satisfies the provisions of the Order.

This Eight-Step Decision Making Process has been applied to the Boiling Spring Lakes Dams Construction/Reconstruction project located in Brunswick County, North Carolina. The owner of the four impacted dams, the City of Boiling Spring Lakes (City), through its consultant, McGill Associates, P.A. (McGill) has completed design documents and submitted permit applications to repair the damages incurred at the dams as noted below.

The Boiling Spring Lakes (BSL) System, a core identity of the City of Boiling Spring Lakes (City), suffered cascading failure of all its dams and lost 275 acres of water impoundments due to excessive rain and flooding caused by Hurricane Florence in September 2018. Overtopping and embankment erosion caused by Hurricane Florence resulted in the sudden release and loss of impoundment at Sanford Dam which led to cascading failures at the smaller, upstream dams in the Boiling Spring Lake system: North Lake Dam, Pine Lake Dam, Middle Lake Dam, and Upper Lake Dam. Middle Lake Dam is privately owned and is not addressed by this project. The Boiling Spring Lakes Dam Construction/Reconstruction project consists of re-establishing the impounded lakes upstream of the City-owned dams by restoring the earthen embankments and installing spillways and seepage control elements that meet current codes and standards. McGill was retained by the City to lead the project design, coordinate with State and Federal agencies, and submit all required permits.

Each section of this report addresses one step of the following eight-step process (the paragraphs listed refer to the paragraph number in 7 CFR 1970):

Step 1. DETERMINE IF THE PROPOSED ACTION IS IN A FLOODPLAIN. Determine whether the proposed action is located within the floodplain and whether the action has the potential to affect or be affected by a floodplain (see § 1970.256(a));

Step 2. PRELIMINARY PUBLIC NOTICE and PRIVATE PARTY NOTIFICATION. Notify the public at the earliest possible time of the intent to carry out an action in a floodplain and involve the affected and interested public in the decision-making process (see § 1970.256(b));

Step 3. SEARCH FOR PRACTICABLE ALTERNATIVES. Identify and evaluate practicable alternatives to locating the proposed action in a floodplain including off-site and on-site alternatives, alternative configurations, other avoidance actions and the "no action" alternative, as appropriate (see § 1970.256(c)).

Step 4. IDENTIFY ADVERSE IMPACTS AND BENEFICIAL VALUES/FUNCTIONS. Identify the potential direct, indirect, and cumulative impacts associated with the proposed action. Identify the floodplain's beneficial functions and values such as water quality improvement, water filtration, floodwater storage, fish and wildlife habitat, aesthetics, and biological productivity (see § 1970.256(d));

Step 5. MITIGATE ADVERSE IMPACTS. Mitigation can take the form of avoidance, minimization of floodplain impacts, or compensation for impacts, and can include all efforts to minimize the adverse impacts to floodplains identified under Step 4 (see § 1970.256(e));

Step 6. RE-EVALUATE ALTERNATIVES. Re-evaluate the proposed action to determine if it is still practicable in light of the remaining exposure to flood hazards, extent to which the action will aggravate hazards and the potential to disrupt floodplain values. Alternatives preliminarily rejected at Step 3 should also be re-evaluated as to whether they are practicable in light of the information gained in Steps4 and 5. (see § 1970.256(f));

Step 7. FINAL PUBLIC NOTICE. Prepare and provide the public with a finding and public explanation of the Agency's final decision that the floodplain impact is the only practicable alternative as specified in § 1970.261(see § 1970.256(g)); and

Step 8. IMPLEMENT PROPOSED ACTION WITH APPROPRIATE MITIGATION. When floodplain (or other important resource) impacts would occur from an Agency action, but permits/authorizations are not yet issued, the Agency can complete an EA/EIS and publish a FONSI/ROD evaluating the proposed impacts with an indication within the EA/EIS, the FONSI/ROD, and the letter of conditions, that permit(s) and authorization(s) are pending and that any associated mitigation will be a requirement in the letter of conditions (see § 1970.256(h)).

2 Step 1. Determine if the Proposed Action is in a Floodplain (7 CFR § 1970.256(a))

Sanford Dam

As a flood control facility, by definition, the dam restoration project is located within the 100-year floodway (Zone AE) and 500-year floodplain (Zone X) as illustrated on the FIRMette Panels 3720219000K and 3720219100K effective date August 28, 2018 (Figure 1).

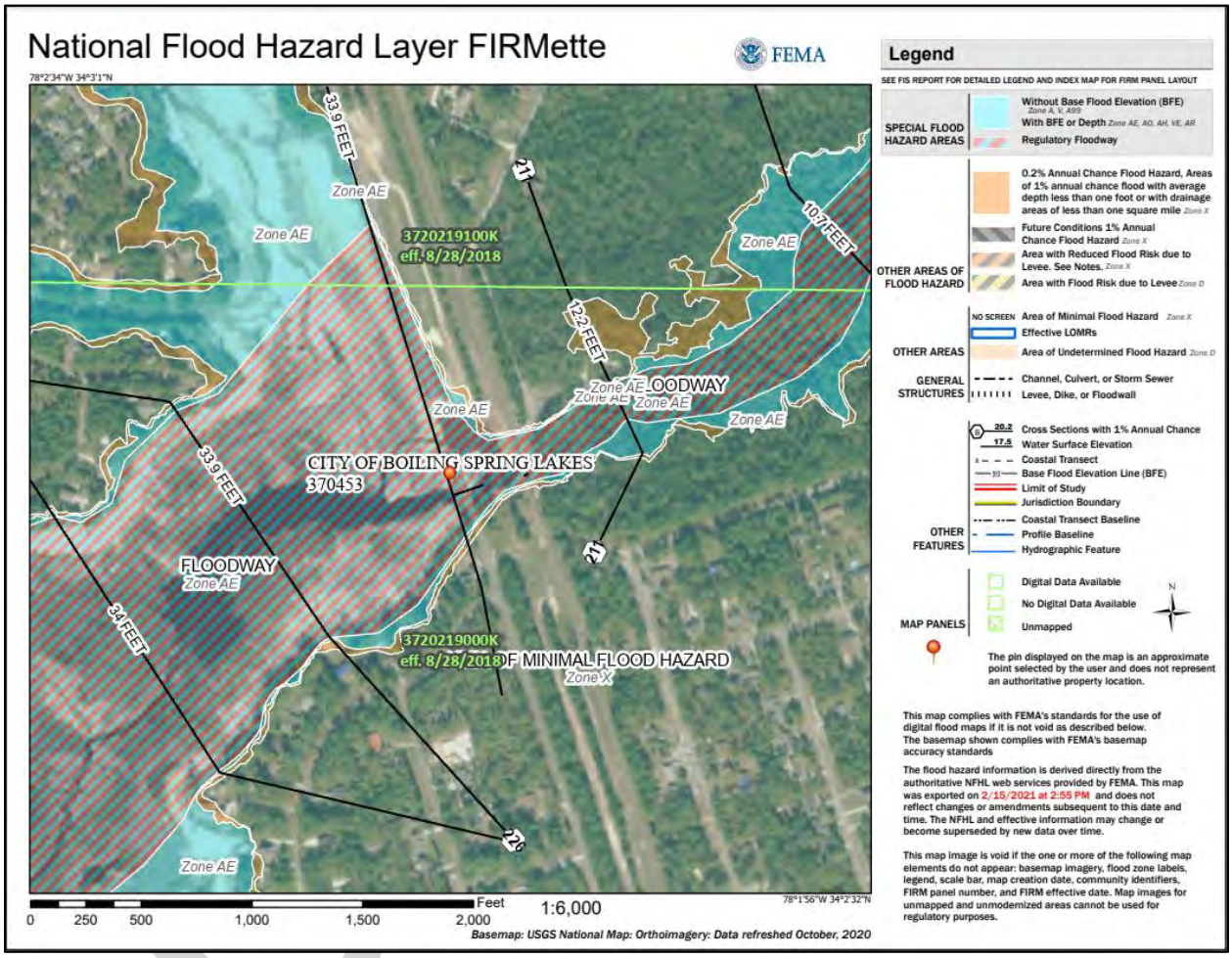


Figure 1 - Sanford Dam FIRMette

North Lake Dam

As a flood control facility, by definition, the dam restoration project is located within the 100-year floodplain (Zone AE) as illustrated on the FIRMette Panel 3720218000K effective date August 28, 2018 (Figure 2).

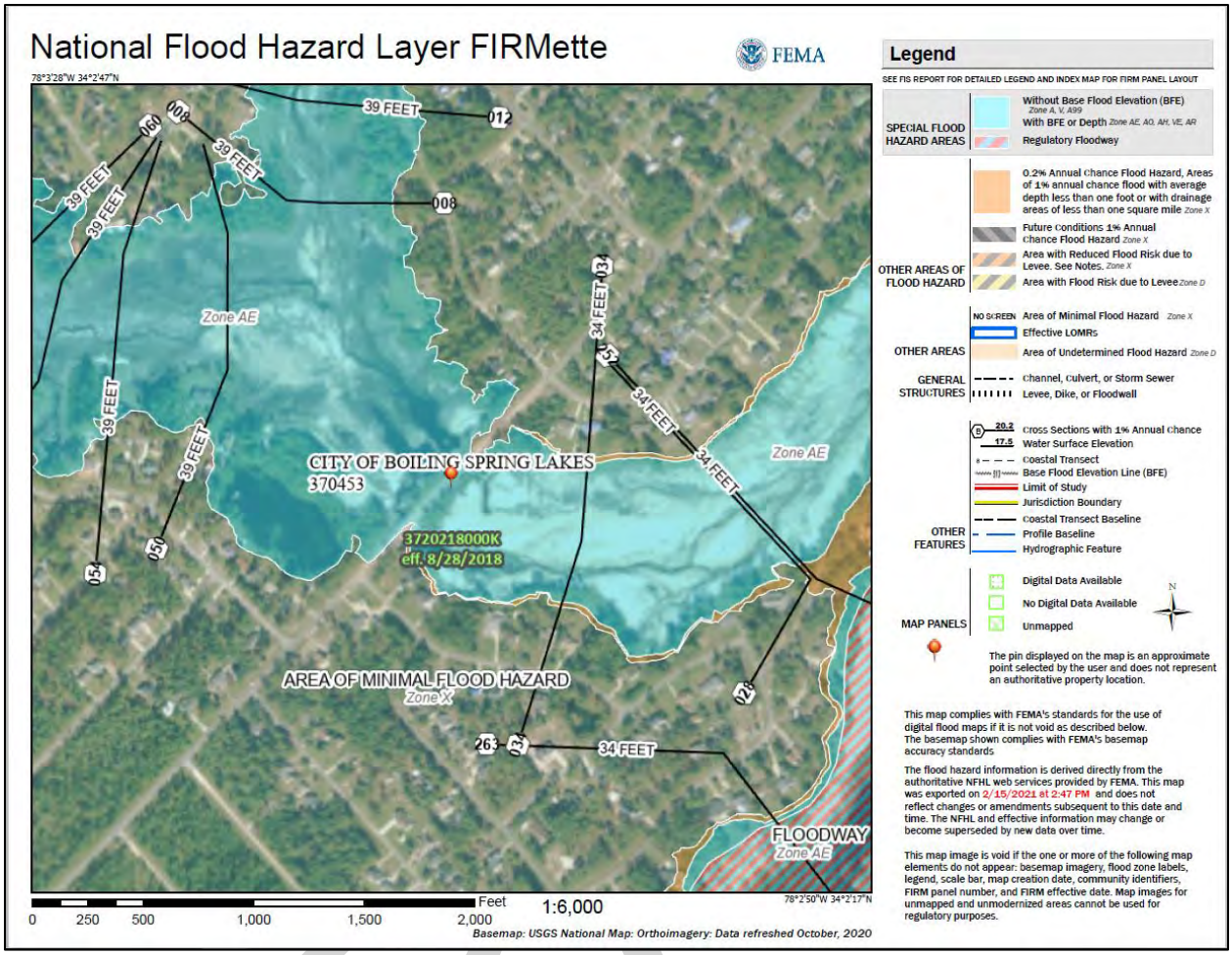


Figure 2 - North Lake Dam FIRMette

<u>Pine Lake Dam</u>

As a flood control facility, by definition, the dam restoration project is located within the 100-year floodplain (Zone AE) and 500-year floodplain (Zone X) as illustrated on the FIRMette Panel 3720218000K effective date August 28, 2018 (Figure 3).

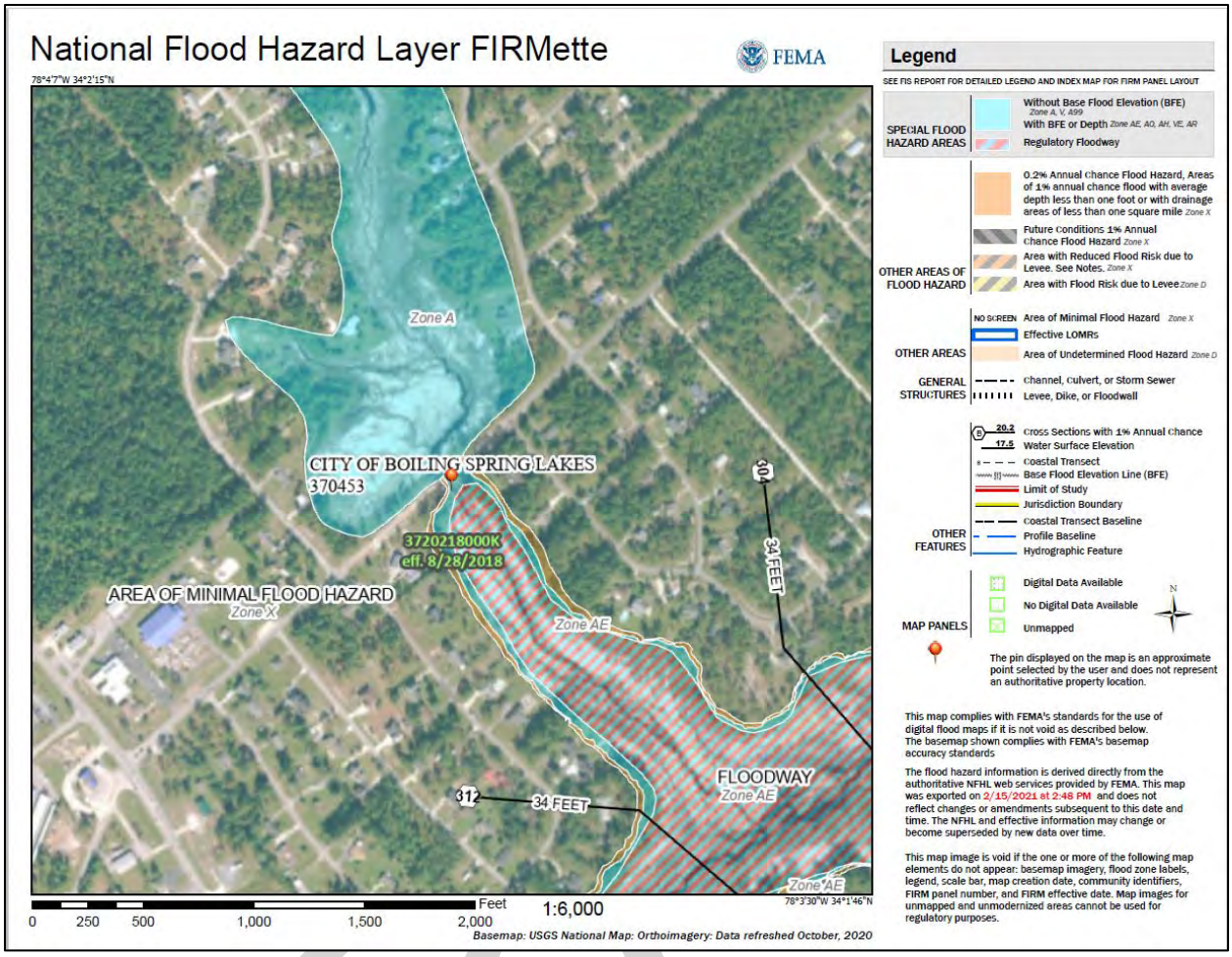


Figure 3 - Pine Lake Dam FIRMette

<u>Upper Lake Dam</u>

As a flood control facility, by definition, the dam restoration project is located within the 100-year floodway (Zone AE) as illustrated on FIRMette Panels 3720218000K and 3720208900J effective dates August 28, 2018 and June 2, 2006 respectively (Figure 4).

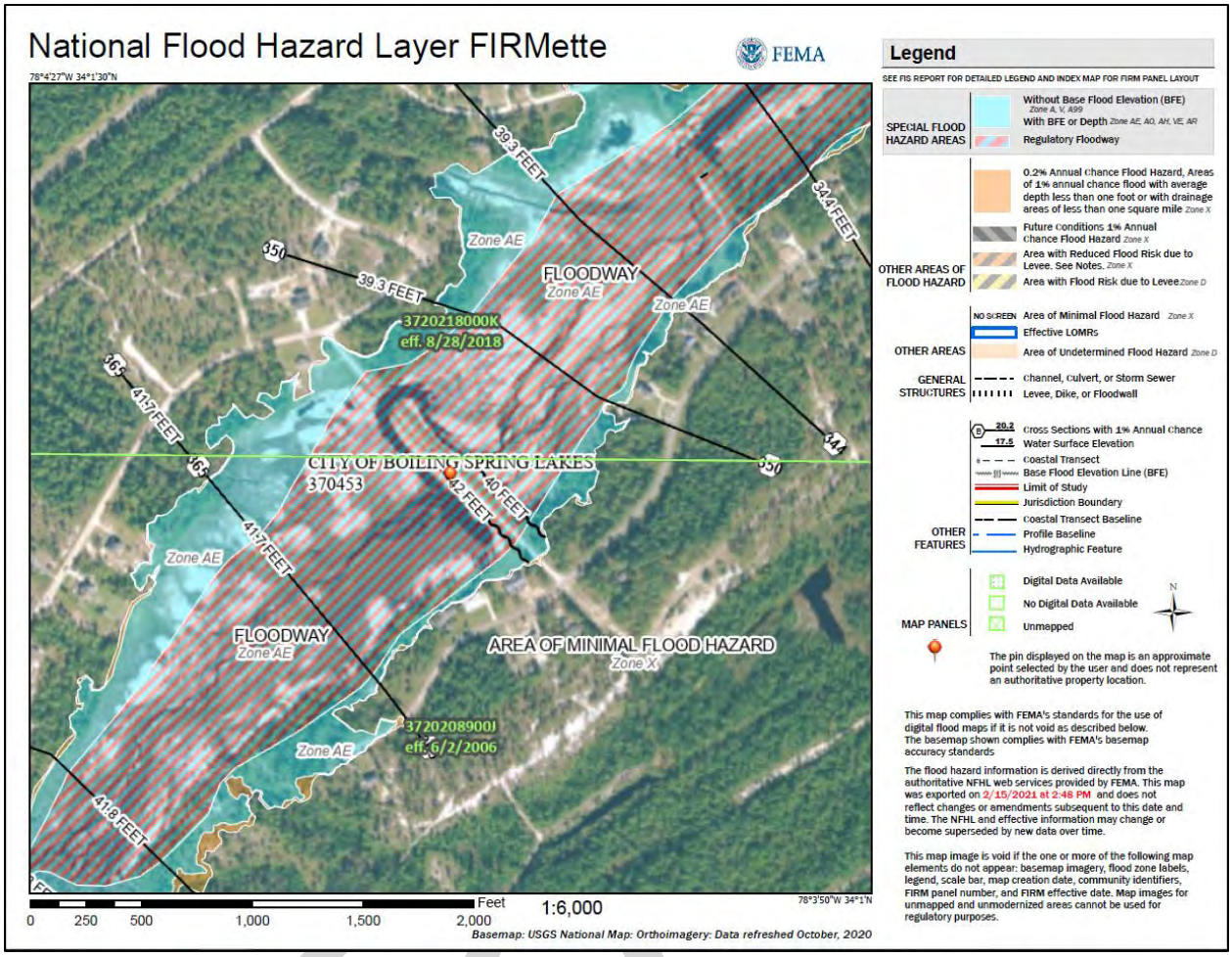


Figure 4 - Upper Lake Dam FIRMette

3 Step 2. Preliminary Public Notice and Private Party Notification (7 CFR § 1970.256(b))

Public engagement has been sought throughout the design phases. Several board meetings were held between December 2019 and January 2021 and were announced to the public. These meetings were as follows:

December 3, 2019 – Preliminary Analysis Report Board Update
February 19, 2020 – Preliminary Analysis Report Board Update
September 18, 2020 – 60% Board Update/ Industry Day
January 25, 2021 – 90% Board Update

Each meeting included a clear description of the proposed repairs, funding and permitting updates, and updates to the expected project schedule. The City hosted an Industry Day on September 18, 2020 as part of a public board meeting. Prospective contractors were invited to attend the meeting on-site to get a general understanding of the design and participate in an organized tour of the four dam sites. Full presentations and minutes from these meetings are included in Appendix 2. The project remains highly anticipated by the community because the project will restore recreational use of the lakes and adjacent homeowner access to this public amenity.

In addition to the public meetings, the following public notifications were conducted:

- A public notice was published in the local weekly newspaper, State Port Pilot, for two (2) consecutive weeks, providing a public review period of 14 days from the initial publication date of the Notice. A copy of the published notice and an affidavit of publication are included in Appendix 1.
- As part of the National Flood Insurance Program regulation 65.7(b)(1), notice will be published in the local newspaper about the intent to revise flood hazard information as part of the Conditional Letter of Map Revision (CLOMR) currently under review. Anticipated publication date: _____

4 Step 3. Search for Practicable Alternatives (7 CFR § 1970.256(c))

Given the nature of the project (i.e., repair of a dam), the floodplain is the only practicable location for the project. Although actions within the floodplain were unavoidable, the design did consider and implement options to minimize the impacts of the project to the extent practicable. The proposed design is the culmination of several iterations of alternative designs that aimed to minimize the potential impacts to the floodway/floodplain as well as the environment while meeting NC Dam Safety requirements and maintaining public safety.

No-Action Alternative:

This alternative involves leaving the dam breaches as-is and not restoring the impoundments. While this alternative eliminates the proposed impact to jurisdictional areas from dam construction and the installation of spillways, it will result in additional adverse impacts to historic open waters, and continued release of sediment and bank/shoreline erosion downstream. While at full pool, the Boiling Spring Lakes system contains State listed natural communities and provides a variety of habitat for native plant and animal species including several Federal and State listed species. In addition, the impoundments, which have been present in some shape since the early 1960s, create a vital natural resource and identity for the community. It is used for multiple recreational activities, directly contributes to home and land sales, and provides economic benefits through tourism. Therefore, this alternative was deemed impractical.

Partial Reconstruction – Sanford Dam only

This alternative consists of repairing only Sanford Dam, allowing a portion of the main lake to refill to its normal (historic) water elevation of 30ft. This alternative would result in less impacts to lakebed areas for construction and allow for Allen Creek and its tributaries to return to a stream channel structure in upstream areas within Pine Lake, North Lake, and Upper Lake. However, with the Sanford Dam normal water elevation at 30ft, the resulting water elevations within Pine Lake, North Lake, and Upper Lake would be much lower than desired. The Pine Lake and North Lake water elevation would be 5ft lower than original, and Upper Lake water elevation would be 8ft lower than original. The upper three lakes at this elevation would leave many existing private docks land locked, eliminating many waterfront properties, and would leave virtually all of the upstream wetland and shoreline areas drained. In addition, the continued release of sediment from exposed lakebed areas would be an ongoing maintenance issue within the lake and downstream into Allen Creek. Due to these undesirable issues, this alternative was deemed impractical.

Construction/Reconstruction of Sanford Dam, North Lake Dam, Pine Lake Dam, and Upper Lake Dam – Chosen Alternative:

The proposed designs are the culmination of several iterations of alternative designs that aim to minimize the potential impacts to the floodway/floodplain as well as the environment while

maintaining public safety. In the early stages of the project a Preliminary Analysis Report (PAR) was prepared as part of the NC Dam Safety permitting process. The PAR identified the minimum spillway design capacity needed to meet the requirements of NC Dam Safety, which also resulted in the minimum required footprint which was the basis of design for this project. The proposed repairs of the City-owned dams include restoration of the earthen embankment primarily within the existing footprint and installation of upgraded spillways and seepage control elements that meet current codes and standards.

Hydrologic and Hydraulic (H&H) models were developed to simulate the lake system aiming to assess hydraulic performance for various alternatives of all spillways. These models used the required design storm approved by NC Dam Safety: the ½ Probable Maximum Precipitation (PMP) storm event for Sanford Dam and the ⅓ PMP storm event for all other dams. The H&H evaluation provided adequate spillway sizing to ensure overtopping protection up to the design storm for each lake. In addition, a combined breach of all dams upstream of Sanford Dam was simulated to ensure that the breach of the upstream dams does not cause overtopping and risk of failure at Sanford Dam.

The following are the major elements included in the design:

- At Sanford Dam, install a cutoff wall for the entire length of the dam, upgrade riser structure and cast-in-place (CIP) concrete box culvert to replace the existing undersized spillway and rebuild the embankment at the location of the breach and partially scoured area, and install mix-in-place (MIP) panels along the upstream and downstream toes of the embankment to mitigate the potential for cyclic liquefaction.
- At North Lake Dam and Pine Lake Dam, remove the temporary NCDOT installed bottom metal culverts because they are not compliant with current codes and standards and install riser structures and CIP box culverts with seepage controls.
- At Upper Lake Dam, replace the existing undersized spillway with a riser structure and CIP box culverts with seepage controls and rebuild the embankment at the breach.

Since dam failure in 2018 lake system water levels have receded to the open channel uncontrolled levels in Allen Creek and associated tributaries. These large areas have begun to convert from a forested wetland and typical lakeshore open water system with established littoral and limnetic zones to a headwater stream system with a saturated sandy bed and upland banks. By restoring the dams to their original capacity and reestablishing hydrologic conditions through flooding, these impacted areas should quickly rebound and return to their historic function. Loss of wetland and littoral habitat in these cove areas has most likely displaced many wildlife species. According to US Fish & Wildlife Service, NC Wildlife Resources Commission, and the NC Natural Heritage Program several Federal and State listed species and natural communities have documented occurrences or have the potential to occur within the lake system or within adjacent and upstream wetland areas (Documented within project area or within 1-mile of project area). These species include, but are not limited to, Venus Flytrap (*Dionaea muscipula*), Wood Stork (*Mycteria americana*), Pigmy Rattlesnake (*Sistrurus miliarius*), and Blackbanded Sunfish (*Enneacanthus chaetodon*).

The ecological benefits gained from restoring the Boiling Spring Lakes system to its original open water condition far outweigh the effects of land disturbing activities during construction. Lake restoration will rejuvenate open water, upstream wetland, and lake shore hydrology, recreating lost habitat for many wildlife species, eliminate downstream sedimentation due to dam failure, and return the listed Natural Communities, Natural Areas, and Managed Areas to their desired condition.

5 Step 4. Identify Adverse Impacts and Beneficial Values/Functions (7 CFR § 1970.256(d))

The proposed project is located within the non-encroachment area or floodway of a mapped, effective FEMA floodplain. The proposed spillway would alter the effective floodplain; however, the proposed action does not adversely impact adjacent properties. The base flood elevations will increase and decrease at different locations along Allen Creek and Clear Pond upstream, decrease along Spring Lake upstream, and increase along Liliput Creek and McKinzie Creek downstream. The elevation changes range from -3.00' to 4.26'. Some locations downstream will also see a marginal enlargement of the 100-year and 500-year floodplains as compared to the effective floodplain maps that predate the breach. Despite these increases in base flood elevation and floodplain area, the proposed actions will result in no impacts to surrounding structures. Further, the project will reduce public risk due to repetitive dam failure and uncontrolled release of impounded water by minimizing the risk of overtopping.

Based on preliminary discussions with the USACE and NCDWR, and field visits performed by McGill Associates, PA environmental specialists it has been determined that the proposed project will permanently impact approximately 0.74-acres of former lakebed (open water) and approximately 90 linear feet of Allen Creek downstream of Sanford Dam. Temporary impacts associated with equipment access and lay down areas will total approximately 5.9-acres of former lakebed (open water) and approximately 30 linear feet of Allen Creek downstream from Sanford Dam. All anticipated temporary impact areas will be returned to their original conditions and stabilized prior to lake refilling. See below for individual dam impact estimates.

<u>Sanford Dam</u> – Permanent Impacts = 0.5-Acres Open Water, 90LF Allen Creek

Temporary Impacts = 2.5-Acres Open Water, 30LF Allen Creek

<u>North Lake Dam</u> – Permanent Impacts = 0.07-Acres Open Water

Temporary Impacts = 1.3-Acres Open Water

<u>Pine Lake Dam</u> – Permanent Impacts = 0.09-Acres Open Water

Temporary Impacts = 1.4-Acres Open Water

<u>Upper Lake Dam</u> – Permanent Impacts = 0.08-Acres Open Water

Temporary Impacts = 0.7-Acres Open Water

As stated in Section 4 above, while the no-build or partial reconstruction alternatives would result in fewer impacts to lakebed areas for construction, they would leave virtually all of the upstream wetland and shoreline areas drained causing damage to the ecosystems reliant on these areas as well as eliminating multiple waterfront properties in comparison with the selected alternative.

6 Step 5. Mitigate Adverse Impacts (7 CFR § 1970.256(e))

The proposed design results in a net benefit in the floodplain by providing control and conveyance of up to the ½ PMP event for Sanford Dam and the ⅓ PMP event for the other three dams. The design reduces overtopping and therefore also reduces risks associated with dam failure due to overtopping of the dams. The project also results in a reduction in the 100-year base flood elevations at various locations along Allen Creek, Clear Pond, and Spring Lake as documented in the FEMA MT-2 Application, Conditional Letter of Map Revision (CLOMR) submitted to FEMA. Despite some rise in the 100-year base flood elevation and an enlargement of the effective 100-year and 500-year floodplain downstream of the project area, there are no impacts to surrounding structures and the project provides a reduction in floodplain elevation/extent in comparison to a no-build alternative. The US Fish and Wildlife Service did not identify any impacts the project would have to endangered or threatened species or critical habitats. The design includes an in-depth erosion and sediment control plan in order to minimize impacts to aquatic resources and ecosystems.

The design aims at utilizing the footprint of the existing structures to the maximum extent possible. No impacts to wetlands are anticipated as a result of the proposed project. Permanent and temporary impacts to the lakebed consist of dam improvements outside of the original dam footprints and access and laydown areas. Although some permanent impacts will result from the construction of the larger spillways, the benefits from the restoration of the lake habitats for native plant and animal species creates a net positive effect on natural resources.

7 Step 6. Re-Evaluate Alternatives (7 CFR § 1970.256(f))

The most practicable alternative was selected based on the Preliminary Analysis Report (PAR) for the repair of Sanford Dam. This design solution consists of upgrading the riser structures and cast-in-place (CIP) concrete box culverts to replace the pre-breach undersized spillways and rebuilding the embankment at the location of the breach and partially scoured area. This proposed design restores the embankment while providing protection against further erosion.

The impacts to wetlands were avoided and impacts to open water (lakebed) and streams were minimized to the maximum extent practical by reusing the footprint of the pre-breach spillways and implementing erosion and sediment control measures to protect the surrounding embankment. Temporary impacts during construction will be restored upon completion of land disturbing activities and the installation of the spillway will restore the normal water elevations of the lakes. The Allen's Creek Orton Plantation area approximately 1.75 miles downstream of Sanford Dam also has a designation as a managed natural area under the North Carolina Coastal Land Trust.

Following the dam breaches, new channels began to form within the lake beds, degrading the stream system due to a lack of stable bank vegetation and causing sediment deposition. The impoundment, which has been present since 1960, is a vital natural resource for the ecosystem and the community as it provides lacustrine and forested wetland habitat, is used for multiple recreational activities, and provides secondary economic benefits to businesses in the area.

8 Step 7. Final Public Notice (7 CFR § 1970.256(g))

Following evaluation of alternatives and after conducting public meetings, receiving feedback from the public, and coordinating with regulatory agencies, the design proceeded with the identified solution. In addition, the preliminary notice was published as described in Step 2 and Appendix 1 and no additional comments were received from the public. A final notice will be similarly conducted.

9 Step 8. Implement Proposed Action With Appropriate Mitigation (7 CFR § 1970.256(h))

The project will be constructed in accordance with the proposed design with construction observation by the design engineer, McGill Associates. An as-built survey will be performed following construction completion to document that construction was completed in accordance with the design. Final certifications will be provided by the engineer of record that the project was built as designed. In addition, a Letter of Map Revision (LOMR) will be prepared after construction as required by the CLOMR submitted for the design. As-built certifications will be submitted to multiple agencies that might also inspect the project after construction for compliance with the permitted design.

EIGHT-STEP PLANNING PROCESS FOR FLOODPLAIN MANAGEMENT PROTECTION

BOILING SPRING LAKES DAM CONSTRUCTION/ RECONSTRUCTION

Brunswick County, NC

Appendix 1 – Preliminary Public Notice for Potential Impacts to Floodplains

5400 Trinity Avenue, Suite 107
Raleigh, NC 27607

PROJECT NO. 20.07036

Preliminary Public Notice for Potential Impacts to Floodplains

The City of Boiling Spring Lakes intends to seek financial assistance from USDA, Rural Housing Service (RHS) for construction repairs to four (4) existing dams. The proposed project consists of repairs to North Lake Dam (BRUNS-001), Pine Lake Dam (BRUNS-002), Boiling Springs Lake/Sanford Lake Dam (BRUNS-003), and Boiling Springs Lake Upper Dam (BRUNS-011). During Hurricane Florence, Sanford Lake Dam suffered a catastrophic failure due to overtopping and subsequent embankment erosion that caused cascading failures at the North Lake Dam, Pine Lake Dam, and Upper Lake Dam. The existing dams are located in the City of Boiling Spring Lakes, Brunswick County, North Carolina.

If implemented, the proposed project will improve existing structures located in previously converted Base Floodplain – which is the 100-year floodplain or (one-percent chance floodplain), by constructing the dam repairs in the floodplain. In accordance with Executive Order 11988, Floodplain Management and USDA Departmental Regulation 9500-3, Land Use Policy, the purpose of this notice is to inform the public of this proposed conversion or effect and request comments concerning the proposal, alternative sites or actions that would avoid these impacts, and methods that could be used to minimize these impacts.

The environmental documentation regarding this proposal is available for review at 2736 NC Highway 210, Smithfield, NC 27577 or electronically upon request. For questions regarding this proposal, contact Tobais Fullwood, Area Specialist, USDA Rural Development at 910.300.4841 or Tobais.Fullwood@usda.gov.

Any person interested in commenting on this proposal should submit comments to the address above by March 18, 2021.

EIGHT-STEP PLANNING PROCESS FOR FLOODPLAIN MANAGEMENT PROTECTION

BOILING SPRING LAKES DAM CONSTRUCTION/ RECONSTRUCTION

Brunswick County, NC

Appendix 2 – Public Meeting Presentations and Minutes

5400 Trinity Avenue, Suite 107
Raleigh, NC 27607

PROJECT NO. 20.07036

PRELIMINARY ANALYSIS REPORT
DAMS CONSTRUCTION/RECONSTRUCTION PROJECT
CITY OF BOILING SPRING LAKES
BOARD UPDATE

December 3, 2019

DEQ Meeting 11/20/19

- Preliminary Analysis Report (PAR)
- Agency Coordination
- Codes and Standards
- Preliminary H&H
- Geologic Conditions
- Design Considerations
- Recommendations

Alton Lennon Road (Sanford Dam) during Hurricane Florence

Preliminary Analysis Report

A meeting on June 3, 2019 with FEMA, NCDOT and NC Dam Safety Program revealed that additional tasks were necessary to fully define FEMA's Disaster Recovery Scope of Work related to the BSL dams. These tasks are the primary focus of this Preliminary Analysis Report. They include:

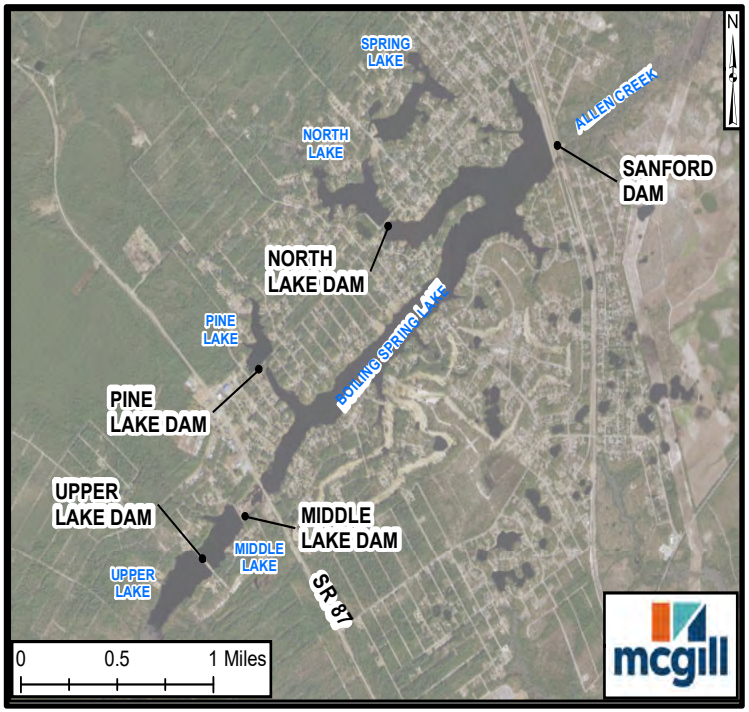
- Coordination with agencies to determine the most suitable permitting process
- Comprehensive hydrologic and hydraulic models
- Subsurface exploration program to fully address potential issues related to sinkhole formation
- Utilizing East Boiling Spring Lake Road as an impounding structure for North Lake and Pine Lake

Agency Coordination

McGill met onsite on 10.17.19 with:

- NC Wildlife Resources Commission,
- NC Department of Environmental Quality and
- US Army Corps of Engineers on site

1. *Permit based on pre Florence conditions - impacts to open water. (anticipate NWP 3 for Maintenance Activities and Water Quality General Certification 4132).*



Boling Spring Lakes Site Map

Agency Coordination (cont.)

2. *WRC requested inclusion of data on the need to restore the lakes.*
3. *Low flow conditions will be established in order to maintain downstream aquatic habitat within Allen Creek*
4. *NCHPO found no historic impacts.*
5. *Middle Dam (private) may be reconstructed under NRCS EWP grant.*

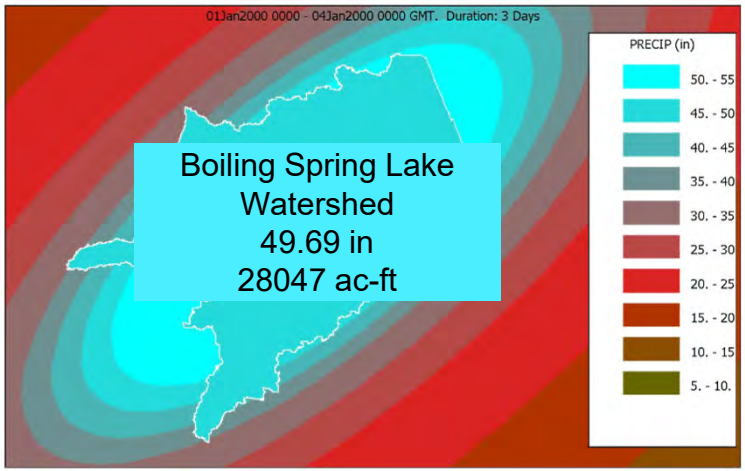
Middle Dam post Hurricane Florence

Codes and Standards

- All dams predated NC Dam Safety regulations
  - Pre Florence - all dams were functional and impounding
  - Post Florence - all dams are now considered High Hazard
- NC Regulations require reconstructed all dams meet current design standards per 15A NCAC 02K.0204(e)
- Hydrologic and Hydraulic Evaluation and Spillways Design
  - Sanford spillway must provide overtopping protection up to ½ PMP storm
  - North Lake, Pine Lake, and Upper Lake spillways must provide overtopping protection up to ⅓ PMP storm
- Geotechnical Evaluation and Embankments Design
  - Sanford - Sink holes, Seepage, Stability
  - North Lake, Pine Lake, and Upper Lake – Seepage and Stability

Preliminary Hydrologic/Hydraulic Evaluation

- Hydrology – PMP analysis
- Hydraulics – Combined modeling approach
- Comparison to effective model
- Initial spillway sizing
- Preliminary breach conditions



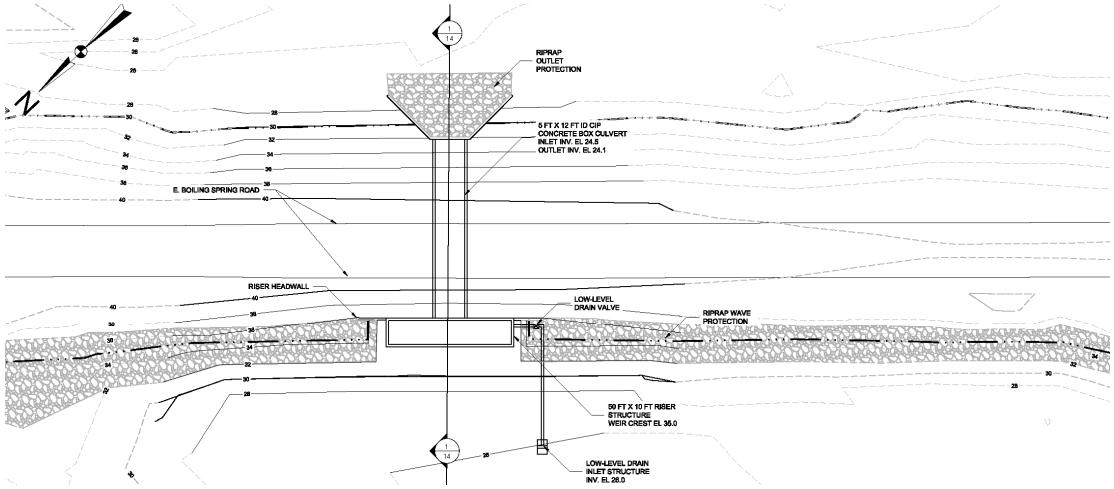
Initial Spillway Sizing

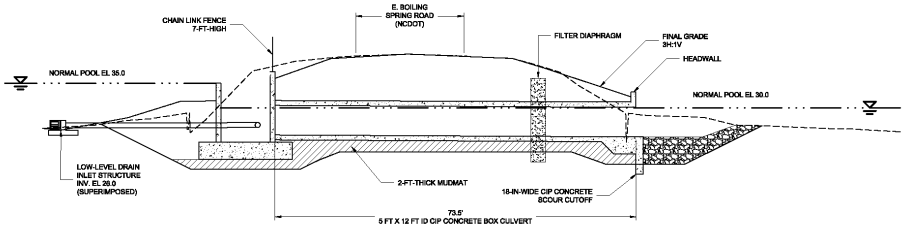
	Overtopping	Storm Design Flow (SDF)		Water Surface Elevation		
	Elevation	Event	Flow	Normal	SDF	Freeboard
Upper Lake Dam	41.3	⅓ PMP	943.1	38	40.4	0.9
E. Boiling Spring at Pine Lake Dam	44	⅓ PMP	335.9	35	38.6	5.4
E. Boiling Spring at North Lake Dam	40	⅓ PMP	888.2	35	38.3	1.7
Alton Lennon Road at Sanford Dam	39	½ PMP	6477	30	35.3	3.7
			Upper Dam Breach		35.5	
			Upper and Middle Dam Breach		35.7	

Overview of NLD/PLD/ULD Explorations

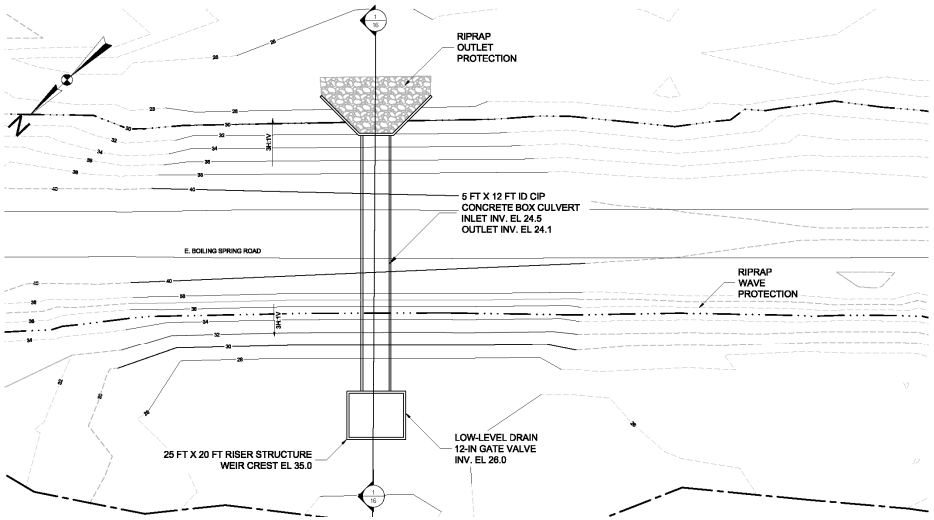
- Intent of Exploration
  - Confirm approximate height of the dams
  - Characterize fill soils and foundation materials
- Exploration Method
  - Auger Borings with Standard Penetration Tests (SPT)
- General Findings
  - Dams are similar to design drawings.
  - Foundation soils: - poorly-graded sands overlying clayey sands
    - N < 10 blows per foot (bpf)
  - Dam fill soils: - poorly-graded sands found in City vicinity
    - 10 bpf < N < 30 bpf
  - No core soils identified
  - Pre-construction natural debris, organic soils, and other materials

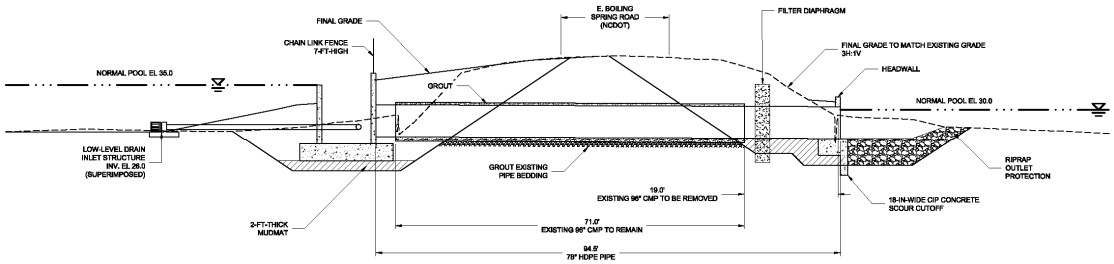
NLD/PLD/ULD Alternative 1 – Embedded Riser



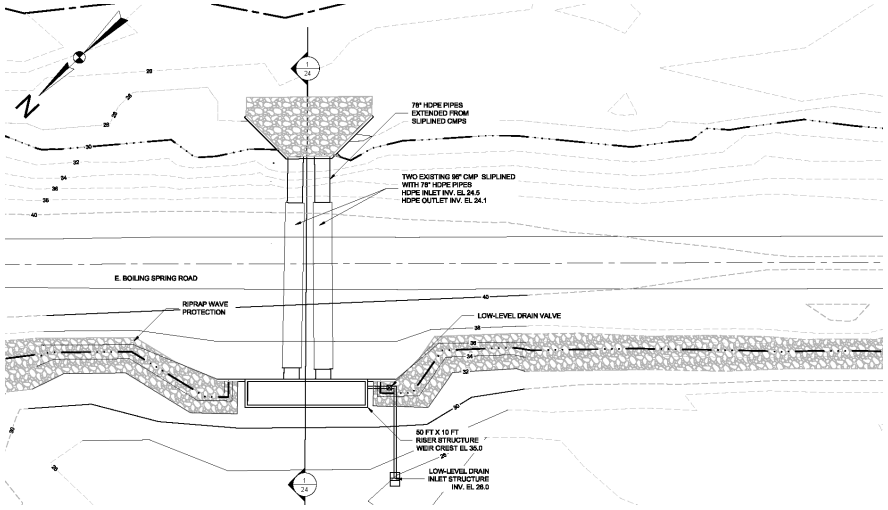


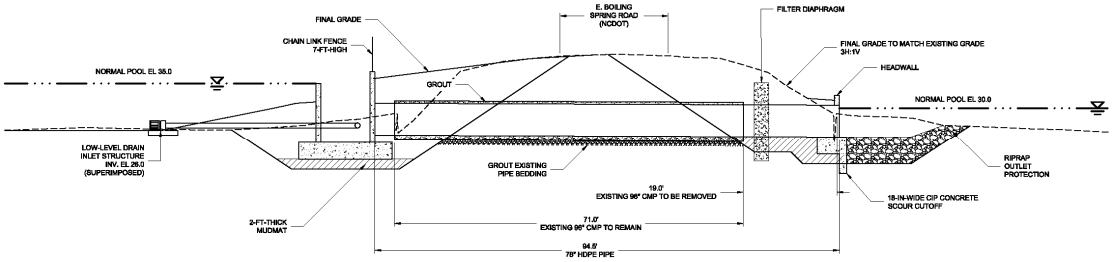
NLD/PLD/ULD Alternative 2 – Riser in Lake



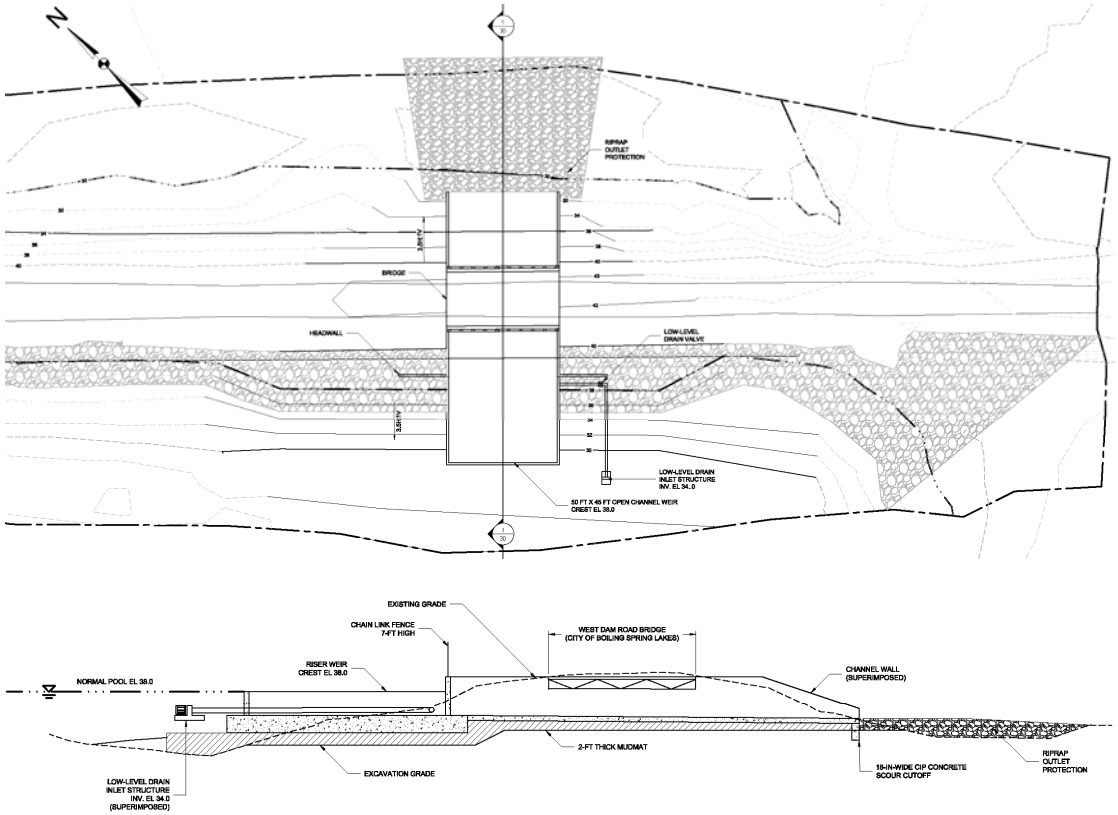


NLD/PLD Alternative 3 – Upgrade Existing





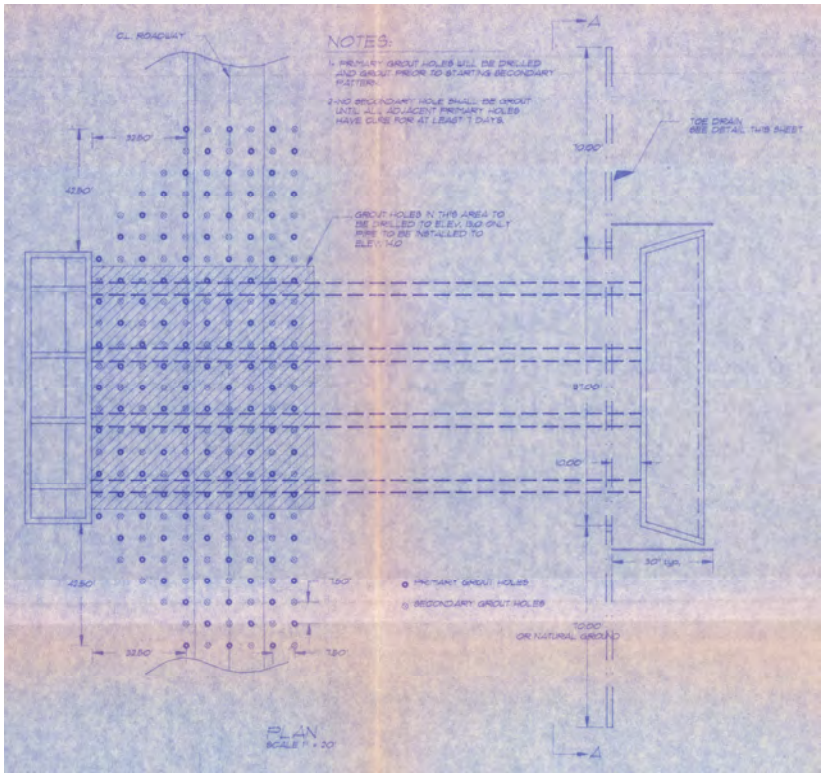
ULD Alternative 3 – Open Channel Spillway

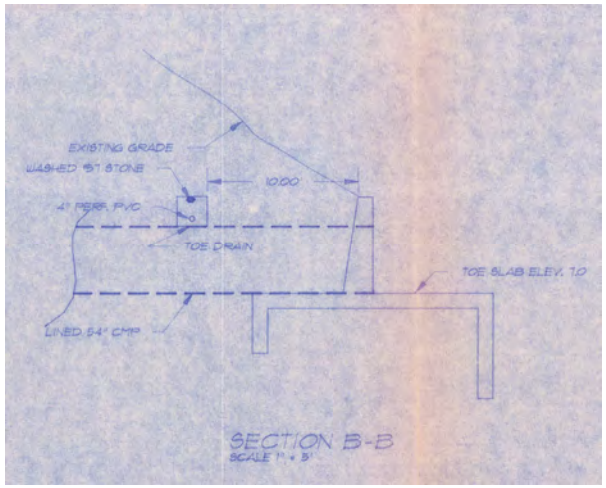


Seepage Events at Sanford Dam (SD)

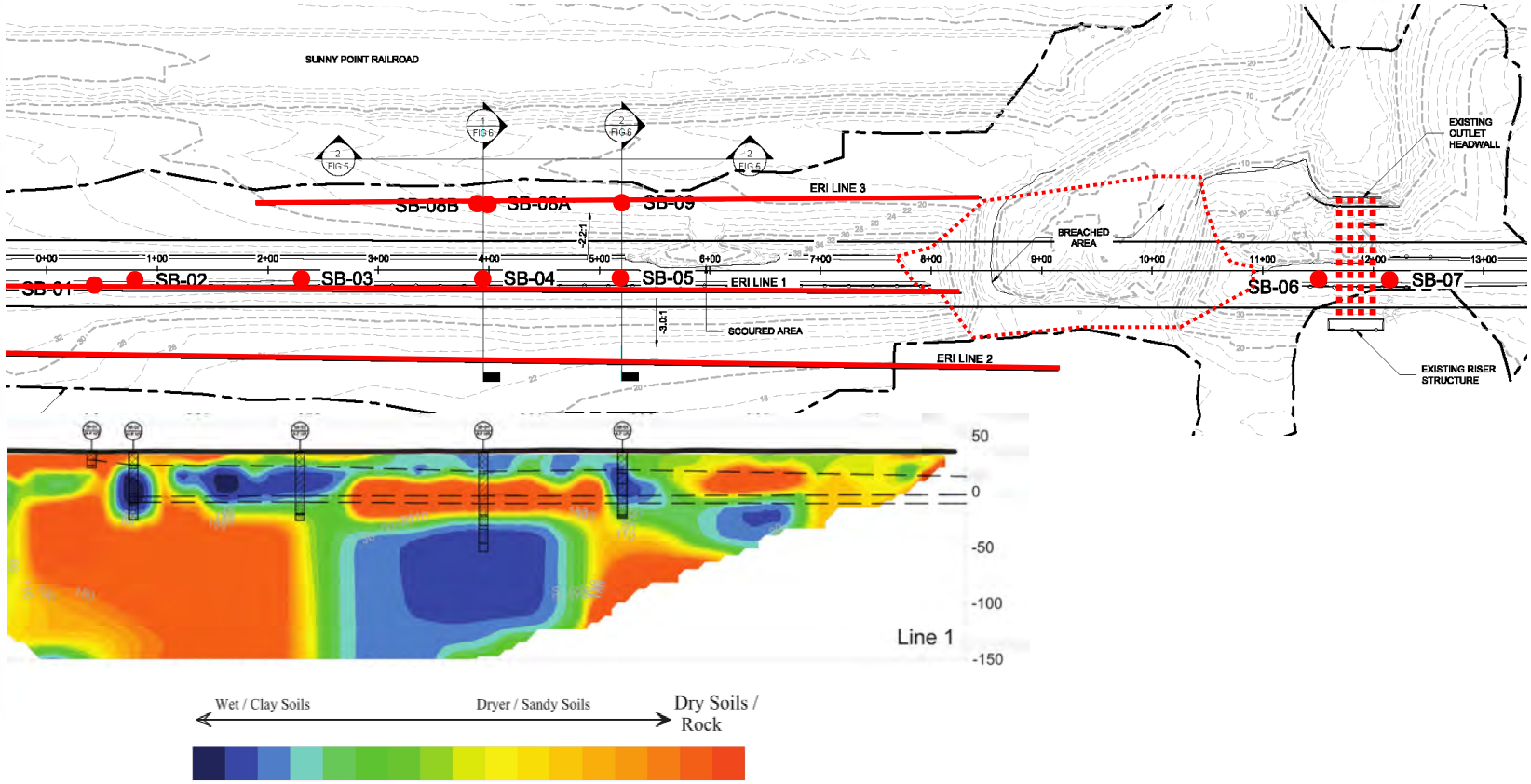
- Records available for four seepage events
  - 1962
  - 1976-1978
  - 1986-1987
  - 2001-2002
- Average of one event per decade in first 40 years

1986-1987 SD Seepage Event





Overview of SD Exploration



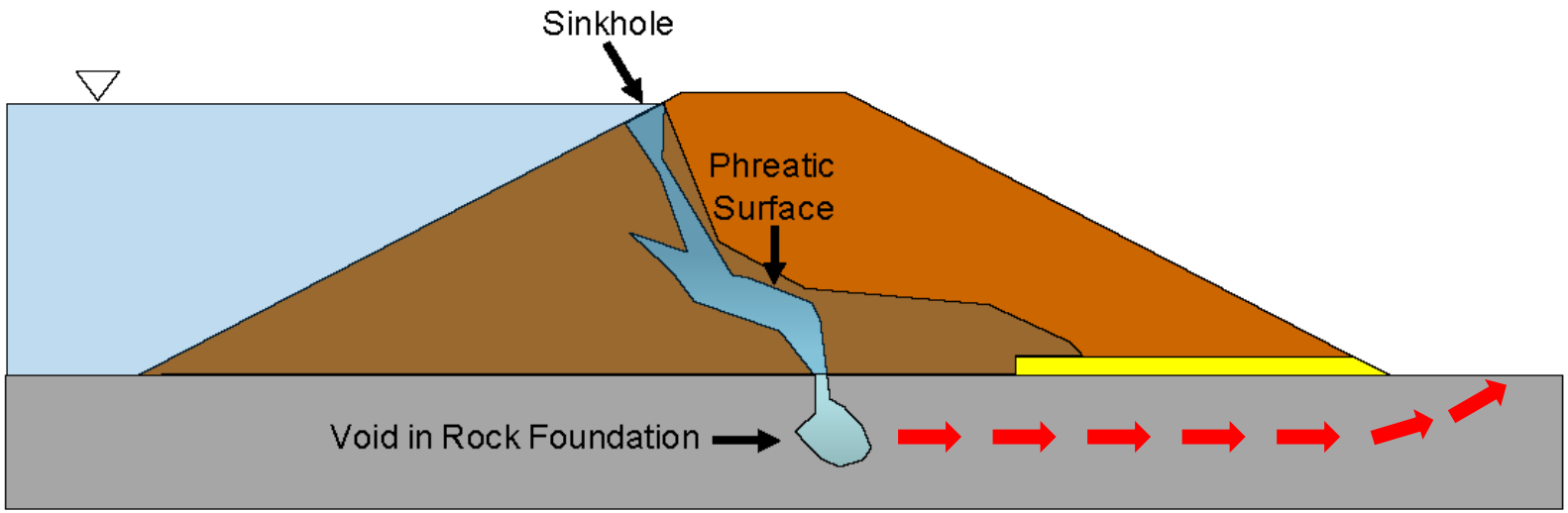
SD Design Goals

- Reduce risk to Dam Safety due to uncontrolled seepage
- Safely pass design flood
- Restore the lake to pre-breach condition
- Extend design life
- Facilitate ability to drain lake
- Promote public safety
- Meet additional current codes and standards

SD Common Design Modifications

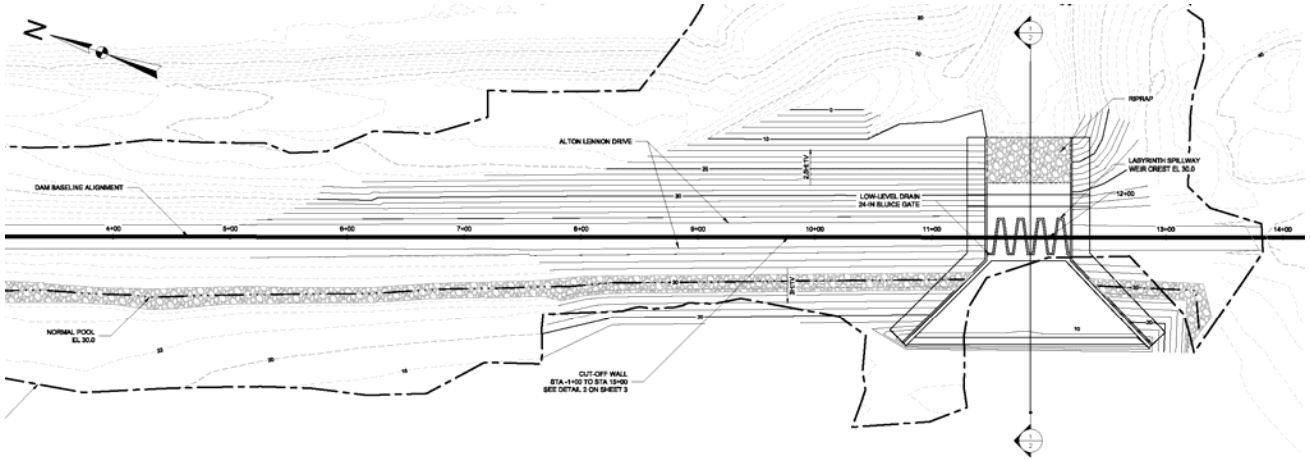
- New Spillway
- Repair / regrade embankment
- Install positive seepage cutoff
- Remove existing spillway

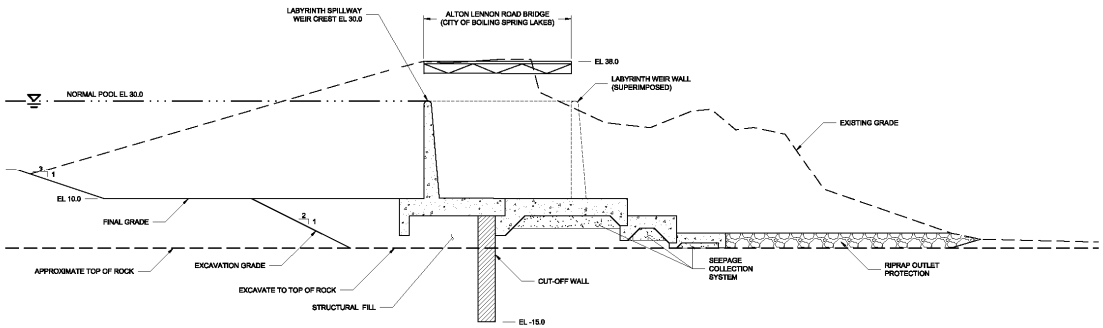
Seepage Failure Mode



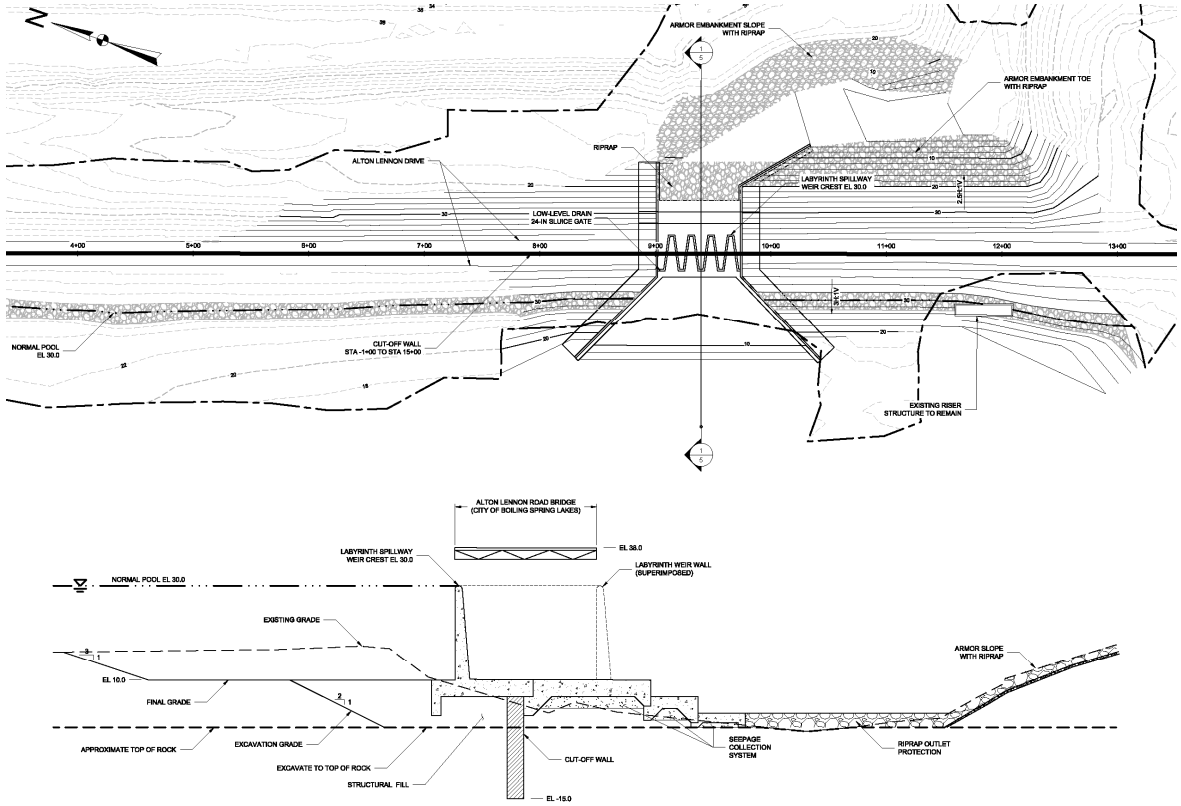
(taken from Best Practices in Dam and Levee Safety Risk Analysis, USBR / USACE, 2015)

SD Alt. 1A – Labyrinth in Existing Footprint

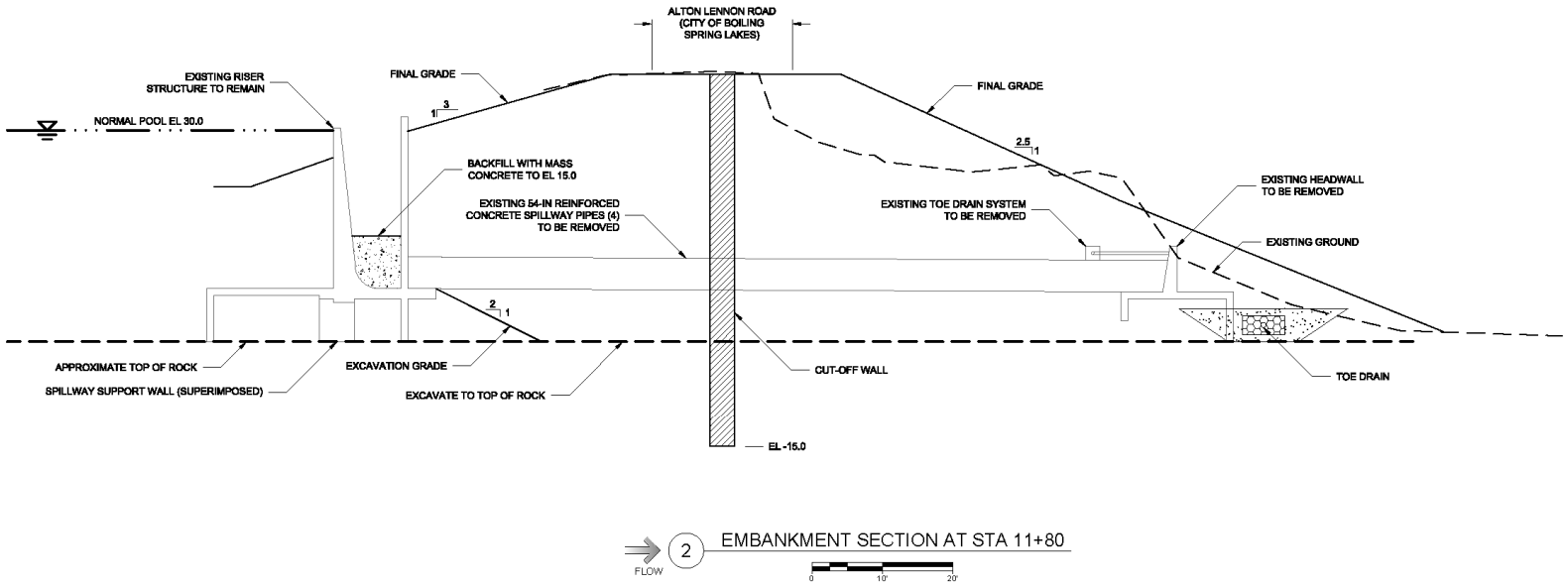




SD Alt. 1B – Labyrinth in Breach



SD Existing Spillway Removal

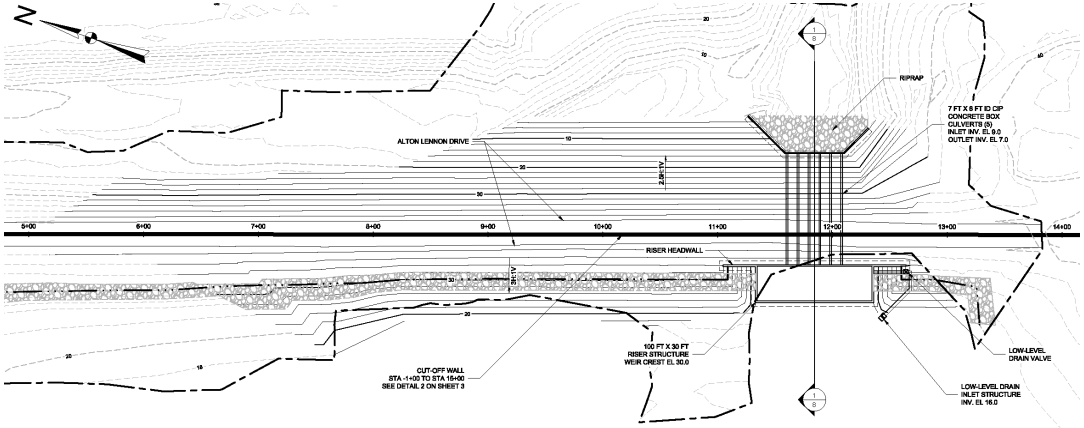


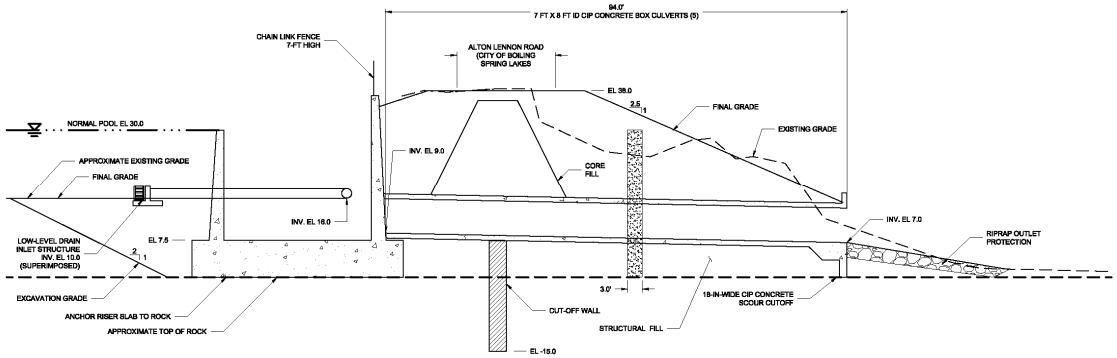
FLOW 2 EMBANKMENT SECTION AT STA 11+80

0 10' 20'

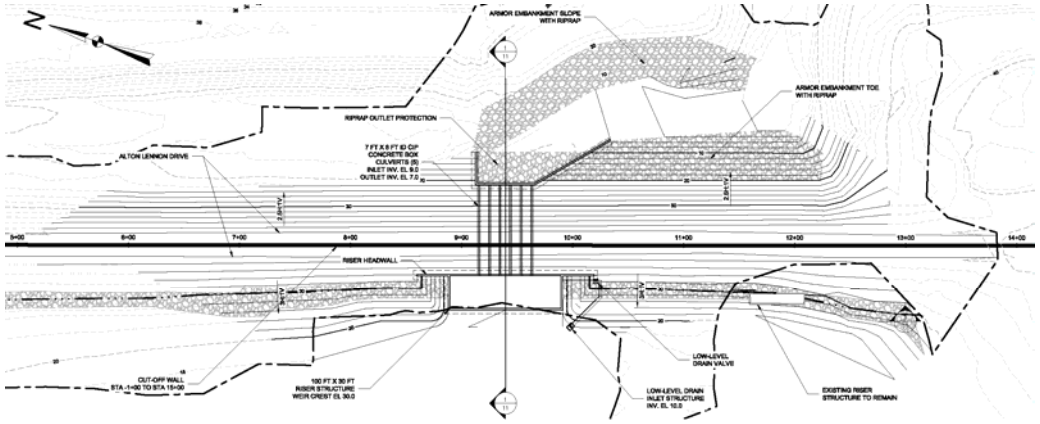
Example Labyrinth Spillway

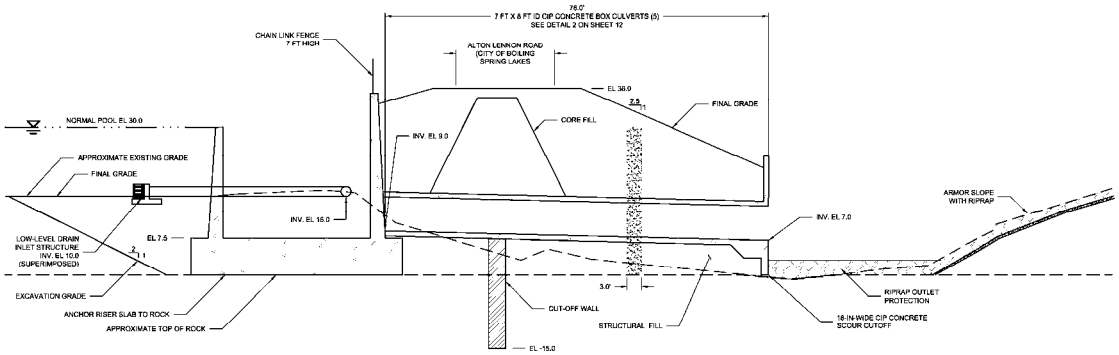
SD Alt. 2A – Riser in Existing Spillway Footprint





SD Alt. 2B – Riser in Breach





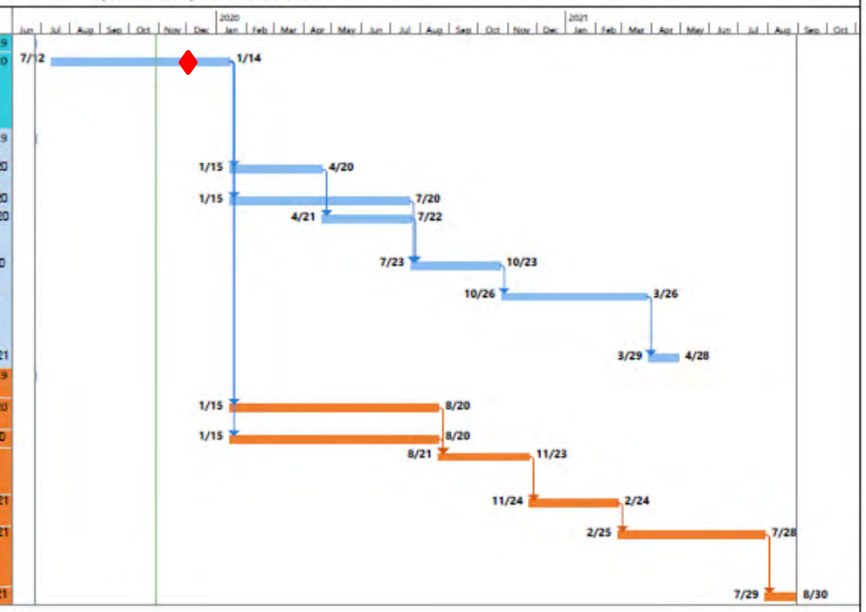
Meeting Conclusions

- Any objections to the presented approach/alternatives?
- The most cost effective solution will be recommended for design.
- FEMA stated that it is important to move to the next step
- FEMA stated that there is still uncertainty on the responsibility split between NCDOT and the City on North Lake and Pine Lake Dams

Schedule

City of Boiling Spring Lakes
Dams Construction/Reconstruction Project
Updated Schedule per Contract Date 7/12/19

ID	Task Name	Duration	Start	Finish
1	**Preliminary Design**	1 day?	Tue 6/25/19	Tue 6/25/19
2	Phase 1 - Subsurface assessment including Sanford foundation, base survey, H&H Systemwide Modeling, Geotechnical Data Report, and Preliminary Design Report	133 days	Fri 7/12/19	Tue 1/14/20
3	**Design Contract: Upper Dam, Pine Lake Dam and North Lake Dam**	1 day?	Tue 6/25/19	Tue 6/25/19
4	Phase 2 - Design	69 days	Wed 1/15/20	Mon 4/20/20
5	Individual Permit	134 days	Wed 1/15/20	Mon 7/20/20
6	Submittal and approval of an Application and Emergency Action Plan	67 days	Tue 4/21/20	Wed 7/22/20
7	Phase 3 - Procurement: Bidding, Bid Evaluation and Recommendation	67 days?	Thu 7/23/20	Fri 10/23/20
8	Phase 4 - Construction Management:Construction (Pine Lake dam, North Lake dam and Upper dam)	110 days	Mon 10/26/20	Fri 3/26/21
9	As-built Inspections and certification	23 days	Mon 3/29/21	Wed 4/28/21
10	**Sanford Dam (not currently in contract)**	1 day?	Tue 6/25/19	Tue 6/25/19
11	Design & Permitting	157 days	Wed 1/15/20	Thu 8/20/20
12	Individual Permit	157 days	Wed 1/15/20	Thu 8/20/20
13	Submittal and approval of an Application and Emergency Action Plan	67 days	Fri 8/21/20	Mon 11/23/20
14	Phase 3 - Procurement: Bidding, Bid Evaluation and Recommendation	67 days?	Tue 11/24/20	Wed 2/24/21
15	Phase 4 - Construction Management:Construction (Pine Lake dam, North Lake dam and Upper dam)	110 days	Thu 2/25/21	Wed 7/28/21
16	As-built Inspections and certification	23 days	Thu 7/29/21	Mon 8/30/21



Page 1

MH1

Next Steps

- Complete PAR – due 1/14/20
- Complete FEMA Scope of Work for each dam
- Assist City in coordination with DPS and FEMA
  - HMGP funding
  - Eligibility concerns for EBSR at North Lake and Pine Lake Dams (quit claim deeds from Reeves Telecom pending)
- City approval to proceed with Design Phase (including Sanford Spillway)

Slide 34

MH1 include overall timeline
Michael Hanson, 12/2/2019

PRELIMINARY ANALYSIS REPORT
DAMS CONSTRUCTION/RECONSTRUCTION PROJECT
CITY OF BOILING SPRING LAKES
BOARD UPDATE

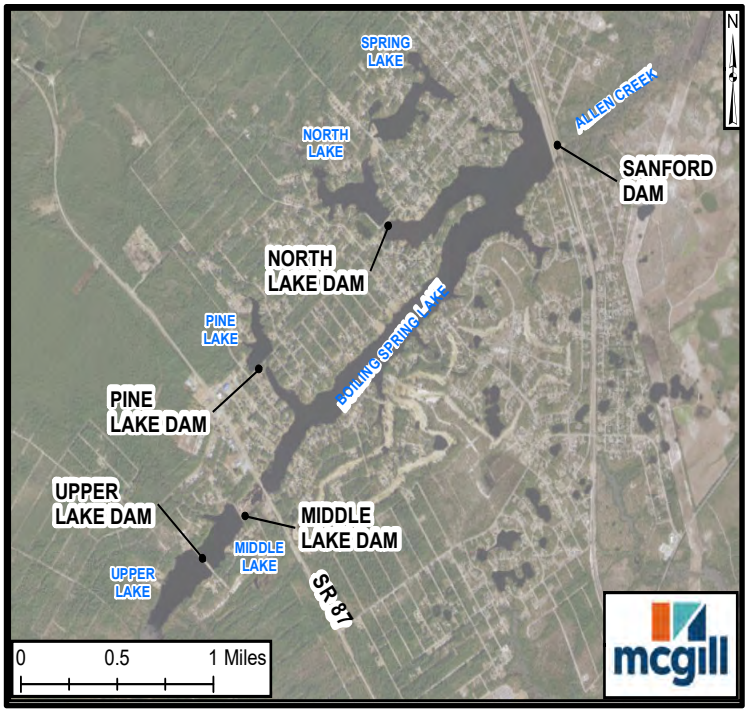
February 19, 2020

mcgill Shaping Communities Together

Schnabel ENGINEERING

Outlines

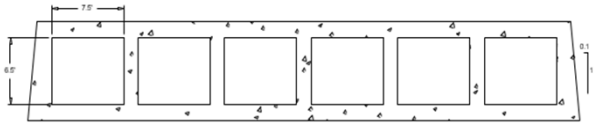
- Recommended Repairs and Construction Cost Estimate
- Project Schedule
- FEMA Funding Update
- Design/Permitting/Bidding Phase

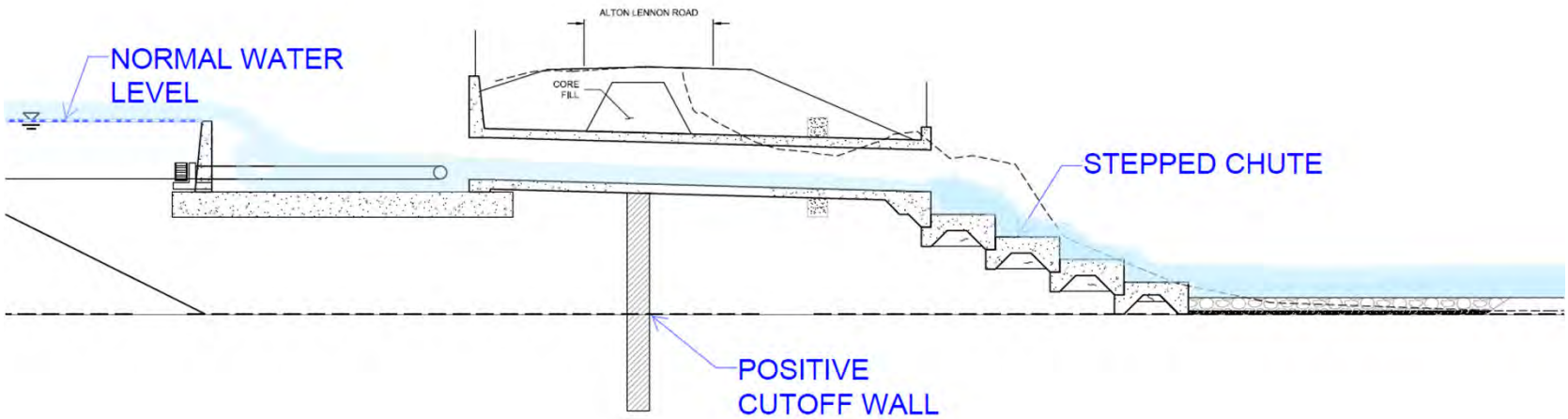


Boling Spring Lakes Site Map

Sanford Dam – Recommended Spillway

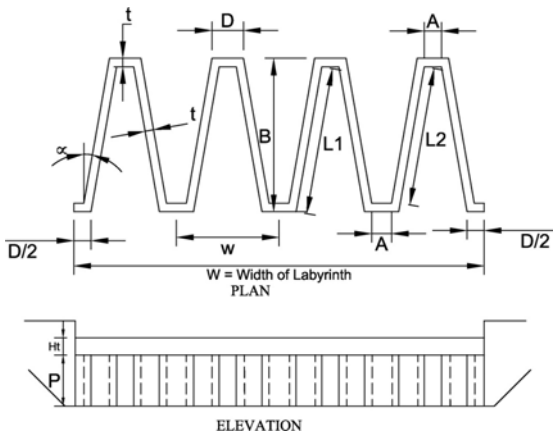
- Riser structure with six box culverts.
- Stepped Chute Energy Dissipator.
- Construction duration: 18 months.
- Estimated Construction cost: $ 32,577,660.





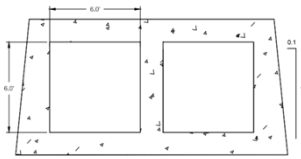
Sanford Dam – Alternative 2

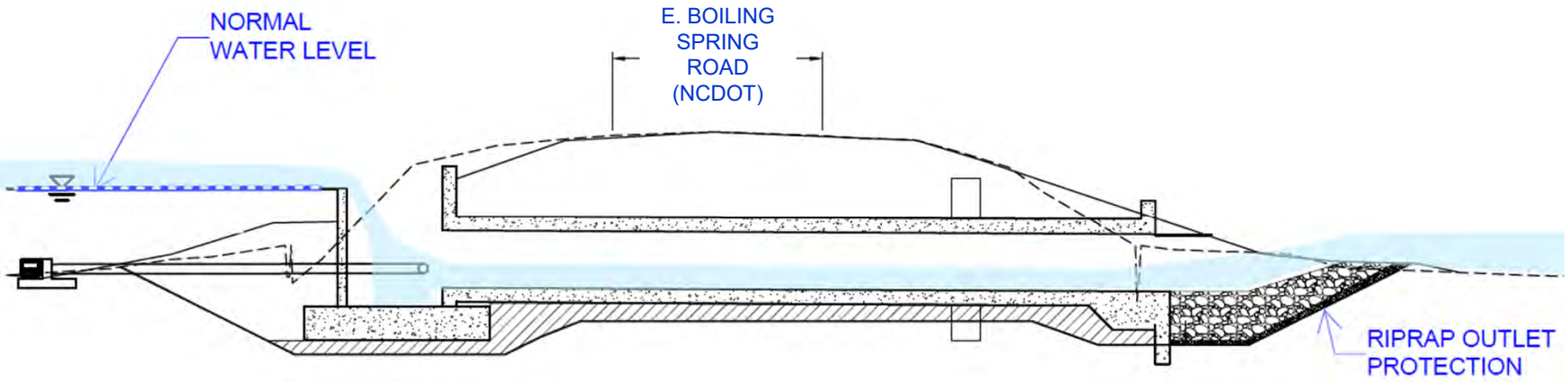
- 4-cycle Labyrinth spillway
- A 2-lane 80 ft bridge is required to span over the labyrinth.
- Construction duration: 18 months.
- Construction cost: $ 33,021,940.



North Lake Dam – Recommended Spillway

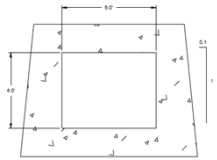
- Riser structure with two box culverts (6 ft span x 6 ft rise each)
- Construction duration: 8 months.
- Construction cost: $ 1,990,465.

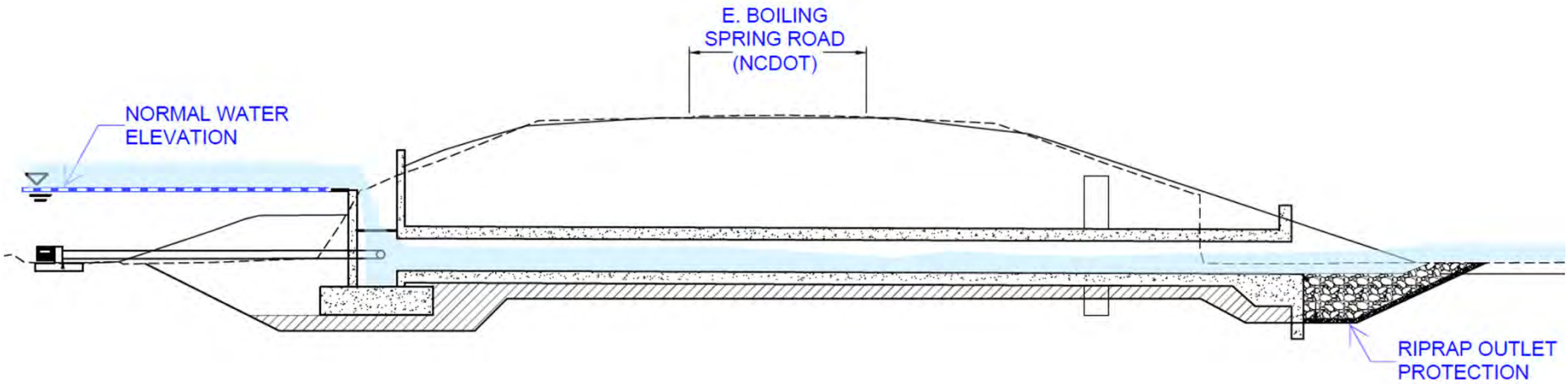




Pine Lake Dam – Recommended Spillway

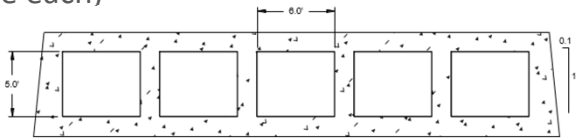
- Riser structure with one box culverts (5 ft span x 4 ft rise)
- Construction duration: 8 months.
- Construction cost: $ 1,543,690.

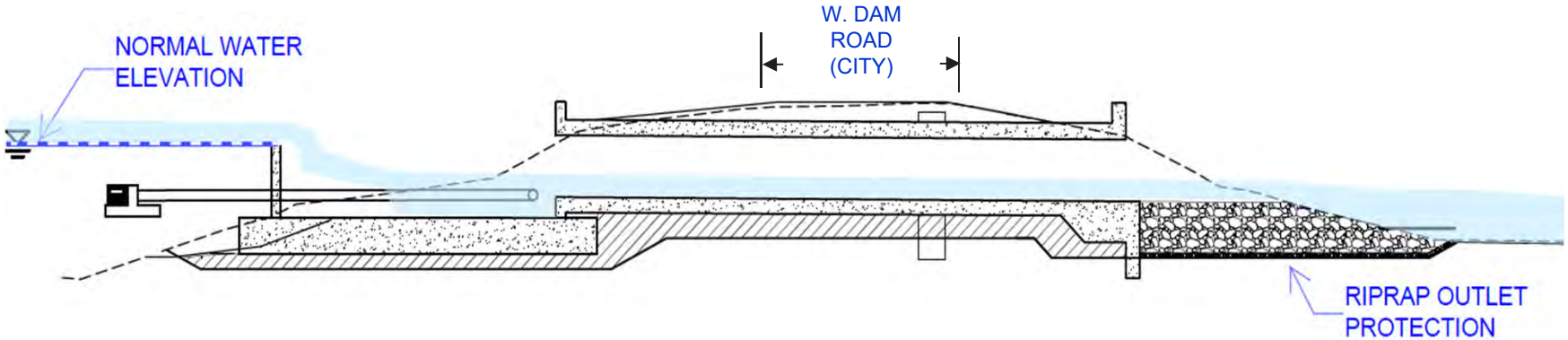




Upper Lake Dam – Recommended Spillway

- Riser structure with five box culverts (6 ft span x 5 ft rise each)
- Construction duration: 8 months.
- Construction cost: $ 2,475,625.





PAR Discoveries and Schedule Impacts

1. North and Pine Lake Dams changing from “exempt” to “high hazard” by NC Dam Safety requiring additional design as opposed to simple replacement
2. Question of ownership of land under EBSR needing to be resolved to determine FEMA participation
3. Seepage and stability concerns on Sanford Dam requiring the addition of a positive cut-off wall and additional testing
4. Replacement of the entire spillway for Sanford Dam due to limited capacity and longevity of the existing spillway

The above items highlight a few of the issues that have increased the complexity of dam design and construction leading to the current projected schedule.

Preliminary Construction Schedule Estimate

SANFORD DAM → NORTH LAKE → PINE LAKE

18 Months

2/2021 to 8/2022

Alton Lennon Road Closed

16 Months (8 each)

Following completion of Sanford Dam and Alton Lennon Road

East Boiling Spring Road Closed

UPPER LAKE

8 Months

Flexible construction Sequencing

FEMA Funding Update

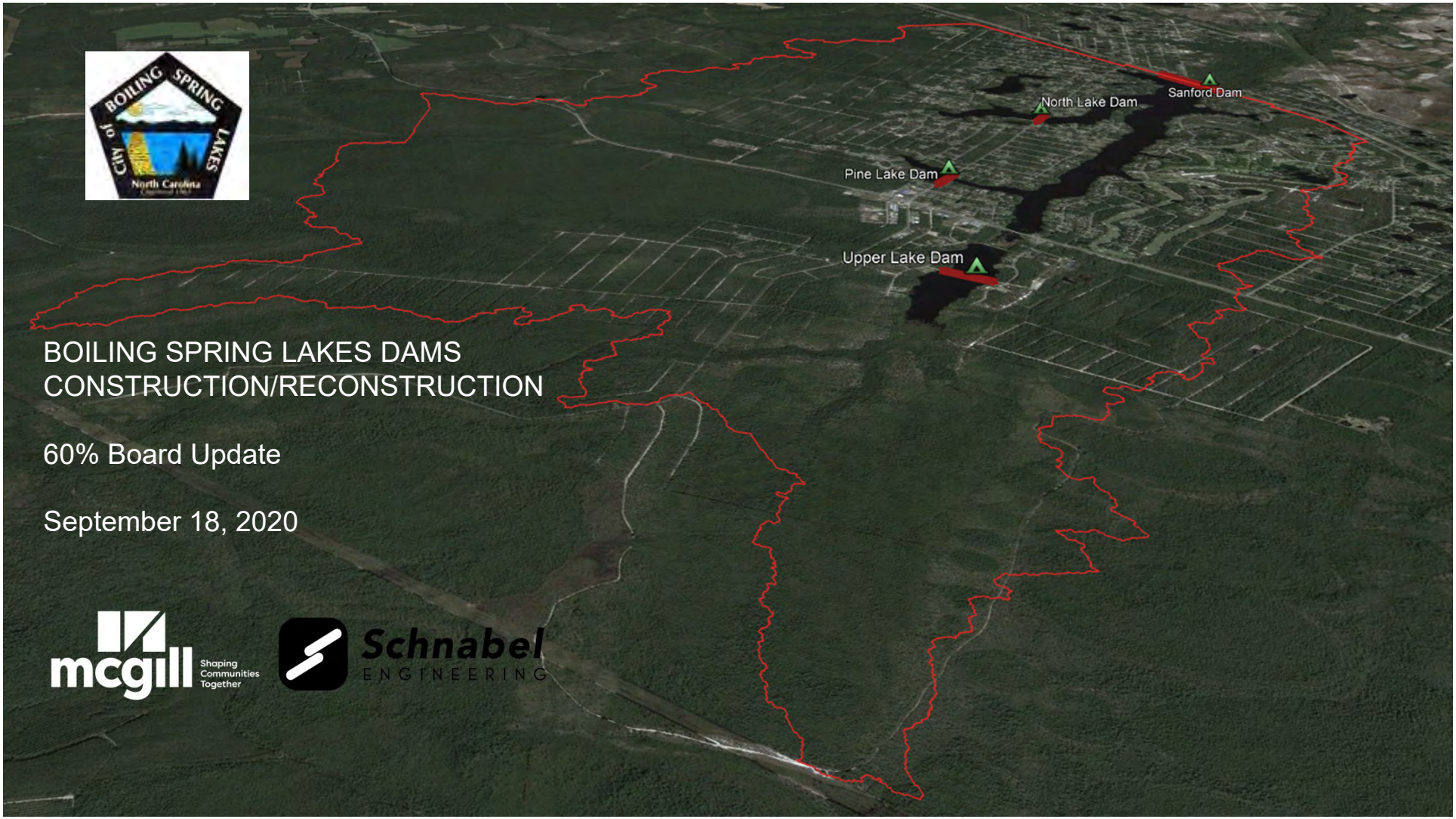
- Submitted statement of work for recommended repairs in January 2020

- FEMA suggested separating North Lake and Pine Lake as separate project due to NCDOT ownership of EBSR

Task Order 2 – Design/Permitting/Bidding

Task	Sanford Dam	North Lake Dam	Pine Lake Dam	Upper Lake Dam
Task 1 – Project Planning	$ 64,022.22	$ 16,114.59	$ 16,114.59	$ 16,114.59
Task 2 – Phase 2 Subsurface Exploration	$ 287,545.71	$ 20,195.76	$ 20,195.76	$ 20,195.76
Task 3 - Hydrologic and Hydraulic Study	$ 73,868.87	$ 18,575.21	$ 18,575.21	$ 18,575.21
Task 4 – 60% Design Development	$ 262,831.39	$ 105,588.54	$ 105,588.54	$ 105,588.54
Task 5 – 90% Design Submittal	$ 252,648.04	$ 91,637.99	$ 91,637.99	$ 91,637.99
Task 6 – 100% Design Submittal	$ 90,757.88	$ 23,558.71	$ 23,558.71	$ 23,558.71
Task 7 – Environmental Permitting	$ 56,040.41	$ 14,092.03	$ 14,092.03	$ 14,092.03
Task 8 – Bid Phase Services	$ 36,441.95	$ 8,487.68	$ 8,487.68	$ 8,487.68
Totals	**$ 1,124,156.46**	**$ 298,250.51**	**$ 298,250.51**	**$ 298,250.51**

Overall Phase 2 Project Total	**$ 2,018,908.00**



BOILING SPRING LAKES DAMS CONSTRUCTION/RECONSTRUCTION

60% Board Update

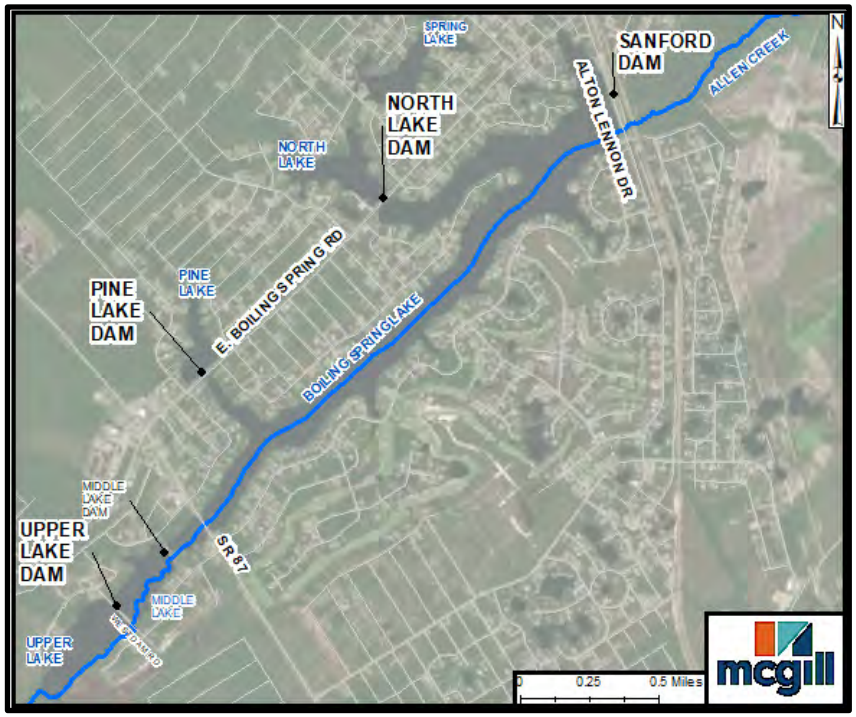
September 18, 2020

mcgill Shaping Communities Together

Schnabel ENGINEERING

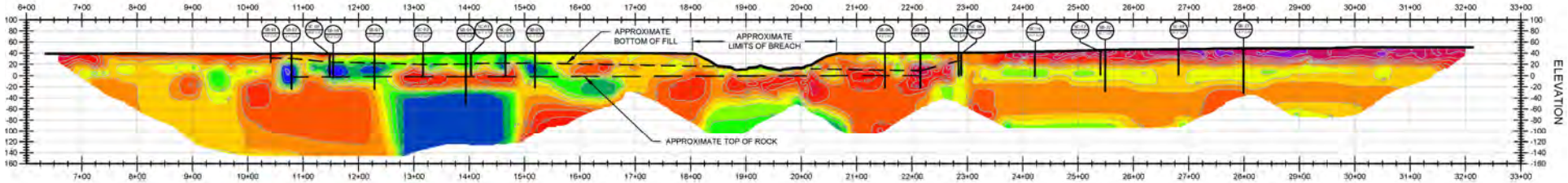
Agenda

- 60% Design Update
- Industry Day
- FEMA
- RFQ (Prequalification)
- Next Steps



60% Submittal Dam Safety Meeting

- Date: 7/31/2020
- Topics
  - ✓ Hydrology/Hydraulics and spillways
  - ✓ Control of water
  - ✓ Roads and utilities
  - ✓ Geotechnical exploration and evaluation
- Results – Approval of design concepts



Industry Day

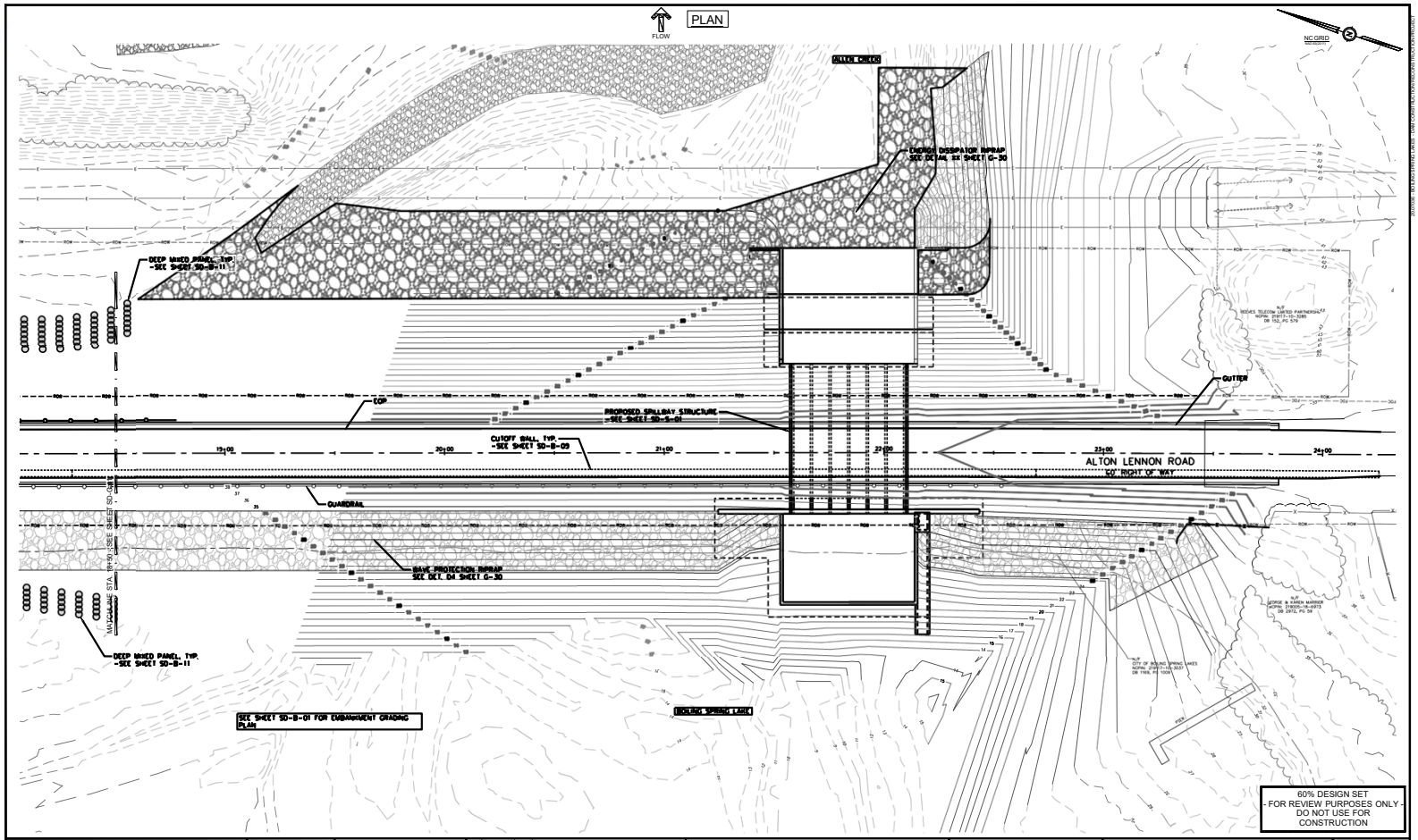
- Date: 7/31/2020
- Topics
  - ✓ Mobilization and temporary construction facilities
  - ✓ Road closures and traffic controls, including acquisition of related permits
  - ✓ Power and telecom utility relocation/coordination
  - ✓ Erosion and sediment control
  - ✓ Control of water (stream diversion using cofferdams over 10 feet high)
  - ✓ Demolition
  - ✓ Cast-in-place concrete riser and box culvert spillways (4,000 cubic yards (CY) of structural concrete)
  - ✓ Approximately 98,000 CY of bulk excavation

Industry Day

- Topics (continued)
  - ✓ Embankment Construction including core materials, drains and filters (~110,000 CY of earthfill placement and ~7,400 CY of drainfill)
  - ✓ Construction of deep mixing panels, including soilcrete mix design, design and installation of temporary work platforms, demonstration panels, sampling and laboratory testing (~26,000 CY of soilcrete)
  - ✓ Roadway reconstruction
  - ✓ Sanford Dam only:
    - cutoff wall through the entire length 20 feet into the limestone rock (~80,000 square feet of wall profile area)
    - Installation of new instrumentation (structure monitoring points, vibrating wire piezometers, automated data collection and transmission equipment)

ID - Potential Maintenance of Traffic Routes

ID Sanford Dam



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NC Firm License # C-0459
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PRELIMINARY

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11A Oak Branch Drive / Greensboro, NC 27407
T/ 336-274-9456 F/ 336-274-9458 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

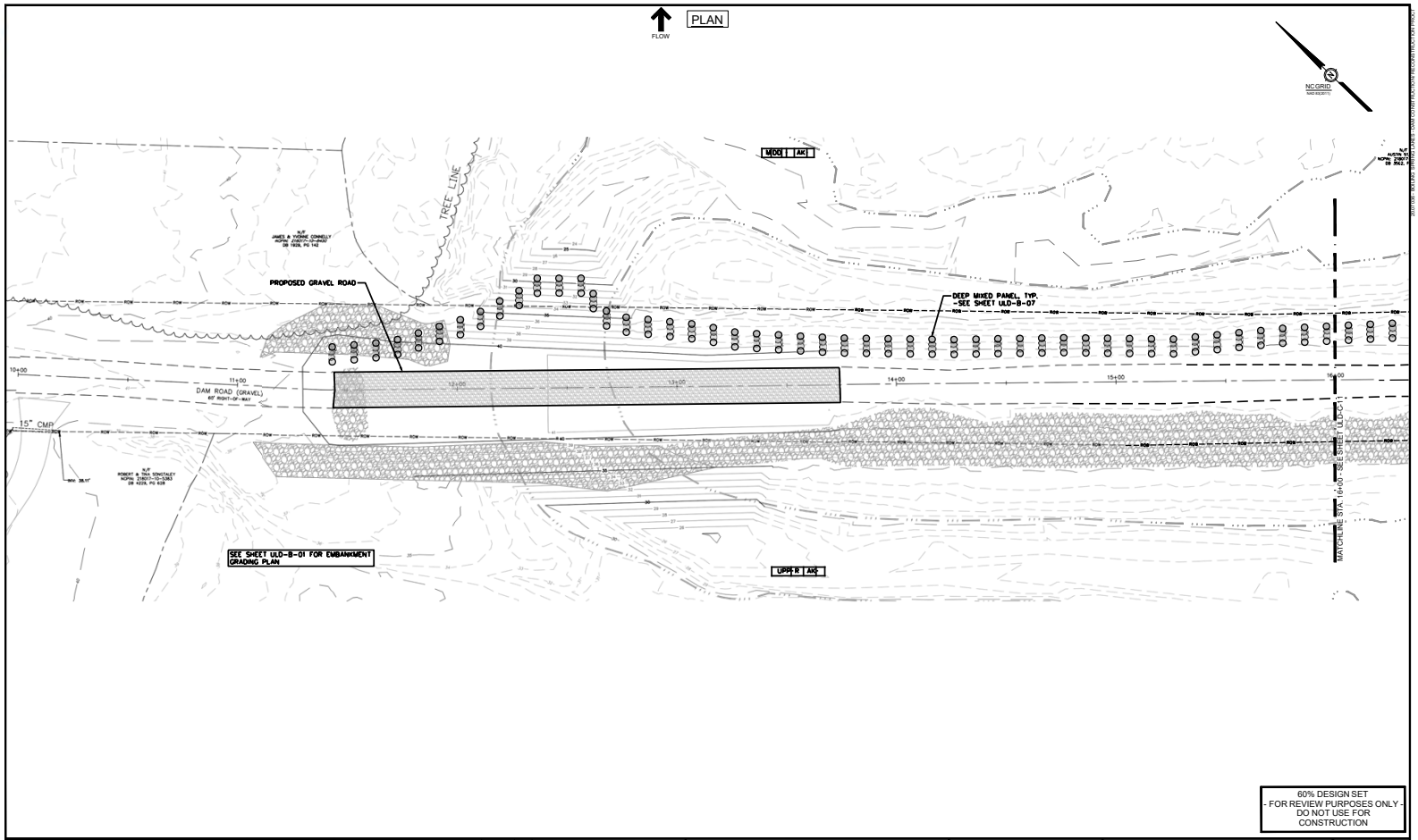
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT#	FUNDING#
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

FINAL SITE PLAN STA. 18+50 - STA. 24+00

SHEET
SD-C-12



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

FINAL SITE PLAN STA. 10+00 - STA. 16+00

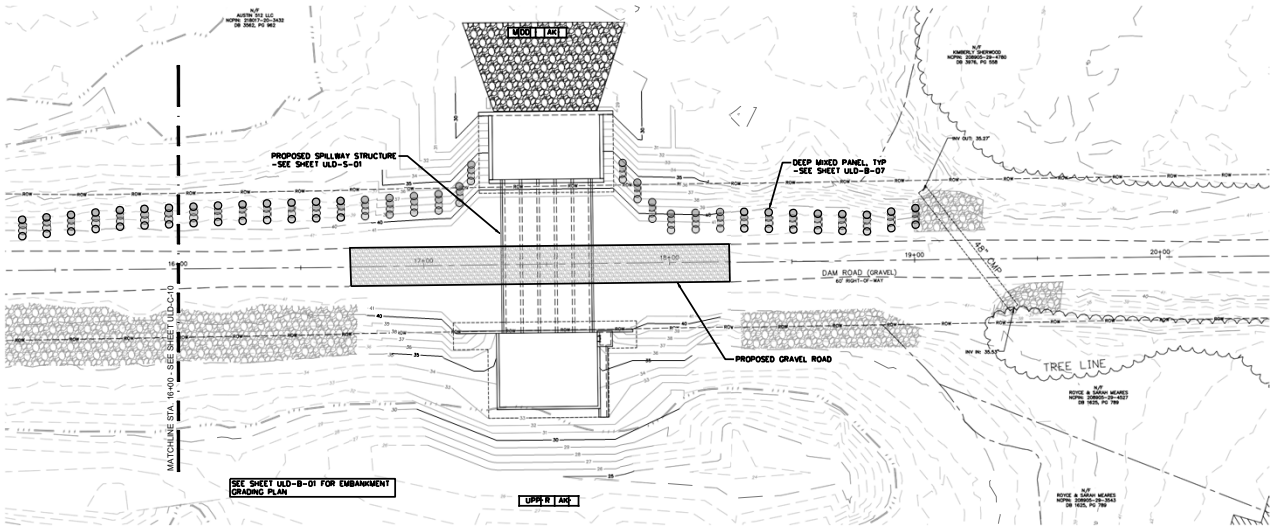
OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

SHEET
ULD-C-10

ID Upper Lake Dam

PLAN

FLOW



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

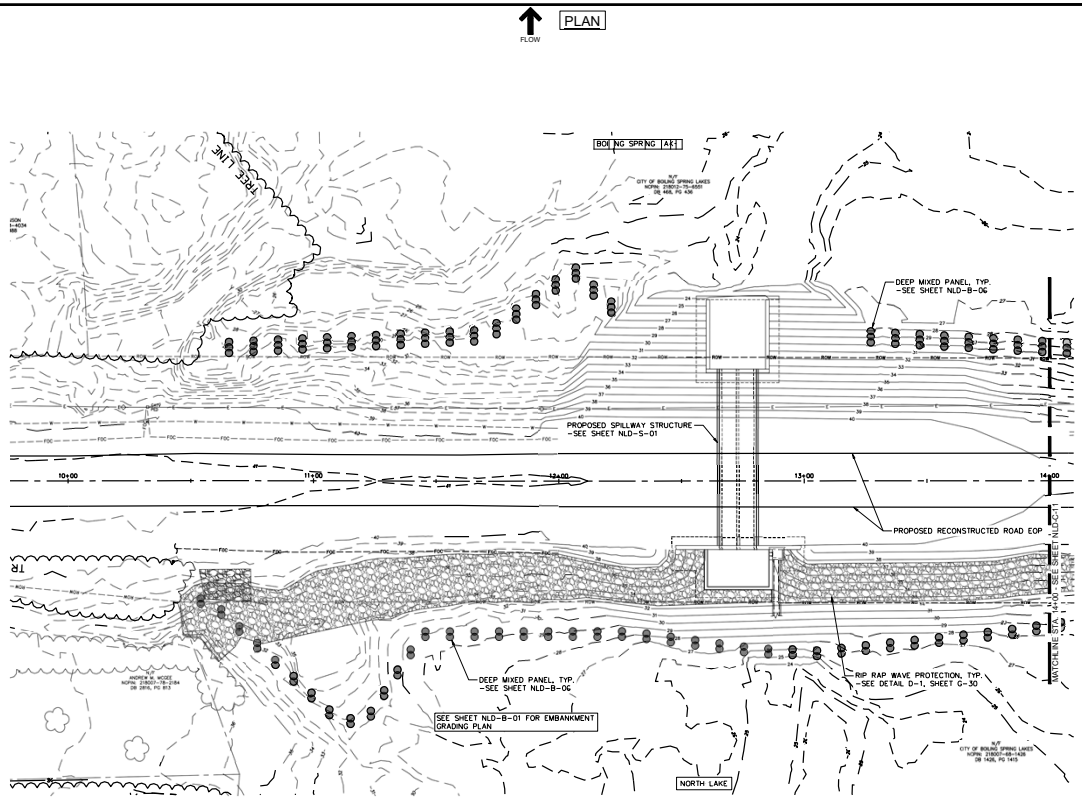
GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

FINAL SITE PLAN STA. 16+00 - STA. 20+00

SHEET
ULD-C-11

ID North Lake Dam



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

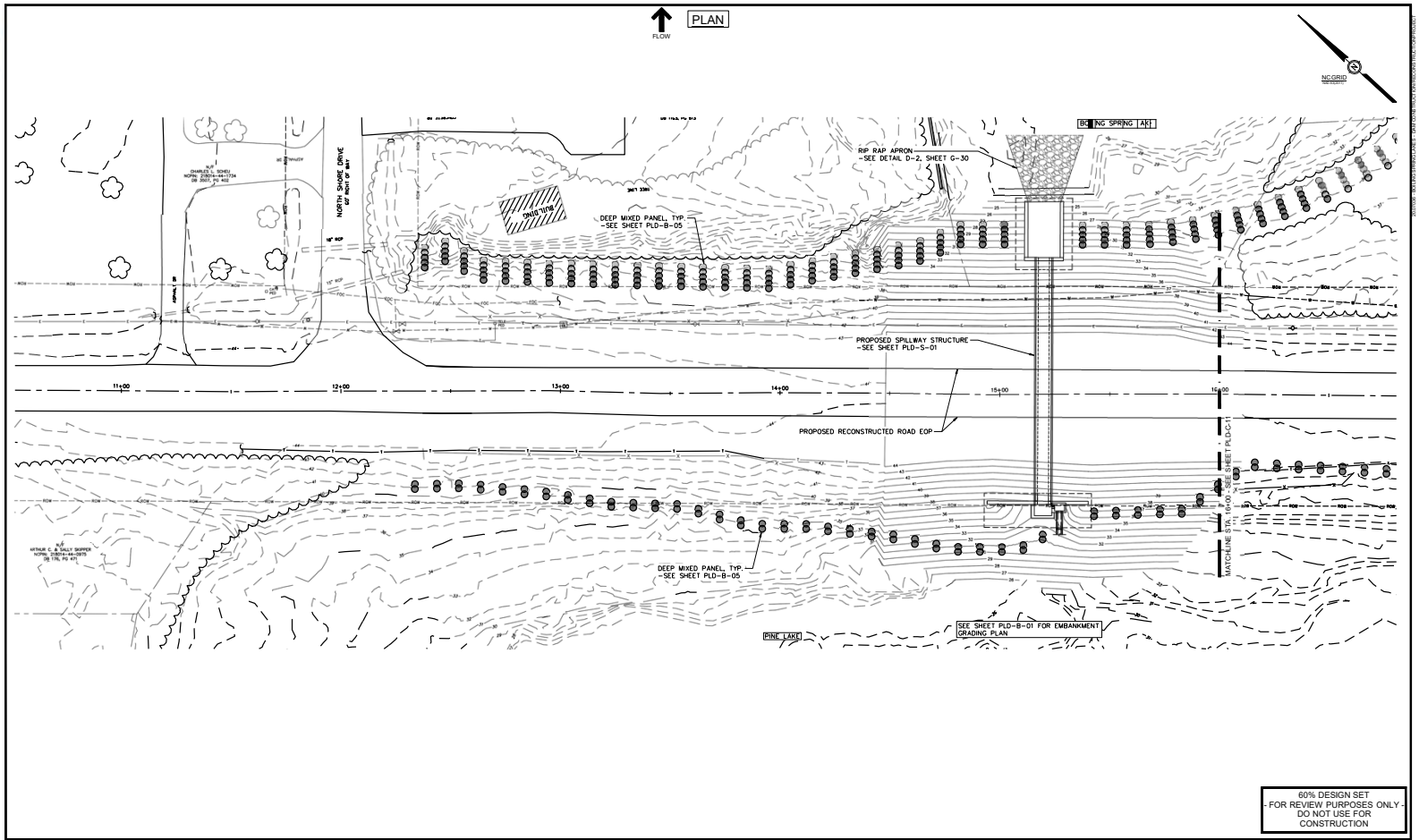
OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

FINAL SITE PLAN STA. 10+00 - STA. 14+00

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET
NLD-C-10

I D P i n e L a k e D a m



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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

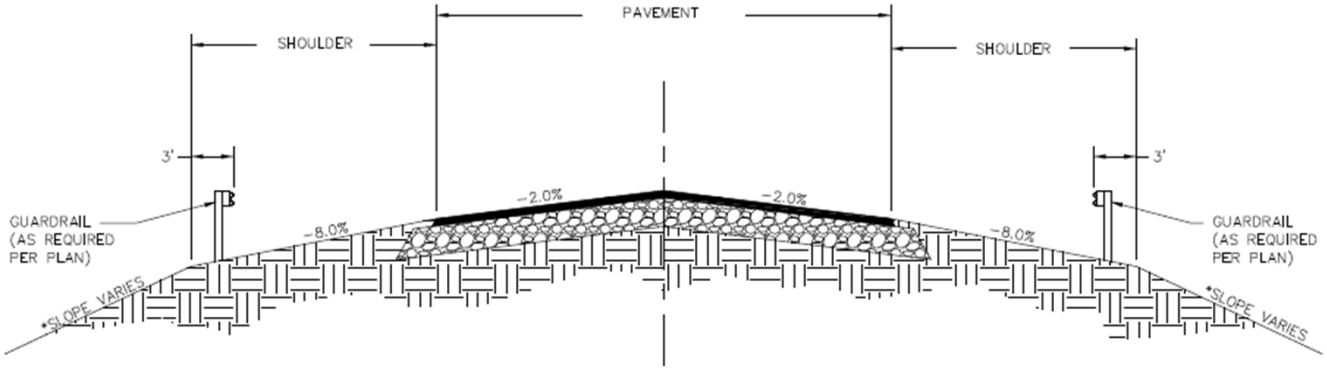
GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	FINAL SITE PLAN STA. 11+00 - STA. 16+50		
PROJECT MANAGER	REVIEWER	DATE	PROJECT#	FUNDING#
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

SHEET

PLD-C-10

ID - Roadway and Utilities



Recent FEMA Coordination

- Date: 8/19/2020
- Topics
  - ✓ PLD, NLD and EBSR
  - ✓ NCDOT project
- Results
  - ✓ FEMA has agreed to allow 2 applicants to claim the same physical site – Success!
  - ✓ FEMA will reimburse cost for reconstruction of water control features back to pre-disaster condition
  - ✓ Codes and Standards are only applicable for original dam design (guardrail, low drain, etc.)
  - ✓ Submitted SOW to FEMA on 8/31/2020

RFQ

- Due to the complexity of the construction required and the overall magnitude of the project McGill/Schnabel recommends that the City prequalify bidders for this project.

- A Request for Qualifications (RFQ) will be publicly distributed. Qualification submittals from Contractor Teams will be reviewed by the City and Engineer of Record based on meeting minimum levels of experience with various unique construction methodologies required for this project. Contractor Teams will be notified regarding meeting minimum qualifications prior to distribution of the bid package.

RFQ

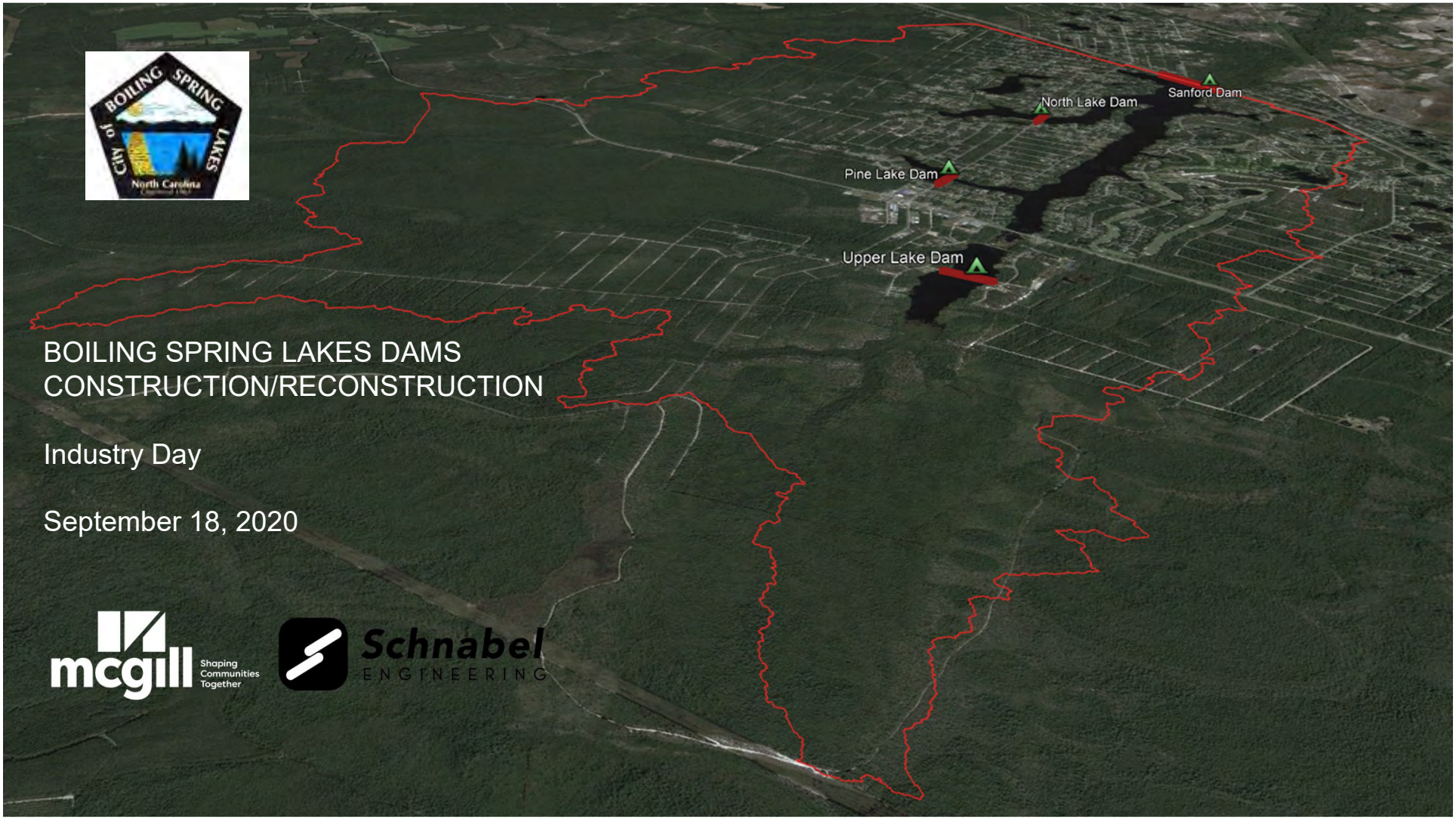
- For Prequalified Bids the NC GS requires
  - The City adopts an objective prequalification policy and
  - The City adopts the assessment tool and criteria for that specific project

- McGill has provided suggested language for Board adoption
- The Board is scheduled to meet October 6, 2020
- If approved, the RFQ is scheduled for release October 9, 2020

Next Steps

Critical Dates

- Submittal to Dam Safety 12/23/20
- Dam Safety Review 12/23/20 to 3/23/21
- Bidding and Contractor Selection 3/31/21 to 5/28/21
- Start Construction 5/28/21



BOILING SPRING LAKES DAMS CONSTRUCTION/RECONSTRUCTION

Industry Day

September 18, 2020

mcgill Shaping Communities Together

Schnabel ENGINEERING

Introductory Remarks

- Reconstruction of four dams that breached during Hurricane Florence
- All information, questions and discussions from today's event are public information
- All design schematics shown in the presentation are based on the 60% design and are subject to change.
- A Geotechnical Data Report is available for download on the City website

Today's Schedule
Presentation: 7:45 - 9 AM.
ULD test pit/site visit 9:15 - 9:45 AM.
PLD site visit 10 - 10:30 AM
NLD site visit 10:45 - 11:15 AM.
SD test pit/site visit 11:30 AM - 12:30 PM

Owner and Design Team

- **Owner:** City of Boiling Spring Lakes
  Representative: Jeffery Repp, City Manager
- **Design Team**:
  - McGill Associates, PA
    Representatives: Michael Hanson, PE, LEED AP, Project Manager
    Michael Norton, PE, Client Manager
  - Schnabel Engineering South, PC
    Representative: Adam Paisley, PE, Project Manager
    Tom Fitzgerald, PE, Project Director

Potential Maintenance of Traffic Routes

Major Elements

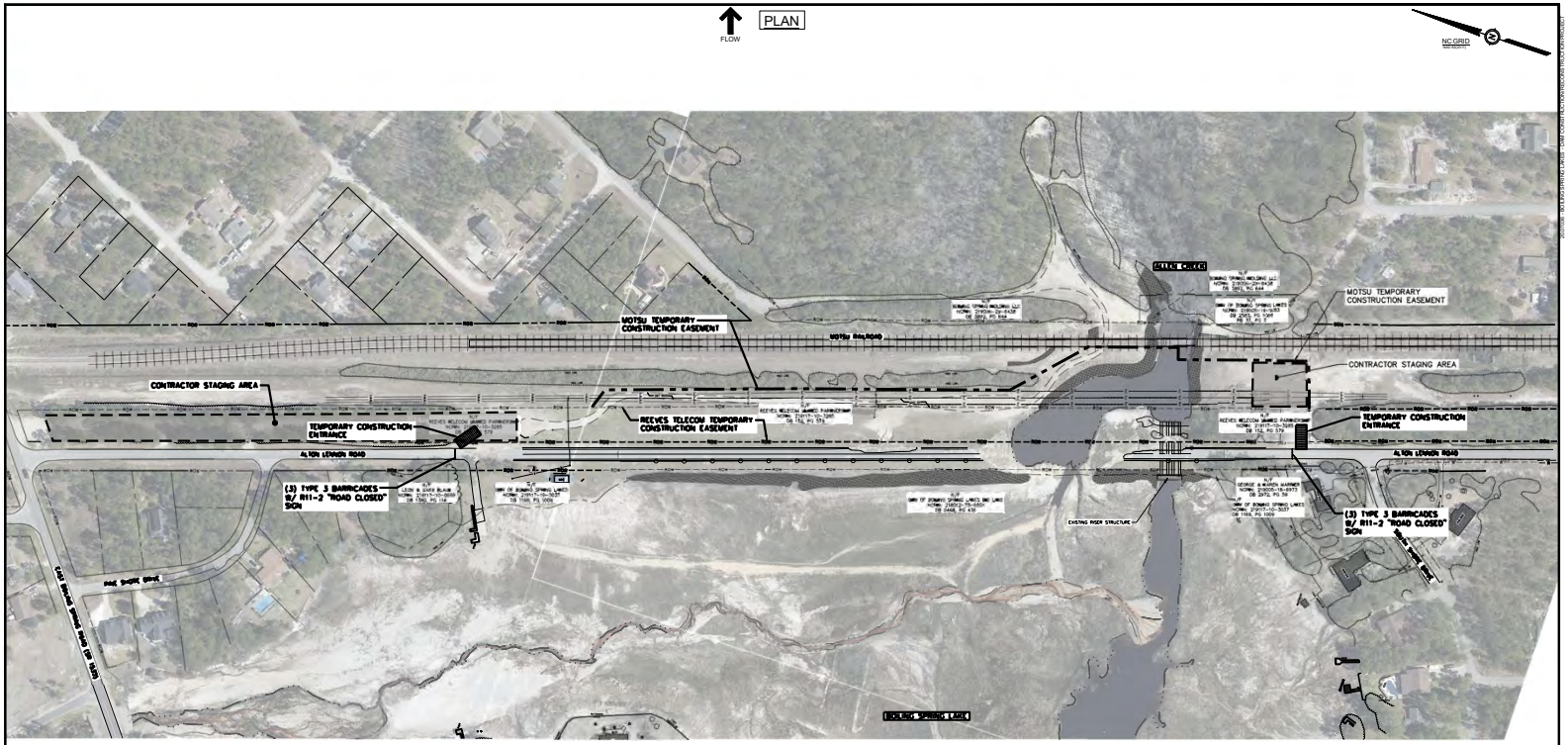
- Mobilization and temporary construction facilities
- Road closures and traffic controls, including acquisition of related permits
- Power and telecom utility relocation/coordination
- Erosion and sediment control
- Control of water (stream diversion using cofferdams over 10 feet high)
- Demolition
- Cast-in-place concrete riser and box culvert spillways (4,000 cubic yards (CY) of structural concrete)
- Approximately 98,000 CY of bulk excavation

Major Elements

- Embankment Construction including core materials, drains and filters (~110,000 CY of earthfill placement and ~7,400 CY of drainfill)
- Construction of deep mixing panels, including soilcrete mix design, design and installation of temporary work platforms, demonstration panels, sampling and laboratory testing (~26,000 CY of soilcrete)
- Roadway reconstruction
- Sanford Dam only:
    - cutoff wall through the entire length 20 feet into the limestone rock (~80,000 square feet of wall profile area)
    - Installation of new instrumentation (structure monitoring points, vibrating wire piezometers, automated data collection and transmission equipment)

Sanford Dam

Sanford Dam Staging



60% DESIGN SET
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DO NOT USE FOR CONSTRUCTION

mcgill
712 Village Road SW
Suite 103
Shallotte, NC 28470
910.755.5872
NC Firm License # C-0459
mcgillassociates.com

PRELIMINARY

Schnabel ENGINEERING
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11A Oak Branch Drive / Greensboro, NC 27407
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT
BOILING SPRING LAKES
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 100 0 50 100 200 — DIVISION VALUE = 100 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

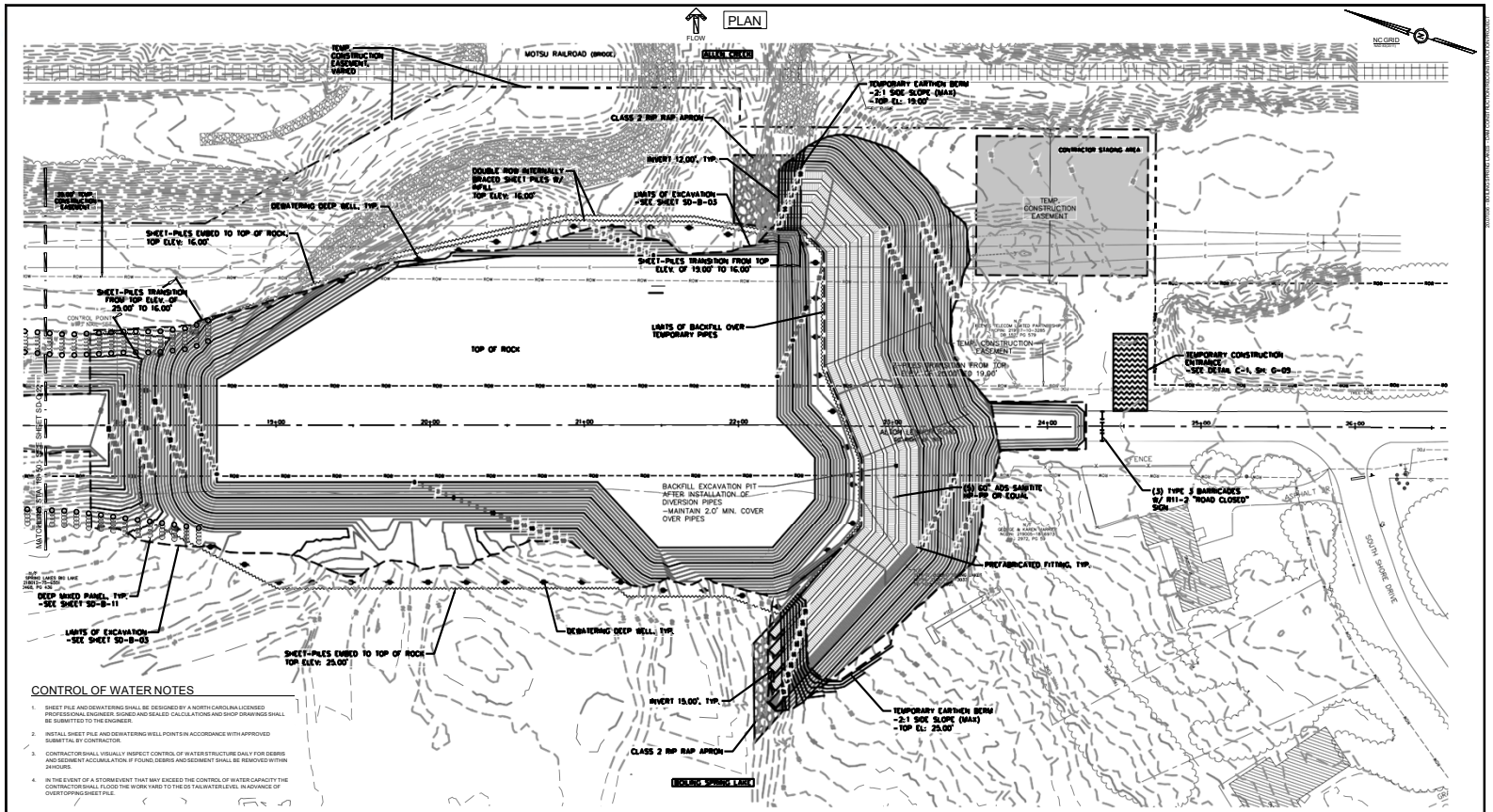
SITE ACCESS AND
TEMPORARY FACILITIES

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET
SD-C-20

Sanford Dam

Stage 1 Plan



CONTROL OF WATER NOTES

1. SHEET PILE AND DEWATERING SHALL BE DESIGNED BY A NORTH CAROLINA LICENSED PROFESSIONAL ENGINEER. SIGNED AND SEALED CALCULATIONS AND SHOP DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER.
2. INSTALL SHEET PILE AND DEWATERING WELL POINTS IN ACCORDANCE WITH APPROVED SUBMITTAL BY CONTRACTOR.
3. CONTRACTOR SHALL VISUALLY INSPECT CONTROL OF WATER STRUCTURE DAILY FOR DEBRIS AND SEDIMENT ACCUMULATION. IF FOUND, DEBRIS AND SEDIMENT SHALL BE REMOVED WITHIN 24 HOURS.
4. IN THE EVENT OF A STORM EVENT THAT MAY EXCEED THE CONTROL OF WATER CAPACITY THE CONTRACTOR SHALL FLOOD THE WORK YARD TO THE DS TAILWATER LEVEL IN ADVANCE OF OVERTOPPING SHEET PILE.

CONTROL OF WATER AND EROSION CONTROL PLAN LEGEND

COFFERDAM (SHEET PILES)

DEWATERING DEEP WELL

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

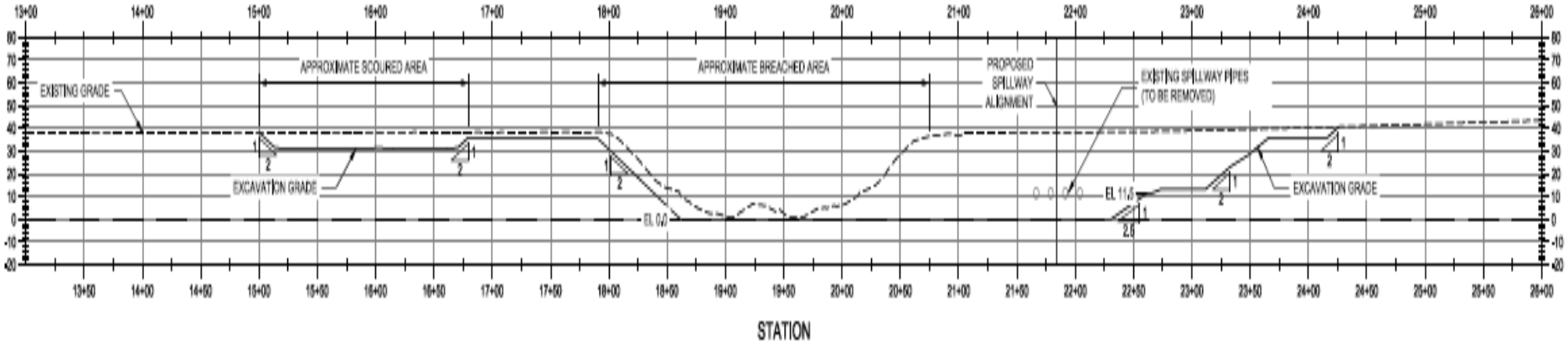
GRAPHICSCALE 30 0 15 30 60 — DIVISION VALUE = 30 FEET

STAGE 1 EROSION AND SEDIMENTATION CONTROL PLAN
3 OF 3

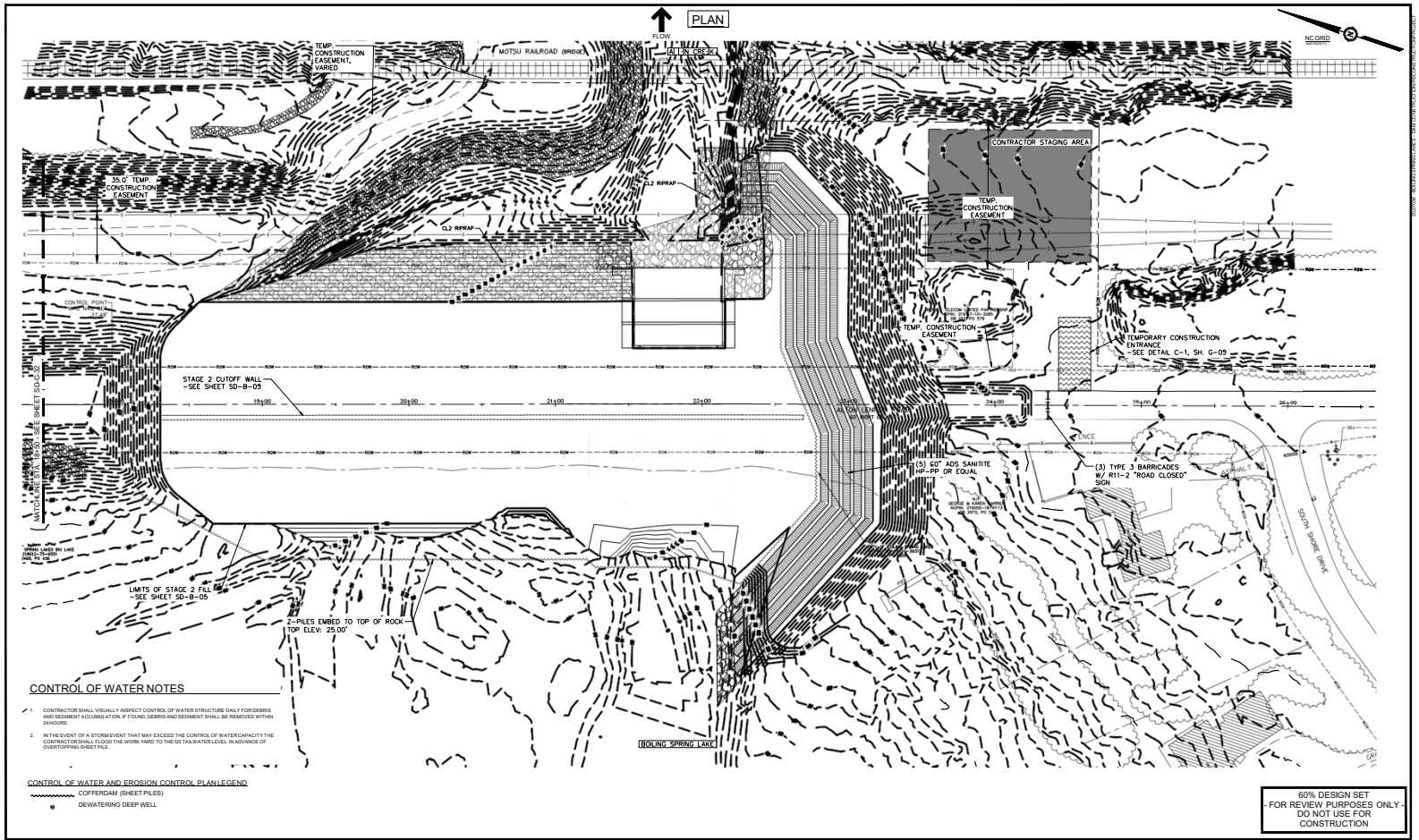
OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT#	FUNDING#
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

SHEET
SD-C-23

Sanford Dam
Stage 1 Profile



Sanford Dam Stage 2 Plan



CONTROL OF WATER NOTES

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CONTROL OF WATER AND EROSION CONTROL PLAN LEGEND

COFFERDAM (SHEET PILES)

DEWATERING DEEP WELL

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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

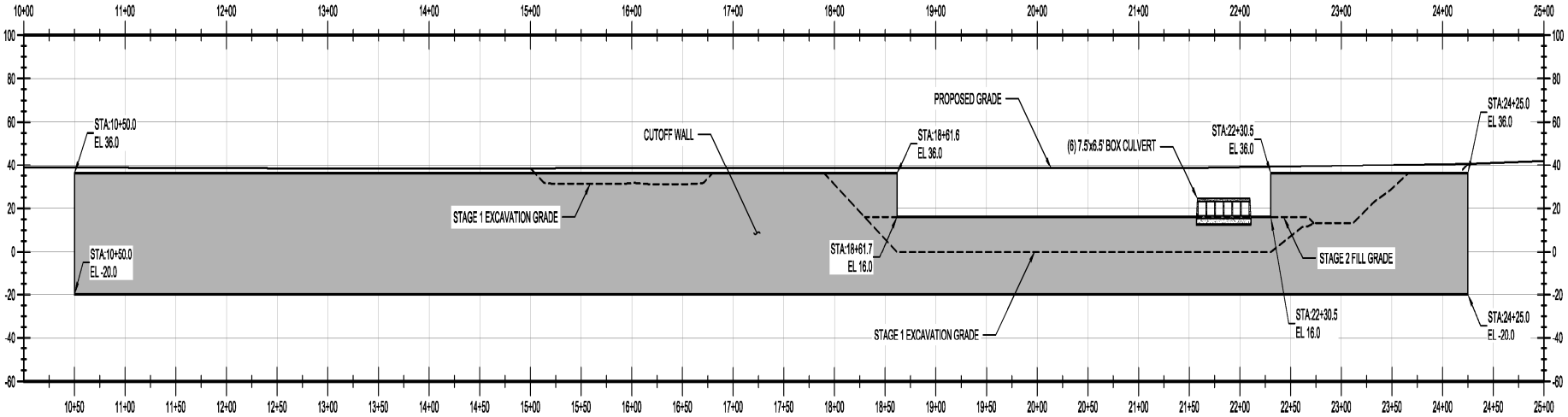
GRAPHIC SCALE — DIVISION VALUE = 30 FEET

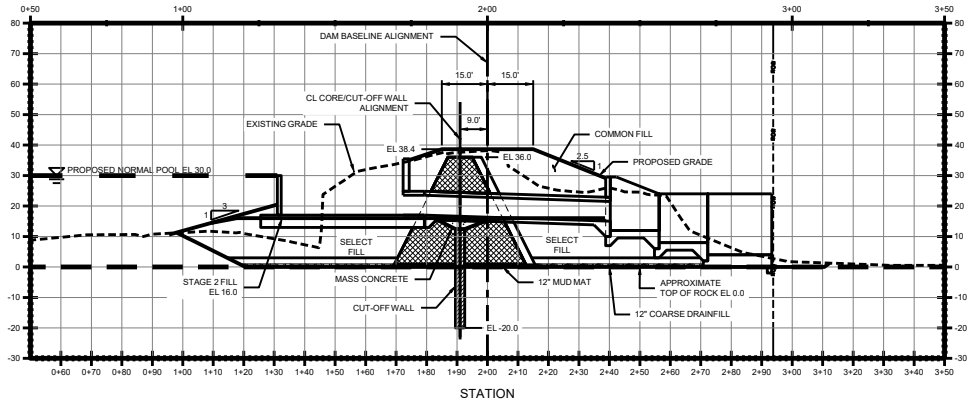
OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

STAGE 2 EROSION AND SEDIMENTATION CONTROL PLAN
3 OF 3

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

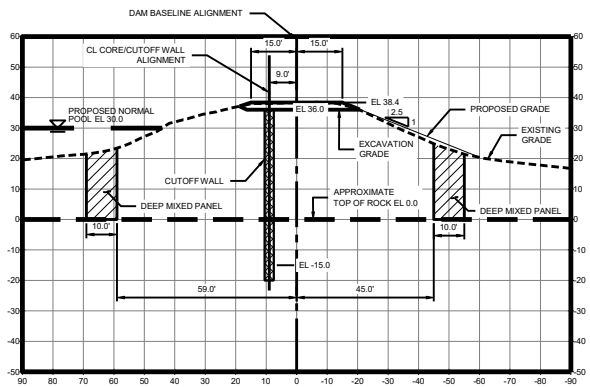
SHEET
SD-C-33


STA:10+50.0
EL 36.0
STA:10+50.0
EL -20.0
CUTOFF WALL
STAGE 1 EXCAVATION GRADE
STA:18+61.6
EL 36.0
STA:18+61.7
EL 16.0
PROPOSED GRADE
(6) 7.5'x6.5' BOX CULVERT
STAGE 1 EXCAVATION GRADE
STA:22+30.5
EL 36.0
STAGE 2 FILL GRADE
STA:22+30.5
EL 16.0
STA:24+25.0
EL 36.0
STA:24+25.0
EL -20.0



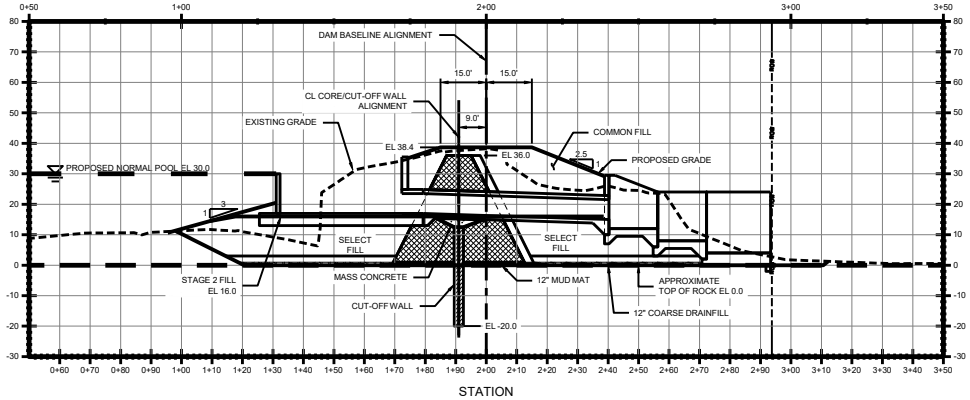
FLOW

1 TYPICAL SECTION THROUGH PROPOSED SPILLWAY ALINGMENT



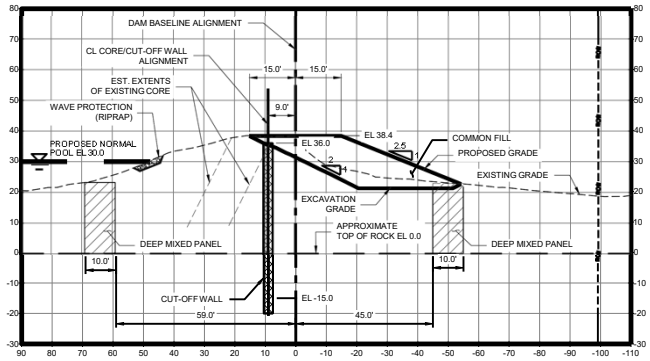
FLOW

3 TYPICAL EMBANKMENT SECTION



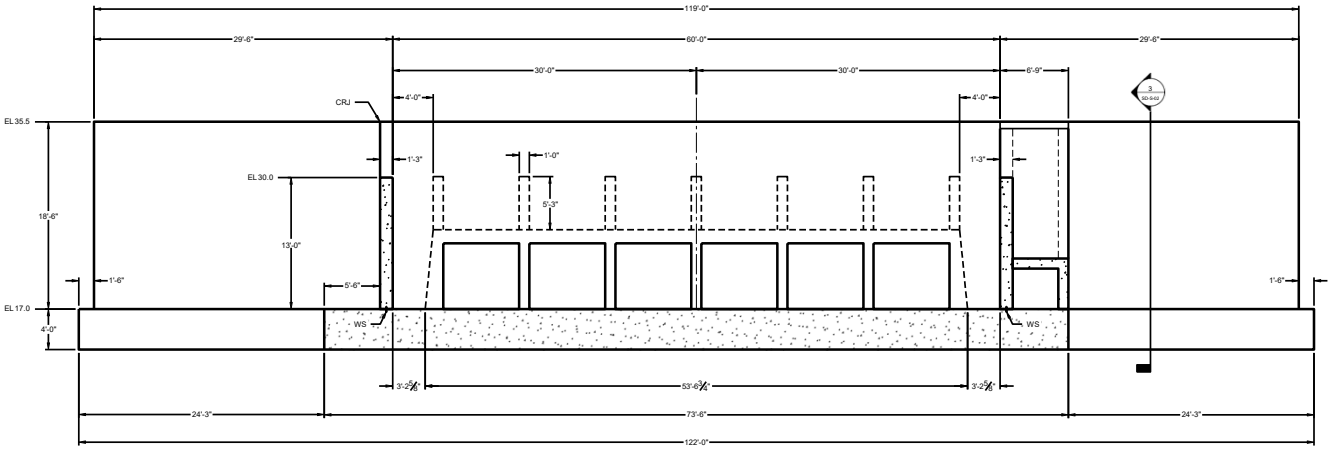
FLOW

1 TYPICAL SECTION THROUGH PROPOSED SPILLWAY ALINGMENT



FLOW

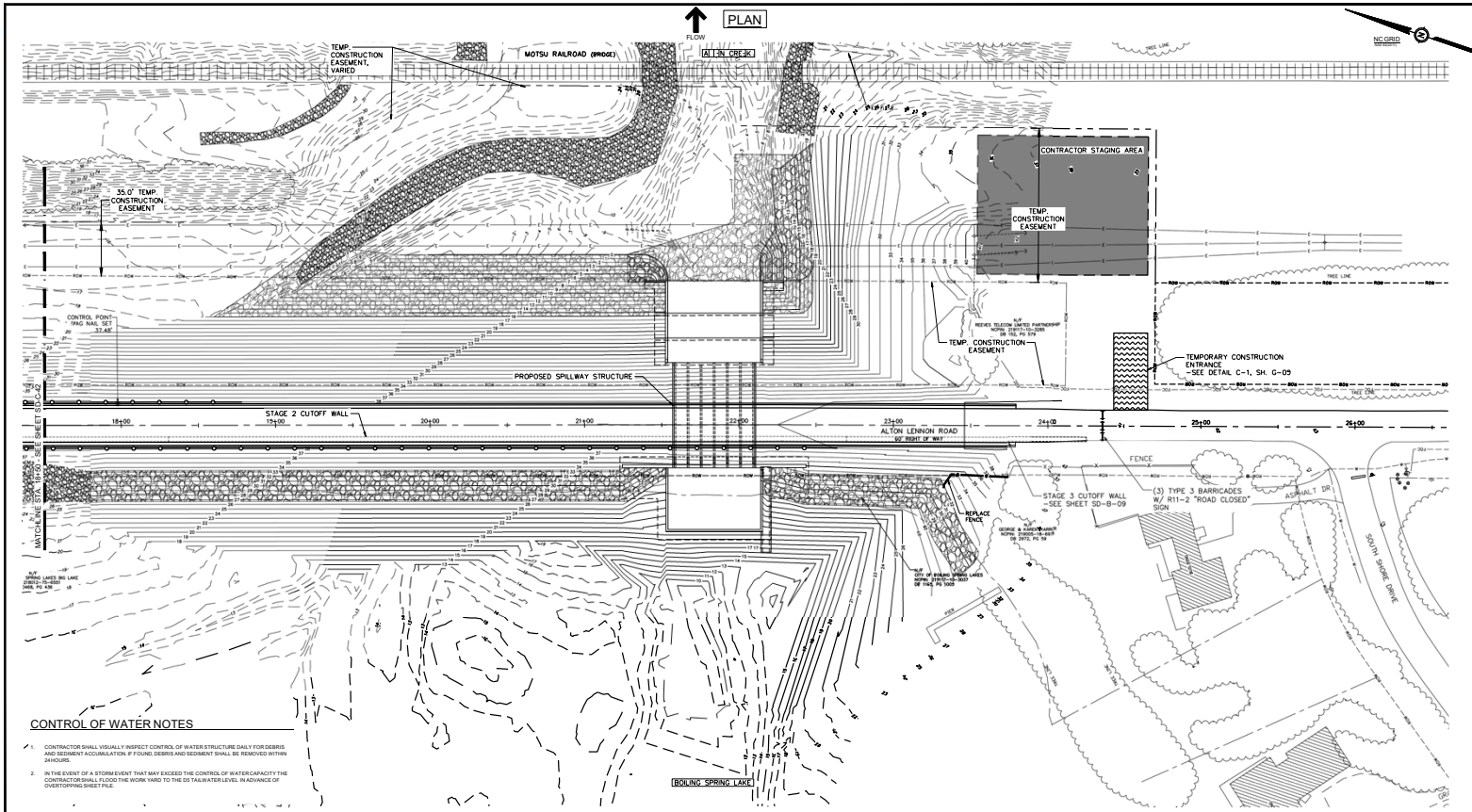
2 TYPICAL SECTION THROUGH SCOURED AREA



1 INLET HEADWALL ELEVATION

SCALE: 3/16"=1'0"

Sanford Dam Stage 3 Plan



CONTROL OF WATER NOTES

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60% DESIGN SET
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NC Firm License # C-0459
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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT
BOILING SPRING LAKES
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 30 FEET

OFFICE MANAGER	M. NORTON
DESIGNER	S. MEEKINS
PROJECT MANAGER	M. HANSON
REVIEWER	M. HANSON

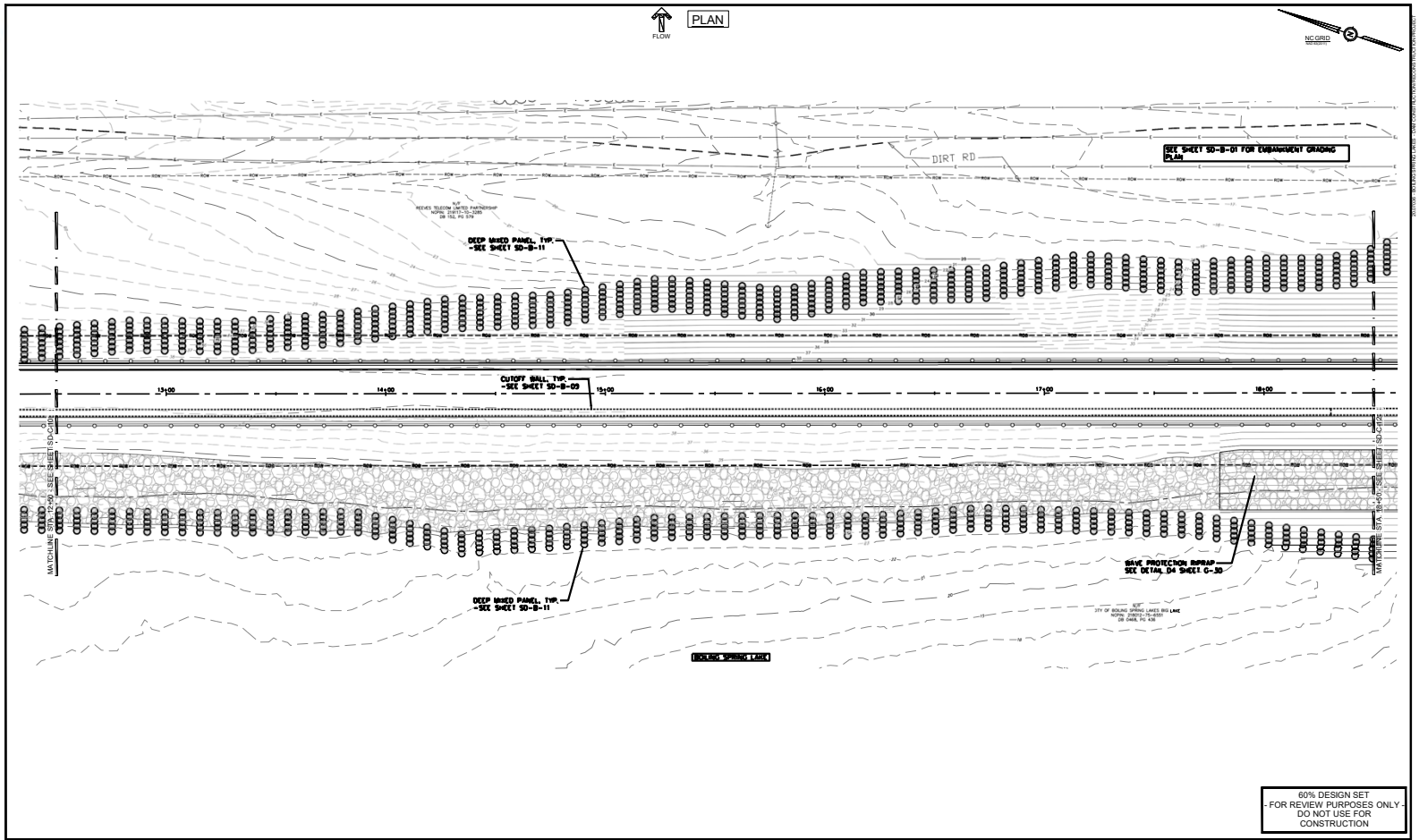
STAGE 3 EROSION AND SEDIMENTATION CONTROL PLAN
3 OF 3

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET
SD-C-43

Sanford Dam

Stage 3 Plan



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

FINAL SITE PLAN STA. 12+50 - STA. 18+50

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET

SD-C-11

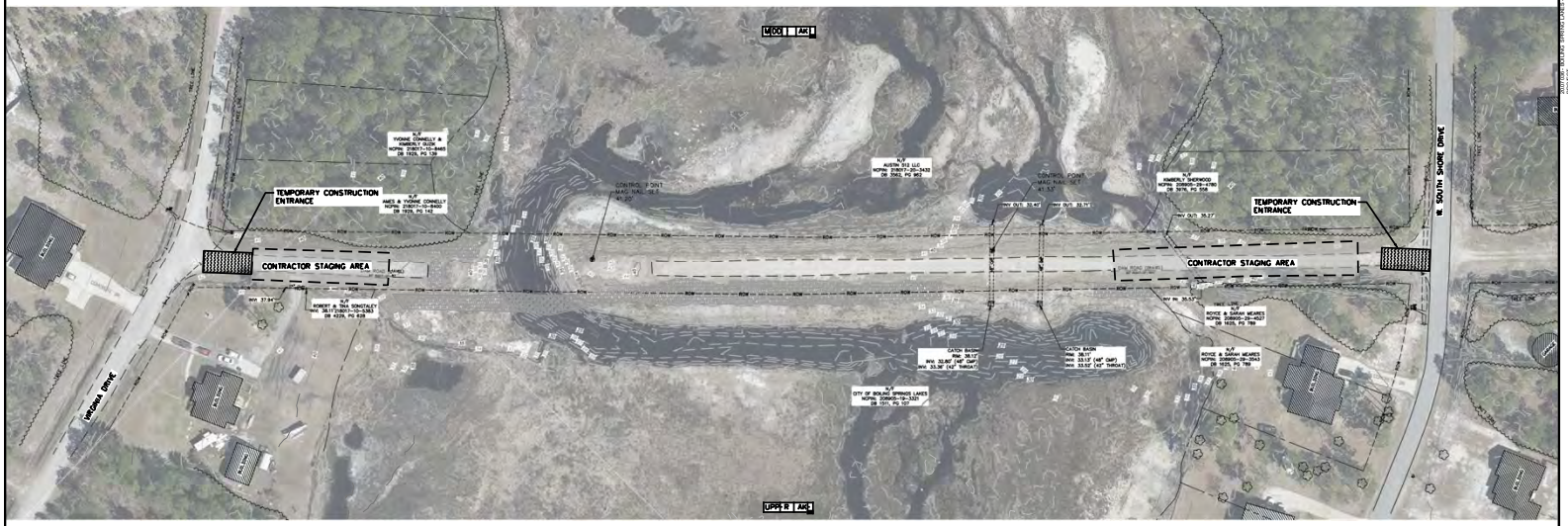
Upper Lake Dam

Upper Lake Dam Staging

PLAN

FLOW

NC GRID



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 50 0 25 50 100 — DIVISION VALUE = 50 FEET

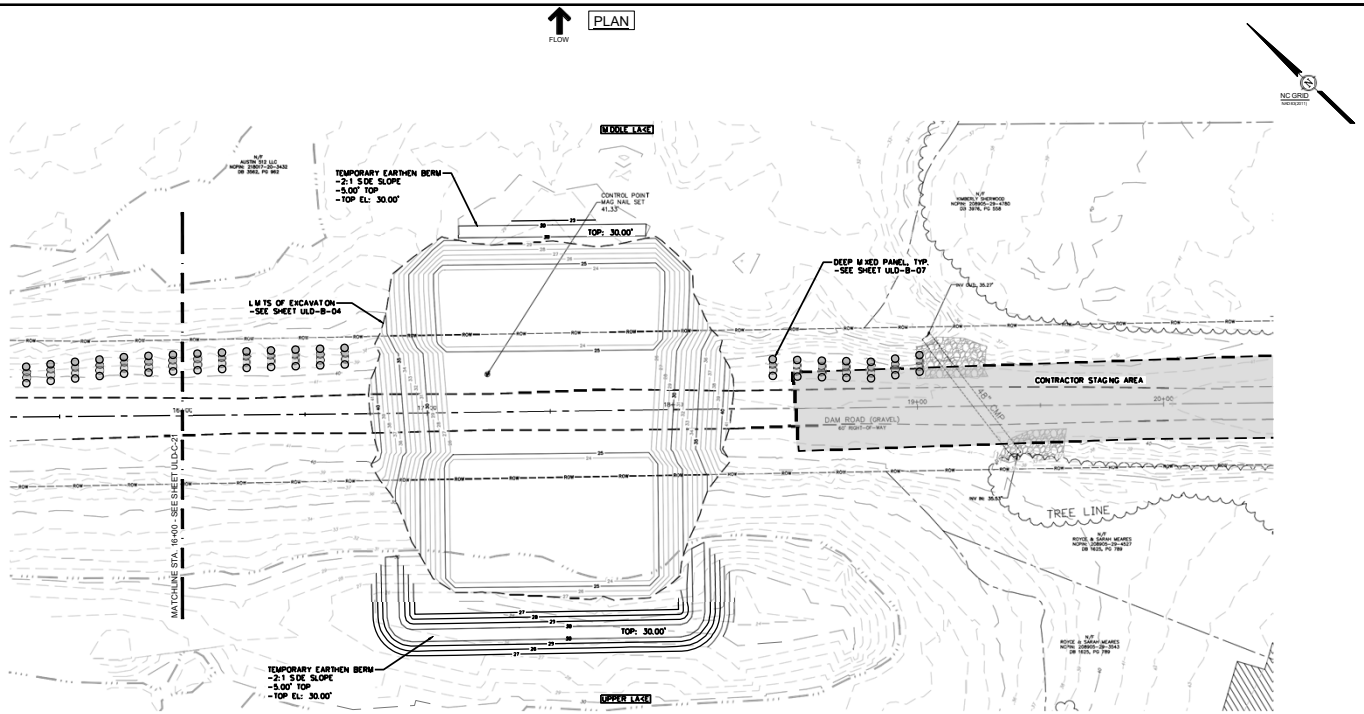
SITE ACCESS AND
TEMPORARY FACILITIES

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

SHEET

ULD-C-20

Upper Lake Dam Stage 1 Plan



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

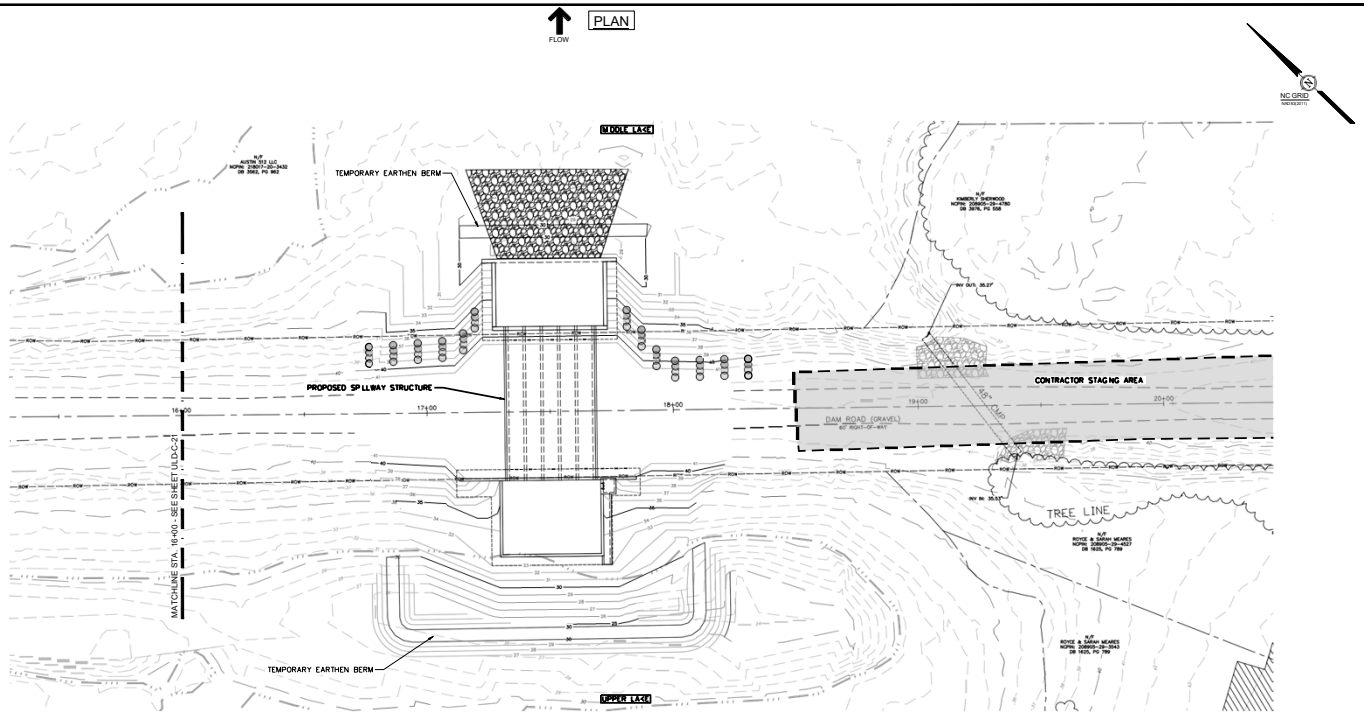
GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

STAGE 1 EROSION AND SEDIMENTATION CONTROL PLAN
2 OF 2

SHEET
ULD-C-22

Upper Lake Dam Stage 2 Plan



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

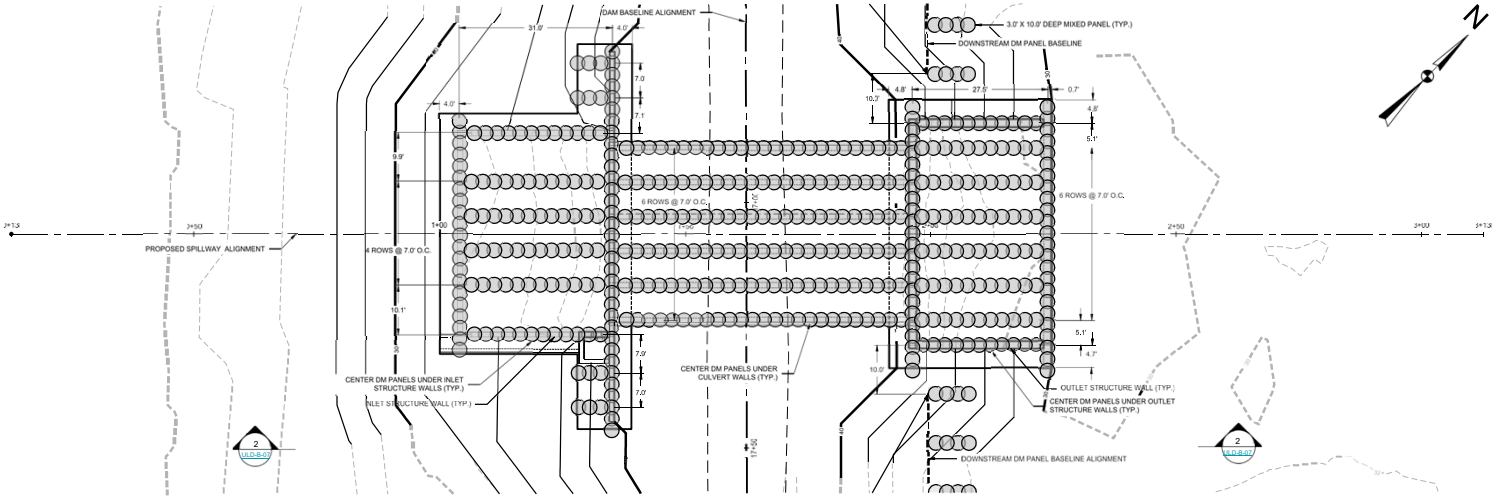
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

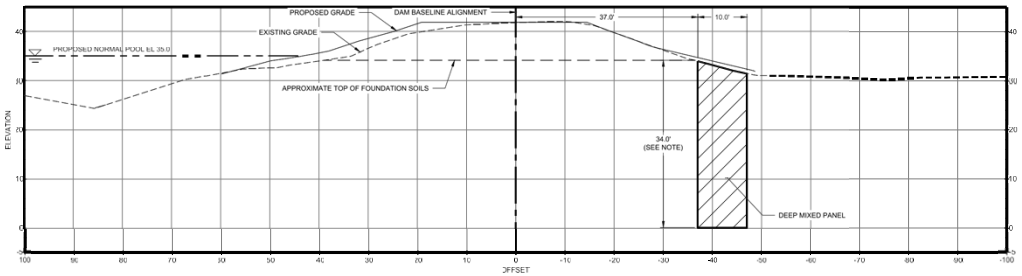
STAGE 2 EROSION AND SEDIMENTATION CONTROL PLAN
2 OF 2

SHEET
ULD-C-32



FLOW

1 UPPER LAKE DAM PROPOSED SPILLWAY DEEP MIXED PANELS PLAN VIEW



FLOW

2 UPPER LAKE DAM PROPOSED EMBANKMENT DEEP MIXED PANELS SECTION STATION 17+50

NOTE: DEEP MIXED PANEL SHALL EXTEND TO A DEPTH OF 34 FEET. BELOW TOP OF FOUNDATION SOILS OR TO TOP OF ROCK.

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T/ 336-274-9456 F/ 336-274-9466 / schnabel-eng.com

N	DA	R	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

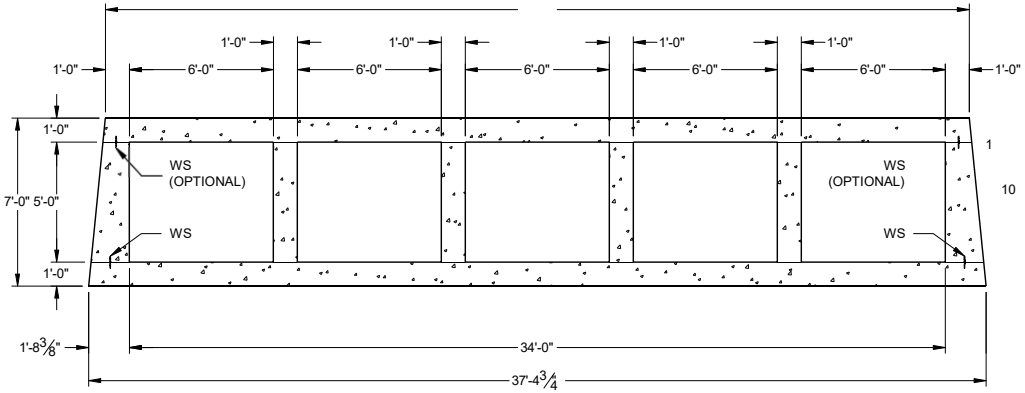
BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 10 FEET

OFFICE MANAGER	DESIGNER		
T. FITZGERALD	R. CALDERON		
PROJECT MANAGER	REVIEWER	DATE	PROJECT#	FUNDING#
A. PAISLEY	A. PAISLEY	JULY 2020	19C21022	N/A

DEEP MIXED PANELS DETAILS

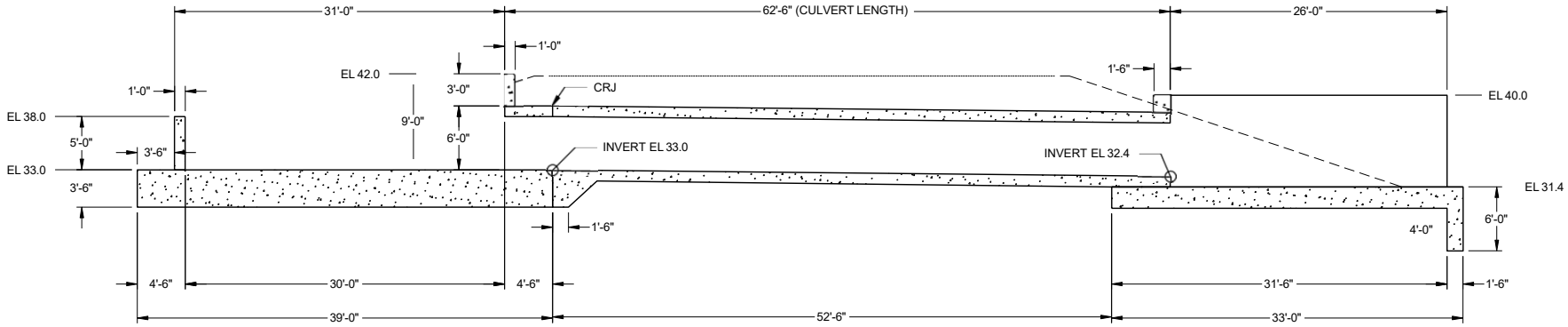
SHEET
ULD-B-07



NOTE: WATERSTOP (WS) SPECIFIED AS OPTIONAL MAY BE DELETED IF EXTERIOR WALLS AND TOP SLAB ARE CAST MONOLITHIC.

3 BOX CULVERT SECTION

SCALE: 1/4"=1'0"

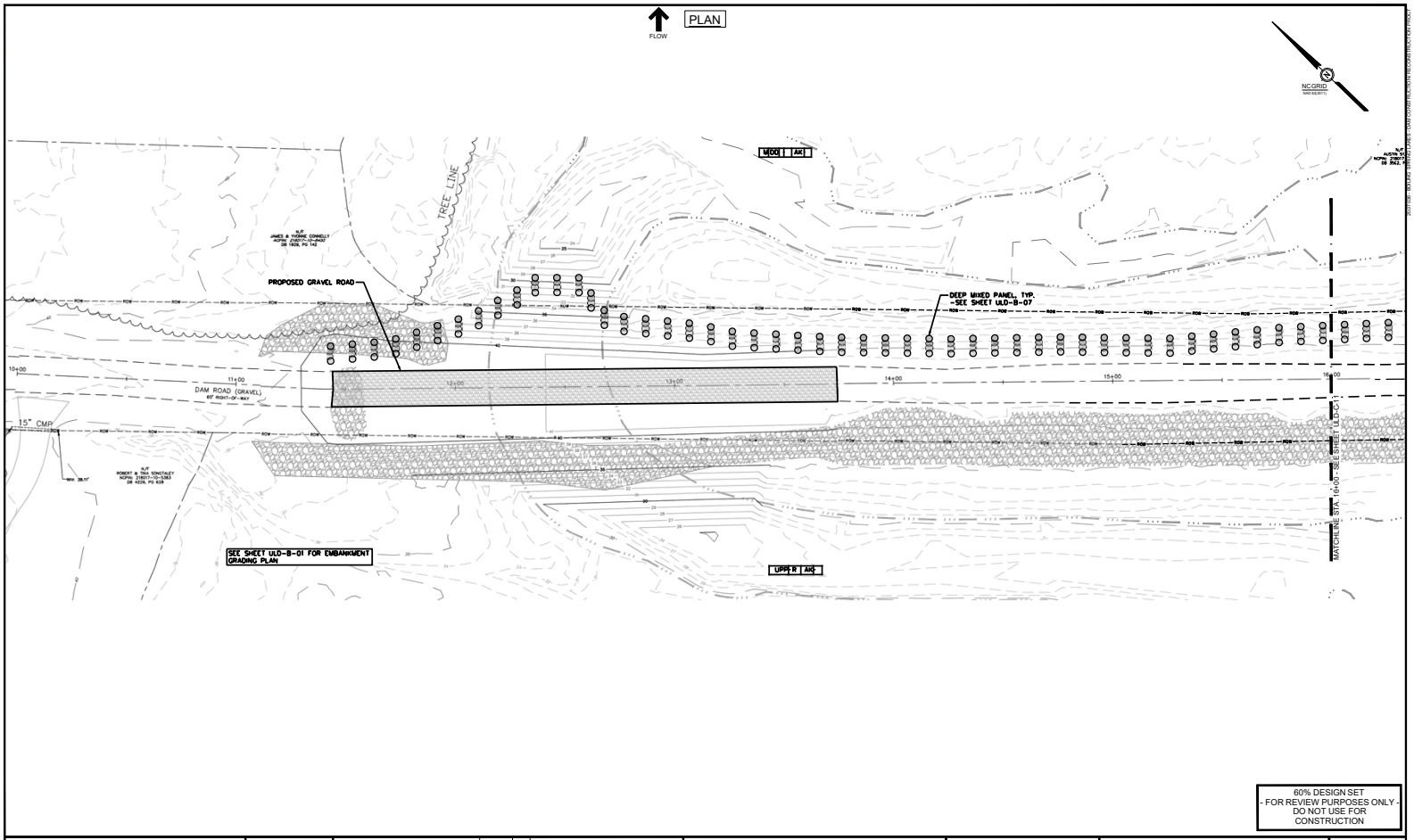


2 UPPER LAKE DAM ELEVATION

SCALE: 1/8"=1'0"

Upper Lake Dam

Stage 3/4 Plan



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LICENCE NUMBER:C-2599
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T: 336-274-9458 F: 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE — DIVISION VALUE = 20 FEET

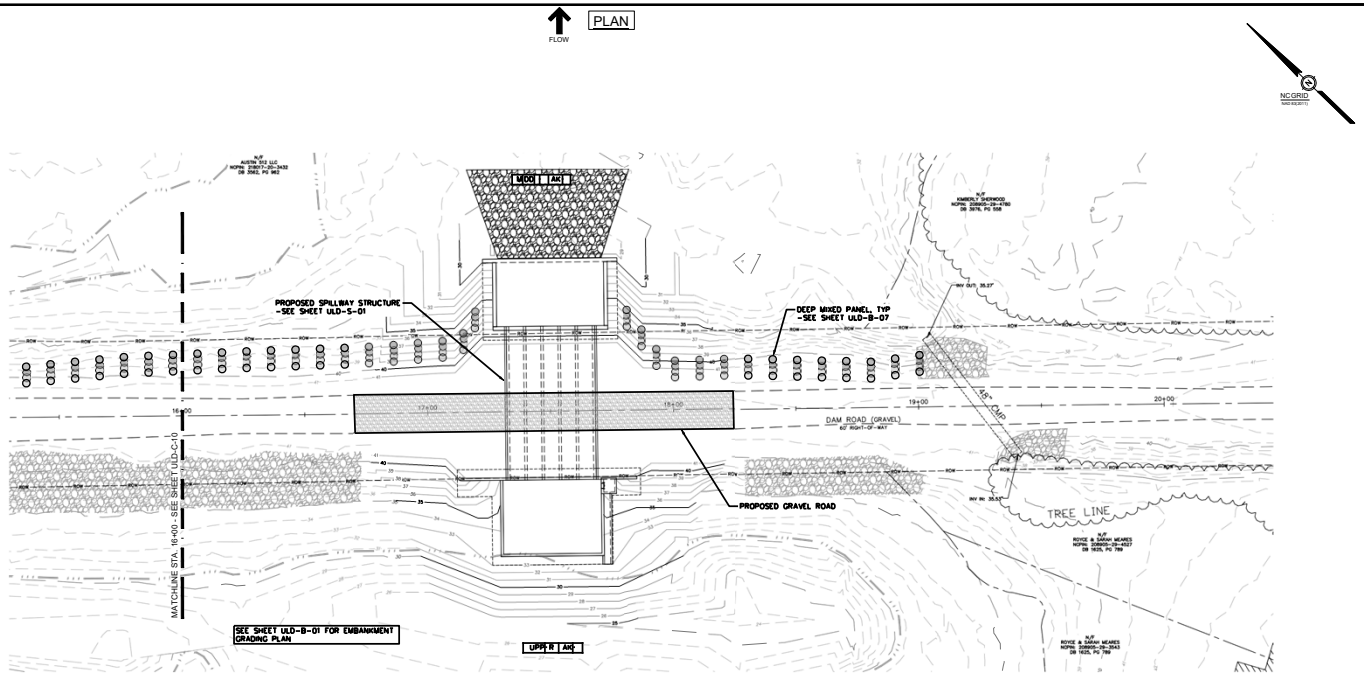
OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

FINAL SITE PLAN STA. 10+00 - STA. 16+00

SHEET ULD-C-10

Upper Lake Dam

Stage 3/4 Plan



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T: 336-274-9458 F: 336-274-9486 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

FINAL SITE PLAN STA. 16+00 - STA. 20+00

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS			
PROJECT MANAGER	REVIEWER	DATE	PROJECT #	FUNDING #
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

SHEET

ULD-C-11

North Lake Dam

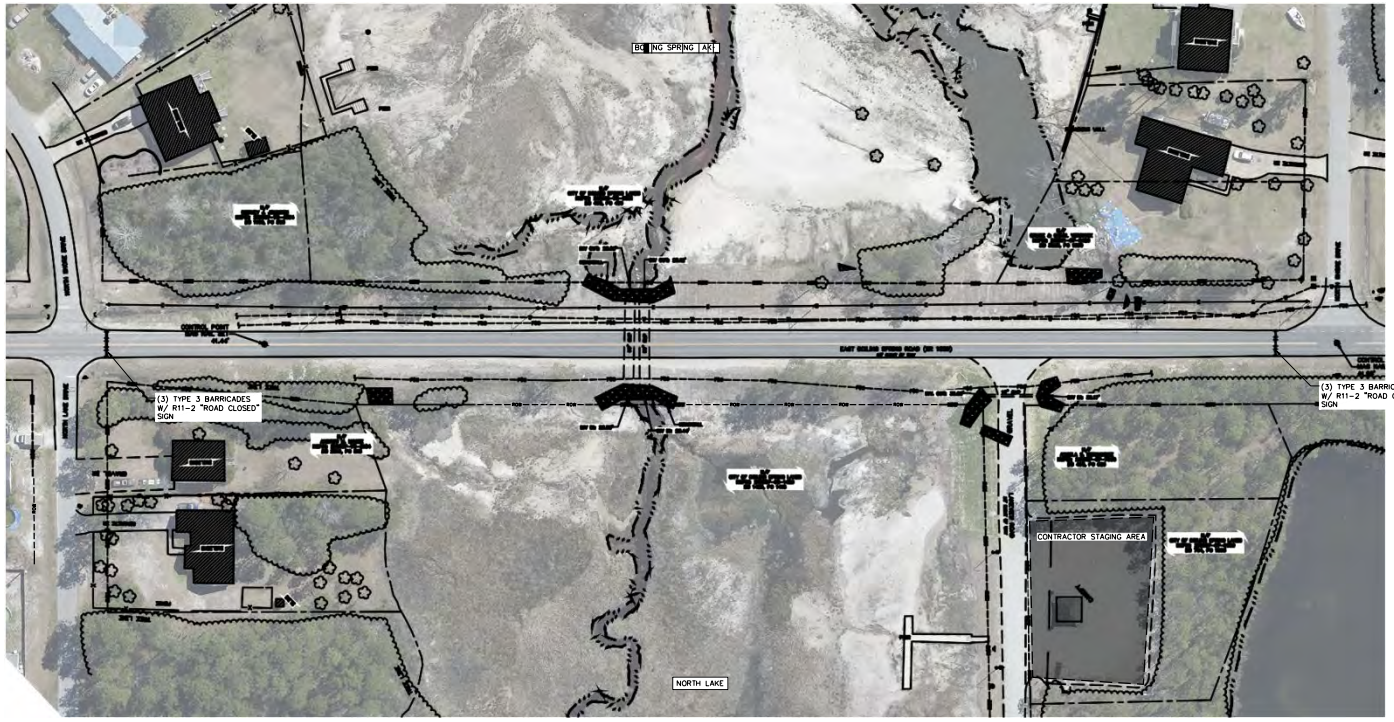
North Lake Dam

Staging

PLAN

FLOW

NC GRID



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N	DA	B	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 40 0 20 40 80
DIVISION VALUE = 40 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

SITE ACCESS AND
TEMPORARY FACILITIES

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

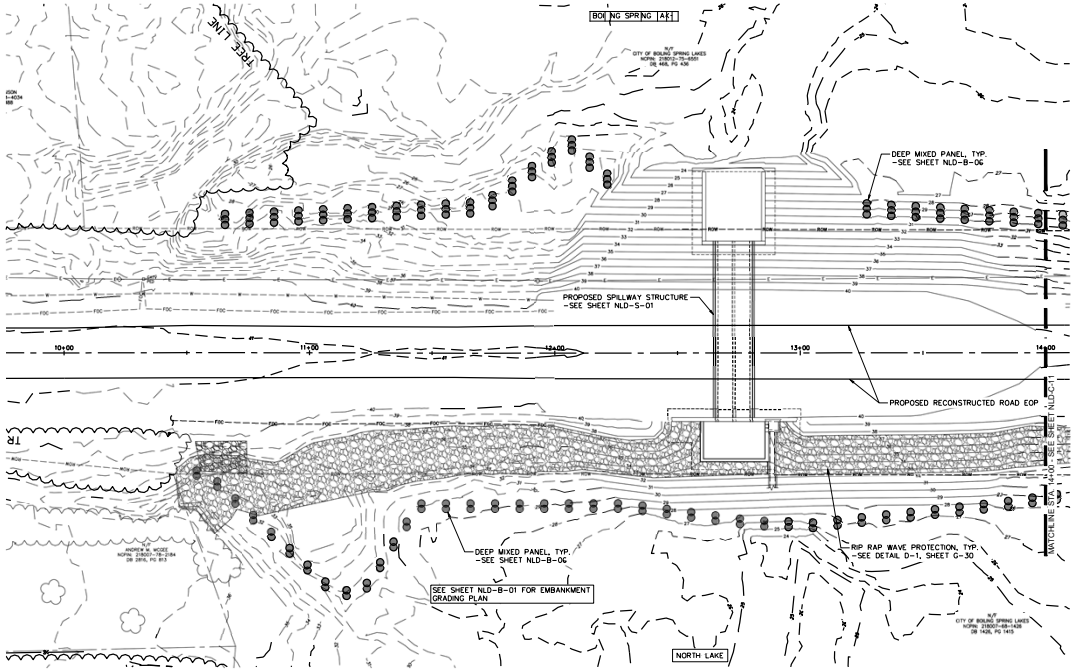
SHEET
NLD-C-20

North Lake Dam

Left Abutment

PLAN

FLOW



60% DESIGN SET
- FOR REVIEW PURPOSES ONLY -
DO NOT USE FOR CONSTRUCTION

mcgill
712 Village Road SW
Suite 103
Shallotte, NC 28470
910.755.5872
NC Firm License # C-0459
mcgillassociates.com

PRELIMINARY

Schnabel ENGINEERING
LICENCE NUMBER C-2599
11A Oak Branch Drive / Greensboro, NC 27407
T/ 336-274-9456 F/ 336-274-9458 / schnabel-eng.com

NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

FINAL SITE PLAN STA. 10+00 - STA. 14+00

DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET

NLD-C-10

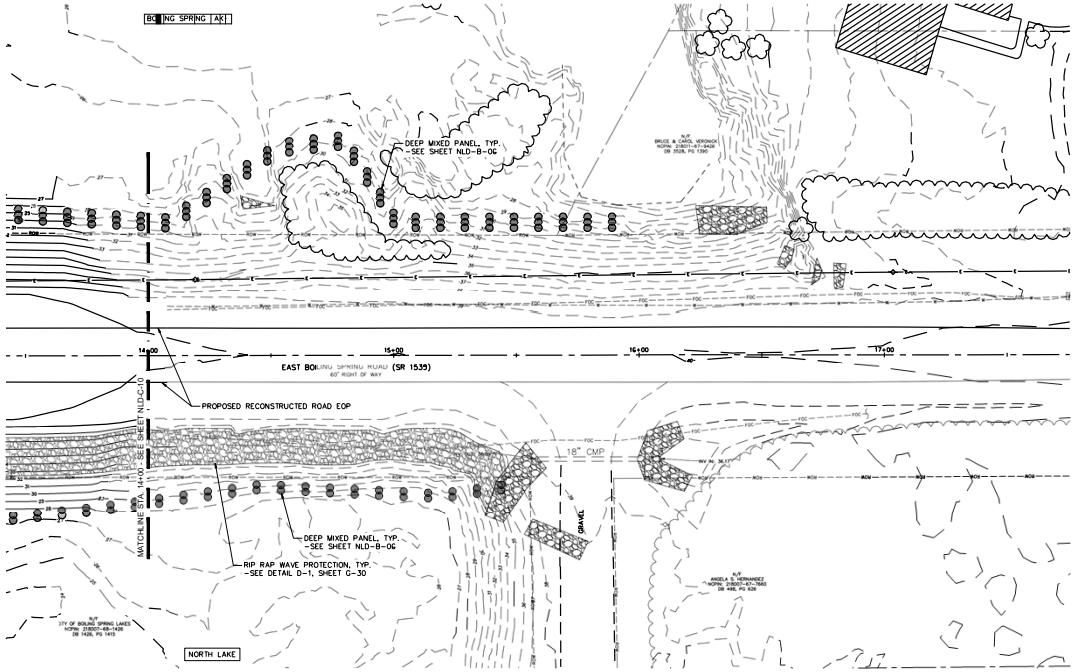
North Lake Dam

Right Abutment

PLAN

FLOW

NC GRID



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DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER			
M. NORTON	S. MEEKINS	FINAL SITE PLAN STA. 14+00 - STA. 17+50		
PROJECT MANAGER	REVIEWER	DATE	PROJECT#	FUNDING#
M. HANSON	M. HANSON	JULY 17, 2020	20.07036	N/A

SHEET

NLD-C-11

Pine Lake Dam

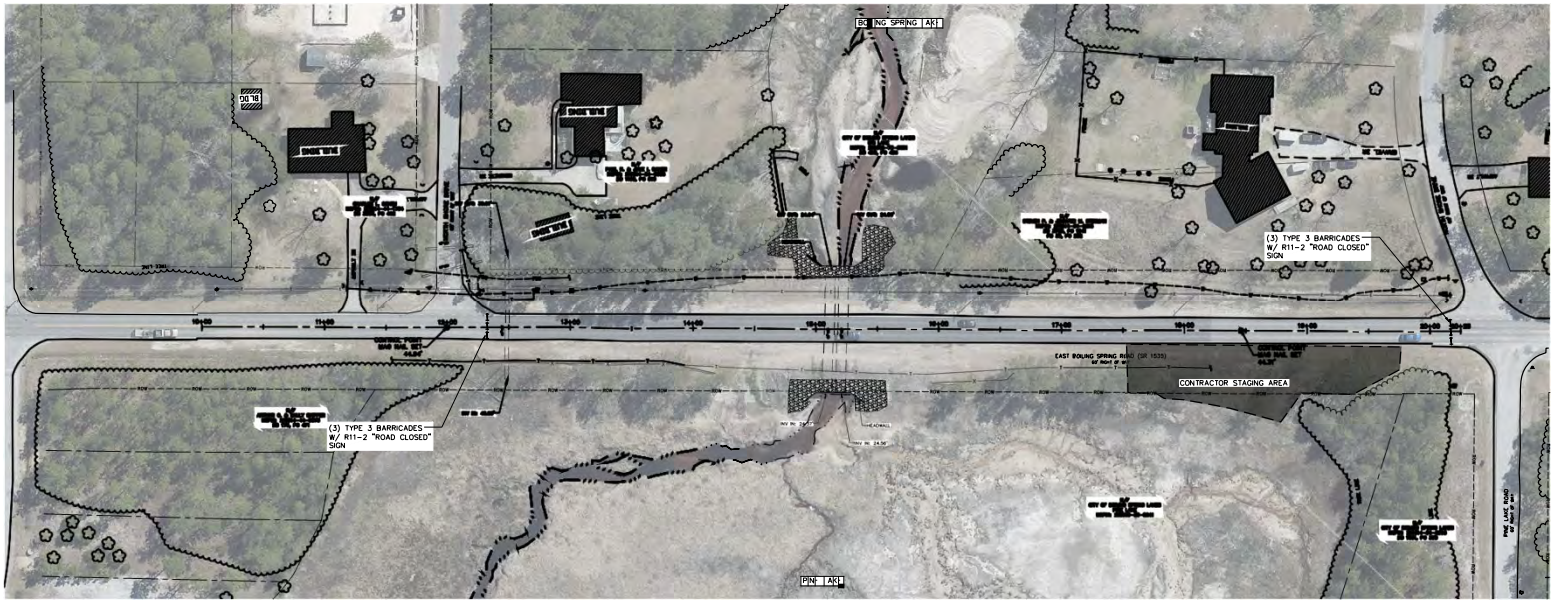
Pine Lake Dam

Staging

PLAN

FLOW

NC GRID



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11A Oak Branch Drive / Greensboro, NC 27407
T/ 336-274-9456 F/ 336-274-9468 / schnabel-eng.com

N	DA	B	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 40 0 20 40 80 — DIVISION VALUE = 40 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

SITE ACCESS AND
TEMPORARY FACILITIES

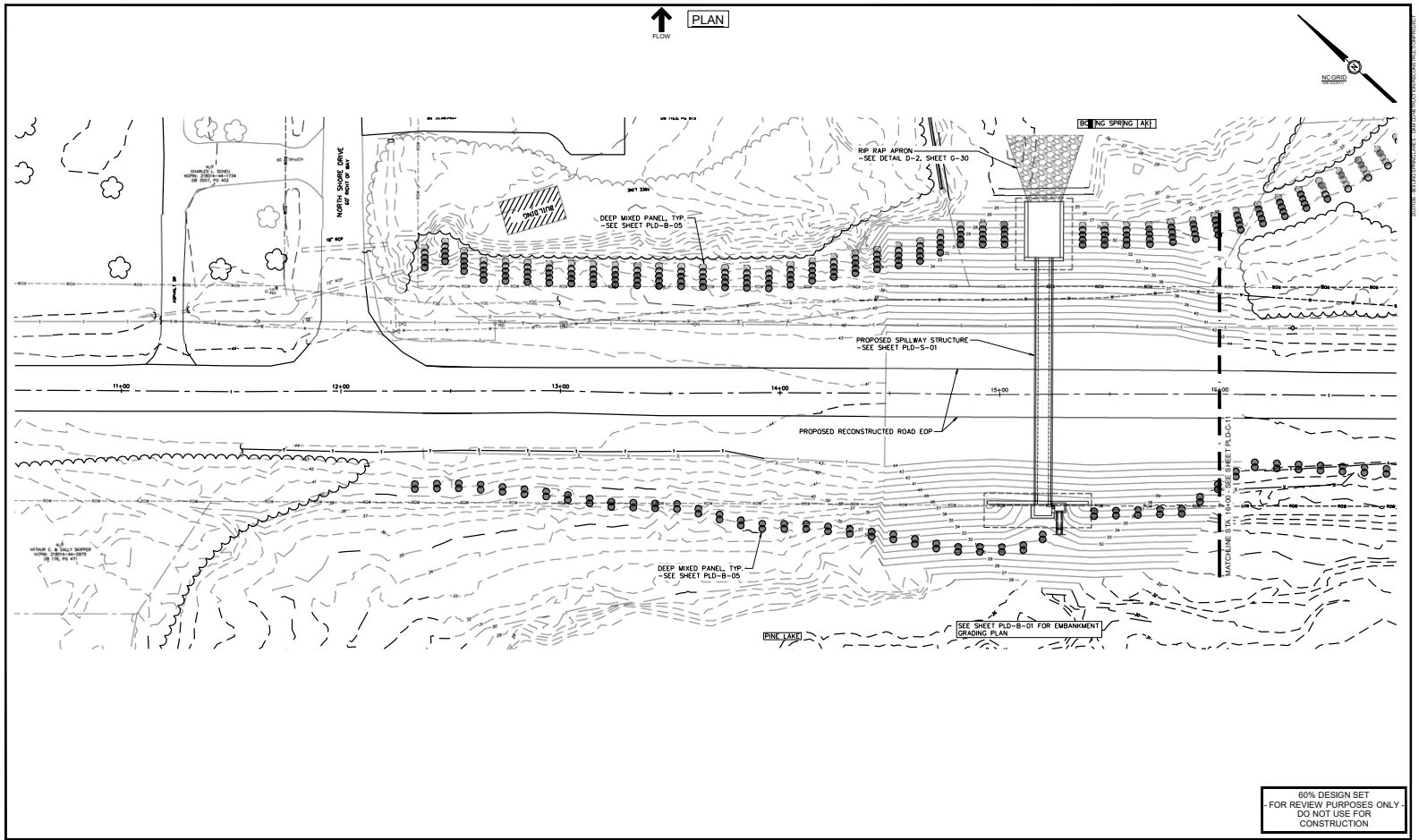
DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET

PLD-C-20

Pine Lake Dam

Left Abutment



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHICSCALE 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

FINAL SITE PLAN STA. 11+00 - STA. 16+50

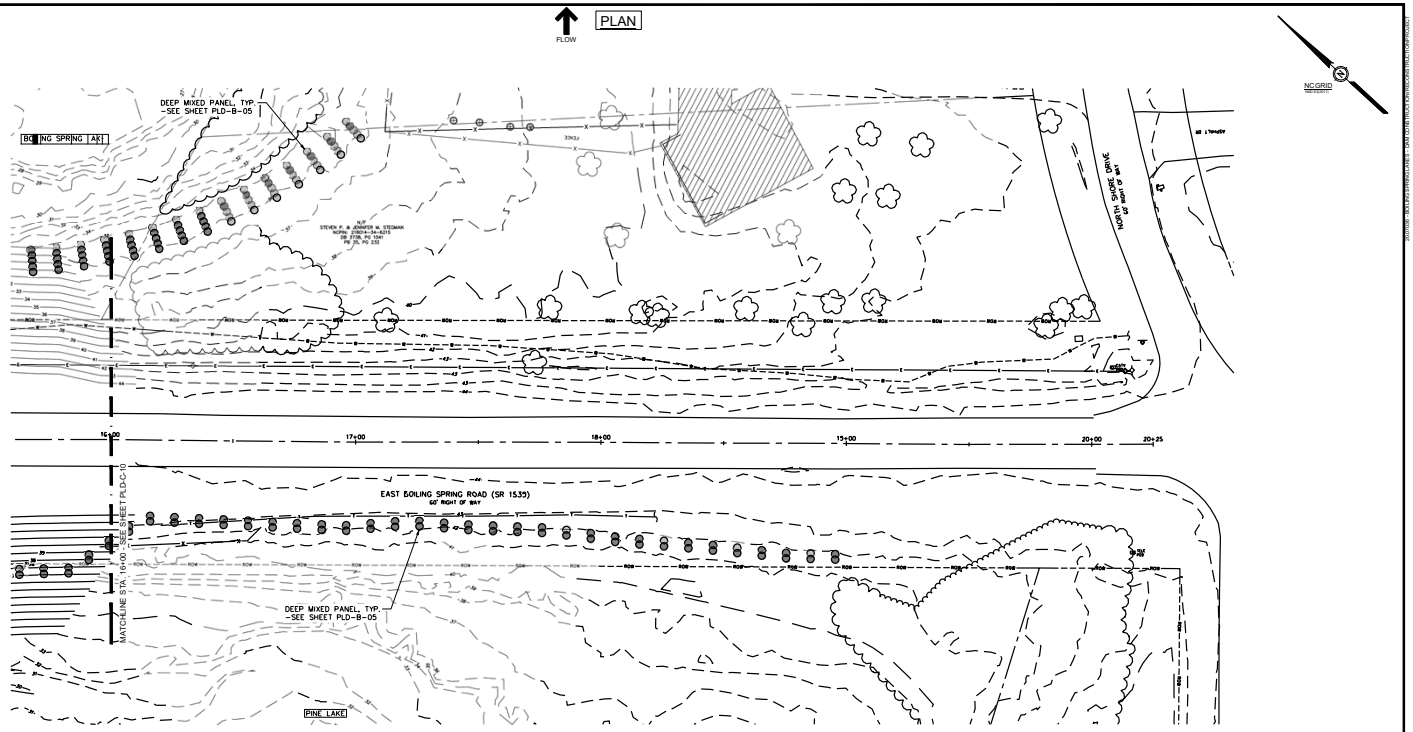
DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET

PLD-C-10

Pine Lake Dam

Right Abutment



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NO.	DATE	BY	DESCRIPTION

DAM CONSTRUCTION/
RECONSTRUCTION PROJECT

BOILING SPRING LAKES

BRUNSWICK COUNTY, NORTH CAROLINA

GRAPHIC SCALE: 20 0 10 20 40 — DIVISION VALUE = 20 FEET

OFFICE MANAGER	DESIGNER
M. NORTON	S. MEEKINS
PROJECT MANAGER	REVIEWER
M. HANSON	M. HANSON

FINAL SITE PLAN STA. 16+50 - STA. 20+25

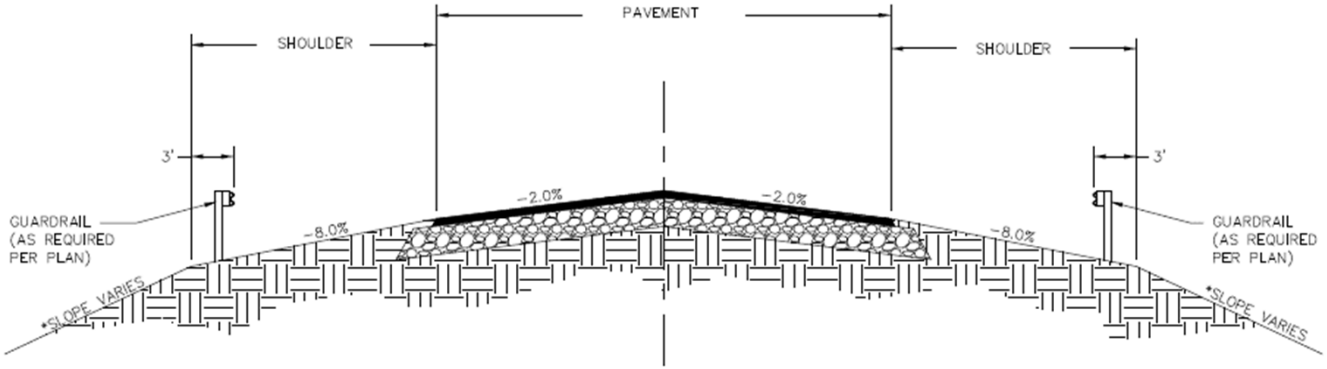
DATE	PROJECT#	FUNDING#
JULY 17, 2020	20.07036	N/A

SHEET

PLD-C-11

P:\2020\20.07036-BOILINGSPRL-DAME CONSTRUCTION\RECONSTRUCTION\WINGS\SHEET SP\PLD-C-10-11 PINE LAKE DAM FINAL SITE PLAN.DWG PLOT DATE 7/17/2020 3:32 PM CAROLINE HEATH-COAT

Roadway



Not to Scale

Utilities

Questions

September 18, 2020
Industry Day Q&A Minutes

Q: Is the duration for the contract for the entire project or are there interim completion milestones?
A: The duration we included in the Industry Day information was an estimated overall duration. We anticipate that that duration may change as we go through the RFQ process, refine our drawings, and move towards 100% completion on the entire design package. The coordination between the construction of the dams we're leaving primarily up to the contractor with the constraint the North Lake Dam is the only dam that cannot be constructed simultaneously with the other three dams. This is due to the limitations they have in being able to reroute traffic around that facility. The city, when these dams were breached, had no other opportunity but to route onto those unpaved and unsurfaced roads, and it created a significant problem for [the City] to maintain those during that time, so we're trying to avoid recreating that situation. That's why North Lake is going to be the primary focus once Alton Lennon Rd. is open, then we've got another alternate route for everyone that lives beyond that facility to come in and not have to go through those back areas. At this point, we do not have included in our preliminary documents an interim finish date for any of the individual dams. What I would say though is that the city is looking for the speediest way to get all of these dams reconstructed and get all of the roadway reopened. So, we will be looking to the contractor through the RFQ process, through the RFP process and your scheduling for information coming back to us on what you believe is the most feasible way to achieve getting the dams open with the least amount of conflict and getting all the roadways back in use.

Q: What permits are the contractors going to be responsible for?
A: We are working with Army Corps and DEQ as part of our design process to obtain all the environmental permits that are necessary. Because there is involvement with FEMA, we'll also be going through their NHP unit that will be backchecking and verifying that all the federal permitting requirements have been met. In addition to that, we're working with NC Dam Safety, so they will be issuing a permit to construct. So those are the main agencies that we anticipate will be involved in the overall permitting. We expect that we will have all permits in place, they will be part of the package provided to the contractor prior to notice to proceed. And as mentioned earlier, there are constraints on some of the elements of the permit design that are going through Dam Safety. We'll be highlighting that as part of the bid package, so control of water is going to be a major feature that they're pressing on wanting to have pretty much as well solidified as possible without any significant change, so we'll be trying to highlight if there are changes in control of water that are deemed significant by that agency that could end up in 30 to 60 day delays on your schedule as a contractor.

As of right now, we do not anticipate that there will be any permits that the contractor will be responsible for. If there are permits that are the contractor's responsibility, we will make sure those are identified as part of the bid package. I do not anticipate that this project will be a great

exporter of material, I expect it will be an importer of material. In the case that the projects generate a lot of potential export, to keep things fair with mining operations, there are permitting requirements that have been required by DMLR there, so we'll look into that.

The temporary construction areas and roadway permits will be handled by the City. If the contractor needs additional staging areas beyond what is shown within the plans, the coordination with private and public agencies and any associated permits for those additional impacts are the responsibility of the contractor.

Something to keep in mind is that FEMA will want to know where your material is coming from and where it's going to. There will be requirements for material that is hauled offsite, whether it's deemed to be reusable for other construction activities or it's deemed as debris, it will all have to be identified and quantified as to where it's being hauled to and disposed of.

Q: You mentioned state and federal funds. Are 100% of the funds secured for this project?
A: As of right now, we anticipate that the city will be proceeding with the project. All four dams are eligible by FEMA standards. They have not been obligated yet since we're still in negotiations with them as to what they will cover and what they won't cover, but then the City will be making up the difference via a bond fund.

Q: Is the contractor going to be required to get permitting for roadway units?
A: The city will take care of that. We anticipate that all temporary construction easements will all be obtained as part of the design process. Beyond the staging areas that are included in the plans, if the contractor determines that they need additional staging areas located at each dam site or more staging areas than what is already provided within the plans for the project, then obtaining any additional coordination with private agencies, public agencies, etc to obtain the rights for staging or use of that land, and any permits associated with that, would be the contractor's responsibility.

Q: Is this just going to be one contract?
A: As of right now we anticipate that this will be one prime contract, we expect that one general contractor will oversee all four dams' construction. However, for FEMA purposes, they split in two, in the sense that Sanford and Upper are considered one project and Pine Lake and North Lake will be in the second project. So we may, when we get to the selection of the contractor, talk about how invoicing is going to have to be done and all the ways we can identify what's being done where for FEMA purposes.

Q: **Has this been advertised yet?**
A: No. We're looking at an RFQ going out sometime later this year, but prior to the end of the

year. We anticipate that the RFP will be going out in Spring of next year, probably looking at March or April. That's dependent on receipt of final permits, approval from Dam Safety, etc. There are certain steps the city has to go through to proceed with the prequalification contract procurement, so as of right now we're anticipating that the city will do those processes, which we have to wait for to be completed to put out the RFQ.

Q: Is there an engineering estimate?
A: As of right now, the engineers estimate is not being made available.

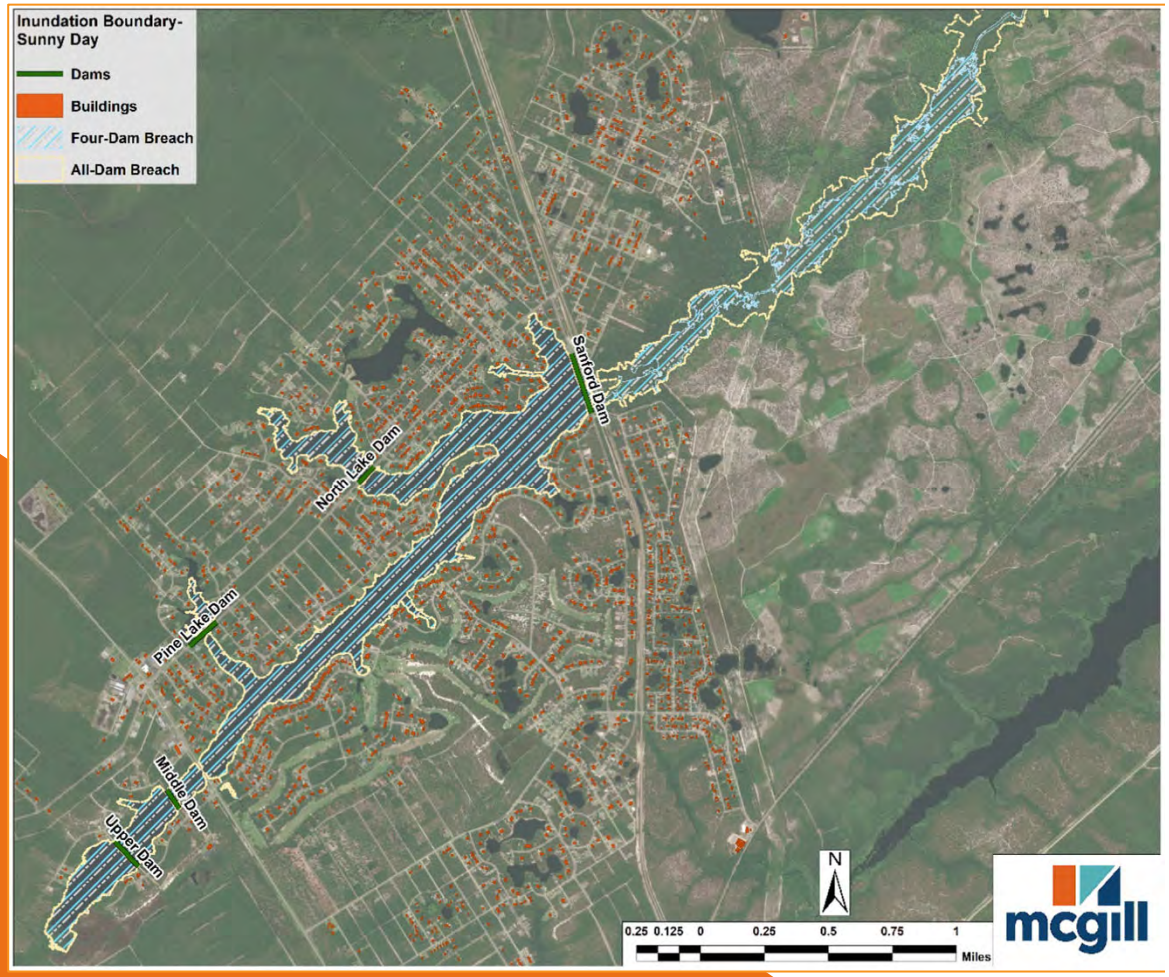
Q: So, the city will prequalify contractors and then send them the RFP?
A: Yes, that's the expectation. It will go through a prequalification process that will be distributed as a typical RFQ on a public project. So, it will be distributed widely through the bid houses, and then as we go through the qualification process, based on everyone who comes in with a qualifications package, we will identify those potential applicants that are qualified and they will then receive the RFP.

Q: Will specialty subs be included in this qualification or will they be in their own?
A: As of right now, because we're looking at a single general prime, we'll be expecting that each general prime will have all specialty subs brought in under their team. We'll be looking specifically for specialty subs to be identified as part of that quals package so that that can be included as part of the overall evaluation of qualifications of the team.

BOILING SPRING LAKES DAMS CONSTRUCTION/RECONSTRUCTION

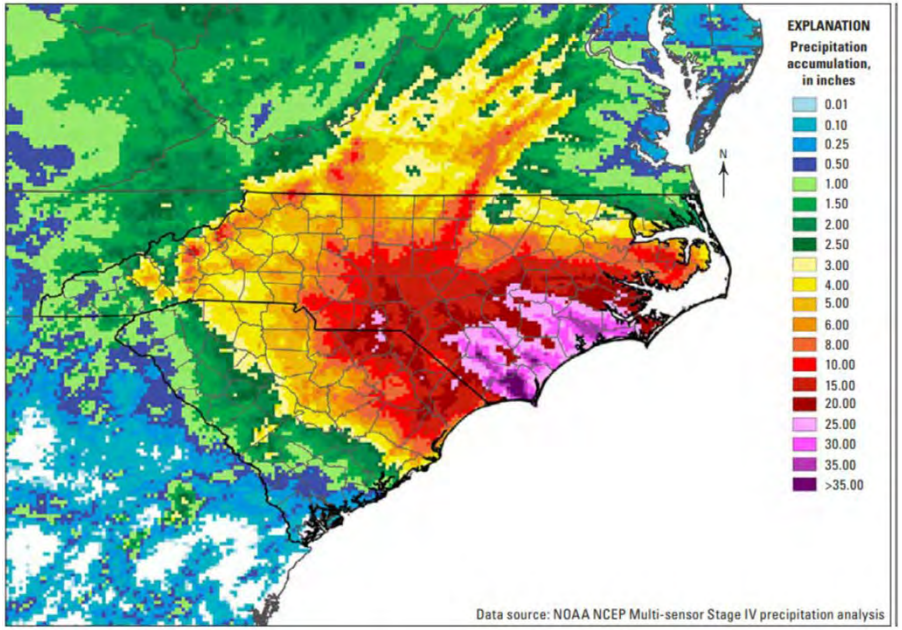
90% Board Update

January 24, 2021



Agenda

- 90% Design Update
- FEMA
- City's Potential Cost Share
- RFQ (Prequalification)
- Next Steps



Project Status

Notable Events Since 60%	
• PLD/NLD Eligible Cost Submittal	9/28/20
• RFQ Issued	10/14/20
• Pre 90% call with Dam Safety	10/20/20
• SD/ULD Eligible Cost Submittal	12/22/20
• Dam Safety 90% Submittal	1/14/21
• Qualified Bidder's List and Easements	1/22/21

Recent FEMA Coordination

- Date: 9/28/2020
- Topics
  - ✓ PLD, NLD and EBSR
  - ✓ NCDOT project
- Results
  - ✓ FEMA sent to CRC on 1/22/2021

- Date: 12/22/20
- Topics
  - ✓ SD and ULD
- Results
  - ✓ CRC review nearing approval

Discussions on Mitigation for all Dams will commence once we have base costs approved. Anticipate up to 100% of base cost

Projected City Cost Share

Dam	Improved Project Cost [1]	FEMA Eligible Base Cost	FEMA CEF	Potential Mitigation [3]	City's Share
SD	$28,046,648	$ 5,725,308	$ 3,391,909	$ 5,725,308	$13,204,124
ULD	$1,994,921	$356,351	$ 298,288	$356,351	$983,932
NLD [2]	$1,524,667	$483,077	$ 400,954	$1,758,077	$0
PLD [2]	$1,246,648	$293,847	$ 243,893	$703,847	$5,061
TOTAL	**$32,812,884**	**$6,858,582**	**$4,335,044**	**$7,268,582**	**$14,193,116**

1 Based on Engineer's 90% Estimate of Probable Construction Cost

2 Based on prelim submittal and CEF from ULD, actual eleigible cost may vary

3 Mitigation limited 100% FEMA Base SD/ULD, Includes NCDOT costs for PLD/NLD

Note: All amounts are still tentative pending FEMA approval

RFQ

- The City received 10 submittals
- The Evaluation Committee reviewed all submittals and met to discuss results
- Conclusion is 6 qualified bidders (announced 1/22/21)

Boiling Spring Lakes Dams Construction/Reconstruction
Prequalification Scoring Matrix

				1	2	3	4	5	6	7	8	9	10
Reviewer:				Civil Works Cont.	Crowder	Johnson Bros.	Kiewit	Morgan Corp.	Phillips & Jordan	Sequoia	Spell Const. Co.	Thalle Const. Co.	Trader Const. Co.
Form #	Description	Score Condition	Max. Score	Pts	Pts	Pts	Pts	Pts	Pts	Pts	Pts	Pts	Pts
Totals				101	151	146	121	161	161	146	DQ	156	121
ECTION 2. MINIMUM CRITERIA FOR PREQUALIFICATIONS													
A	Is your firm registered to do business in the State of North Carolina?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
B	Is your firm a licensed contractor in the State of North Carolina?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
C	Does your company have the resources to bond this project?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
D	Surety Bond Rating												
	a) Surety letter attached?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
	b) Surety bond rating A or better under the A.M. Best Rating system or The Federal Treasury List?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
E	Insurance and indemnification												
	a) Is the company capable of meeting the minimum insurance requirements?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
	b) Copy of company insurance certificate attached?	(If "No" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
F	Has your present company, its officers, owners, or agents ever been barred from bidding public work in North Carolina.	(If "Yes" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
G	Has your present company, its officers, owners, or agents been convicted of charges relating to conflicts of interest, bribery, or bid-rigging in the last five years.	(If "Yes" then Disqualified otherwise 1)	1	1	1	1	1	1	1	1	1	1	1
			9	9	9	9	9	9	9	9	9	9	9

Schedule

- Durations from Contractors ranged from 2.5 to 4 years with an average of 3 years
- Engineer's estimate is 3-4 years
- Cost will increase as duration limit reduces
- Example: Paving Drayton Road (est. $550K) would allow PLD and NLD to proceed in parallel which could save 3-4 months. This is currently an Alternate Bid Item.
- Consider adding incentives

Next Steps

Critical Dates	
• Coordinate FEMA Eligible Costs and Mitigation	12/20/20 - 3/1/21
• Dam Safety Review and Approval	1/14/21 to 4/14/21
• Bidding and Contractor Selection	4/14/21 to 6/15/21
• Estimated Start of Construction	7/1/21

City of Boiling Spring Lakes
PUBLIC NOTICE

PRELIMINARY PUBLIC NOTICE FOR POTENTIAL IMPACTS TO FLOODPLAINS

The City of Boiling Spring Lakes intends to seek financial assistance from USDA, Rural Housing Service (RHS) for construction repairs to four (4) existing dams. The proposed project consists of repairs to North Lake Dam (BRUNS-001), Pine Lake Dam (BRUNS-002), Boiling Springs Lake/Sanford Lake Dam (BRUNS-003), and Boiling Springs Lake Upper Dam (BRUNS-011). During Hurricane Florence, Sanford Lake Dam suffered a catastrophic failure due to overtopping and subsequent embankment erosion that caused cascading failures at the North Lake Dam, Pine Lake Dam, and Upper Lake Dam. The existing dams are located in the City of Boiling Spring Lakes, Brunswick County, North Carolina.

If implemented, the proposed project will improve existing structures located in previously converted Base Floodplain -which is the 100-year floodplain or (one-percent chance floodplain), by constructing the dam repairs in the floodplain. In accordance with Executive Order 11988, Floodplain Management and USDA Departmental Regulation 9500-3, Land Use Policy, the purpose of this notice is to inform the public of this proposed conversion or effect and request comments concerning the proposal, alternative sites or actions that would avoid these impacts, and methods that could be used to minimize these impacts.

The environmental documentation regarding this proposal is available for review at 2736 NC Highway 210, Smithfield, NC 27577 or electronically upon request. For questions regarding this proposal, contact Tobais Fullwood, Area Specialist, USDA Rural Development at 910.300.4841 or Tobais.Fullwood@usda.gov.

Any person interested in commenting on this proposal should submit comments to the address above by March 25, 2021.

Jane McMinn
City Clerk

(3-10, 17)

:K COUNTY
ROLINA

FFIDAVIT OF PUBLICATION

dersigned, a Notary Public of said County and State, ɔned, qualified and authorized by law to administer ly appeared MARISA BUNDRICK, who, being ı, deposes and says that she is the employee autho- this affidavit, of The State Port Pilot Inc., engaged on of a newspaper known as THE STATE PORT ıed, issued and entered as periodicals mail in the ɔrt, in said County and State; that the notice or other ıent, a true copy of which is attached hereto, was HE STATE PORT PILOT on the following dates: March 10, March 17 ; ewspaper in which said notice, paper, document or nent was published was, at the time of each and ication, a newspaper meeting all of the requirements ns of Section 1-597 of the General Statutes of North Carolina and was a qualified newspaper within the meaning of Section 1-597 of the General Statutes of North Carolina.

This the 18th day of March, 2021.

Marisa Bundrick
(Signature of person making affidavit)

Sworn to and subscribed before me this 18th day of March, 2021.

Shannon M Gladden
Notary Public Exp: 4/22/2024

BRUNSWICK COUNTY
NORTH CAROLINA

City of Boiling Spring Lakes
PUBLIC NOTICE

The City of Boiling Spring Lakes intends to seek financial assistance from USDA, Rural Housing Services (RHS) for construction repairs to four (4) existing dams. The proposed project consists of repairs to North Lake Dam (BRUNS-001), Pine Lake Dam (BRUNS-002), Boiling Spring Lake/Sanford Lake Dam (BRUNS-003), and Boiling Spring Lake Upper Dam (BRUNS-011). During Hurricane Florence, Sanford Lake Dam suffered a catastrophic failure due to overtopping and subsequent embankment erosion that caused cascading failures at the North Lake Dam, Pine Lake Dam, and Upper Lake Dam. The existing dams are located in the City of Boiling Spring Lakes in Brunswick County, North Carolina. RHS has assessed the environmental impacts of this proposal and determined that the location of the dam repair project will convert or effect a floodplain or critical action floodplain. In accordance with Executive Order 11988, Floodplain Management and USDA Departmental Regulation 9500-3, Land Use Policy, the Agency is notifying the interested public of this land conversion. It has been determined that there is no practicable alternative to avoiding this conversion or effect and that there is a significant need for the proposal. The basis of this determination is due to the type of project (i.e., repair of a dam), the floodplain is the only practicable location for the proposed project. RHS received no comments during the 14-day preliminary public notice comment period.

For information regarding this notice, contact Tobais Fullwood, Area Specialist, USDA Rural Development at (910) 300-4841 or Tobais.Fullwood@usda.gov.

(7-7)

AFFIDAVIT OF PUBLICATION

undersigned, a Notary Public of said County and State, ssioned, qualified and authorized by law to administer nally appeared MARISA BUNDRICK, who, being orn, deposes and says that she is the employee autho- ke this affidavit, of The State Port Pilot Inc., engaged cation of a newspaper known as THE STATE PORT lished, issued and entered as periodicals mail in the hport, in said County and State; that the notice or other isement, a true copy of which is attached hereto, was THE STATE PORT PILOT on the following dates: July 7, 2021;

l newspaper in which said notice, paper, document or isement was published was, at the time of each and ublication, a newspaper meeting all of the requirements tions of Section 1-597 of the General Statutes of North d was a qualified newspaper within the meaning of Section 1-597 of the General Statutes of North Carolina.

This the 8th day of July, 2021.

Marisa Bundrick
(Signature of person making affidavit)

Sworn to and subscribed before me this 8th day of July, 2021.

Shannon Glaccle
Notary Public Exp: 4/22/2024