Ulster County 2021 Climate Smart Communities Recertification Documentation

PE7 Action: Culverts & Dams

18 POINTS DOCUMENTED

BACKGROUND:

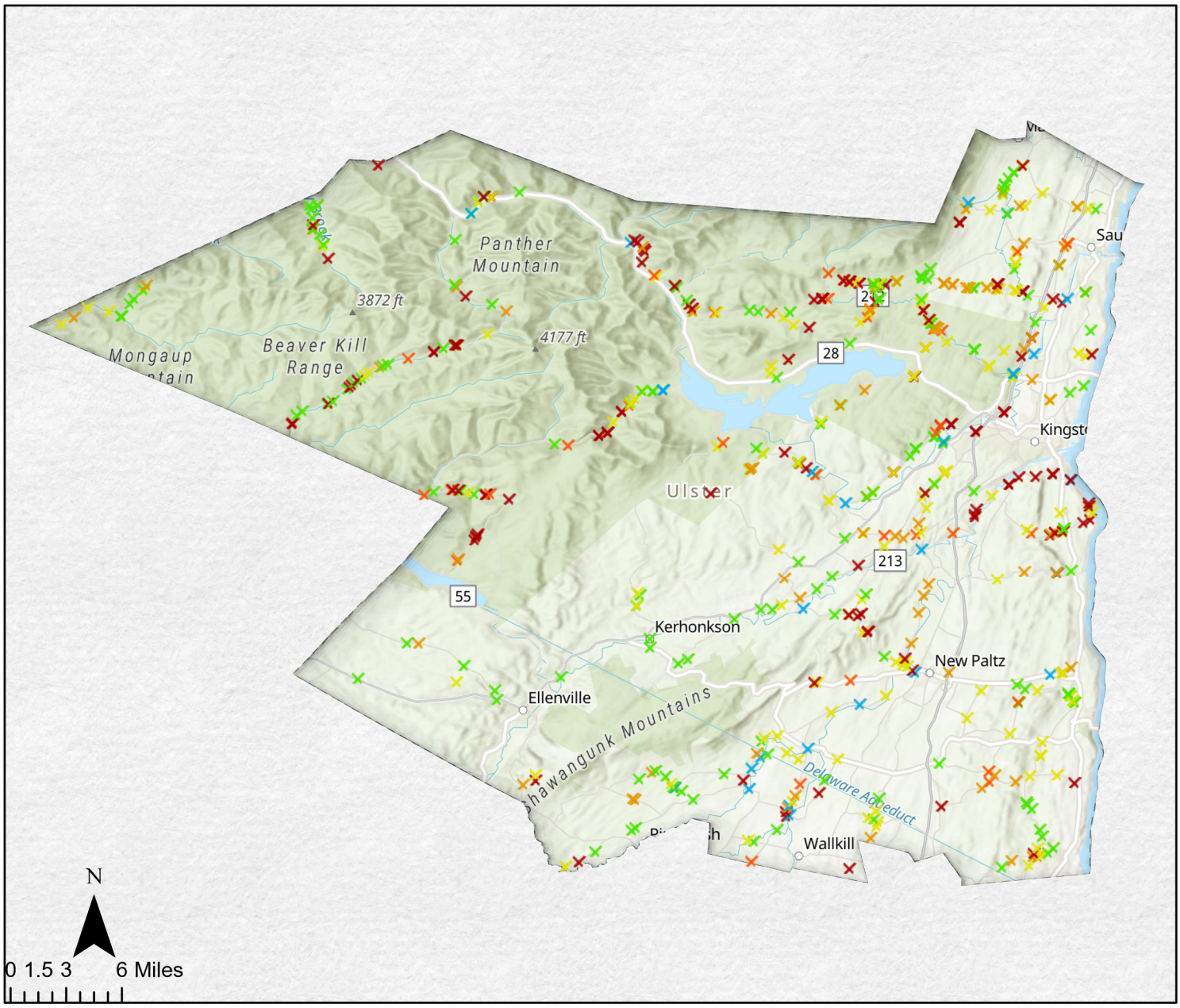
- County RSX Assessments and Management Plan**:** Ulster County received funding through two grant programs to complete assessments of all County-owned RSX in Ulster County. From 2016 to 2018 a Hudson River Estuary Program grant supported the assessment of all RSX outside of the NYC Watershed using the NAACC protocol. In 2019 and 2020, a NEIWPCC and Hudson River Estuary Program funded project supported an expanded multi-objective assessment of RSX in the Lower Esopus Watershed, which was completed in partnership with Cornell Cooperative Extension of Ulster County. This expanded protocol is called the Multi-Objective Stream Crossing Assessment Protocol (MOSCAP). In total, Ulster County has performed well over 500 NAACC assessments, and nearly 300 road stream crossings received a MOSCAP assessment (County and Town owned crossings). Ulster County also periodically performs a DOT culvert analysis of all large County owned culverts (over five feet in width). These data are stored with the County's Department of Public Works, and an Ulster County Road Stream Crossing Management Plan was developed as part of this work.

- Dam Inventory: A dam inventory and map of all dams in Ulster County is included in the attached Management Plan. The County's dam inventory was compiled using data from the New York State DEC Inventory of Dams. There are 187 dams in Ulster County that are included in the inventory, as well as many more dams that are unregistered. As all dams are potential barriers to aquatic connectivity, and can pose threats to human safety and infrastructure, it is important to know the location and status of these dams. A map of the dams included in the NYS Inventory of Dams, as well as the table with more information regarding specific dams, is included in Appendices J and K.

- **DOCUMENTATION:**
  - *Conduct an assessment of all road-stream crossings that fall under the responsibility of the local government using the NAACC protocol (2 points) & Develop a road-stream crossing municipal management plan that prioritizes crossings for replacement based on threats to flooding and aquatic connectivity (2 points):*
    - Map & Table of Ulster County NAAC Assessed Road Stream crossings (the full data table is located in the attached Ulster County Road Stream Crossing Management Plan, Section 7: Appendices)

  - *Right-Size Culverts & Bridges (2 projects, 12 points total):*
    - Fischer Bridge
      - 8 foot diameter culvert to 61 foot bridge replacement project: "Effect on Aquatic Passage" summary; funding letter; before & after pictures
    - Mine Hollow culvert
      - Culvert replacement project: Design summary; before & after pictures

  - *Conduct a dam inventory (2 points):*
    - Map & Table of Ulster County Dam Inventory (the full data table is located in the attached Ulster County Road Stream Crossing Management Plan, Section 7: Appendices)



Ulster County NAACC Assessed Road Stream Crossings

Road Stream Crossings on Ulster County Roads

NAACC Evaluation

- No barrier
- Insignificant barrier
- Minor barrier
- Moderate barrier
- Significant barrier
- Severe barrier

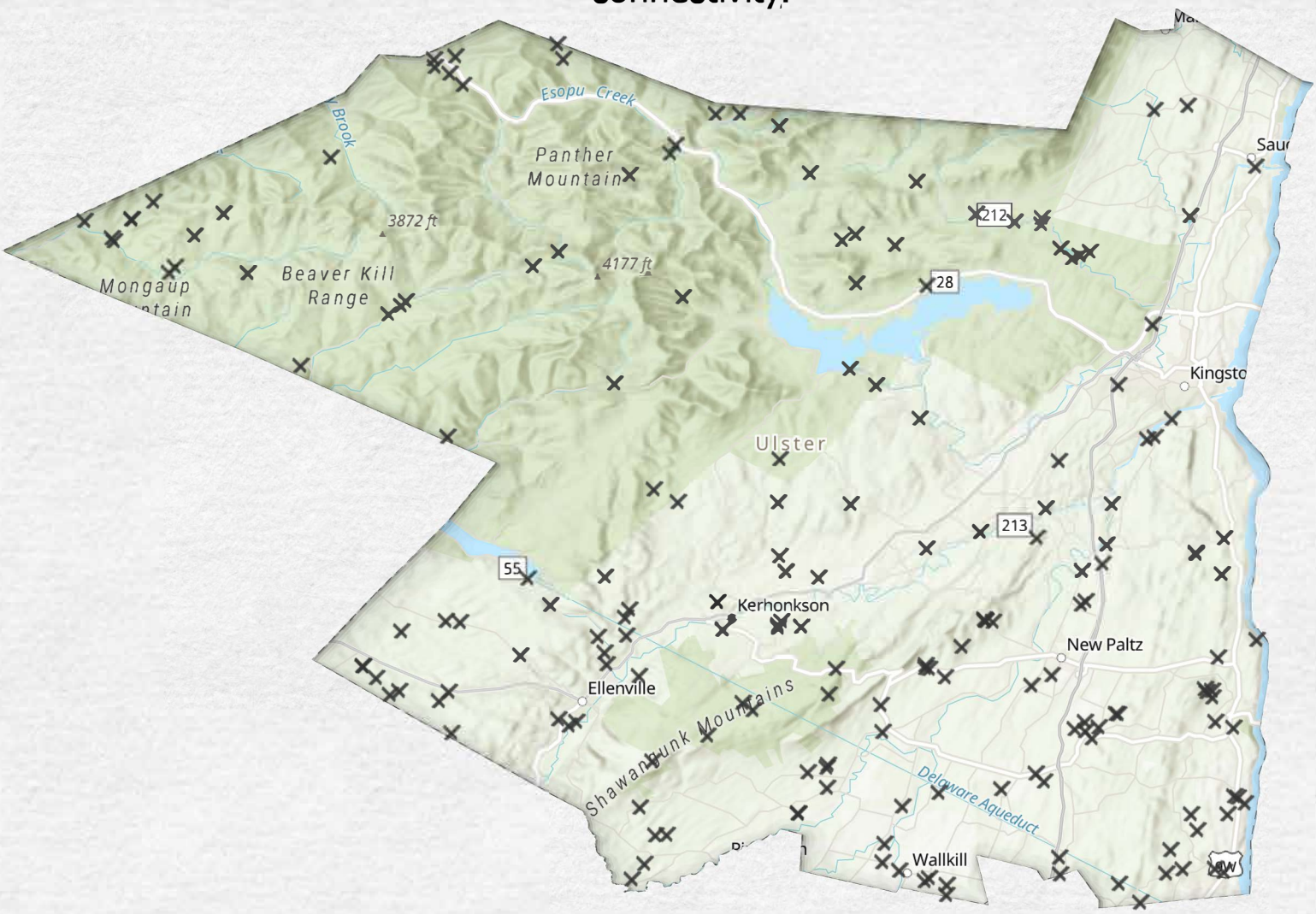
Map by Ulster County Department of the Environment 2021

*Data sources: North Atlantic Aquatic Connectivity Collaborative (2015-current) and Ulster County. for more information please see www.naacc.org
Methodology: Crossing sites selected within 25 feet of County Roads.

Survey_Id	Crossing_Code	Aqua_Pass_Score	AOP	Crossing_Comment	Crossing_Condition	Crossing_Type	Date_Observed	Evaluation	Location_Description	Observer	Road	Stream_Name	Town
36652	xy4203801174158392	-1	No AOP		Unknown	Bridge	2016-06-14	no score - missing data	at Penny Lane	Wolfson, Mandy	Wittenberg	unknown	Woodstock
37145	xy4204471074021780	-1	no score - missing data	wetland to wetland	Unknown	Culvert	2016-07-19	no score - missing data	glasco tpk	Wolfson, Mandy	Glasco Tpk	unknown	Saugerties
37276	xy4204014673994318	-1	no score - missing data	inaccessible outlet. Culvert empties directly into Plattekill Creek	OK	Inaccessible	2016-07-20	no score - missing data	glasco tpk	Wolfson, Mandy	Glasco Tpk	to Plattekill Creek	Saugerties
37326	xy4203504673975667	-1	no score - missing data	steep, overgrown banks	No data	Inaccessible	2016-07-20	no score - missing data	by Jackson Hill Road	Wolfson, Mandy	Glasco Tpk	Tributary to Esopus Creek	Saugerties
37386	xy4195590573980258	-1	no score - missing data	inaccessible, could not locate	No data	Inaccessible	2016-07-26	no score - missing data	Frank Sottile	Wolfson, Mandy	Frank Sottile	unknown	Ulster
41408	xy4197300074082800	-1	No AOP		Poor	Culvert	2016-09-29	no score - missing data	near Hoyer Rd	Wolfson, Mandy	Rt 28A	unknown	Ulster
41411	xy4197506074086177	-1	Reduced AOP	main culvert #3 completely submerged	Unknown	Culvert	2016-09-29	no score - missing data	at wetlands	Wolfson, Mandy	Rt 28A	unknown	Ulster
41411	xy4197506074086177	-1	Reduced AOP	main culvert #3 completely submerged	Unknown	Culvert	2016-09-29	no score - missing data	at wetlands	Wolfson, Mandy	Rt 28A	unknown	Ulster
41411	xy4197506074086177	-1	Reduced AOP	main culvert #3 completely submerged	Unknown	Culvert	2016-09-29	no score - missing data	at wetlands	Wolfson, Mandy	Rt 28A	unknown	Ulster
41502	xy4187166673952378	-1	no score - missing data	local id 081-03	OK	Culvert	2016-10-31	no score - missing data	directly at Hudson River	Wolfson, Mandy	River Road	trib to Hudson River	Esopus
47500	xy4169202673979608	-1	no score - missing data	submerged culvert bordering large wetland created due to culvert blockage, leads to catch basin before reconnecting with stream on private property, frequently causes adjacent property to flood	Unknown	Partially Inaccessible	2017-06-29	no score - missing data	near Deller Rd., bordering large wetland	Clark, Johnathan	Chapel Hill Rd.	unnamed	Lloyd
48884	xy4182562674005352	-1	no score - missing data	outlet blocked by large rose bush	OK	Partially Inaccessible	2017-07-18	no score - missing data	near house No. 866	Clark, Johnathan	Old Post Rd.	Swarte Kill	Esopus
49864	xy4174168674110882	-1	no score - missing data		OK	No Upstream Channel	2017-07-27	no score - missing data	near intersection with Rt. 299	Clark, Johnathan	Libertyville Rd.	stream draining from wetland into Wallkill River	New Paltz
49864	xy4174168674110882	-1	no score - missing data		OK	No Upstream Channel	2017-07-27	no score - missing data	near intersection with Rt. 299	Clark, Johnathan	Libertyville Rd.	stream draining from wetland into Wallkill River	New Paltz

Dams in Ulster County, NY

There are 187 dams in Ulster County, NY that are listed in the New York State Inventory of Dams as of 2020. As dams are in-stream structures, all dams are potential barriers to aquatic connectivity.



× Dams in Ulster County

Data source: New York State Inventory of Dams
https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1130

0 2.5 5 10 Miles

N

Map by Ulster County Department of the Environment

STATE_ID	FEDERAL_ID	QUAD	NAME_ONE	NAME_TWO	COUNTY1_NAM	REGION_NAM	HAZARD_COD	P1_INSP_DE	SCS	BASIN_NAME	RIVER_STRE	NR_CITY_NA	EAP_STATUS	YEARBUILT	CONSTR_TYP	MUNI	OWNERS	OWNERTYPE	PURPOSES	LAST_INSP	LST_AN_CRT	LST_COND_R	Hudson Aquatic Barrier*	Potential Aquatic Barrier
161-0450	NY14598	C	(161-0450)		Ulster	3	D	None	N	DELAWARE	BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	SALMO FONTINALS CLUB	Private	Other	5/9/1973	Not Found	Not Rated		Y
161-0465	NY14600	D	(161-0465)		Ulster	3	D	None	N	DELAWARE	BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	BALSAM LAKE ANGLER'S CLUB	Private	Other	5/9/1973	Not Found	Not Rated		Y
161-0466	NY14601	C	(161-0466)		Ulster	3	D	None	N	DELAWARE	TR-BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	GARY D SHAVER	Private	Other	5/8/1973	Not Found	Not Rated		Y
161-0467	NY14602	C	(161-0467)		Ulster	3	D	None	N	DELAWARE	BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	Not Found	Not Found	Other	5/8/1973	Not Found	Not Rated		Y
161-0471	NY14603	C	(161-0471)		Ulster	3	D	None	N	DELAWARE	TR-BEAVER KILL		None	0	OT - Other	Town of Hardenburgh	Not Found	Not Found	Other	5/8/1973	Not Found	Not Rated		Y
176-0960	NY14620	D	(176-0960)		Ulster	3	D	None	N	LOWER HUDSON	ESOPUS CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/11/1973	Not Found	Not Rated		Y
176-0983	NY14621	D	(176-0983)		Ulster	3	D	None	N	LOWER HUDSON	TR-CLOVE CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/9/1973	Not Found	Not Rated		Y
176-1000	NY14622	A	(176-1000)		Ulster	3	D	None	N	LOWER HUDSON	BUSHNELLSVILLE CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/7/1973	Not Found	Not Rated		Y
176-1006	NY14623	A	(176-1006)		Ulster	3	D	None	N	LOWER HUDSON	BUSHNELLSVILLE CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other		Not Found	Not Rated		Y
176-1010A	NY14624	A	(176-1010a)		Ulster	3	D	None	N	LOWER HUDSON	TR-BIRCH CREEK		None	0	OT - Other	Town of Shandaken	Not Found	Not Found	Other	5/7/1973	Not Found	Not Rated		Y
177-0750	NY14626	D	(177-0750)		Ulster	3	D	None	N	LOWER HUDSON	TR-VERNOOY CREEK		None	0	OT - Other	Town of Wawarsing	Not Found	Not Found	Other	4/5/1973	Not Found	Not Rated		Y
192-0896	NY14632	D	(192-0896)		Ulster	3	D	None	N	LOWER HUDSON	SAW KILL		None	0	OT - Other	Town of Woodstock	Not Found	Not Found	Other	5/11/1973	Not Found	Not Rated		Y
192-0907	NY14634	D	(192-0907)		Ulster	3	D	None	N	LOWER HUDSON	SAW KILL		None	0	OT - Other	Town of Woodstock	Not Found	Not Found	Other	4/25/1973	Not Found	Not Rated		Y
193-0166A	NY14707	B	(193-0166a)		Ulster	3	D	None	N	LOWER HUDSON	RONDOUT CREEK		None	0	OT - Other	Town of Esopus, City of Kingston	Not Found	Not Found	Other	5/30/1990	Not Found	Not Rated		Y
193-0826	NY14636	A	(193-0826)		Ulster	3	D	None	N	LOWER HUDSON	TR-ESOPUS CREEK		None	0	OT - Other	Town of Marbletown	Not Found	Not Found	Other	4/24/1973	Not Found	Not Rated		Y
194-0606	NY14638	C	(194-0606)		Ulster	3	D	None	N	LOWER HUDSON	TR-WALLKILL RIVER		None	0	OT - Other	Town of Shawangunk	Not Found	Not Found	Other	4/19/1973	Not Found	Not Rated		Y
161-3059	NY01222	C	Alder Lake Dam		Ulster	3	A	None	N	DELAWARE	ALDER CREEK	Turnwood	None	1994	RE - Earth, CN - Concrete Gravity	Town of Hardenburgh	NYS DEC - DIVISION OF FISH AND WILDLIFE	State	Recreation	8/28/2012	Not Found	Not Rated		Y
192-4888	NY13135	D	Alex Rice Mckim Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-SAW KILL CREEK	Sweet Meadows	None	0	RE - Earth	Town of Woodstock	WALRUS PROPERTIES LLC	Private	Recreation	7/18/1986	Not Found	Not Rated		Y
193-0855	NY00041	A	Ashokan Dam	Olive Bridge Dam	Ulster	3	C	OK	N	LOWER HUDSON	ESOPUS CREEK	Olive Bridge	On File	1916	RE - Earth, MS - Masonry	Town of Olive	NYCDEP DAMS WEST OF THE HUDSON RIVER	Local Government	Water Supply - Primary	11/9/2018	12/16/2019	Deficiently maintained		Y
194-5853	NY16998	A	Bales Dam		Ulster	3	A		N	LOWER HUDSON	Unnamed Trib - Wara Kill		None	0	ST - Laid Up Stone	Town of Gardiner	JAMES E BALES	Private	Recreation	4/10/2014	Not Found	Not Rated		Y
161-0470	NY01232	C	Beecher Lake Dam		Ulster	3	A	None	N	DELAWARE	BEECHER BROOK	Turnwood	None	1925	RE - Earth	Town of Hardenburgh	New York Zendo Shobo-Ji	Private	Recreation	8/28/2014	1/25/2010	Not Rated		Y
176-5806	NY16942	A	Belleayre Snowmaking Pond Dam		Ulster	3	D		N	LOWER HUDSON	Trib - Birch Creek	Pine Hill	None	0	RE - Earth	Town of Shandaken	NYS DEC	State	Recreation		Not Found	Not Rated		Y
177-2249	NY12920	D	Ben Benson Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Kerhonkson	None	1955	RE - Earth	Town of Rochester	BEN BENSON	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
193-0863	NY01130	B	Binnewater Reservoir Dam & Dike		Ulster	3	B	None	N	LOWER HUDSON	TR-ESOPUS CREEK	Kingston	On File	1926	RE - Earth	Town of Ulster	CITY OF KINGSTON	Local Government	Recreation	6/26/2019	1/31/2011	Unsound - More Analysis needed		Y
193-4813	NY13152	D	Binnewater Road Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Rosendale	None	0	MS - Masonry	Town of Rosendale	TOWN OF ROSENDALE	Local Government	Other	10/27/2015	5/1/2014	No deficiencies noted		Y
194-0607	NY13161	C	Borden Home Pond Dam #1		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Walden	None	1891	CN - Concrete Gravity, RE - Earth	Town of Shawangunk	BORDEN HOME FARM	Private	Fire Protection, Stock, Or Small Farm Pond, Recreation	4/19/1973	Not Found	Not Rated		Y
194-0615	NY13163	C	Borden Home Pond Dam #3		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Walden	None	1850	RE - Earth, ER - Rockfill	Town of Shawangunk	TOWN OF SHAWANGUNK	Local Government	Other	8/27/2009	Not Found	Not Rated		Y
194-5453	NY16068	C	Borden Home Pond Dam #4		Ulster	3	A	None	N	LOWER HUDSON		Wallkill	None	1850	RE - Earth	Town of Shawangunk	TOWN OF SHAWANGUNK	Local Government	Recreation	8/27/2009	Not Found	Not Rated		Y
212-5004	NY14151	A	Bridgeview Plaza Dam		Ulster	3	B	None	N	LOWER HUDSON	NONE	Highland	None	0	RE - Earth	Town of Lloyd	BRIDGEVIEW SP CORP	Private	Flood Control and Storm Water Management	1/11/2017	2/4/2019	Not Rated		Y
211-1024	NY13440	C	Broglio Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	BLACK CREEK	Esopus	None	1934	CN - Concrete Gravity	Town of Esopus	John Burroughs Assocoation	Private	Recreation	10/6/2016	Not Found	Not Rated		Y
177-3570	NY12925	D	Camp Grant Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-RONDOUT CREEK	Granite	None	0	RE - Earth	Town of Rochester	CAMP GRANITE	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
177-4066	NY12927	C	Camp Napanoch Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	Lackawack	None	1973	ER - Rockfill	Town of Wawarsing	CAMP NAPANOCH	Private	Recreation	12/31/1901	Not Found	Not Rated		Y
176-1236	NY12911	D	Camp Pond Dam	Muddy Brook Pond Dam	Ulster	3	A	None	N	LOWER HUDSON	MUDDY BROOK	Phoenicia	None	1946	CN - Concrete Gravity, RE - Earth	Town of Shandaken	J EDWARDS	Private	Recreation	4/17/2013	Not Found	Not Rated		Y
177-3253	NY12922	C	Camp Westmont Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-BEER KILL	Ulster Heights	None	1964	CN - Concrete Gravity	Town of Wawarsing	BENJAMIN TZENG	Private	Recreation	4/26/2011	Not Found	Not Rated		Y
178-0751	NY00265	A	Cape Pond Dam		Ulster	3	B	Unsafe Spillway Capacity	N	LOWER HUDSON	BEER KILL	Ellenville	On File	1914	RE - Earth	Town of Wawarsing	CAPE POND INC.	Private	Recreation	1/11/2017	1/28/2019	No deficiencies noted		Y
193-0770	NY00782	C	Central Hudson Dam At High Falls	High Falls Dam	Ulster	3	A	None	N	LOWER HUDSON	RONDOUT CREEK	High Falls	None	1935	CN - Concrete Gravity	Town of Marbletown	Central Hudson Gas & Electric Corp.	Public Utility	Hydroelectric	3/16/2009	2/3/2011	Not Rated		Y
193-2416	NY13143	C	Chaits Hotel Lake Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-ROCHESTER CREEK	Accord	None	1956	RE - Earth	Town of Rochester	CHAITS HOTEL	Private	Recreation	4/4/1973	Not Found	Not Rated		Y
212-0683	NY13487	A	Chance Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TWAALFS KILL CREEK	Highland	None	1911	MS - Masonry, RE - Earth	Town of Lloyd	PHILIP SCHANTZ	Private	Recreation	4/27/1973	Not Found	Not Rated		Y
176-5507	NY16127	D	Chichester Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-STONY CLOVE	Chichester	None	0	RE - Earth, RE - Earth	Town of Shandaken	PAUL & HEIDI NUTE	Private	Recreation	8/30/2016	7/23/2013	Not Rated		Y
193-4239	NY13148	D	Chousa Pond Dam		Ulster	3	A	None	N	LOWER HUDSON	TR-WALLKILL RIVER	Rifton	None	1976	RE - Earth, CN - Concrete Gravity	Town of New Paltz	MANUEL R CHOUSA	Private	Recreation	12/12/2012	Not Found	Not Rated		Y

* Source: WRI/HREP "Biologically Important Barriers" https://www.google.com/maps/d/u/0/viewer?mid=1yjfPSCYwn7tGtGNU2x5eSZRVWAE&ll=41.8632940740885%2C-73.94817599999999&z=8

Data Source: *NYSDEC Inventory of Dams* https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1130

FISHER BRIDGE EFFECT ON AQUATIC PASSAGE

The Fisher Bridge was installed post-Irene to replace an eight foot diameter heavy steel pipe. The new structure has a span of 61 feet, which has resulted in an extreme increase in the hydraulic capacity and a positive effect on aquatic organism passage (AOP). These positive effects on AOP are as follows:

1. Bankfull width: The new structure span more than accommodates the bankfull width of the existing waterway. This has resulted in lower velocities when compared the outlet of the old structure which was slightly purged as a result of the under sizing of the structure. Please see Photo 1 below for reference.
2. Natural Streambed: The replacement of the steel pipe with the bridge has created a natural channel with potential aquatic habitat.
3. Continuous Profile: The natural channel bottom has created a continuous stream profile for the waterway.

The Fisher Bridge has eliminated localized impediments to aquatic organism passage at the crossing of Oliveria Road.

Photo 1. Eight foot diameter pipe outlet prior to Fisher Bridge construction

ULSTER COUNTY DEPARTMENT OF PUBLIC WORKS

317 Shamrock Lane, Kingston, New York, 12401

MICHAEL P. HEIN
County Executive

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SUSAN K. PLONSKI
Commissioner

BRIAN CUNNINGHAM
Deputy Commissioner

April 5, 2016

Ms. Leslie Zucker
Ashokan Watershed Stream Management Program
P.O. Box 667
Shokan, NY 12481

RE: SMIP APPLICATION 2016
FISCHER BRIDGE (C.B. 211)
TOWN OF SHANDAKEN

Dear Ms. Zucker:

Ulster County respectively submits the attached SMIP grant application for your review. This grant request provides Ulster County funding to help with the shortfall of funding for the construction of the Fischer Bridge carrying Oliveria Road over the Esopus in the Town of Shandaken. Ulster County spent at total of approximately $645,000 to replace an 8 foot diameter pipe with a 61 foot span bridge. FEMA is providing approximately $155,000 to the County, leaving a $490,000 shortfall in available reimbursement.

The proposed grant was previously funded by a SMIP grant from your program in 2011, but the funding/grant was terminated in January 2015 so that other municipalities could utilize the funding the grant was tying up. The termination of the grant was due to delays in FEMA determining the amount of their mitigation funding. Ulster County could not seek funds through your program prior to knowing the amount of funding FEMA was going to provide. Ulster County recently found out the final total amount of FEMA reimbursement for the project, which is extremely less than the actual costs incurred, thus is applying now for the grant.

Also enclosed with the application please find the 2011 SMIP grant application and correspondence related to the grant and project. Please feel free to contact me with any questions or require any further information at (845) 340-3125 or aemr@co.ulster.ny.us.

Sincerely,

Andrew J. Emrich

Enclosures


3. 23. 2004

MINE HOLLOW CULVERT DESIGN SUMMARY

Town of Olive, Ulster County, NY

Ulster County Department of Public Works

November 2015

Project Background

Mine Hollow is a tributary to the Bushkill Stream in the Town of Olive. The Mine Hollow's headwaters are in the col/ridge of Hanover Mountain and an unnamed peak to the southwest flowing approximately 1.8 miles southeasterly to its' confluence with the Bushkill. Immediately prior to its' confluence with the Bushkill, the Mine Hollow flows through two (2) horizontally adjacent 48 diameter smooth steel pipes which carry Watson Hollow Road (County Road 139). This crossing has been a continual flood hazard for the Ulster County Department of Public Works and the Town of Olive. Debris, both woody and large aggregate, collects at the inlet of the two pipes during high intensity rainfall events, resulting in flooding across Watson Hollow Road. This project intends to improve this hazard by replacing the two steel pipes with a concrete box culvert. The structure is located on the map in Figure 1.

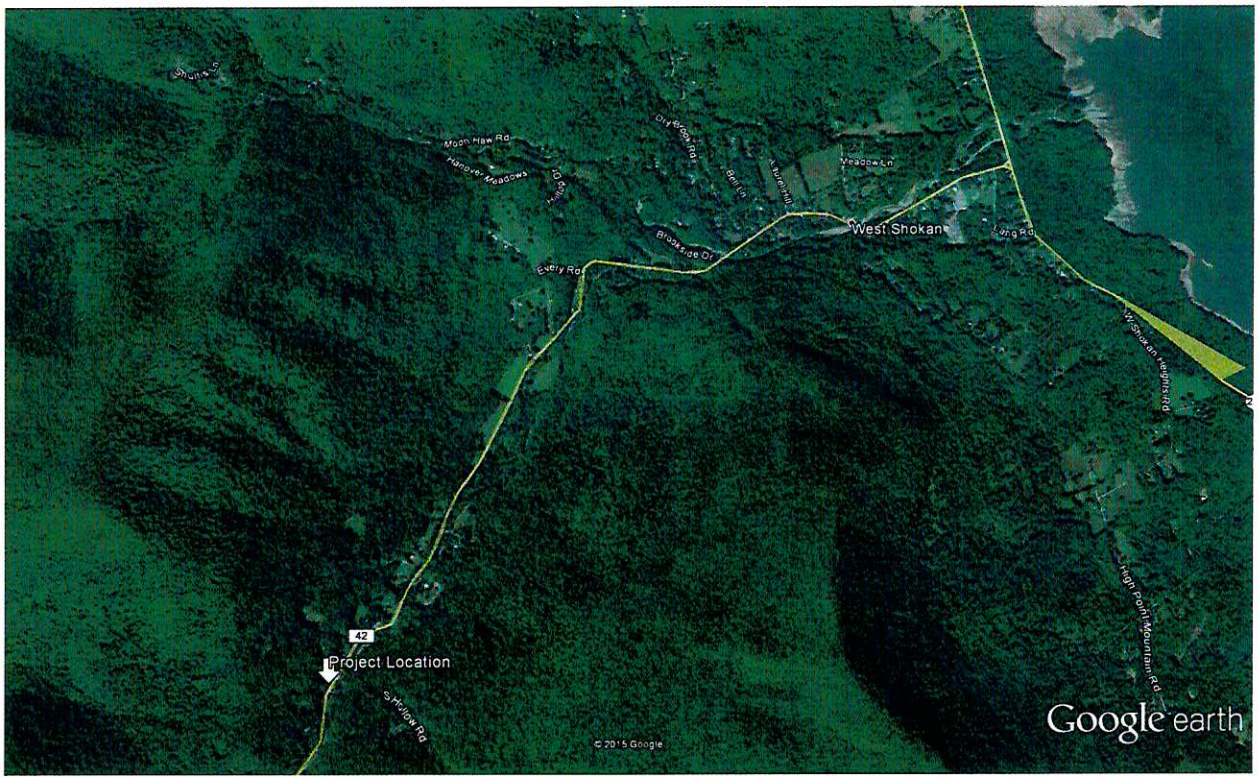

Figure 1: Mine Hollow Structure Location Map

Field Assessment

Ulster County Department of Public Works (UCDPW) engineering staff has visited the site several times over the past few years. During these site visits, observations were made of the Mine Hollow channel upstream of the structure at Watson Hollow Road, at the inlet of the structure and at the outlet/confluence with the Bushkill. Measurements were also taken during site visits of the existing structure, channel, and roadway.

The Mine Hollow Channel upstream of the Watson Hollow crossing has been observed to be slightly incised but in stable condition. The channel has a slope of approximately 6%, a bankfull width of 12 feet and is assumed to be classified as a B2/3 stream type as according to the Rosgen stream classification system. The channel dimensions have not seen any dramatic changes over time; however, there is a constant load of larger aggregate/cobble that is being supplied by the upper, steeper reaches of the channel. This aggregate becomes mobile during high flow events at which point it settles at the inlet of the structure and the main channel upstream is re-supplied with aggregate from the upper reaches. This causes a continual maintenance requirement for UCDPW to remove accumulated debris at the inlet in order to keep the structure functional. Figures 2 and 3 are photographs of the observed inlet condition during separate site visits. Figure 4 shows UCDPW staff trying to dislodge debris accumulated at the inlet during a heavy rainfall event and Figure 5 shows the flooding of Watson Hollow Road due to the blockage.

Figure 2: Mine Hollow Structure Inlet in February 2012

Figure 3: Mine Hollow Structure Inlet in November 2014

Figure 4: Ulster County Staff Attempting to Unclog the Inlet of the Mine Hollow Culvert

Figure 5: Watson Hollow Road Flooding due to Blockage at the Inlet of the Mine Hollow Culvert

Figure 2: Mine Hollow Structure Inlet in February 2012

NEW YORK STATE OF OPPORTUNITY | Climate Smart Communities

PE7 Action: Culverts & Dams

2 — 24 Points

A. Why is this action important?

Hydraulic obstructions, such as dams, culverts, and bridges can contribute to localized flooding near road-stream crossings, and present a hazard to the community if they are routinely overtopped or washed out. Intense precipitation can cause more water and debris than usual to be carried by streams, resulting in debris jams, overflows, scour, or even washouts of culverts and bridges that are too small.

Many dams in New York State (NYS) are not properly maintained, are past their engineered lifespan, and/or were not constructed with climate change in mind. They can present a flooding hazard to upstream communities and, in the event of a dam failure, to downstream communities as well. Some municipalities and private dam owners are interested in removing their dam if the right support and resources are offered.

Fish and many other organisms use rivers and streams as pathways to move between feeding, nursery, and breeding grounds. Many culverts and dams disrupt this "aquatic connectivity" because they act as barriers to fish and wildlife movement.

This Climate Smart Communities (CSC) action focuses on removing dams and correctly sizing bridges and culverts to maintain beneficial floodplain functions and restore natural stream conditions, which can reduce flooding impacts and restore aquatic connectivity.

B. How to implement this action

Follow the steps and guidance below to implement this action. Your municipality can assess and prioritize culverts and bridges separately from dams, or address them all together in one combined process and resulting plan.

Culverts and Bridges

1) **Assess stream crossings in your municipality**, both publicly and privately owned, that have caused flooding or may cause flooding in the future due to changes in precipitation from climate change or changes in upstream land use. For assessing road-stream crossings, use the North Atlantic Aquatic Connectivity Collaborative (NAACC) assessment protocol. If a FEMA flood insurance study is available, then hydraulic obstructions may be shown on river or stream profiles. Other sources of data that may identify hydraulic obstructions sources include the following:

- Army Corps of Engineers
- United States Geological Survey (USGS)
- Natural Resource Conservation Service
- Soil and Water Conservation Districts
- Local flood analyses
- Local or regional watershed assessments (See Section G below for examples of tools and protocols)
- Local and/or County Hazard Mitigation Plans
- State Department of Transportation
- Local Department of Public Works (for data concerning local flooded infrastructure)
- Local experience

When evaluating sites, consider the larger watershed context and effects both up and down stream. Problems could arise

from the following:

- Undersized crossings
- Shallow crossings
- Perched crossings
- Multiple culverts at one stream crossing

2) **Create a road-stream crossing management plan** for identified crossings for municipalities to use as a resource to right-size and improve undersized and deficient crossings. Prioritize culverts and bridges for right-sizing based on flooding and aquatic connectivity risk (see resources in Section G). Include the road-stream crossing management plan as a chapter of other relevant plans such as capital planning or hazard mitigation. Include implementation and funding strategies.

3) **Install a right-sized culvert or bridge**. Work with local soil and water conservation districts, qualified engineers, and the NYS Department of Environmental Conservation (DEC) staff to design the appropriate type of stream crossing and minimize impact to the stream. Best practices include the following:

- Use open-bottomed culverts, that span at least 1.25 times the bank full width, where possible, to reduce barriers to aquatic life.
- Use the most recent flow volume standards and incorporate projections of future rainfall subject to climate change (see NYS Flood Risk Management Guidance). Size to the 100-year storm event where possible.
- Local bridges and culvert projects that receive federal funding have to follow the NYS DOT Design Manual (DM). The DM requires that 10 and 20 percent (depending on the part of the state) must be added to the current peak flows. The 50 year flow needs to be used for culverts.
- Contact the DEC to determine if a permit is necessary. Permits are required for streams classified as C(T) or higher quality (ECL Article 15-0501), navigable bodies of water (ECL Article 15-0505), and DEC regulated wetlands (ECL Article 24).
- Evaluate the impact of removal of the hydraulic obstruction. Determine the benefits such as decrease in floodplain area, reduced road closures and damage, or increased fish and wildlife habitat connectivity. Also, examine the costs such as increased downstream flooding or loss of wetlands.
- Prepare a maintenance and inspection plan for structures such as bridges and culverts that may need to be checked for structural deficiencies, erosion, undermining, and debris buildup. Refer to and update the plan as conditions change.
- Perform annual maintenance on all culverts and stream crossing structures and check for structural deficiencies, undermining and debris buildup. Refer to and update management plan as conditions change.

Dams

1) **Create an inventory of dams in the municipality**, both publicly and privately owned. Assess their ownership and maintenance status, and if they are serving an important community need, such as water supply, flood control, and/or power generation. Assess which dams pose a significant threat to fish migration and aquatic connectivity (e.g., Biologically Important Barriers in the Hudson River Estuary (PDF).

2) **Remove a dam** by working with local and regional DEC staff, town engineers and attorneys, and other stakeholders, as necessary. Follow the guidance from the DEC and partners (see resources in Section G). Contact dam owners to solicit interest in removal or stream restoration. Prioritize removal of dams that are in hazardous condition and/or pose significant threat to aquatic connectivity/fish migration.

C. Timeframe, project costs, and resource needs

The timing and costs to assess a road-stream crossing will vary according to the amount of staff time needed to perform the assessment or the cost to hire a consultant to perform the assessment(s) using the NAACC protocol. The timing and costs to right-size a stream crossing depends on the number of crossings to be replaced and the type and extent of upgrade or replacement involved. Dam removal projects require several planning steps and can be a lengthy process. Costs of these projects are variable, depending on the complexity of the upgrading or mitigation strategy. An additional timing constraint involves applying for the necessary permits. Local governments will typically need to devote some staff time and capital resources for the improvement of stream crossings and removal of unwanted dams.

D. Which local governments implement this action? Which departments within the local government are most likely to have responsibility for this action?

This action is applicable to all types of local governments. The department or staff responsible for public works, highways or engineering are most appropriate to lead this action, although dam removal projects will likely need help from dam removal experts outside the municipal staff. Culvert resizing should be included in municipal highway annual maintenance plans. For this effort to be successful, cross-department involvement and support are recommended. Private landowner partnerships will be needed in many cases. Municipal committees, such as CSC task forces, conservation advisory councils, environmental conservation committees, or watershed groups may also be involved. This action could be led by another organization, such as a county agency, but the local government must demonstrate substantial involvement in the effort to receive points.

E. How to obtain points for this action

Points for this action are tiered based on completion of the components described below. All must have occurred within ten years prior to the application date.

	POSSIBLE POINTS
Conduct an assessment of all road-stream crossings that fall under the responsibility of the local government using the NAACC protocol	2
Develop a road-stream crossing municipal management plan that prioritizes crossings for replacement based on threats to flooding and aquatic connectivity	2
Right-size at least one culvert or bridge. It must not be a barrier to aquatic connectivity and must be sized to future climate projections (e.g., to the standards recommended in the Draft NYS Flood Risk Management Guidance). A maximum of 12 points is available for 2 (or more) right-sizing projects	6
Conduct a dam inventory	2
Remove one or more dams identified as barriers to aquatic connectivity and/or are in hazardous condition	6

F. What to submit

This action has five different tiers of points (as above); clearly describe the tiers for which the local government is applying. For assessment and management plan(s) for culverts and bridges, and/or a dam inventory, submit copies of the reports (or the web addresses for them).

For points associated with right-sizing culverts or bridges, or removing dams, submit evidence of completion, such as before and after photographs, and a description of the reason and design for removal or right-sizing. Applicants may receive points for any of these actions over a 10-year period.

All CSC action documentation is available for public viewing after an action is approved. Action submittals should not include any information or documents that are not intended to be viewed by the public.

G. Links to additional resources or examples

- DEC Stream Crossings: Guidelines and Best Management Practices
- DEC, Aquatic Connectivity and Barrier Removal
- NYS Flood Risk Management Guidance
- Identification of Biologically Important Barriers in the Hudson River Estuary (PDF)

- Cornell WRI Aquatic Connectivity and Barrier Removal program with Interactive Aquatic Connectivity map
- DEC, Stream Crossings: Protecting and Restoring Stream Continuity
- DEC, Environmental Resource Mapper
- DEC, Hudson Valley Natural Resource Mapper with dam inventory and assessed road-stream crossings
- DEC, Dam Removal and Barrier Mitigation draft guidance (PDF)
- North Atlantic Aquatic Connectivity Collaborative (NAACC) Assessment protocol
- NYS Department of Transportation (DOT) Highway Design Manual
- NYS DOT, Bridge Manual
- Cornell University Local Roads Program
- Riverkeeper Dam Removal
- Northeast Regional Climate Center, Extreme Precipitation in New York & New England
- USGS StreamStats
- USGS Future Flow Explorer
- FEMA Hazard Mitigation Assistance and Public Assistance grants
- High Hazard Potential Dam Rehabilitation Grant Program

H. Recertification Requirements

The recertification requirements are the same as the initial certification requirements.