51377

Westinghouse **SCANNED**

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AUG 02 2019
SC Department of
Health & Environmental Control

Westinghouse Electric Company
Nuclear Fuel
Columbia Fuel Fabrication Facility
5801 Bluff Road
Hopkins, South Carolina 29061
USA

SCDHEC, BLWM
Kim Kuhn
2600 Bull Street
Columbia, SC 29201

Direct tel: 803.647.1920
Direct fax: 803.695.3964
e-mail: joynerdp@westinghouse.com

Your ref:
Our ref: LTR-RAC-19-61

August 2, 2019

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AUG 0 5 2019
SITE ASSESSMENT
REMEDIATION &
REVITALIZATION

Subject: RI Work Plan **Additional Floodplain Assessments**

Mrs. Kuhn:

Please find attached for your consideration a proposal to conduct additional assessments to support the Remedial Investigation (RI) Work Plan. Based upon the July 11, 2019 meeting and discussions with the Department, the attached document proposes additional floodplain assessment.

Respectfully,

Diana P. Joyner
Principal Environmental Engineer
Westinghouse Electric Company, CFFF
803.497.7062 (m)

cc: E. Wills, EH&S Manager
N. Parr, Environmental Manager
J. Grant, AECOM Project Manager
ENOVIA Records

Enc.: "Columbia Fuel Fabrication Facility, Additional Floodplain Assessment, RI Work Plan, AECOM, File #51377.

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AECOM
101 Research Drive
Columbia, SC 29203

(803)254-4400
(803)771-6676

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August 2, 2019

Ms. Kimberly M. Kuhn, Project Manager
State Voluntary Cleanup Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
2600 Bull Street
Columbia, S.C. 29201

Subject: **Columbia Fuel Fabrication Facility**
Additional Floodplain Assessment
Richland County, S.C.
Consent Agreement CA-19-02-HW
File # 51377

Dear Ms. Kuhn:

Based upon our July 11, 2019 meeting, AECOM submits the following additional floodplain assessment plan for your review and approval.

Background

Westinghouse Electric Company. Inc. (Westinghouse) Columbia Fuel Fabrication Facility (CFFF) is currently conducting multi-media assessment of their facility for constituents of potential concern (COPCs) based upon the AECOM Final Remedial Investigation Work Plan submitted in June 2019. The Remedial Investigation (RI) Work Plan was submitted to satisfy item 1 of Consent Agreement CA-19-02-HW between Westinghouse and the South Carolina Department of Health and Environmental Control (SCDHEC). The assessment included the installation of ten lithologic borings from June 10, 2019 through June 25, 2019 within the floodplain south of the developed portion of the property. The borings were intended to gather information about the subsurface geology since an approximately 20-30 foot high bluff separates the developed portion of CFFF from the floodplain.

Previously, two monitoring wells (W-20 and W-25) were installed within the floodplain and numerous monitoring wells and borings had been installed above the bluff that separates the developed portion of the property from the floodplain. The lithologic borings provided additional geological information for the floodplain area. Data gathered from the lithologic borings was inputted into the conceptual site model (CSM). The CSM indicated that there may be connections between conductive sand units above the bluff to the conductive sand units below the bluff.

Proposed Further Floodplain Assessment

Geologic data indicates that there are multiple sand layers within the floodplain through which COPCs could potentially migrate and that these sand layers may be connected to sand layers above the bluff. Because of the highly dynamic fluvial environment that these sediments were deposited in, the current data does not allow for the determination of which sand layers within the floodplain may or may not contain COPCs.

Therefore, CFFF and AECOM propose to collect groundwater vertical profiling samples from seven locations within the floodplain to assess where future groundwater monitoring wells may need to be located and to recommend the appropriate screening intervals. The proposed locations for additional floodplain screening include previous borings L-1, L-8, L-9 and L-10 where sand intervals are known and new borings L-17 through L-19 (**Figures 1 through Figure 4**). Borings L-8 through L-10 and L-19 are located on the northeastern side of Lower Sunset Lake and borings L-1, L-17 and L-18 are located to the south of Upper Sunset Lake.

Vertical Groundwater Profiling Methodology

Vertical groundwater profiling involves obtaining groundwater samples for laboratory analyses from discrete sampling intervals, which were either previously determined or are determined by field personnel based upon subsurface lithology, to assess groundwater quality within a vertical borehole. Proposed borings, associated lithologic information, screening interval and analytes are displayed in the attached **Table 1**.

Groundwater profiling via the rotosonic drilling method will include the following:

- Advancement of a ten foot long inner core barrel to desired depth (either three inch or four inch);
- Advancement of an over-ride casing to same depth as inner barrel (either five inch or six inch);
- Removal of inner core barrel followed by lithologic descriptions of the soil core;
- Installation of 5-foot long, two-inch diameter steel, slotted screen attached to two-inch diameter steel riser pipe to the bottom of the over-ride casing. The riser pipe is fitted with an inflatable packer. The packer is connected to an air compressor at land surface via polyethylene air supply line;
- The over-ride casing will then be pulled up approximately five feet, exposing the screen interval to the bottom of the borehole. The packer will be inflated, sealing off the over-ride casing above the bottom of the borehole and screen;
- A small submersible pump with disposable polyethylene tubing will be lowered into the two-inch riser to a depth just above the screen interval and used to purge water from the aquifer. The purpose of the purging is to remove drilling fluids introduced to the aquifer and obtain groundwater samples that are representative of the water quality within each discrete screened interval.
- Water quality parameters will be measured approximately every five minutes using a water quality meter equipped with a flow-through cell. The water quality parameters will include temperature, pH, specific conductivity, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity. Field water quality meters will be calibrated prior to delivery to the site and at the beginning of each day using fresh standards, each in accordance with the manufacturers' recommendations. Additional calibrations will be performed as warranted (i.e., if the instrument is behaving erratically). Calibration details will be recorded on calibration log forms.
- Purging will proceed until pH is within 0.2 standard units (SU) and specific conductivity and temperature are within 3%. If water quality parameters do not stabilize after a sufficient amount of time, the field geologist and project manager will decide when purging is complete. Although turbidity will be measured during the purging, it will not be used as a stabilization parameter because these temporary wells do not have a sand pack to assist in the reduction of turbidity;

- Once field measurements indicate stable groundwater conditions are achieved, a groundwater sample will be collected in laboratory supplied sample bottles; and

- After the groundwater sample is collected, the boring will be advanced to the next screening interval or properly abandoned if the total vertical profiling depth has been reached.

Prior to collection of vertical groundwater profiling samples from borings L-17 through L-19, subsurface soils will be logged by a South Carolina registered professional geologist to assess the depths to sand layers. Based upon the number and thickness of sand layers in these locations, field personnel will determine the intervals for groundwater screening sample collection.

Rotosonic tooling will be left in the ground at borings L-17 through L-19 after the initial boring is completed to assess the subsurface lithology. A secondary boring approximately 5 feet from the initial location will be drilled to collect the groundwater samples. Leaving the tooling in the ground at the first boring while the secondary boring is completed will allow groundwater samples to be collected without potential pH interference from Portland cement bentonite mixture used for borehole abandonment. After the groundwater samples are collected, both borings at each location will be properly abandoned with a Portland cement and bentonite (up to 5%) grout via tremie pipe. The groundwater sample collection borings at locations L-1 and L-8 through L-10 will be installed approximately 10 to 15 feet sidegradient (east/west), if possible, from the original location to avoid the potential pH interference of the Portland cement bentonite mixture used to properly abandon the original borehole.

Groundwater Analyses

COPCs northeast of Lower Sunset Lake where borings L-8, L-9, L-10 and L-19 are located are chlorinated volatile organic compounds (CVOCs); particularly tetrachloroethene (PCE) and trichloroethene (TCE), nitrate and fluoride. CVOCs are currently the only known COPC that is potentially migrating south of Upper Sunset Lake where borings L-1, L17 and L-18 are located. Therefore, AECOM and CFFF propose that groundwater samples for the vertical profiling be analyzed for these COPCs in their respective boring locations. Proposed borings, associated lithologic information, screening interval and analytes are displayed in the attached **Table 1**.

Rush turnaround time may be requested for analysis of the groundwater samples from L-1, L-17 and L-18 to assess whether or not borings further south would be applicable for downgradient groundwater quality assessment. If additional borings are deemed appropriate, CFFF and AECOM will consult with SCDHEC personnel about the additional boring location(s).

Groundwater samples from the vertical profiling will be labeled with their boring designation and screened interval (i.e. L-1 10-15'). A duplicate groundwater sample will be collected from one of the borings in each lithologic study area. One equipment blank will be collected from the two-inch well screen and trip blanks will be included in the coolers containing VOC samples. The quality assurance and quality control samples will be labeled as described in the AECOM RI Work Plan.

Revised Schedule

Adding this proposed scope of work to the RI will result in needed revisions to the already approved RI Work Plan schedule. The following is the proposed revised schedule:

- Vertical groundwater profiling: August 14-23, 2019
- Vertical profiling analytical results received from the laboratory: September 6, 2019
- Propose floodplain monitoring well installation locations: week of September 9-13, 2019.
- Permanent Well Installation: September 16-27, 2019
- Permanent Monitoring well development and survey: September 30, 2019 through October 11, 2019

- Comprehensive groundwater sampling of the monitoring well network: October 14, 2019 through November 1, 2019
- Receipt of the groundwater analytical results and validation of the data: November 15-29, 2019
- Plume map generation and data integration into the Conceptual Site Model: December 2-13, 2019
- Presentation of the data and discussion with CFFF personnel, scheduling of meeting with SCDHEC personnel: December 16-21, 2019
- Meeting with SCDHEC personnel to discuss investigation results and to assess the next step(s): week of January 6-10, 2020

Should you have any questions regarding the information provided in this plan, please do not hesitate to contact AECOM at (803) 254-4400.

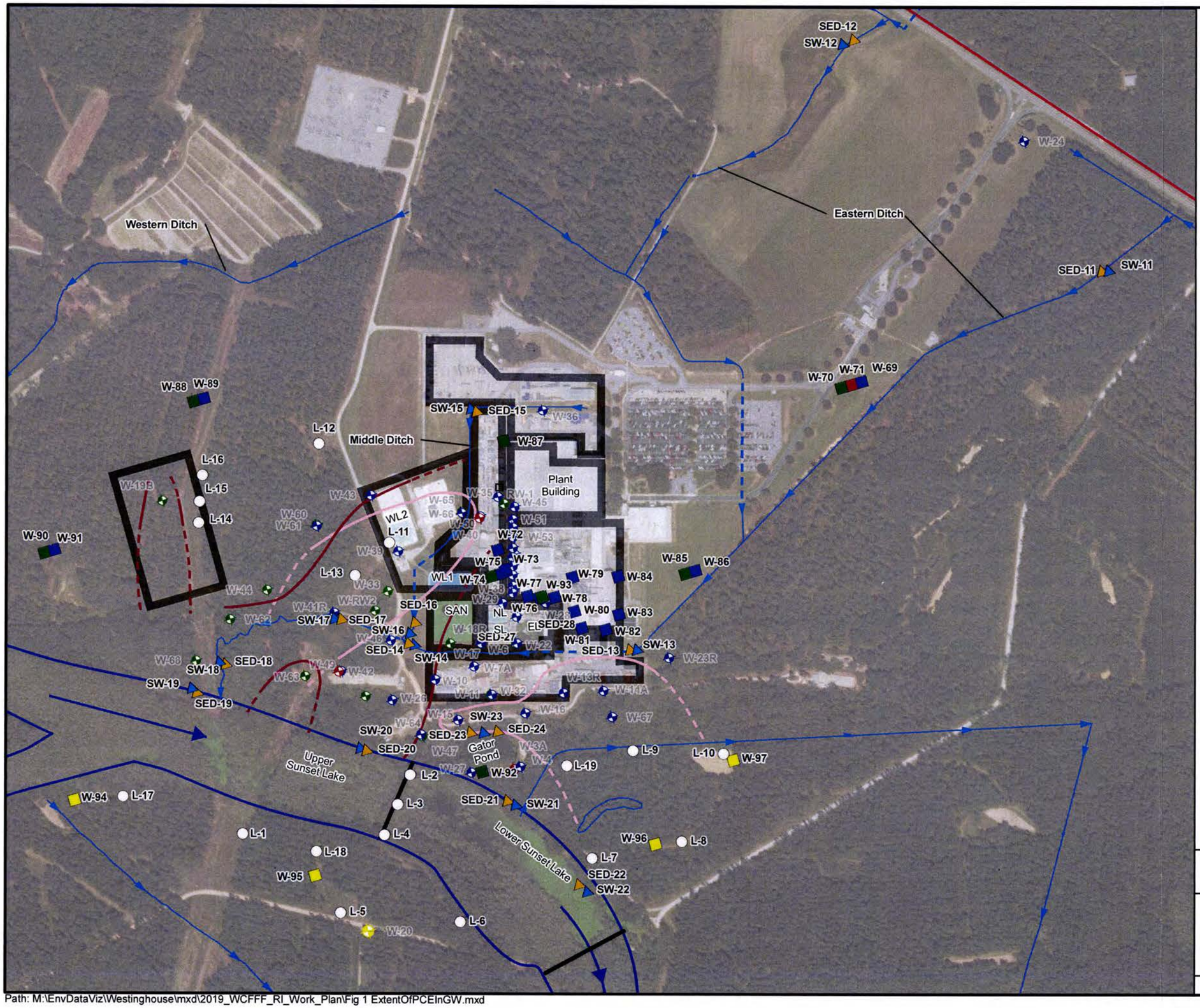
Sincerely,

Chuck Suddeth, P.G.
Project Geologist

Jeremy Grant, P.G.
Project Manager

Attachments: Figure 1 – Extent of PCE in Groundwater
Figure 2 – Extent of TCE in Groundwater
Figure 3 – Extent of Nitrate in Groundwater
Figure 4 – Extent of Fluoride in Groundwater
Table 1 – Proposed Vertical Groundwater Profiling Details

Cc: Nancy Parr, CFFF
Diana Joyner, CFFF
Ed Wills, Jr., CFFF



Legend

- Ditch
- Culvert
- Mill Creek Flow Direction
- EL East Lagoon
- NL North Lagoon
- SL South Lagoon
- SAN Sanitary Lagoon
- WL1 West Lagoon I
- WL2 West Lagoon II
- Mill Creek
- Property Line
- SCRDI Bluff Road Superfund Site
- Dike Location
- Operable Units

Groundwater Monitoring Wells

- Upper Surficial Aquifer
- Lower Surficial Aquifer
- Black Mingo Aquifer
- Floodplain Well

Proposed Locations

- Sediment Sample
- Surface Water Sample
- Lithologic Boring
- Upper Surficial Aquifer Monitoring Well
- Lower Surficial Aquifer Monitoring Well
- Black Mingo Aquifer Monitoring Well
- Floodplain Monitoring Well

COPC Isocontour Lines

- PCE - ≥ to MCL of 5 ug/L (Lower Surficial October-November 2018)
- PCE - ≥ to MCL of 5 ug/L (Upper Surficial October-November 2018)

0 250 500 Feet

1:6,000

Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet

Datum: North American 1983

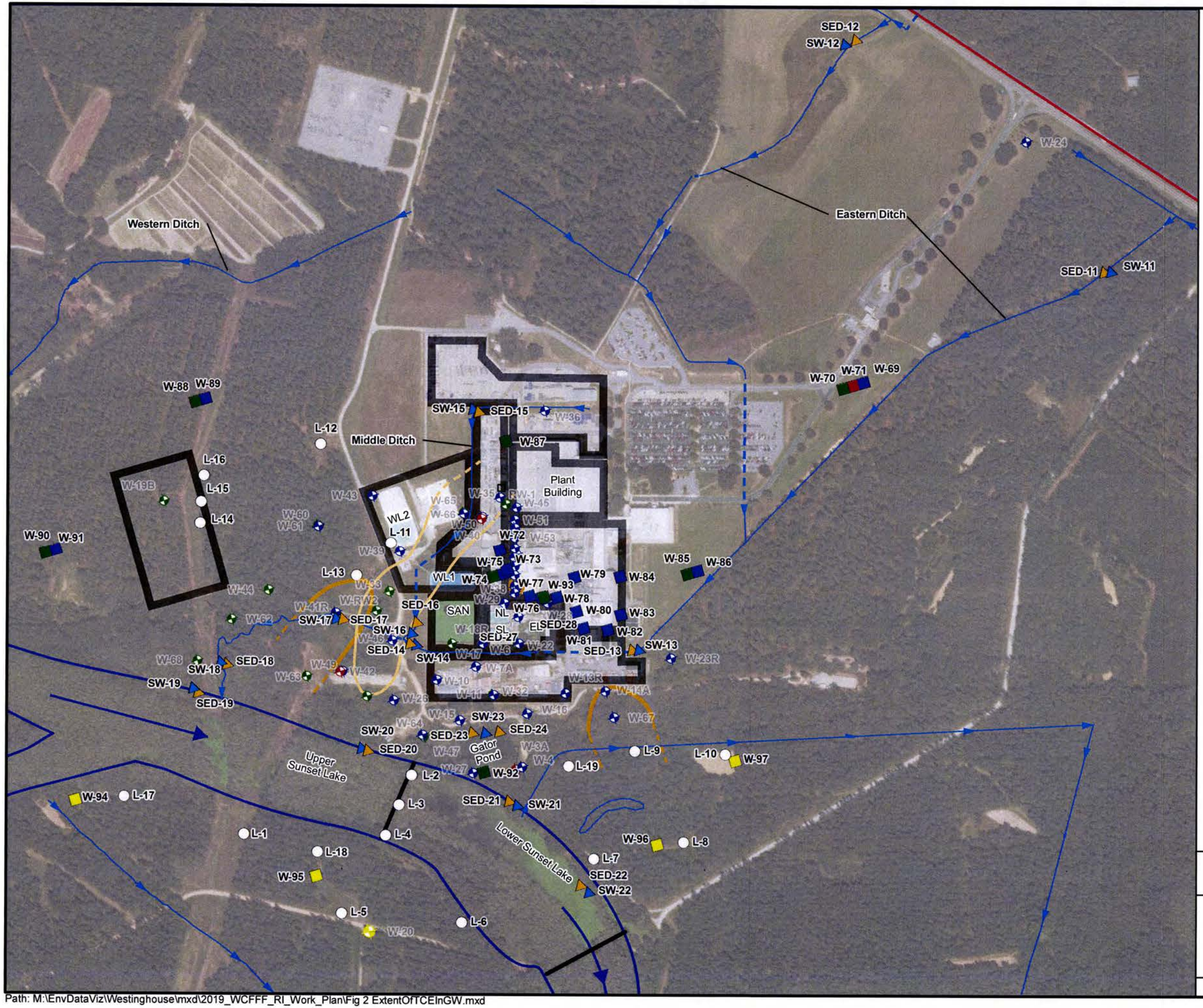
AECOM
101 Research Drive
Columbia, SC 29203
T: (803) 254-4400 F: (803) 771-6676

Extent of PCE in Groundwater

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	July 2019	FIGURE 1

Path: M:\EnvDataViz\Westinghouse\mxd\2019_WCFFF_RI_Work_Plan\Fig 1 ExtentOfPCEInGW.mxd



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Proposed Locations

- Sediment Sample
- Surface Water Sample
- Lithologic Boring
- Upper Surficial Aquifer Monitoring Well
- Lower Surficial Aquifer Monitoring Well
- Black Mingo Aquifer Monitoring Well
- Floodplain Monitoring Well

COPC Isocontour Lines

- TCE - ≥ to MCL of 5 ug/L (Lower Surficial October-November 2018)
- TCE - ≥ to MCL of 5 ug/L (Upper Surficial October-November 2018)

0 250 500 Feet

1:6,000

Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet

Datum: North American 1983

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Columbia, SC 29203
T: (803) 254-4400 F: (803) 771-6676

Extent of TCE in Groundwater

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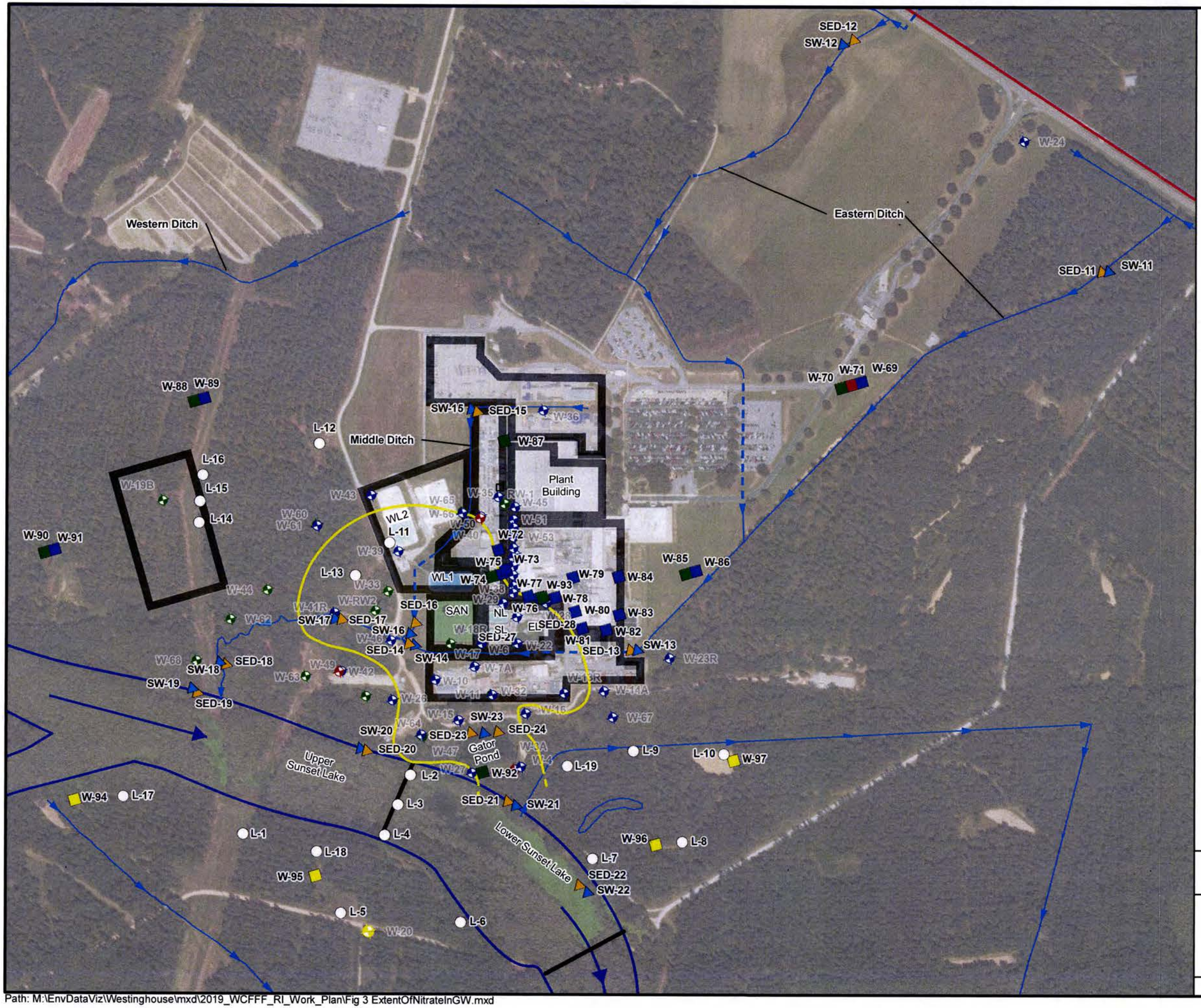
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	July 2019	FIGURE 2

Path: M:\EnvDataViz\Westinghouse\mxd\2019_WCFFF_RI_Work_Plan\Fig 2 ExtentOfTCEInGW.mxd



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- Floodplain Well

Proposed Locations

- Sediment Sample
- Surface Water Sample
- Lithologic Boring
- Upper Surficial Aquifer Monitoring Well
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- Floodplain Monitoring Well

COPC Isocontour Lines

- Nitrate - ≥ to MCL of 10 ug/L (October-November 2018)

0 250 500 Feet

1:6,000

Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet

Datum: North American 1983

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101 Research Drive
Columbia, SC 29203
T: (803) 254-4400 F: (803) 771-6676

Extent of Nitrate in Groundwater

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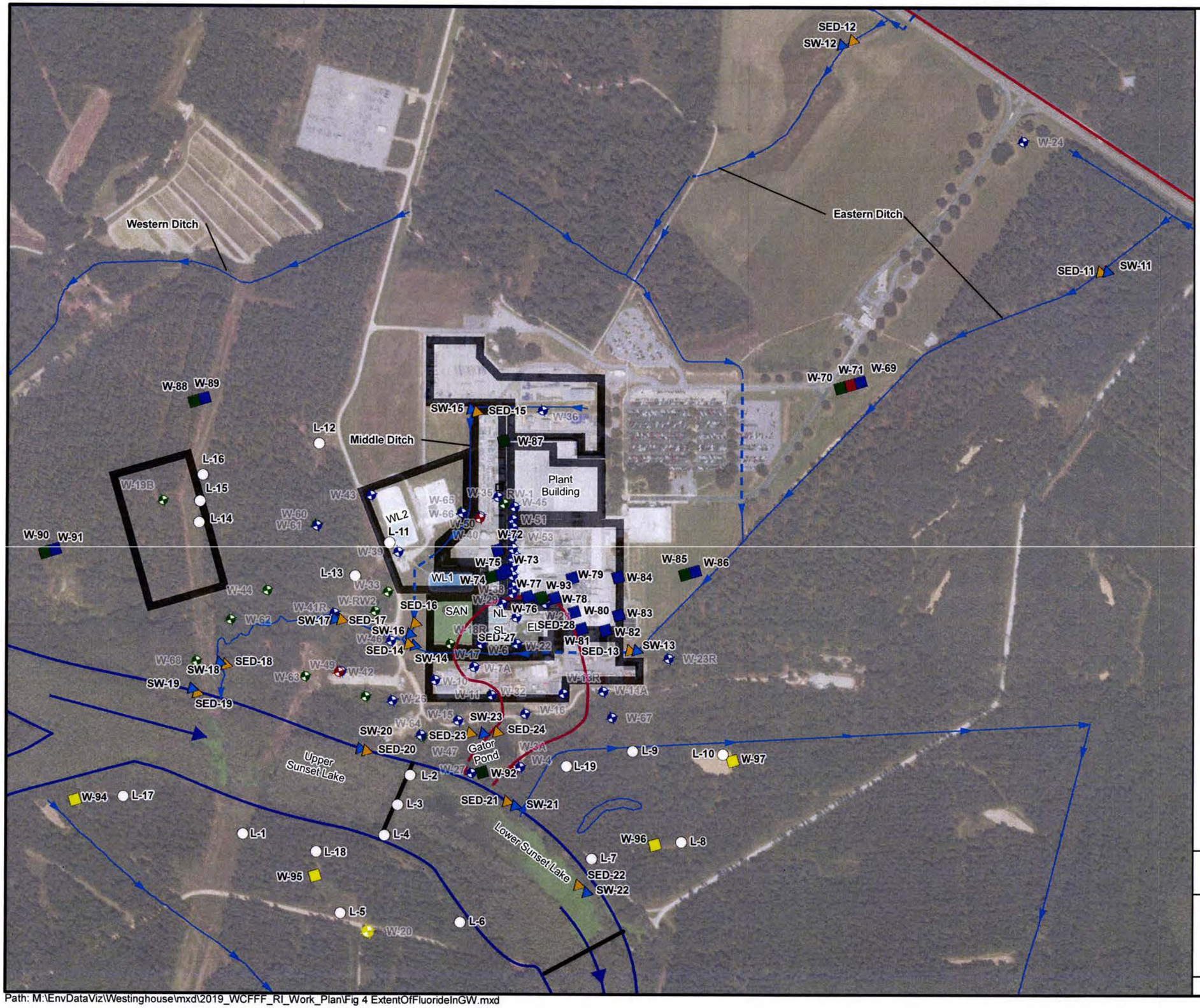
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	July 2019	**FIGURE 3**

Path: M:\EnvDataViz\Westinghouse\mxd\2019_WCFFF_RI_Work_Plan\Fig 3 ExtentOfNitrateInGW.mxd



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- Floodplain Well

Proposed Locations

- Sediment Sample
- Surface Water Sample
- Lithologic Boring
- Upper Surficial Aquifer Monitoring Well
- Lower Surficial Aquifer Monitoring Well
- Black Mingo Aquifer Monitoring Well
- Floodplain Monitoring Well

COPC Isocontour Lines

- Fluoride - ≥ to MCL of 4 ug/L (October-November 2018)

0 250 500 Feet

1:6,000

Map Projection: NAD 1983, South Carolina State Plane, FIPS 3900, Feet

Datum: North American 1983

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101 Research Drive
Columbia, SC 29203
T: (803) 254-4400 F: (803) 771-6676

Extent of Fluoride in Groundwater

WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY
HOPKINS, SOUTH CAROLINA

PROJECT NO.	PREPARED BY:	DATE:	
60595649	CCS	July 2019	FIGURE 4

Path: M:\EnvDataViz\Westinghouse\mxd\2019_WCFFF_RI_Work_Plan\Fig 4 ExtentOfFluorideInGW.mxd

Table 1
Westinghouse Columbia Fuel Fabrication Facility
Additional Floodplain Assessment
Proposed Vertical Groundwater Profiling Details

Sample Location	Depth Interval (feet)	Generalized Lithology	Sampling Interval(s) (feet)	Analytical Testing
L-1	0-8.5	Clayey silt	-	CVOCs by EPA Method 8260B
	8.5-33.5	Sand	10-15, 28-33	
	33.5-45	Silt	-	
	45-83	Sand	48-53, 63-68, 78-83	
	83-86	Clay	-	
L-8	0-8	Clayey silt	-	CVOCs by EPA Method 8260B, nitrates by EPA Method 353.2, fluoride via EPA Method 9056A
	8-22	Sand	8-13, 17-22	
	22-25	Silty clay	-	
	25-46	Sand	25-30, 41-46	
	46-47	Clay	-	
L-9	0-10	Clayey silt	-	CVOCs by EPA Method 8260B, nitrates by EPA Method 353.2, fluoride via EPA Method 9056A
	10-28.5	Sand	10-15, 23-28	
	28.5-32	Silty clay	28-32.5	
	32-34.5	Sand and gravel	32-37	
	34.5-37.5	Clayey sand	-	
	37.5-43.5	Clay	-	
L-10	0-9	Clayey silt	-	CVOCs by EPA Method 8260B, nitrates by EPA Method 353.2, fluoride via EPA Method 9056A
	9-22.5	Sand	9-14, 18-23	
	22.5-24.5	Silty clay	-	
	24.5-33.5	Sand	28-33	
	33.5-38.5	Clay		
L-17	TBD	TBD	TBD	CVOCs by EPA Method 8260B
L-18	TBD	TBD	TBD	CVOCs by EPA Method 8260B
L-19	TBD	TBD	TBD	CVOCs by EPA Method 8260B, nitrates by EPA Method 353.2, fluoride via EPA Method 9056A

Notes:
CVOCs - chlorinated volatile organic compounds
EPA - United States Environmental Protection Agency
TBD - to be determined by the field geologist