Ticonderoga Chilson Water Transmission Main Facility Hazard Mitigation Relocation Project

Appendix B

Engineer's Preliminary Report/Photographs

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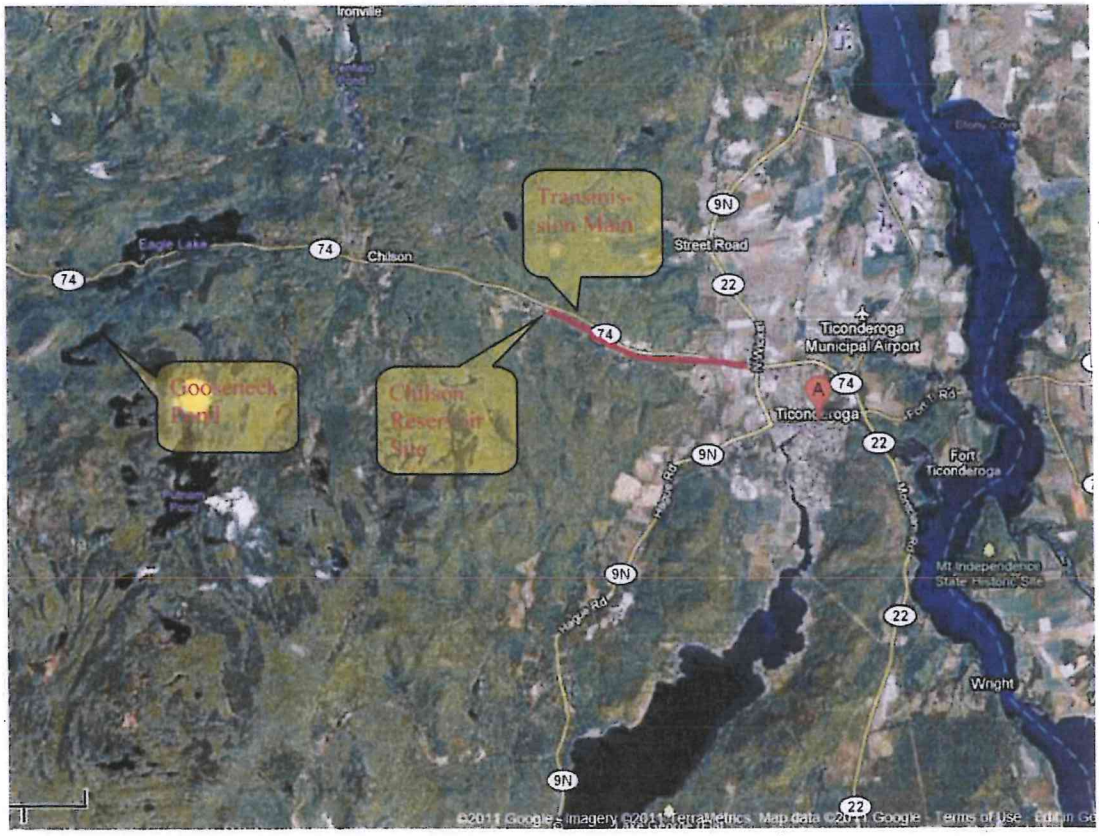
Town of Ticonderoga
Hurricane Irene, FEMA 4020 DR NY
August 26th, 2011 and Counting

Project Damage Inspection: Chilson Water Transmission Main Failure

Description of Impacted Infrastructure

The Town of Ticonderoga is located in the southeast region of Essex County, within the bounds of the Adirondack Park. The water system operated by the Town supplies water to approximately 1,700 users within the central former Village boundaries and extensions along to NYS Route 9, Shore Airport Road, Baldwin Road, and other outlying areas as far as Chilson and Eagle Lake. The Ticonderoga Water System maintains two sources of water supply, one of which is the Gooseneck Pond, a gravity fed system located approximately nine miles west of the hamlet area.

The transmission main from Gooseneck Pond to an open reservoir on Old Chilson Road that dates back to circa 1931 and consists of 14" and 10" cast iron pipe. An older, late 1800's 12" cast iron transmission main from the Chilson Reservoir delivers water down to the community. This 1800's main was installed along Chilson Brook and a now abandoned roadway. The Gooseneck System feeds the majority of the water users located upland from the Town's secondary source. It is important to note that although the Gooseneck Pond system is capable of providing water to the entire system, the secondary source is capable of serving only half of the system's residences.



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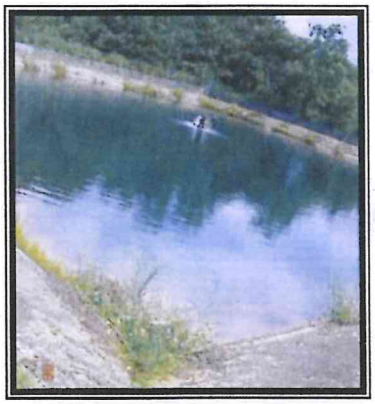
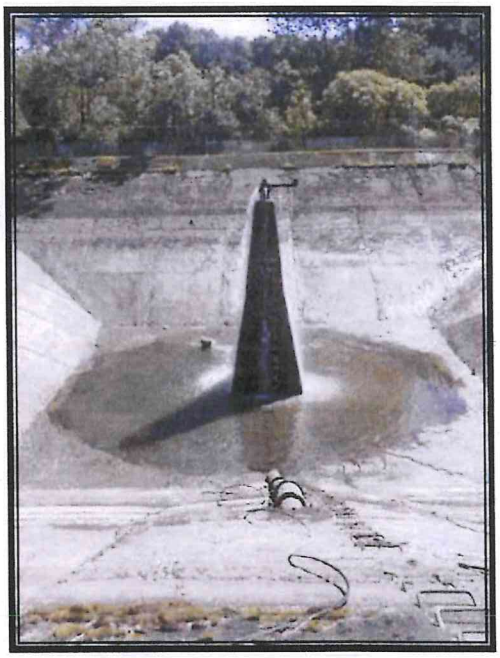


Chilson Reservoir (Full)

Wash out of Main



Chilson Reservoir (Empty)

In the wake of Hurricane Irene, flash flooding of Chilson Brook washed out roadways and broke the 1890's vintage 12" cast iron transmission main that is the sole supply to the Town's commercial area, Chilson residents, and the Street Road district. When the main broke, the 1 million gallon contents of the Chilson reservoir emptied into the brook, and roughly 850 users had either low pressure, or no water at all.

First Break, Boiling in Brook

Emptied Water Main

Emergency Repair

Boil water orders were issued due to the fact that the water main break emptied sections of the main. Since the break was located in Chilson Brook, contaminated water entered the drinking water system (supplying some residences), as well as significant amounts of sediment from the washout of stream banks.

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Summary of Conditions

During the Hurricane Irene event the Chilson Brook was inundated with flood waters. The Chilson transmission main is located along and under the Chilson Brook. The storm event washed out portions of the Chilson Brook bank and moved massive amounts of soil and material in and around the brook. The event also changed the course of the brook. Erosion of bank along the water main has left an approximately 130' section of main without proper bury depth. The insufficiently buried main no longer has protection from the weather or the brook itself.

In some locations, the cover over the water main was washed away entirely. The loss of cover combined with a collapsing bank caused two water main breaks to occur. As a result, the 1 million gallon Chilson Reservoir emptied and many of the water users were without water. The location of the breaks along Chilson Brook allowed a considerable amount of sand, and gravel to enter the water main. This sand and gravel was washed further down the transmission main, leading to other problems and damage.

Approximately 315' downstream from the water main breaks a small driveway crosses the brook, creating a barrier for the storm flow. As a result, a significant amount of material (stones, etc.) carried by the storm flow was deposited just upstream of the driveway. The deposited material has formed a large mound of material. This material was deposited over a section of the water main, making future access to the main (for maintenance and repair work) difficult if not impossible.

Immediate Town Action

Town personal located the water main breaks and installed (2) replacement sections of pipe, consisting of C-900 plastic pipe and Hymax couplers to return the water main to service. A small excavator was lowered into the brook valley to divert the stream and provide some protection of the exposed main within the brook bed.

Recommended Temporary Repairs

None

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Recommended Permanent Repairs (Replacement In-Kind)

Water Main Break:

The type of pipe used in the temporary repair is not intended for direct bury in river crossings, especially in bury conditions of river rock. Therefore, the repaired sections of pipe will need to be replaced with the modern ductile iron equivalent of the existing 12" Class D 2-bolt cast iron heavy wall pipe to match the original pipe . Due to the re-routing of Chilson Brook and the erosion of the pipe cover, the water main is no longer properly buried. The replacement pipe must be buried to restore proper bury depth.

The location of the existing water main is very difficult to access and is in an environmentally sensitive area. Therefore there will be several considerations that must be factored into the cost of the repair work.

- Permits– Due to the potentially large environmental impact of the project, it is likely that the permitting process will be long and expensive. At a minimum, permits will likely be needed from the APA, NYS DEC, ACOE, and SHPO. This expense is taken into account in the project cost estimates.
- The water main is currently installed in the Chilson Brook, therefore, the brook will have to be temporally rerouted when the water main installation occurs. Proper environmental controls, turbidity curtains and silt fence will also have to be utilized to protect the brook.
- After the permanent water main repairs are installed, the brook will have to be restored to its original path and condition.
- Access to the site is difficult. Only small machinery can reach the repair location, which may cause the cost of the project to increase.

Debris Removal:

The pile of debris located just upstream of the driveway that crosses the Chilson Brook should be removed such that access to the water main can be maintained for future repair work.

The following considerations must be taken into account with regards to the project:

- Permits- Due to the potentially large environmental impact of the project, it is likely that the permitting process will be long and expensive. At a minimum, permits will likely be needed from the APA, NYS DEC, ACOE, and SHPO. This expense is taken into account in the project cost estimates.
- The debris pile is locate near the Chilson Brook and, therefore, the brook will need to be protected from damage.
- Access to the site is limited to small machinery, which may cause the cost of the project to increase.

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Recommended Permanent Repairs (Mitigation)

Due to the lack of access to the current location of the water main, and the potential for environmental damage to the Chilson Brook, it is recommended that the Town pursue an option of relocating the water main from its current location in the Chilson Brook to a location along NYS RT 74. This option will allow for easier access to the water main and, most importantly, will minimize the environmental disturbance caused by the project by not requiring the brook to be excavated and rebuilt. This option will also mitigate the hazard of new breaks occurring within the brook during future flood events.

To relocate the water main, a new section of main would be directionally drilled under the Chilson Brook from the Chilson Reservoir site. This main would be then installed out to Middle Chilson road and east along NYS RT 74 before tying into the existing water main at the location where the existing main crosses NYS RT 74.

Cost Estimates and Figures

The actual costs associated with the initial repair work are submitted under a separate cover.

Cost Estimates and Figures have been provided and are attached for each item described above.

- Table 1.1—Replacement-in-Kind Cost Estimate Summary
- Table 1.2—Estimate: Stream Temporary Rerouting Labor & Equipment
- Table 1.3—Estimate: Stream Restoration Labor & Equipment
- Table 1.4—Estimate: Stream Debris Removal Labor & Equipment
- Table 1.5—Permanent Repairs (Mitigation) Relocating Chilson Transmission Main
- Figure 1.1—Chilson Transmission Main: Water Main Break Location & Replacement in-kind Map
- Figure 1.2— Chilson Transmission Main: Proposed Location (Mitigation) Map

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Figure 1.1 Chilson Transmission Main: Water Main Break Location & Replacement in-kind Map

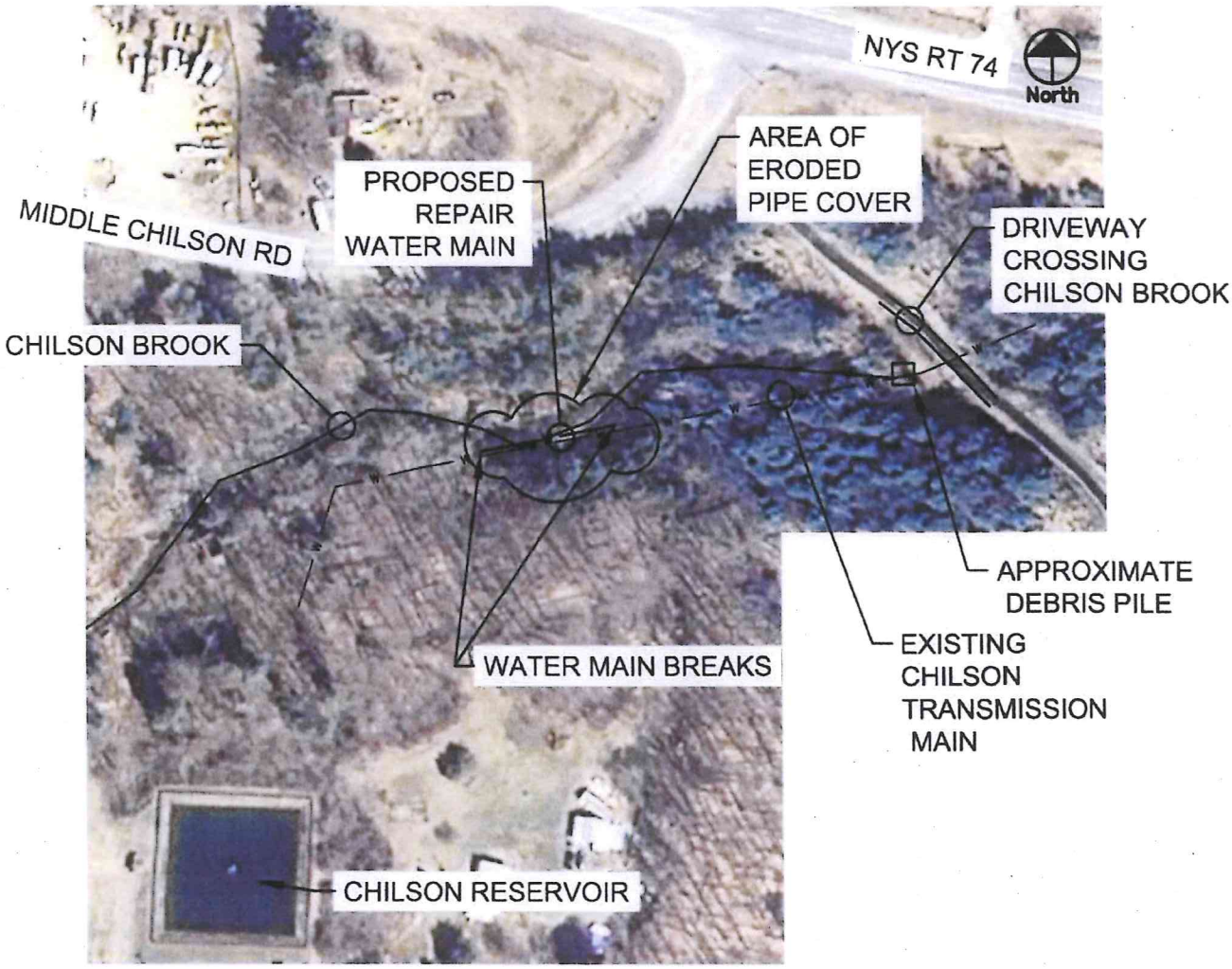

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Figure 1.2 Chilson Transmission Main: Proposed Relocation (Mitigation) Map

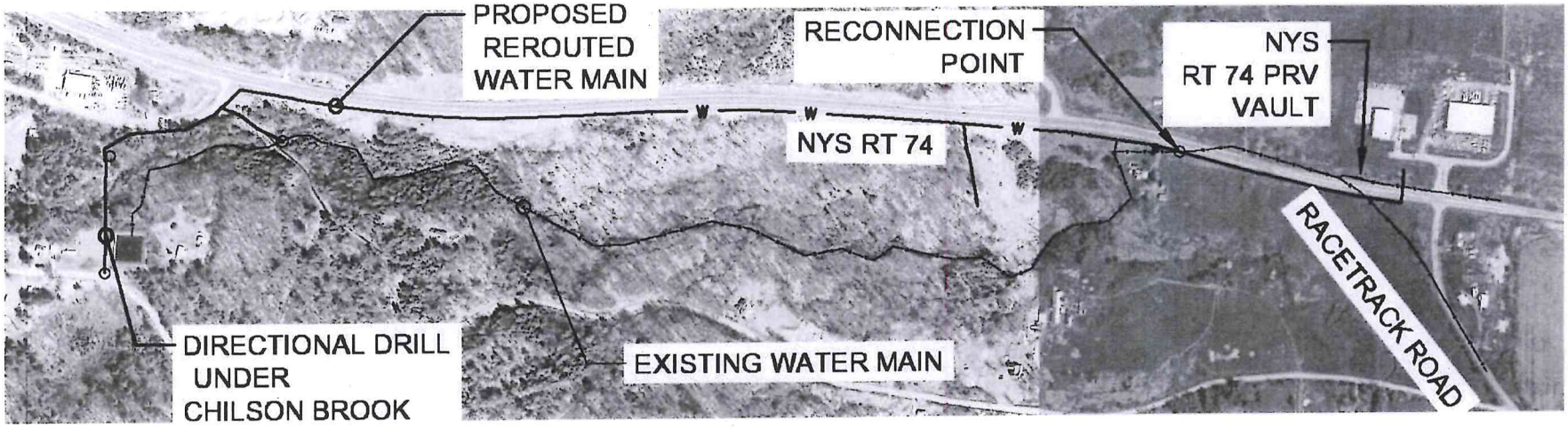

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Table 1.5 Permanent Repairs (Mitigation) Relocating Chilson Transmission Main

No.	Description of Item	Units	Est. Qt.	Cost/Unit	Total Cost
1	Water Main				
2	12" D.I.	LF	5,342.00	$ 120.00	$ 641,040.00
3	Directional Drill Piping	LF	326.40	$ 220.00	$ 71,808.00
4	12" Gate Valve	EA	8.00	$ 2,500.00	$ 20,000.00
5	Thrust Block	EA	2.00	$ 1,000.00	$ 2,000.00
6	Connection to Existing Water Main	EA	2.00	$ 2,000.00	$ 4,000.00
7	Temporary Bypass pumping	LS	1.00	$ 5,000.00	$ 5,000.00
8	Repair Unmarked Water Lines	EA	1.00	$ 500.00	$ 500.00
9	Hydrants				
10	Hydrant Unit	EA	11.00	$ 4,000.00	$ 44,000.00
11	Trench				
12	Restoration	LF	5,342.00	$ 15.00	$ 80,130.00
13	Rock Removal	YD	1,187.11	$ 100.00	$ 118,711.11
14	Sand	YD	7,122.67	$ 15.00	$ 106,840.00
15	#2 Stone	CY	593.56	$ 40.00	$ 23,742.22
16	Driveway Repair, County Driveway	SY	12.00	$ 60.00	$ 720.00
17	Road Repair, County Requirements	SY	63.67	$ 60.00	$ 3,820.00
18	Driveway Repair, NYS DOT Driveway	SY	53.56	$ 150.00	$ 8,033.33
19	Storm water Pollution Prevention				
20	Silt Fence	LF	2,289.30	$ 5.00	$ 11,446.50
21	Check Dams	LF	4,521.50	$ 10.00	$ 45,215.00
22	Construction Fence	LF	388.00	$ 5.00	$ 1,940.00
23	Traffic and Maintenance Protection	Day	16.78	$ 1,000.00	$ 16,778.33
24	Site Work				
25	Top Soil Seed and Mulch	CY	146.91	$ 40.00	$ 5,876.30
26	Rip Rap (Slopes)	CY	115.00	$ 30.00	$ 3,450.00
27	Clearing and Grubbing	Acre	0.18	$ 12,000.00	$ 2,185.40
28	Labor Fill	CY	10,645.93	$ 11.00	$ 117,105.19
29	Import Fill	CY	10,645.93	$ 17.00	$ 180,980.74
30	Temporary Staging Areas	LS	1.00	$ 30,000.00	$ 30,000.00
31	General Conditions	LS	1.00	$ 40,000.00	$ 40,000.00
32	Testing	LS	1.00	$ 20,000.00	$ 20,000.00
33	Allowances				
34	General Allowance	EA	1.00	$ 110,000.00	$ 110,000.00

Subtotal Construction Costs	$ 1,715,322.12
Soft Costs (Engineering, Legal, Bonding) 20%	$ 343,064.42
Project Contingencies	$ 102,919.33
Total Probable Project Costs	$ 2,161,305.87