



RESOURCE
INSTITUTE

*Restoring America's Streams,
Rivers and Wetlands*

2021
ANNUAL
REPORT

BALTIMORE IS CALLING IN 2023



Resource Institute hosts the second National Stream Restoration Conference

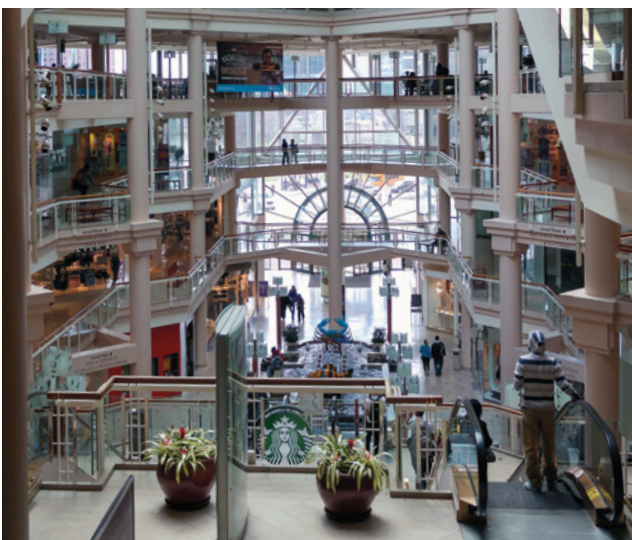
August 21 - 23, 2023

Renaissance Baltimore Harborplace Hotel
Baltimore, Maryland

STREAM RESTORATION 2023: FINDING COMMON GROUND

- Over 100 presentations from industry experts
- Evolve your perspective beyond the channel
- Over 40 vendors and exhibitors with the latest technology and equipment
- Enjoy Charm City – a city that honors history and has an eye to the future
- Delve into diverse neighborhoods and rich cultural sites
- Explore the Inner Harbor – don't miss its exciting lineup of family-friendly activities and entertainment

MORE INFORMATION AT RESTORESTREAMS.ORG



Message from the Chair

BY KENNON (KEN) WHITE

As I write this annual message, I find myself full of gratitude. It appears we have emerged from the deadly Covid Pandemic. We all have a new profound respect for our healthcare professionals and first responders.

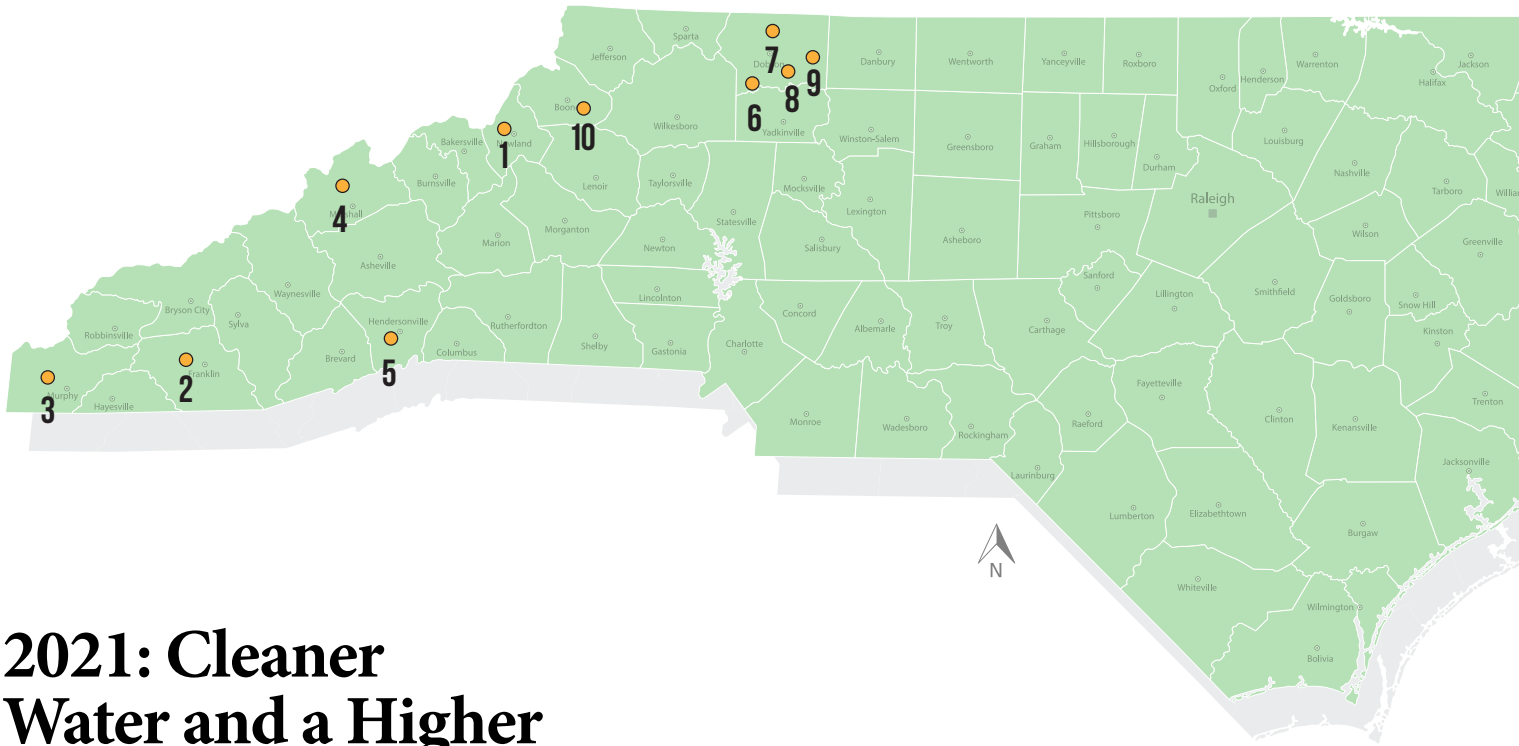
In 2021, RI completed 10 projects. Many of RI's restoration projects are quite complex, with the average project taking three years to complete—from concept, assessment, grant application, design, construction, and planting. Through these projects, RI restored 21,395 linear feet of streams, agricultural ponds, and wildlife habitat. RI and its partners planted 12,560 trees and 37,440 shrubs and plants as part of these projects. These plantings will sequester 500 tons of carbon within 10 years.

During RI's 21-year history, it has completed 205 projects. These projects benefit local communities in a variety of ways. These projects reduce pollution, creating cleaner, safer drinking water. The projects protect property and often safeguard critical infrastructure. The projects also improve habitat and fisheries bringing new recreation and education opportunities to locals and visitors. RI is adamant that each project improves the local citizens' quality of life.

With a grateful heart to all of our partners—communities, municipalities, government agencies, nonprofits, and private companies. Through these unique alliances, RI will continue to restore America's streams, rivers, and wetlands.

In the words of Bud Shuster, "clean water is an investment in the future of our country."





2021: Cleaner Water and a Higher Standard of Living

RI completed 10 multi-year projects in 2021!

These projects restored over 21,395 feet of stream. To restore streams, RI uses Natural Channel Restoration. This methodology employs sustainable river engineering technologies to improve natural stream stability and habitat functions. This holistic approach produces extensive benefits—flood resiliency, improved water quality, habitat, fisheries, and reduced flooding and sedimentation.

Stream Restoration also improves the local economy.

Restoration dollars circulate in the local economy at least 1.28 times. If you spend 1 million on restoration, the local economy sees a minimum return of 1.28 million dollars. The return can come in multiple ways:

- Spending at local businesses (e.g., engineering and construction, surveying, environmental testing, and nurseries)
- Improved recreation opportunities and community health
- Increased tourism
- Higher property values
- Lower water treatment and health care costs

Several projects are located in rural areas or small towns. These restoration dollars significantly impact the residents’ quality of life and lead to a higher standard of living.

2021 COMPLETED PROJECTS

Stream Restoration Projects

	County – Stream Name	Feet
1	Avery – Squirrel/Bartlett Farmer Creeks	1,500
2	Macon – Bates Branch	1,250
3	Cherokee – Valley River	700
4	Madison – Ivey Creek	1,725
5	Henderson – Foster Creek	3,100
6	Surry – UT Little Fisher	1,900
7	Surry – Big Elkin Creek	3,500
8	Surry – Fisher River (EWP)	350
9	Surry – Mitchell River	1,500
10	Watauga – Linville Creek	5,870
	TOTAL	21,395

NCDA Ponds

County	Number
Cumberland – Smith (NCDA)	1
TOTAL	1



UT to Squirrel Creek post-restoration with stabilized streambanks and reconnected floodplain



Prior to restoration streambanks on Squirrel Creek were steep and severely eroded.



BEFORE: Unstable reach of UT to Squirrel Creek prior to restoration.



AFTER: A view of the instream structures installed on UT to Squirrel Creek. The instream structures reduce erosion and help stabilize the streambanks.

UT TO SQUIRREL CREEK & SQUIRREL CREEK STREAM RESTORATION PROJECT

UT to Squirrel Creek is a headwater stream that suffered from critical erosion and incised streambanks. Streambanks on Squirrel Creek were steep and severely eroded and lacked a riparian buffer.

Toe River Watershed
Avery County, Plum Tree, NC

Status: Complete
Stream Restored: ~1,500 feet

PARTNERS:

- USDA-NRCS
- North Carolina Land & Water Fund
- Brushy Fork Environmental Consulting
- Avery Soil & Water Conservation District

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, organic, and inorganic loading of the stream and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.

HOG LOT BRANCH & BATES BRANCH RESTORATION PROJECT

Hog Lot Branch and Bates Branch are headwater streams that suffered from critical erosion and incised streambanks.

Tributary of Little Tennessee
Macon County, Franklin, NC

Status: Complete
Stream Restored: ~1,250 feet

PARTNERS:

- USDA-NRCS
- North Carolina Land & Water Fund
- North Carolina Division of Water Resources
- Michael Baker International
- Penland Construction
- Belflower Construction
- Macon Soil & Water Conservation District

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, organic, and inorganic loading of the stream and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.

Remove barriers to provide an opportunity for the aquatic organisms to access additional habitat and migrate up and downstream.

Install structures to create or enhance hellbender habitat.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.



AFTER: Bates Branch post-restoration with instream structures to stabilize streambanks and new riparian buffer.



Morgan Harris, Working Lands for Wildlife Eastern Hellbender Initiative, and the Conservation Management Institute at Virginia Tech, surveys Bates Branch for hellbenders and hellbender habitat.



Jason York, Michael Baker International, performs a macroinvertebrate assessment as part of the design assessment process.

BEFORE: Prior to restoration, Bates Branch and Hog Lot Branch had high, unstable streambanks that were severely eroding.



VALLEY RIVER STREAM RESTORATION PROJECT

This section of the Valley River was transporting excess sediment and nutrients. The streambanks were eroding and it lacked a riparian buffer.

Valley River Watershed, Hiwassee River
Cherokee County, Murphy, NC

Status: Complete
Stream Restored: ~1,100 feet

PARTNERS:

- USDA-NRCS
- North Carolina Land & Water Fund
- NC Department of Environmental Quality
- Jennings Environmental
- North State Environmental
- Cherokee Soil & Water Conservation District

PROJECT OBJECTIVES:

Create a bankfull bench and re-slope the banks.

Install fencing to restrict livestock access to the stream corridor to protect streambanks and streambank vegetation.

Plant a riparian buffer.



AFTER: The project partners restored this section of the Valley River by regrading the streambanks, creating a bankfull bench, planting a riparian buffer, and excluding livestock from the stream.



BEFORE: Before restoration, this section of the Valley River was transporting excess sediment and nutrients. The steep streambanks were eroding and it lacked a riparian buffer.



This aerial drone photo shows degradation to Paint Fork, California Creek, and Little Ivey Creek prior to restoration.



This aerial drone photo shows instream construction along Paint Fork, California Creek, and Little Ivey Creek.

Paint Fork and California Creek as they flow into Little Ivey Creek just after instream construction.



Paint Fork and California Creek as they flow into Little Ivey Creek after riparian planting

PAINT FORK, CALIFORNIA CREEK, AND LITTLE IVEY CREEK STREAM RESTORATION PROJECT

Paint Fork, California Creek and Little Ivey Creek were impacted by development and suffered from critical erosion and incised streambanks. Streambanks were steep and severely eroded. All three streams lacked a riparian buffer.

French Broad River Watershed
Madison County, Beech Glen, NC

Status: Complete

Stream Restored: ~1,725 feet

PARTNERS:

- USDA-NRCS
- North Carolina Land & Water Fund
- North Carolina Department of Environmental Quality
- Stantec
- North State Environmental
- Roy Young Trucking
- Madison Soil & Water Conservation District

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, organic, and inorganic loading of the stream and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel beds.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.

Remove barriers to provide an opportunity for the aquatic organisms to access additional habitat and migrate up and downstream.

FOSTER CREEK STREAM RESTORATION PROJECT

This section of Foster Creek suffered from severe erosion and incised streambanks. Steep and severely eroded streambanks from highway development caused significant erosion. Agriculture producers were losing land to erosion each year.

Tributary of the Mills River
Henderson County, Mills River, NC

Status: Complete
Stream Restored: ~3,100 feet

PARTNERS:

- USDA-NRCS
- North Carolina Department of Environmental Quality
- Mills River Partnership
- Jennings Environmental
- North State Environmental
- Henderson Soil & Water Conservation District

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, organic, and inorganic loading of the stream and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.

Provide an alternate watering source for livestock that includes pump and pipeline to convey water to watering facilities with surrounding heavy use area protection.

Install fencing to restrict livestock access to the stream corridor to protect streambanks and streambank vegetation.



AFTER: The project team constructed in-stream structures, used bioengineering techniques, and planted a riparian buffer. The team also worked with landowners to restrict livestock access to the stream.



BEFORE: Steep, unstable streambanks on Foster Creek prior to restoration.



The project team installed instream stream structures and planted a riparian buffer to stabilize UT Little Fisher Creek



BEFORE: Prior to restoration UT Little Fisher Creek's streambanks were high, unstable, and eroding.

UNNAMED TRIBUTARY OF LITTLE FISHER

The Unnamed Tributary to Little Fisher Creek suffered from severe erosion and incised streambanks. Its dimension, pattern, and profile prevent it from adequately transporting sediment.

Tributary of the Fisher River
Surry County, Dobson, NC

Status: Complete
Stream Restored: ~1,600 feet

PARTNERS:

- USDA-NRCS
- North Carolina Department of Environmental Quality
- Ecosystem Planning & Restoration
- Yadkin Valley Construction
- Surry Soil & Water Conservation District

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, organic, and inorganic loading of the stream and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.

Provide an alternate watering source for livestock that includes a pump and pipeline to convey water to watering facilities with surrounding heavy use area protection.

Install fencing to restrict livestock access to the stream corridor to protect streambanks and streambank vegetation.

Construct stream crossings to provide a travel way for people, livestock, equipment, or vehicles that will improve water quality by reducing streambank and streambed erosion.

BIG ELKIN CREEK STREAM RESTORATION PROJECT

Severe erosion on Big Elkin Creek created an incised channel with no access to a floodplain. Hurricanes Michael & Florence exacerbated the situation in 2018, causing additional erosion. Six years of this battering caused severe instability and steep unstable streambanks.

Tributary of the Yadkin River
Surry County, Elkin, NC
Status: Complete
Stream Restored: ~3,500 feet

PARTNERS:

- North Carolina Department of Environmental Quality
- Ecosystem Planning & Restoration
- North State Environmental
- Surry County
- Watershed NOW

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, organic, and inorganic loading of the stream, and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.



The project team constructed rock and woody structures and planted a riparian buffer to stabilize Big Elkin Creek.



BEFORE: Prior to restoration, severe erosion on Big Elkin Creek created an incised channel with no access to a floodplain.



This photo is looking upstream from the old dam post-construction and prior to riparian buffer planting.

MITCHELL RIVER STREAM RESTORATION PROJECT

In October 2018, Hurricane Michael inundated Surry County dropping more than 10 inches of rain in some areas. This torrent of rain blew out the historic Kapps Mill dam along the Mitchell. After the blowout, the stream was flooded with tons of fine, sandy sediment causing extensive erosion and impairing water quality.

Tributary of the South Fork New River
Surry County, Dobson, NC

Status: Complete

Stream Restored: ~1,500 feet

PARTNERS:

- North Carolina Department of Environmental Quality
- Ecosystem Planning & Restoration
- North State Environmental
- Surry Soil & Water Conservation District
- Surry County

PROJECT OBJECTIVES:

Improve water quality by reducing sediment loading of the stream, and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.



BEFORE: Hurricane Michael dropped more than 10 inches of rain on Surry County. This resulted in the destruction of the historic Kapps Mill dam. The blowout flooded the Mitchell with tons of fine sediment and caused extensive erosion.

DUTCH CREEK RESTORATION PROJECT

Dutch Creek was actively migrating, lacking proper dimension, pattern and profile. Additionally, it was actively eroding and lacked a sufficient riparian buffer and aquatic habitat.

Watershed – Watauga River
Watauga County, Valle Crucis, NC

Status: Complete
Stream Restored: ~1,000 feet

PARTNERS:

- USDA-NRCS
- North Carolina Land & Water Fund
- Watauga Soil & Water Conservation District
- Jennings Environmental, PLLC
- Brushy Fork Environmental Consulting

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream and reduce streambank erosion.

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands.

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed.

Construct stream crossings to provide a travel way for people, livestock, equipment, or vehicles that will improve water quality by reducing streambank and streambed erosion.

Remove barriers to provide an opportunity for the aquatic organisms to access additional habitat and migrate up and downstream.

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs.



Dutch Creek stream restoration project after instream construction and just before planting the riparian buffer.



Dutch Creek restoration project just after establishing the riparian buffer.

BEFORE: Prior to restoration, Dutch Creek was actively migrating and lacked proper dimension, pattern, and profile, as well as riparian buffer and aquatic habitat.





Linville Creek stream restoration project after instream construction and planting the riparian buffer.



Instream structures constructed for the Linville Creek restoration project.



BEFORE: Linville Creek lacked stream crossings contributing to streambank and streambed erosion.

LINVILLE CREEK RESTORATION PROJECT

Linville Creek was actively migrating, lacking proper dimension, pattern and profile. Additionally, it was actively eroding and lacked a sufficient riparian buffer and aquatic habitat.

Watershed – Cove Creek
Watauga County, Vilas, NC

Status: Complete
Stream Restored: ~2,500 feet

PARTNERS:

- USDA-NRCS
- North Carolina Land & Water Fund
- North Carolina Division of Water Resources
- Watauga Soil & Water Conservation District
- Brushy Fork Environmental Consulting

PROJECT OBJECTIVES:

Improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream and reduce streambank erosion

Stabilize the stream reach to prevent further aggradation or degradation by providing an improved dimension, pattern and/or profile that will improve sediment transport, and manage surface waters and groundwater levels in floodplains, riparian areas, and wetlands

Construct rock and woody structures to provide instream habitat, stabilize streambanks and the channel bed

Construct stream crossings to provide a travel way for people, livestock, equipment, or vehicles that will improve water quality by reducing streambank and streambed erosion

Remove barriers to provide an opportunity for the aquatic organisms to access additional habitat and migrate up and downstream

Establish a riparian buffer, remove invasive plant species and reestablish native plants, trees, and shrubs

Work in progress

RI is excited about 2022! 20 projects are nearing completion. The projects will be constructed in the Spring through Summer, with final riparian plantings in the late Fall and early Winter.

Almost 39,360 linear feet of stream will be enhanced and restored.



Hodges Creek, Surry Co., NC
Resource Institute is working with Surry Soil & Water Conservation District, NC Division of Water Resource and NRCS to establish a riparian buffer and install cattle crossings in this reach of the stream.



Pounding Mill Creek, Cleveland Co., NC
This stream flows into Knob Creek, a past Resource Institute project. On this section, RI will reduce the bank height ratio and create a bankfull bench.



UT Second Broad, Rutherford Co., NC
RI will restore a 2,700 feet section of this stream, including establishing a riparian buffer and installing stream crossings for cattle.

2022 PROJECTS

COUNTY – RIVER/STREAM	Feet of Restoration
Buncombe County – Swannanoa River	3,300
Cleveland County – Knob/Pounding Mill Creeks	3,175
Henderson County – Crab Creek	785
Henderson County – Boylston Creek	3,650
Macon County – Nantahala River	2,750
Rutherford County – UT Second Broad	2,700
Rutherford County – Cleghorn Creek	1,770
Rutherford County – Cedar Creek	2,700
Surry County – Hodges Creek	2,700
Surry County – Cooks Creek	1,250
Surry County - Christian Creek	1,230
Surry County – UT Cooks Creek	1,250
Surry County – UT Ararat River	500
Watauga County – Cove Creek	2,200
EQIP - SUBTOTAL	29,960
Mount Airy – Ararat River	2,700
Town of Pilot Mtn – Chinquapin Creek	1,700
NON-EQIP - SUBTOTAL	4,400

NCDA PONDS	Number
Johnston County – Mileski (NCDA) Sediment removal	1
Surry County – Cedarbrook	1
Duplin County – Williams (NCDA)	1

GREENWAYS	Feet
Surry – Mt Airy Ararat River	5,000



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