



Technical Memorandum

*To: South Carolina Department of Natural Resources (DNR)
South Carolina Department of Health and Environmental Control (DHEC)*

From: CDM Smith

Date: September 6, 2016

*Subject: Unimpaired Flow Development
Savannah River Basin, South Carolina*

1.0 Background and Objectives for Unimpaired Flows

Unimpaired flow (UIF) describes the natural hydrology of a river basin. UIFs quantify streamflows throughout a river basin in the absence of human intervention in the river channel, such as storage, withdrawals, discharges, and return flows. From this basis, modeling and decision making can be compared with pristine conditions.

This memorandum identifies the active and inactive flow gages the Savannah River basin and provides recommendations on where UIF development may occur.

2.0 Overview of the Savannah Basin USGS Gages

There are over seventy United States Geological Survey (USGS) active or former streamflow gaging stations in the Savannah River Basin within South Carolina or on its border. At eight gaging stations on the Savannah River (mainstem), the Georgia Environmental Protection Division (GA EPD) has calculated UIFs for the period 1939 through 2013 (GA EPD, 2015). Since mainstem UIFs have already been developed, additional UIF development to support the South Carolina Surface Water Availability Assessment is focusing on gage locations at select South Carolina tributaries to the mainstem.

An overview map of the current and former USGS streamflow gages in the Savannah River Basin is shown in **Figure 1**. Proposed (new) UIF locations on South Carolina tributaries to the mainstem are identified by green triangles. The location of previously calculated UIFs are identified by red triangles (GA EPD “Basic” UIF nodes) and red circles with triangles (GA EPD “Planning” UIF nodes). Other mainstem gaging stations, which will be included in the model framework, but will not be subject to UIF development are identified by purple triangles.

Table 1 matches each project ID with its gage number, location, periods of record, activity, and whether it is on a tributary and thus subject to UIF development. **Figure 2** depicts the length and

timing of records for existing and proposed UIFs, and other model framework gages in the Savannah River basin.

3.0 Recommendations for UIF Development

Twenty-one tributary gages are candidates for UIF development. Two situations arose in which a tributary gage was not included:

- USGS gage 02186090 was only active from May 1998 to September 1999. Since no SWAM model objects are upstream of the gage, and given its short period of record, it was excluded.
- A cluster of forty-three gages were installed within the Department of Energy's Savannah River Site (SRS), all of which are currently inactive. A selection of six of these were chosen to represent key tributaries in this region. The remaining inactive gages will be excluded from UIF calculations.

4.0 Summary

Of the almost-eighty USGS gaging stations, twenty-one gages on tributaries have been identified as candidates for UIF development, supplementing the existing eight UIF locations on the mainstem. The two exceptions have either an insufficient period of record or were omitted in order to simplify the SRS site.

5.0 References

GA EPD, 2015. Savannah River Basin Comprehensive Study II: 2009 – 2013 Unimpaired Flow Data Extension (Draft Report).

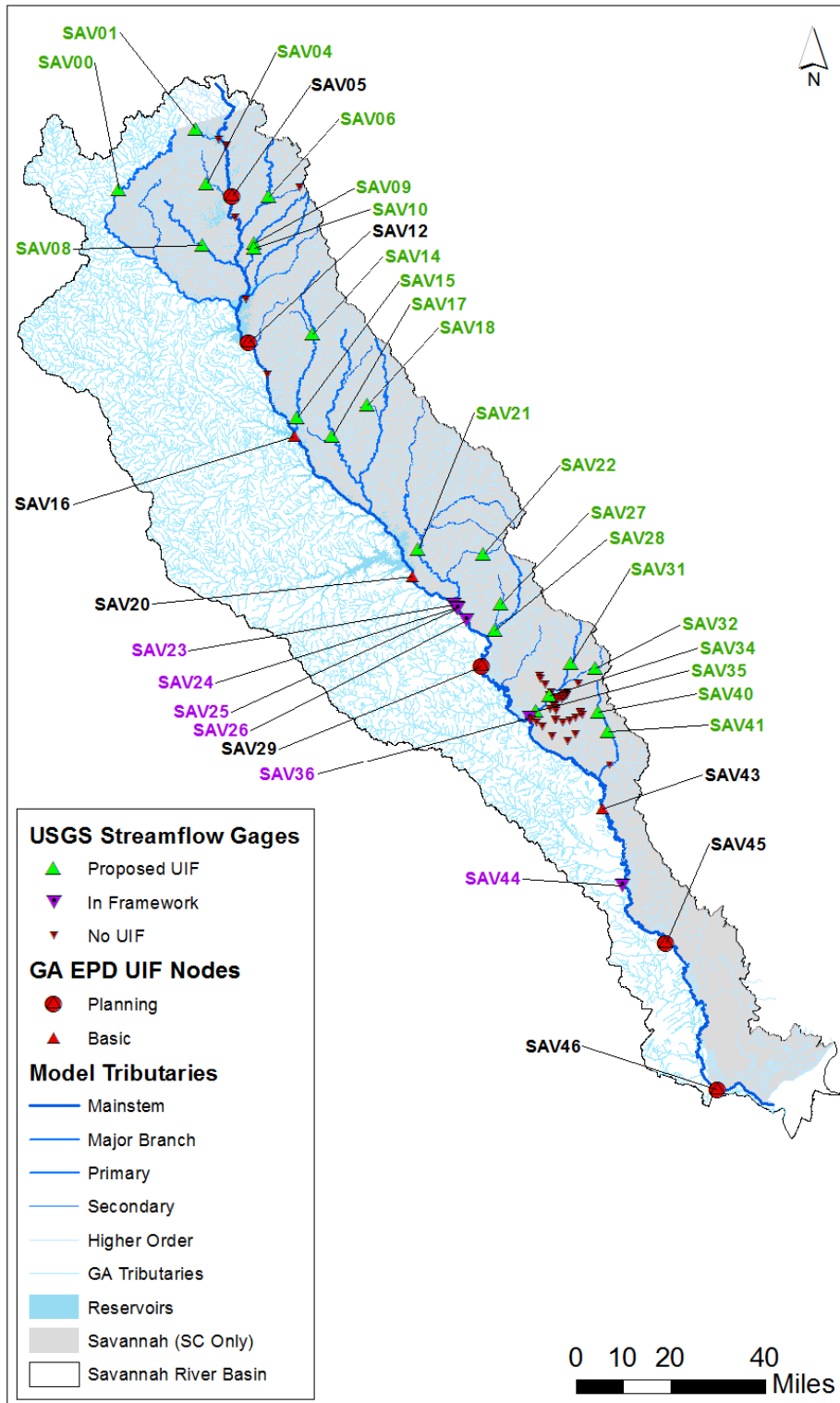


Figure 1: Proposed and Previous UIF Locations

Table 1. Savannah River Basin USGS Streamflow Gages (with project IDs)

Project ID	Tributary UIF	Existing UIF	USGS Number	Description	From:	To:	From:	To:	From:	To:	From:	To:
SAV00	Yes	No	02177000	CHATTOOGA RIVER NEAR CLAYTON, GA	Oct-1939	Dec-2013						
SAV01	Yes	No	02184475	HOWARD CREEK NEAR JOCASSEE, SC	May-1988	Sep-1996						
SAV04	Yes	No	02185200	LITTLE RIVER NEAR WALHALLA, SC	Mar-1967	Sep-2003						
SAV05	No	Yes	02185145	LAKE KEOWEE NEAR SIX MILE, SC	Oct-1999	Sep-2000						
SAV06	Yes	No	02186000	TWELVEMILE CREEK NEAR LIBERTY, SC	Aug-1954	Dec-2013						
SAV08	Yes	No	02186645	CONEROSS CK NR SENECA, SC	Apr-1989	Sep-2003						
SAV09	Yes	No	02186699	EIGHTEENMILE CREEK ABOVE PENDLETON, SC	May-1998	Jul-2008						
SAV10	Yes	No	02186702	EIGHTEENMILE CREEK BELOW PENDLETON, SC	Oct-2012	Dec-2013						
SAV12	No	Yes	02187252	SAVANNAH RIVER BELOW HARTWELL LK NR HARTWELL, GA	Oct-1984	Sep-1999						
SAV14	Yes	No	02187910	ROCKY RIVER NR STARR, SC	May-1989	Mar-1996	Oct-1996	Oct-2001	Feb-2003	Mar-2004	Oct-2004	Dec-2013
SAV15	Yes	No	02188000	ROCKY RIVER NEAR CALHOUN FALLS, SC	Mar-1950	Sep-1966						
SAV16	No	Yes	02189000	SAVANNAH RIVER NEAR CALHOUN FALLS, S. C.	Oct-1896	Sep-1979						
SAV17	Yes	No	02192500	LITTLE RIVER NEAR MT. CARMEL, SC	Jan-1940	Sep-1970	Aug-1986	Oct-2003	Oct-2004	Dec-2013		
SAV18	Yes	No	02192830	BLUE HILL CREEK AT ABBEVILLE, SC	Feb-1998	Aug-2008						
SAV20	No	Yes	02195000	SAVANNAH RIVER NEAR CLARKS HILL, S.C.	May-1940	Jun-1954						
SAV21	Yes	No	02196000	STEVENS CREEK NEAR MODOC, SC	Nov-1929	Sep-1931	Feb-1940	Sep-1978	Nov-1983	Dec-2013		
SAV22	Yes	No	02196250	HORN CREEK NR COLLIERIERS (EDGEFIELD), SC	Oct-1980	Sep-1994						
SAV23	No	No	021964832	SAVANNAH RIVER ABOVE AUGUSTA CANAL NEAR BONAIR, GA	Sep-2011	Dec-2013						
SAV24	No	No	02196484	SAVANNAH RIVER NEAR NORTH AUGUSTA, SC	Oct-1988	Sep-2002						
SAV25	No	No	02196485	AUGUSTA CANAL NR AUGUSTA, GA (UPPER)	Jul-1988	Dec-1992	Oct-1996	Jul-2003	May-2005	Jan-2009	May-2009	Dec-2013
SAV26	No	No	02196500	AUGUSTA CANAL AT AUGUSTA (LOWER)	Nov-1930	Sep-1957	Oct-1988	Sep-1992				
SAV27	Yes	No	02196689	LITTLE HORSE CREEK NEAR GRANITEVILLE, SC	Oct-1989	Dec-1999	Mar-2000	Apr-2001	Feb-2002	Jul-2002		
SAV28	Yes	No	02196690	HORSE CREEK AT CLEARWATER, SC	Apr-2005	Dec-2013						
SAV29	No	Yes	02197000	SAVANNAH RIVER AT AUGUSTA, GA	1883-10-01	1891-12-31	1896-01-01	Dec-1906	Jan-1925	Dec-2013		
SAV31	Yes	No	02197300	UPPER THREE RUNS NEAR NEW ELLENTON, SC	Jun-1966	Sep-2002						
SAV32	Yes	No	021973005	TINKER CREEK ON SRS RD 8-11 AT SRS, SC	Oct-1992	Sep-1996	Dec-1998	Sep-2002				
SAV34	Yes	No	02197310	UPPER THREE RUNS ABOVE ROAD C (SRS), SC	Jun-1974	Jan-1998	Dec-1998	Sep-2002				
SAV35	Yes	No	02197315	UPPER THREE RUNS AT ROAD A (SRS), SC	Jun-1974	Jan-1978	Oct-1978	Sep-2002				
SAV36	No	No	02197320	SAVANNAH R. NR JACKSON, SC	Oct-1971	Sep-2002						
SAV40	Yes	No	02197380	LOWER THREE RUNS BELOW PAR POND @ SRS, SC	May-1974	Sep-2002						
SAV41	Yes	No	02197400	LOWER THREE RUNS NEAR SNELLING, SC	Mar-1974	Dec-1996	May-1997	Sep-2002				
SAV43	No	Yes	02197500	SAVANNAH R AT BURTONS FERRY BR NR MILLHAVEN, GA	Oct-1939	Sep-1970	Oct-1982	Oct-2003	Oct-2004	Dec-2013		
SAV44	No	No	02198375	SAVANNAH RIVER NEAR ESTILL, SC	Jul-2009	Sep-2014						
SAV45	No	Yes	02198500	SAVANNAH RIVER NEAR CLOY, GA	Oct-1929	Sep-1933	Oct-1937	Sep-2014				
SAV46	No	Yes	021989773	SAVANNAH RIVER AT USACE DOCK, AT SAVANNAH, GA	Oct-2007	Dec-2013						

Existing UIFs are in **bold**

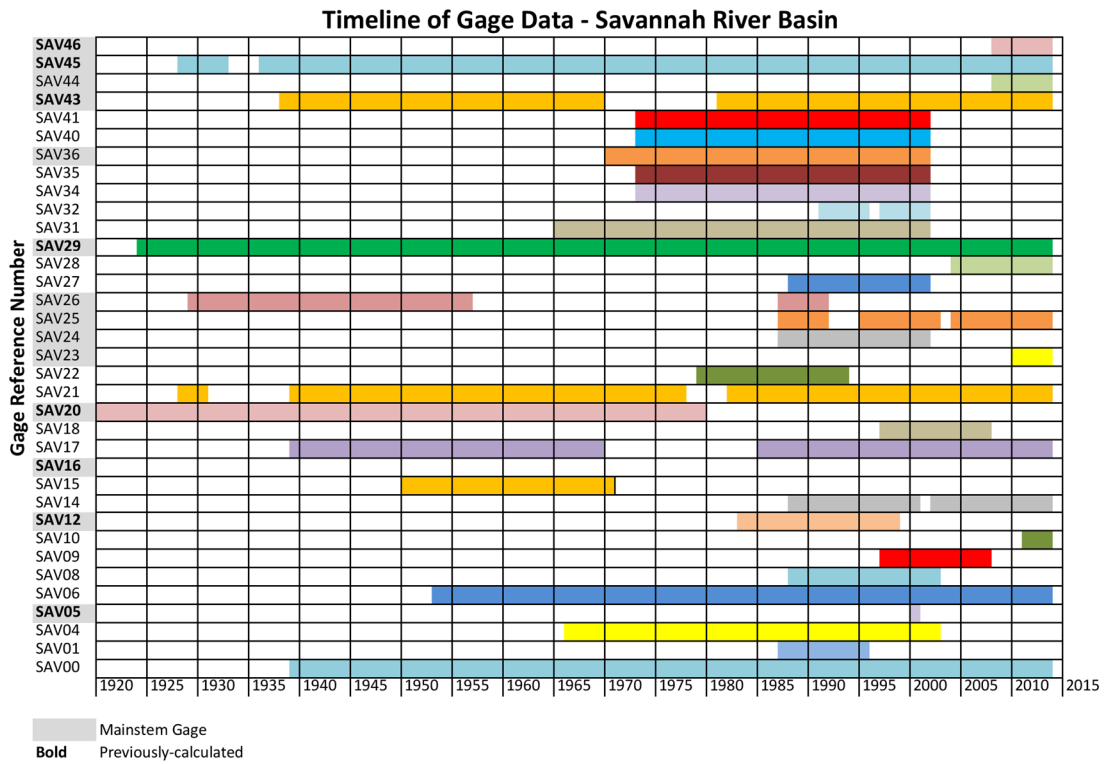


Figure 2. Period of record for proposed UIF USGS gages in the Savannah Basin