U.S. DEPARTMENT OF ENERGY

SRS

Citizens Advisory Board

Common Infrastructure and Utilities

Savannah River Site

David Bender
DOE-SR Division Director
Infrastructure and Area Completion Division

September 26, 2022

Common Infrastructure and Utilities Agenda

- Overview – Big Picture
- Common Infrastructure and Utilities 'Road to Green' Plan
- 'Road to Green' Examples:
  - Road Repaving
  - Facility Roof Replacements
  - River Water Pump House Electric Power
- FY22 Budget
- Sustainability, Clean Energy, and Climate Change
- Conclusion

River Water Pump House Under Construction -1952

SRS Common Infrastructure and Utilities – Big Picture

Electric Power
(64 Miles High Voltage Lines)
(9 Large Substations)
(180 Miles Distribution Lines)

Facilities
(42 - Admin, Shops, Emer, Security)

Roads
(119 Miles Paved)

Steam Energy
(5 Biomass Plants)

River Water (7500 GPM)

Fire Water
(1500 Hyrdrants)

Domestic Water
(2M Gals/day)

Sanitary Waste Water
(Central Sanitary Plant)

Lakes and Dams
(2 High Hazard Dams)

Rail Roads (33 Miles Track)

Prepare Site Common Infrastructure and Utility Systems for Future through "Road to Green" Plan

12 Systems

- PECMC+ and Transportation
- Domestic Water
- Steam Generation and Dist.
- Electrical Distribution
- Sanitary Waste
- Fire Water
- Chilled Water
- Facilities
- River Water
- Process/Service Water
- Dams, Outfalls, Basins, Lakes
- Roads, Bridges, Railroads

Current State and Plan to become and stay GREEN*

Jan-20	Jan-21	Jan-22	Jan-23	Jan-24	Jan-25	Jan-26	Jan-27
PECMC & Transportation	PECMC & Transportation	PECMC & Transportation	PECMC & Transportation	PECMC & Transportation	PECMC & Transportation	PECMC & Transportation	PECMC & Transportation
Domestic Water	Domestic Water	Domestic Water	Domestic Water	Domestic Water	Domestic Water	Domestic Water	Domestic Water
Steam Gen. & Distribution	Steam Gen. & Distribution	Steam Gen. & Distribution	Steam Gen. & Distribution	Steam Gen. & Distribution	Steam Gen. & Distribution	Steam Gen. & Distribution	Steam Gen. & Distribution
Electrical Distribution	Electrical Distribution	Electrical Distribution	Electrical Distribution	Electrical Distribution	Electrical Distribution	Electrical Distribution	Electrical Distribution
Sanitary Wastewater	Sanitary Wastewater	Sanitary Wastewater	Sanitary Wastewater	Sanitary Wastewater	Sanitary Wastewater	Sanitary Wastewater	Sanitary Wastewater
Fire Water	Fire Water	Fire Water	Fire Water	Fire Water	Fire Water	Fire Water	Fire Water
Chilled Water	Chilled Water	Chilled Water	Chilled Water	Chilled Water	Chilled Water	Chilled Water	Chilled Water
SS Facilities & Support	SS Facilities & Support	Facilities	Facilities	Facilities	Facilities	Facilities	Facilities
River Water	River Water	River Water	River Water	River Water	River Water	River Water	River Water
Process / Service water	Process / Service water	Service Water	Service Water	Service Water	Service Water	Service Water	Service Water
		Process Water	Process Water	Process Water	Process Water	Process Water	Process Water
Outfalls, Dams, Basins, Lakes	Outfalls, Dams, Basins, Lakes	Outfalls, Basins & Landfills	Outfalls, Basins & Landfills	Outfalls, Basins & Landfills	Outfalls, Basins & Landfills	Outfalls, Basins & Landfills	Outfalls, Basins & Landfills
		Dams, Lakes & Ponds	Dams, Lakes & Ponds	Dams, Lakes & Ponds	Dams, Lakes & Ponds	Dams, Lakes & Ponds	Dams, Lakes & Ponds
Roads, Bridges, & Railroads	Roads, Bridges, & Railroads	Railroad	Railroad	Railroad	Railroad	Railroad	Railroad
		Roads & Bridges	Roads & Bridges	Roads & Bridges	Roads & Bridges	Roads & Bridges	Roads & Bridges

STATUS

System — System functioning properly and fully available with minor deficiencies

System — System functioning and fully available with deficiencies or at risk for future failure

System — Unsatisfactory – Sub-systems have degradation such that failure will have significant impact on system availability and/or customer needs

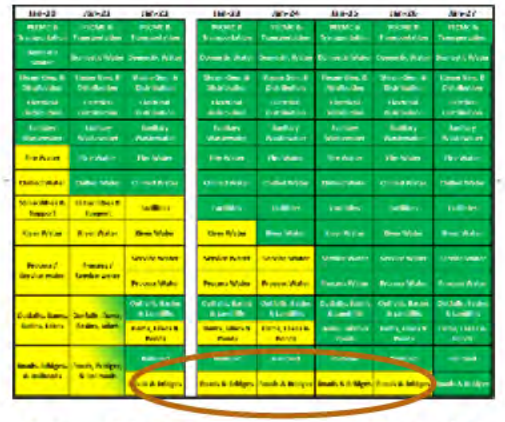
Selected Improvement Projects and other O&M actions drive status toward Green

Road to Green Plan is executed through the annually updated 5-year and Fiscal Year Improvement Plans

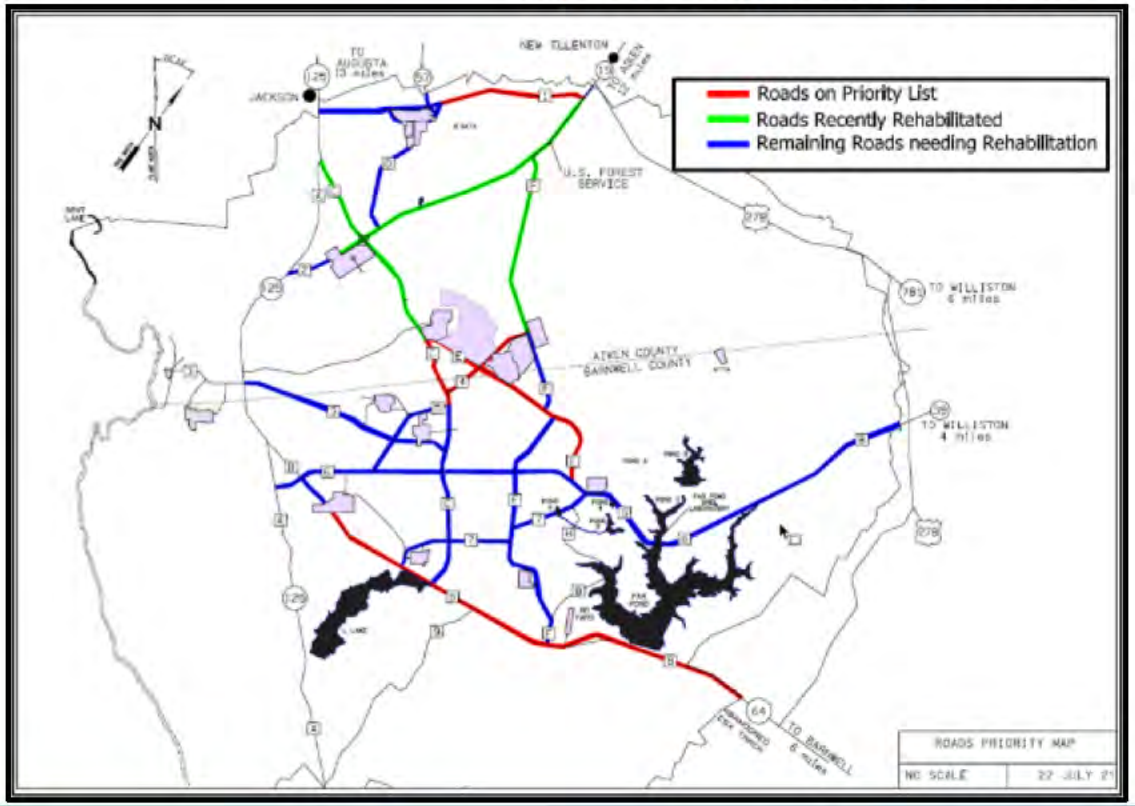
+Portable Equipment Commodity Management Center

SRS Road Repaving Program

- Average daily traffic onsite is 35,000 trips per day
- Most of the site road system is in very poor condition
- Priority Site Access Roads (2, F, C, 1, B)
- Priority Facility Access Roads (4, E)
- Strategy to Prioritize the 'high traffic' roads

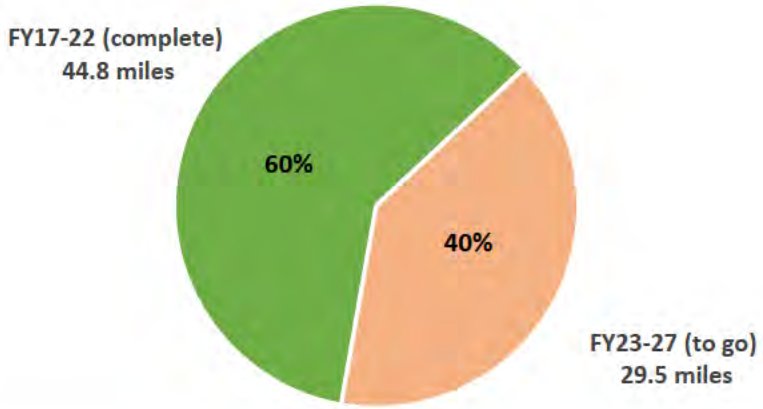


Map of Road Improvements & Priorities



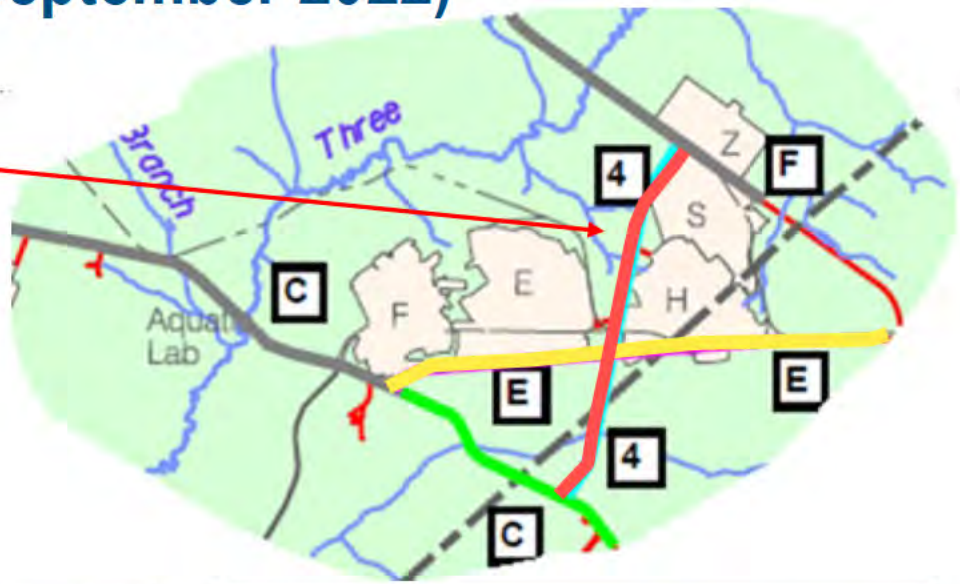
Road Repaving Progress (FY17-22)

74 Two Lane Miles (high traffic) Total



Road 4 Repaving Project (August-September 2022)

- Roadway: 2.5 miles / 2 lanes
- Budget: $2.0M
- Sub-Contractor: Grade South
- Indirect Funded
- Approved and funded April 2022
- Bulk of work at night and weekends



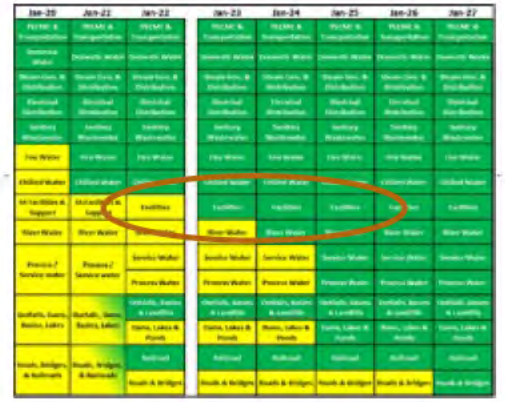
Current Roads Resurfacing Priority List

Route Name	From	To	Length (Mi)
Road 4	Road F	Road C	2.5
Road E	Road 6	Road C	5.5
Road C	Road E	Road 5	2
Road 1	Road 2	Road A	7
Road B	B-cade 4	Road 6	13
		Total Length	30

Road 4 Before

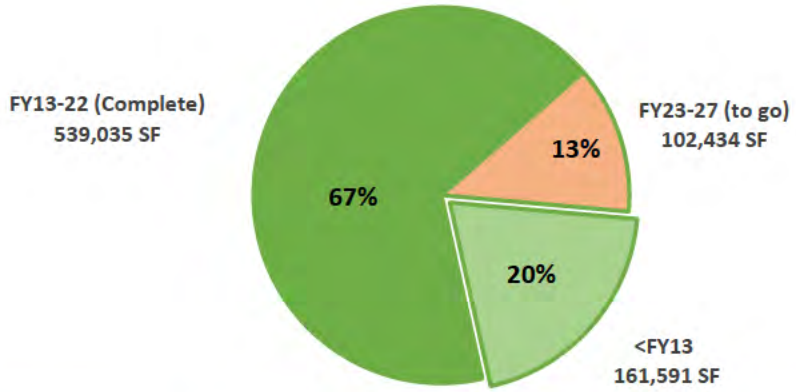
Road 4 After

SRS Common Facilities Roof Replacement Program



Support Facilities Roof Progress

803,060 SF (42 Major Facilities)



New "Cool" Roof for Renovated Site Gateway Center (2019)

Typical situation in large Admin Facility (2013)

FY22 730-B Roof Replacement Project

- Roof Square Footage – 39,760 sf
- Budget: $1.8M
- Sub-Contractor: CE Bourne (local)
- Indirect Funded
- Approved and funded September 2021
- Authorization to Proceed – March 2022

Before – Seam Separation

On-going – August 2022

On-going – August 2022

SRS River Water System

- Originally supplied cooling water to each of the Site's 5 reactors
  - Two identical pumpstations on Savannah River
    - *Ten 32,000 gpm pumps each*
  - Mission changes reduced the need for water
    - *681-1G pumphouse was deactivated*
    - *Number of pumps at 681-3G right-sized to two smaller pumps*
- Current Mission:
  - Source of Boiler Feed Water and Fire Water for BCF and L-Area
  - Supplies environmental needs in K and L-Areas, L-Lake and, if needed, Par Pond
  - System capacity exists should future missions require additional water

681-3G River Water Pump House

Laying River Water lines – April 1952

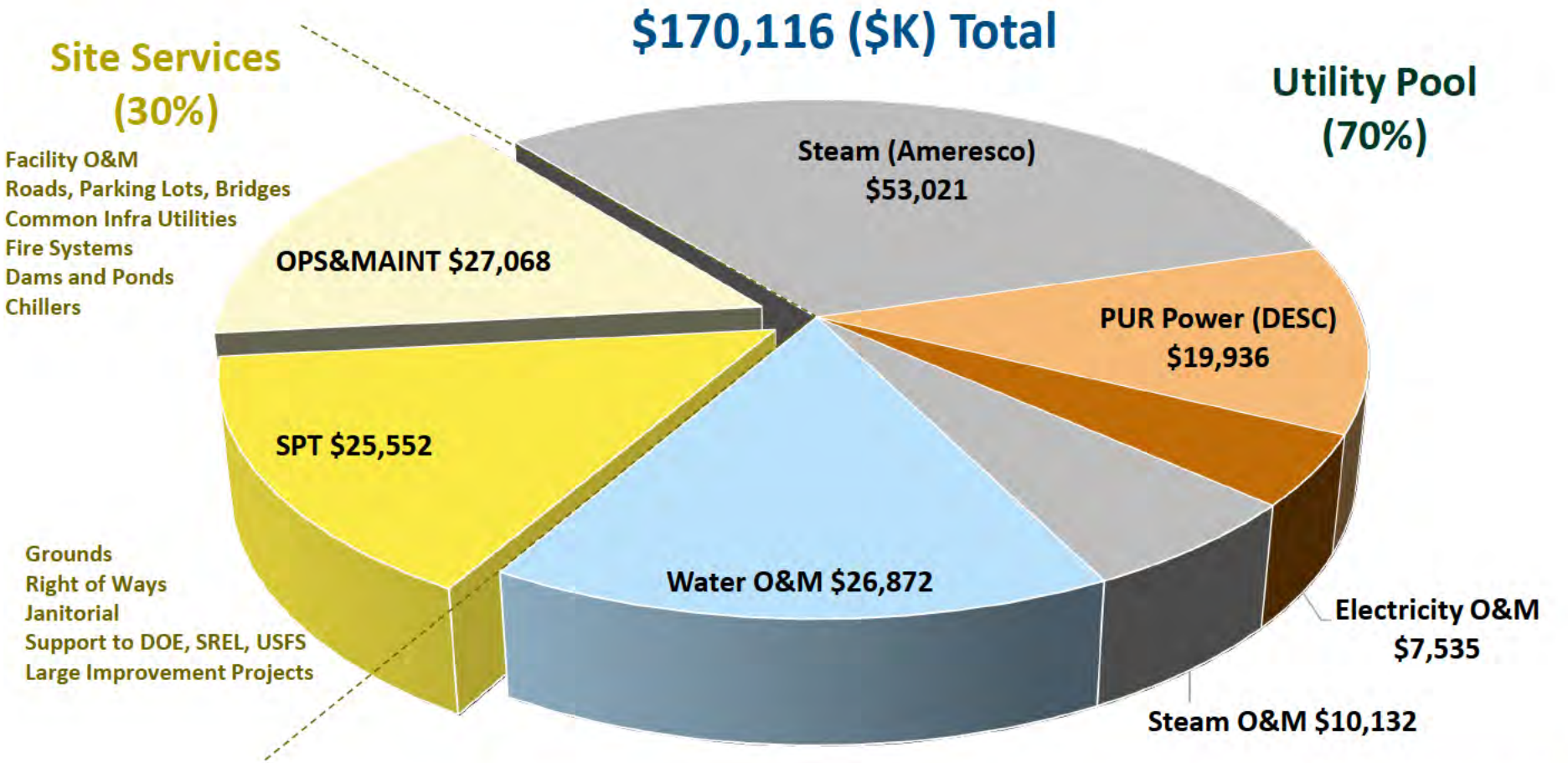
River Water System 681-3G Project

- Electrical Power system original equipment (1952)
- All Transformers have degraded test results
- Substation operated by Dominion Energy (DESC) supplies power to pumphouse at 4160V from the 115kV grid through two large transformers
- Cables feeding building and internal switchgear have significant degradation and have experienced failures
- Project Scope and Description:
  - DESC design,, procure and right-size/replace 70-year-old transformers and switchgear
  - SRNS design, procure, and replace cabling and 4160V to 480V transformers and switchgear
  - Budget $6.0M Indirect Funded (Utility Pool) over 5 yrs
  - Integration of DESC and SRNS effort/contracts challenge

681-3G River Water Pump House Substation (2022)

Two ‘right-size’ (20MVA>1.5MVA) transformers delivered July 2022

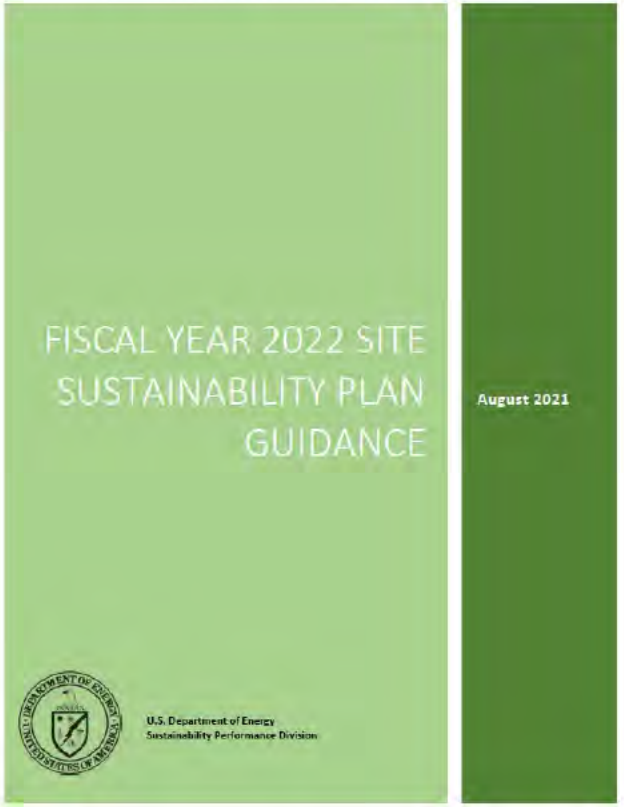
SRS Common Infrastructure and Utilities Budget FY22



>50% to Energy and Delivery

Sustainability, Resiliency, and Clean Energy - Drivers and Challenges

- **Drivers**
  - Energy Independence and Security Act of 2007
    - *Conduct energy audits and Annual Site Sustainability Plan (SSP)*
  - Energy Security Act of 2020 (DEC 2020)
    - *Complete Energy Conservation Measures within 2 years (50% via UESC or ESPC*)*
  - EO14008 (JAN 2021) Tackling Climate Crisis
  - EO14030 (MAY 2021) – Climate Related Financial Risks
    - *Climate Adaptation and Resilience Plan (CARP)*
    - *Vulnerability and Adaptation and Resilience Plan (VARP)*
  - EO14057 (DEC 2021) Catalyzing Clean Energy Industries and Jobs
    - *Carbon Free Electricity Plan (CFE)*
    - *Zero Emission fleet strategy (ZEFS)*



- **Challenges**
  - Electric Power Costs up 10% in May / DESC requesting a further 27% increase in November (+$4M)
  - Increasing Requirements for the annual Site Sustainability Plan and 'dashboard' updates
  - Supply Chain Impacts

*Utility Energy Service Contract or Energy Savings Performance Contract

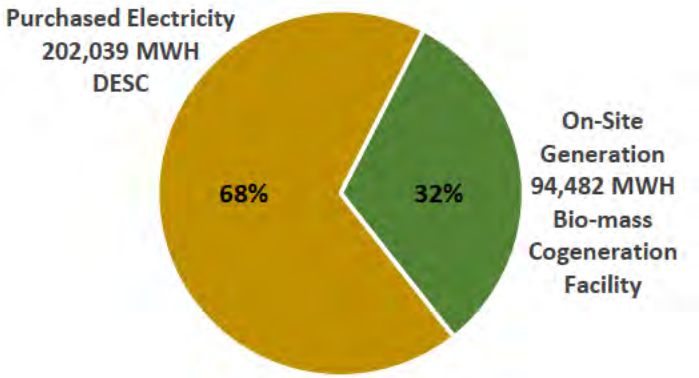
Sustainability, Resiliency, and Clean Energy Strategy

- **Sustainability (Efficiency – Reduce Energy and Water Demand)**
  - Increase implementation of Energy Conservation Measures (ECM)
    - Replace Light Fixtures with LED
    - Replace whole HVAC/Air Handling Systems
    - Implement other ECMs
  - Repair and replace water system piping
  - Modernize facility restroom and common area water fixtures
- **Resiliency (Reduce Risk of Climate Change and Aging)**
  - Replace Critical Electrical Grid Components with most modern components
  - Replace Large Building HVAC Systems with most efficient systems
- **Clean Energy / Carbon Free Electricity**
  - Max partnership with utility provider via UESC*
  - Collaborate with Federal Energy Management Program (FEMP)
  - Explore transitions from fossil burning equipment i.e., fuel fired boilers and generators, vehicles
  - Explore other opportunities for local solar or renewable power sources

*Utility Energy Service Contract

SRS Electricity Consumption (2021)

296K MegaWatt-Hours (MWH) Total

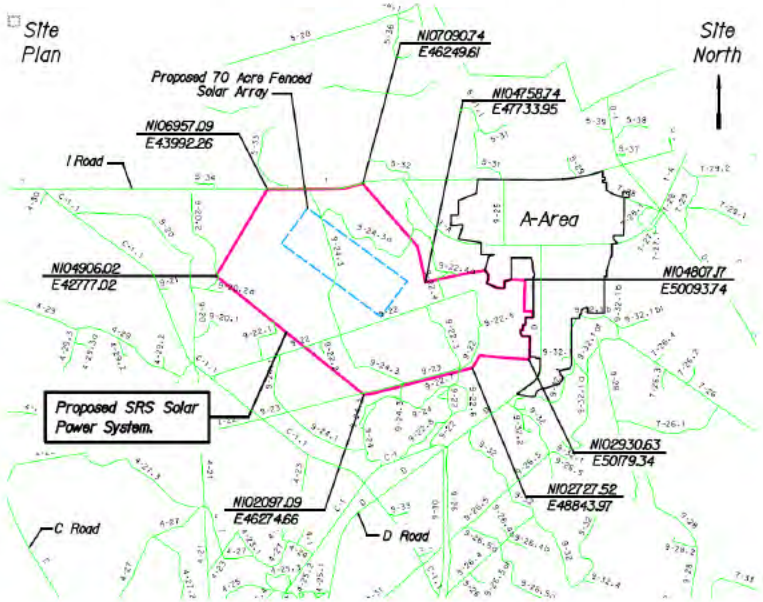


A-Area Solar Powered X-walk

Sustainability, Resiliency, and Clean Energy Efforts (current)

- **Immediate – EV Charging Stations**
  - Install 16 Charging Stations in anticipation of 62 EVs arriving in FY23
  - Support 100% Light Duty Fleet (600 vehicles) conversion to EVs
  - Conducting discussions with DESC for follow-on Stations
- **Near Term (FY23-FY27) - ~10MW Solar Field**
  - Site Adjacent to A/M Areas identified
  - Conducting discussions with DESC
  - Contract Modification or UESC
  - FEMP and US Army Corps of Engineers support
- **Far Term (FY28 and beyond)**
  - ~75MW Solar Field w/ Commercial Hydrogen
  - VARP* identified climate change risk remediation

Future SRS 10MW Solar Field Site



*Vulnerability Adaptation and Resilience Plan

2022 Sustainability DOE Award Submissions

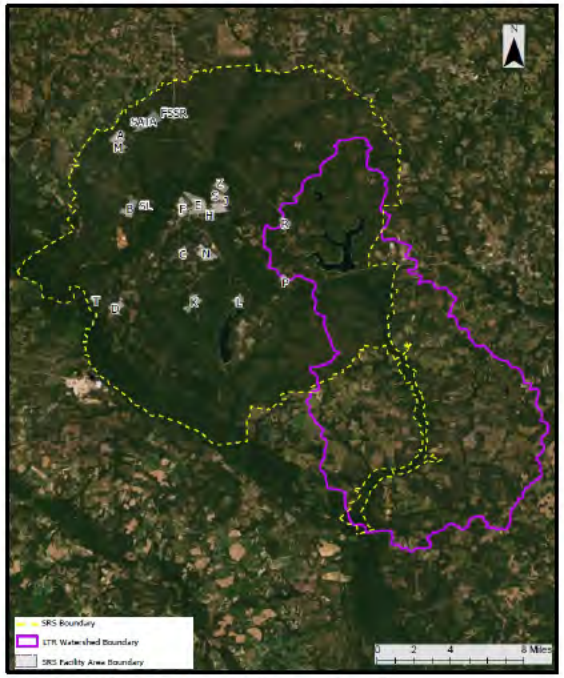
- **Phytoremediation – <u>DOE Innovation Award WINNER</u>**
  - Irrigate Pine Forest using trans-evaporation to remediate Tritiated groundwater
- **D-Area Innovative Groundwater Treatment**
  - Low pH groundwater treated with soil amendments and flushed with artesian well water and treated with calcium carbonate reactive barriers

Old D-Area Power House Coal Yard (post cleanup)

D-Area Artisan Well

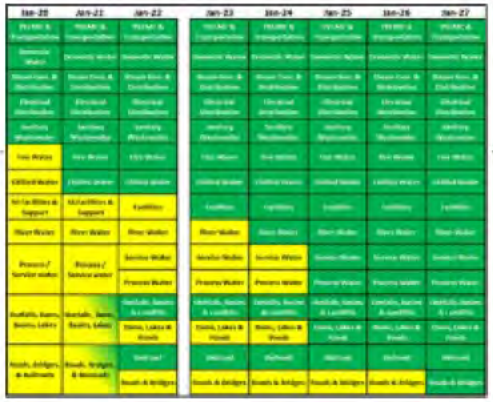
- **Lower Three Runs Integrator Operable Unit (IOU) Record of Decision**
  - Use of Land Use Controls and natural attenuation to protect personnel and environment versus destructive removal actions

Phytoremediation Irrigation



Lower Three Runs Watershed

SRS Common Infrastructure and Utilities Conclusion



- 70-year-old backbone infrastructure
- Still Enabling Execution of SRS Missions
- Robust planning and execution strategy ensures system improvements are prioritized based on:
  - *Risk*
  - *System Capabilities*
  - *Readiness to execute*
- 'Road to Green' Planning and Execution Process requires focused attention and priority

Old A-Area 70-year-old Dual Use Fire Water Tank

New A-Area Firewater Water Pump House and Tank Completed 2020

River Water Pump House 'Trash' Rack (Screen) addition August 2022
(Recall Agenda picture of River Water Pump House construction)