

Biological and Aquatic Life Use Attainment Assessment Barney Brook, Bennington, VT



Prepared by

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Biological Assessment Summary Fact Sheet

General Setting

Barney Brook is located in Bennington County, and is a tributary to the Walloomsac River. Barney Brook is a Class B, cold water stream management type, with an aquatic life use management objective to support a good quality aquatic biota and high quality habitat. Its headwaters are on Harmon Hill south east of Bennington. It enters the Walloomsac River in the city of Bennington near Beech Street (see **Table 1 and Figure 1**). From its headwaters the brook flows past the old Burgess Brothers landfill, where it has been relocated around. Below the landfill it flows for a short distance before it enters a wetland complex that has been partially modified by AOT; as part of a CUD for the Route 9 realignment project. Modifications included the construction of a series of ponds within the wetland, and re-vegetative planting. Several small feeder streams join the brook as it wanders thru the wetland complex. Below the wetland the brook immerges as a high gradient stream for the rest of its length, and the immediate watershed is dominated by rural residential housing. At below river mile 1.5 the landuse transitions toward a more urban setting until its confluence with the Walloomsac River (**Table 2, Figure 2** and Phase one Geomorphic reach Summary Report).

Table 1. Barney Brook sample site location information.

Location	Site (RM)	Comm	Latitude	Longitude	Elev ft	D.A. km ²	Description
Barney Brook	0.3	MF	42.87889	73.18083	770	6.80	Above South Branch Rd to Rt 9.
	0.8	MF	42.88054	73.17023	845	5.40	At the end of Shawmut Street.
	1.5	M	42.87944	73.16000	960	5.63	Above Barney Road crossing 50m.
	1.8	M	42.87834	73.15600	985	4.40	Below series of artificial ponds within wetland area.
	1.9	M	42.87624	73.15507	998	4.20	Immediately above wetland complex.
	2.2	MF	42.87417	73.15306	1025	4.10	Below access road 50 m, below old Burgess Landfill.
	2.7	MF	42.86917	73.14889	1170	2.80	Upstream of diversion channel around old Burgess landfill.
Barney Brook Wetland Trib 1	0.1	WQ	42.87858	73.15753	990	0.02	On extreme west side of wetland, just in from Earl Drive.
	0.2	WQ	42.87618	73.15794	995	0.01	Above wetland just below Burgess Road.
Barney Brook Wetland Trib 2	0.1	M	42.84822	73.15743	990	0.02	Trib. in center of wetland drains private pond, and at times main stem Barney Brook .
	0.2	WQ	42.87722	73.15655	995	0.01	Above confluence with private pond, recieves main stem Barney Brook at times.
Barney Brook Private Pond Trib	0.1	WQ	42.87657	73.15675	995	0.01	Small trib. drains a private pond.
Barney Brook Landfill Trib	0.1	WQ	42.87360	73.15293	1140	0.01	Old stream channel drains Old Burgess landfill.

Figure 1. Bioassessment site locations on Barney Brook.

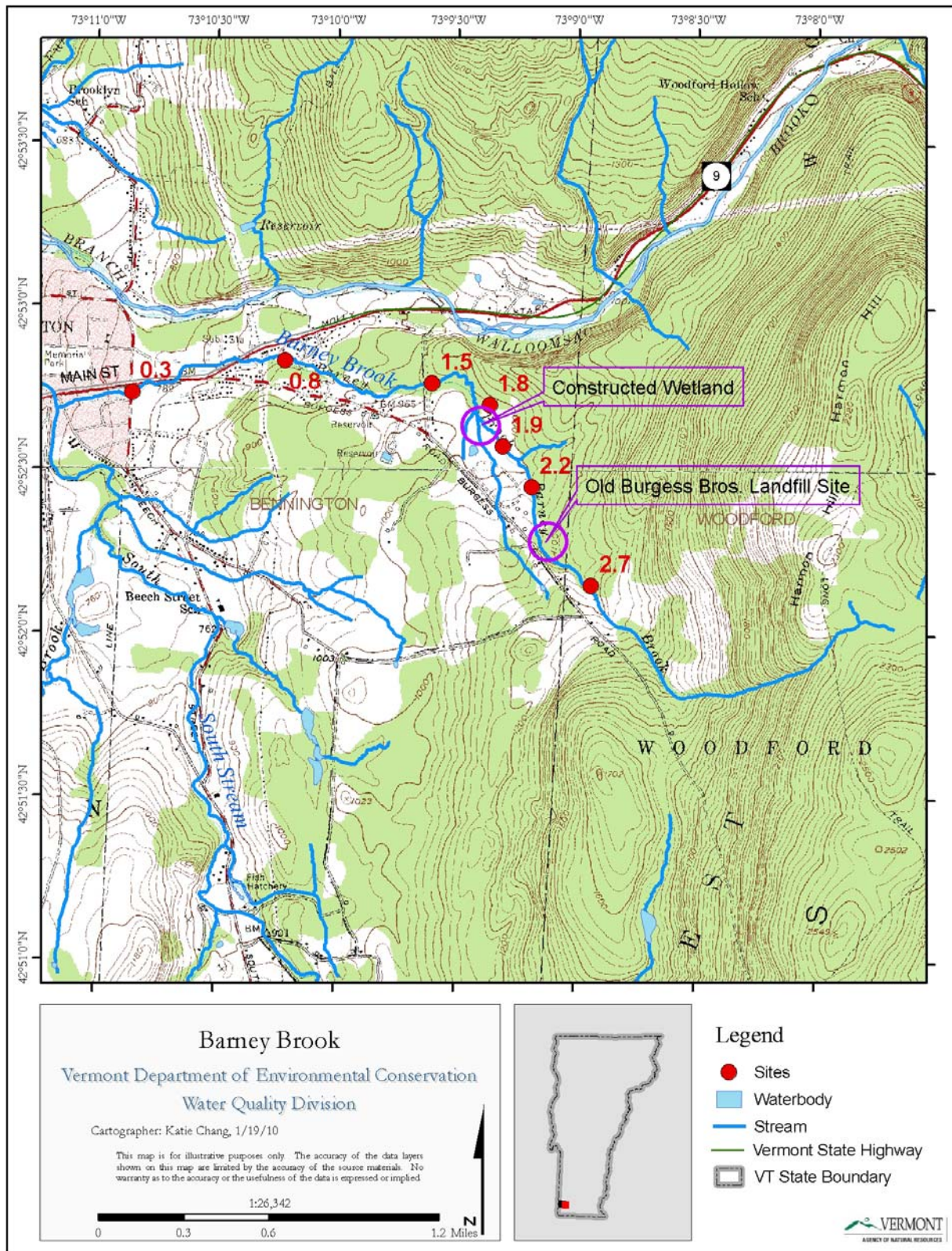
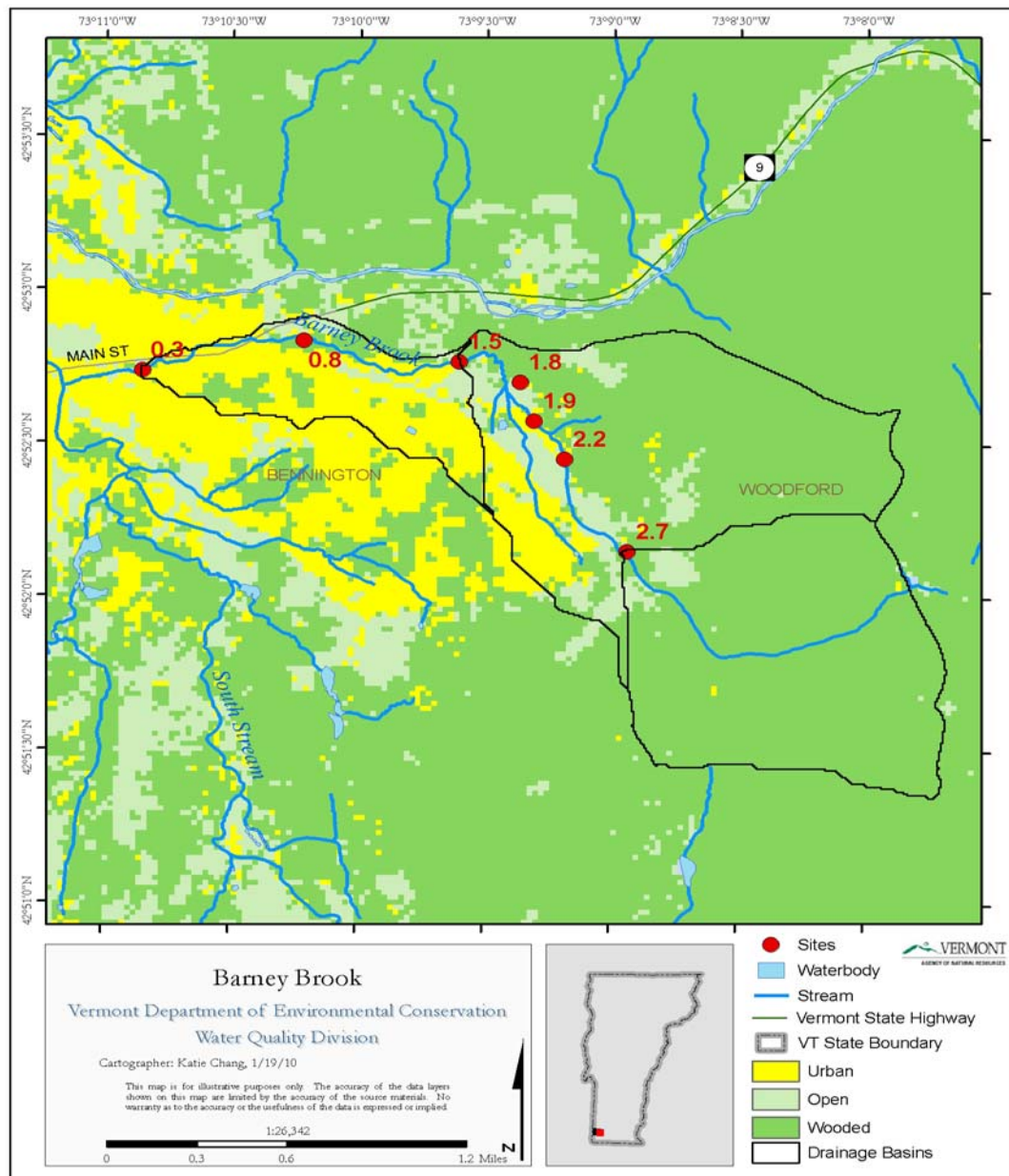


Table 2. Percent land use of Barney Brook watershed at selected biomonitoring sites, and the sub-basins (land use of watershed area between two sites).

% Land Use	BARNEY 0.3	BARNEY 0.3 SUB (0.3-1.5)	BARNEY 1.5	BARNEY 1.5 SUB (1.5-2.7)	BARNEY 2.7
Developed	8.2	37.8	2.6	4.9	0.1
Agriculture	10.3	10.4	11.3	18.9	1.0
Forest	81.3	51.8	86.9	76.0	98.8
Wetland	0.2	0.0	0.2	0.2	0.2

Figure 2. Showing land use categories of Barney Brook watershed, and subbasins between bioassessments sites.



Biological condition by reach

RM 2.7 is located above the influence of most human land use modification in a mostly forested watershed (98.8 %). The macroinvertebrate community rated excellent in biological integrity (see **table 3**). The macroinvertebrate community was found to be moderate in abundance, and high in richness, and EPT taxa. The PMA-o and PPCS-f show the community to be very similar in both order and functional group composition, (see **table 4 and 5**), to a SHG stream. The percent Oligochaeta is low, Bio Index is low and EPT/EPTc high showing sediment and nutrient stress is not influencing the community. No fish were collected at this site. The very small drainage area (2.8km²), is possibly the reason for the absence of a fish community. Water quality samples (see **table 7a-d**) show this reach to be moderately low in alkalinity (<10mg/l), as a result the pH may fluctuate in response to snow melt due to “acid rain”, and aluminum maybe elevated during these episodes. Sand was also found to be somewhat elevated, and embeddedness between 25-50 percent (see **table 6**). The above conditions are likely highly influenced by the bedrock geology of the upper and immediate watershed. This being quartzite, sandstone, and dolostone. At this point however the water quality or habitat does not appear to be adversely impacting the macroinvertebrate community. However the combination of pH, and aluminum stress during spring runoff events and physical de-connectivity from RM 2.2 may play a role in the absence of the fish community.

RM 2.2 is below the old Burgess Brothers landfill and stream channel realignments. The macroinvertebrate community remained *excellent* condition very similar to that found at RM 2.7. The community is high in Richness and EPT species, and very similar in both order level and functional group similarity to SHG reference. The fish community had three species present, and was scored with the Cold Water Index of Biotic Integrity (CW IBI). The fish community was rated as *good*, with a CW IBI of 33. The community is dominated by slimy sculpin (96%); however the abundance of brook trout were found to be moderately low resulting in the *good* overall rating.

Water quality sampling shows this stream reach to be considerably higher in alkalinity (54.3 mg/l) than at RM 2.7. Since the underlying bedrock geology is similar to that of RM 2.7, this is likely the result of all the fill and associated materials from capping of the old Burgess Brothers landfill, and realigning the stream channel around it. Several metals and chloride have also increased slightly but all are well below any chronic effect levels. Habitat observations show the percent sand to be elevated (14%), embeddedness rating of fair (50-75%), and a high silt observation made (4/5). These observations indicate that sediment, and habitat alteration is likely responsible for the lower *good* fish community integrity rating.

RM 1.5 is located below the wetland complex; the percentage land use in developed and agriculture has increased at this point. The macroinvertebrate community has been assessed five times. In 2003 and 2004 it was assessed as *Good-fair*, indicating a moderate level of degradation but meeting Class B ALS. The last three assessments show the macroinvertebrate community degraded and rated as *poor* in 2005 and 2006, and *poor-fair* in 2008. The macroinvertebrate community metrics showed impairment to both the community structure and function. The community is extremely low in abundance, richness and EPT richness, the bio index value is moderately elevated, and functional group composition is highly modified. The fish community was assessed in 2006, and 2008 and was rated as *fair* and *poor* respectively. The community was very similar to that found above the wetland; however both the overall abundance and especially the abundance of brook trout was extremely low.

Water quality samples were collected on several occasions mostly under base flow conditions but once under a freshet flow. On all occasions iron and manganese were found to be significantly elevated (range 400-1000 ug/l, and 100 – 215 ug/l respectively).

Table 3. Macroinvertebrate community assessments and metrics for Barney Brook

Location	Site (RM)	Date	Assessment	Density	Richness	EPT	PMA-O	BI	Oligochaeta %	EPT/EPT&C	PPCS-F
Barney Brook	0.3	9/28/2006	Good-Fair	1924.0	32.0	14.0	87.2	4.12	0.0	0.96	0.35
		9/11/2008	Good-Fair	2344.0	45.0	20.0	72.5	4.24	0.6	0.87	0.34
	0.8	9/10/2008	Good-Fair	845.3	35.0	14.0	69.9	2.89	3.8	0.95	0.42
	1.5	9/10/2003	Good-Fair	833.3	42.5	16.0	67.5	3.88	3.1	0.65	0.55
		10/4/2004	Good-Fair	408.1	36.0	15.5	77.5	2.77	0.2	0.82	0.41
		9/21/2005	Poor	221.0	20.5	6.0	56.3	5.09	0.0	0.95	0.38
		9/27/2006	Poor	161.5	12.5	5.0	45.4	4.64	0.0	0.92	0.17
		9/11/2008	Fair-Poor	792.0	27.5	8.5	55.9	4.44	0.5	0.81	0.28
	2.2	9/27/2006	Excellent	640.0	42.0	21.0	84.4	2.39	0.3	0.91	0.68
2.7	9/27/2006	Excellent	790.0	43.0	24.0	73.4	1.36	0.3	0.84	0.64	
Barney Brook Wetland Tributary 2	0.1	9/11/2008	BPJ-Good/Fair	413.5	40.0	6.0		6.73	2.9	0.14	

Table 4. Fish community metrics for Barney Brook, evaluated using the Cold Water Index of Bioitic Integrity.

Location	Site	Date	Assessment	CW_IBI	IntolSp #	CWSpp %	GenFeeder %	TopCarn %	BrkTrout/100m2	BrkTrout AgeClass #
Barney Brook	0.3	9/27/2006	Poor	24	3	38	0	12	3	2
		9/11/2008	Fair	30	3	51	0	9	1	2
	0.8	9/11/2008	Good	39	3	77	0	72	3	3
	1.5	9/27/2006	Fair	27	3	11	0	8	1	3
		9/11/2008	Poor	21	2	16	0	16	0.3	1
	2.2	9/27/2006	Good	33	2	7	0	4	5	3

Table 5. Percent composition of the major macroinvertebrate orders by site on Barney Brook

Location	Site (RM)	Date	% Coleoptera	% Diptera	% Ephemeroptera	% Trichoptera	% Plecoptera	% Oligochaeta	% Other Orders
Barney Brook	0.3	9/28/2006	9.6	15.2	26.8	33.5	12.5	0.0	2.5
		9/11/2008	23.3	17.3	17.5	40.1	0.9	0.6	0.4
	0.8	9/10/2008	8.5	19.2	3.2	53.3	10.7	3.8	1.3
	1.5	9/10/2003	16.2	39.0	18.9	17.8	3.5	3.1	1.5
		10/4/2004	9.1	22.4	0.8	36.7	29.4	0.2	1.3
		9/21/2005	29.7	25.0	0.0	42.9	0.8	0.0	1.6
		9/27/2006	1.6	69.7	0.0	24.8	2.1	0.0	1.7
		9/11/2008	3.9	50.0	0.8	40.3	3.6	0.5	1.1
	2.2	9/27/2006	12.2	16.9	9.7	32.2	28.8	0.3	0.0
2.7	9/27/2006	3.0	19.2	5.8	23.8	47.3	0.3	0.5	
Barney Brook Wetland Tributary 2	0.1	9/11/2008	0.3	73.6	2.9	6.6	0.0	2.9	13.7

Table 6. Percent composition of macroinvertebrate functional groups for Barney Brook

Location	Site (RM)	Date	% Collector Gatherer	% Collector Filterer	% Predator	% Shredder - Detrivore	% Shredder - Herbivore	% Scraper
Barney Brook	0.3	9/28/2006	27.9	32.0	0.6	0.6	13.1	25.2
		9/11/2008	17.6	41.4	1.3	1.2	3.1	30.9
	0.8	9/10/2008	9.5	63.1	5.4	10.7	0.0	11.4
	1.5	9/10/2003	39.4	29.6	10.8	1.7	1.0	16.5
		10/4/2004	13.0	38.5	12.6	1.8	24.4	9.1
		9/21/2005	1.6	58.5	2.3	6.7	1.3	29.7
		9/27/2006	1.9	93.4	0.0	0.0	2.1	2.6
		9/11/2008	6.2	81.6	2.7	3.3	1.6	4.6
	2.2	9/27/2006	16.6	15.3	20.6	22.5	0.6	24.1
2.7	9/27/2006	19.0	18.0	15.7	42.3	1.3	3.3	
Barney Brook Wetland Tributary 2	0.1	9/11/2008	27.2	9.5	45.4	4.7	0.8	5.3

Iron is listed as potentially toxic at 1000 ug/l; however it is often observed to cause dense mats of iron precipitate and iron bacteria colonies below the toxic level. The reach is also periodically high in iron precipitate, as reported under the micro periphyton category for the site. These coatings of iron on the substrate can degrade benthic substrate habitat interstitial space. Habitat observations show the reach to be very high in silt, and embeddedness fluctuating at 50% plus. Iron precipitate can also cause an embeddedness-like condition when it is observed to bind the cobble in place causing a kind of metallic embeddedness. Iron was also found to be elevated within the wetland complex from samples collected from the three major tributaries that flow through the wetland and all join at its lower end. These habitat observations and water quality samples indicate that a combination of silt, and iron precipitate/bacteria coating the bottom and embedding the substrate are the likely stressors of greatest concern within the stream reach at RM 1.5.

RM 0.8 was sampled once in 2008 for both the fish and macroinvertebrate community. The macroinvertebrate community rated as *fair-good* or indeterminate in its support of Class B biocriteria due to a continued low number of EPT taxa (14), and a moderate alteration in the functional group composition. The community is dominated by the order Trichoptera, Hydropsychidae family, resulting in a functional group composition high in percent collector filterers and low in shredder detritivore for the stream type. All other metrics were within an acceptable range. The percent Oligochaeta however was slightly elevated indicating potential sediment stress. The fish community rated *good* with a CW IBI of 39. Brook trout dominated the community, but were found to be moderately low in abundance.

Water quality measures show this location to still have elevated levels of total iron, and manganese. While no single sample was above ALS criteria, the substrate is discolored, and embeddedness remains moderate at 25-50%. Nutrients are slightly elevated, as is chloride but these are also both below levels of ALS concern. The silt rating was also moderate at 3/5, indicating silt is a contributing stressor at this location.

RM 0.3 is the lowest site sampled near the mouth of the stream. It was assessed in 2006 and 2008 for both fish and macroinvertebrates. The macroinvertebrate community was assessed at the threshold of impairment, *good-fair* both years. In 2006 a very low number of EPT taxa continued to exist, and a moderate shift in community composition toward enrichment tolerant taxa indicated by the Bio Index value, and a shift in the PPCS-f or functional group composition of the community. In 2008, EPT richness improved, however the Bio Index and PPCS-f remained similarly degraded as in 2006. The fish community rated *poor* in 2006, and *fair* in 2008. Cold water species composition was low, as was the percent top carnivores, brook trout density, and number of year classes.

Water quality sampling at this site continues to show low levels of iron and chloride present, and nutrients continue to be slightly elevated, all well below any indication of ALS criteria, but indicative of potential moderate stress. All other water quality measures are well within aquatic life support levels. Habitat observations show the substrate to be moderately embedded between 25-50%, with low levels of sand present, and a low silt rating of 2/5. The amount of macro algae observed is the highest of all the reaches and is likely a response of low level nutrients and a low level of stream canopy (shading) that ranged widely between 20 and 80% along the reach. In 2006 the amount of micro algae was also relatively thick.

The phase 1 geomorphic reach summary report indicates the stream corridor erodibility as potentially severe, under basin characteristics. It also found the lower 2/3 of the watershed from about RM 2.2 to be 69% forested, but with a stream corridor 33.8 percent urban. This is in agreement with the land use characteristics of the sub basin reported here as being 37.8% developed. Also indicated is long reaches

of stream with less than 25 ft of buffer, and 29 percent of corridor potentially straightened to some degree. These are preliminary phase one data that still need to be field verified.

Summary of Biological Condition and Stressors

Barney Brook was first assessed in 2003 and again in 2004 at river mile 1.5 and was rated as *good-fair* indeterminate but not ALS impaired using the Small High Gradient macroinvertebrate stream type biocriteria guidelines (VTDEC 2002). The density was low but well within an acceptable range. The taxa richness and EPT taxa were also found to be low, just at the Class B moderate alteration threshold for Class B SHG streams. The bio index showed a moderate increase indicating some taxonomic shift toward nutrient enrichment taxa in 2003, and the PPCS-f a similarity index for functional group composition was also moderately altered in 2004. In 2005 a follow-up assessment showed the community to be considerably degraded to a *poor* condition. In 2006 and 2008 very similar *poor* and *fair* aquatic life integrity was found. Numerous macroinvertebrate community metrics were effected showing an impairment to both the community structure and function. Extremely low abundance, richness and EPT richness, and elevated bio index value, and highly modified functional group composition.

From 2006 –2008 additional macroinvertebrate and fish community assessments, as well as water quality sampling, habitat observations and a wetland plant community assessment were done throughout the watershed from 2006 to 2008 bracketing the major human disturbances and land use in the watershed. These assessments found Barney Brook to be in *excellent* condition in the upper mostly forested watershed, but fishless at river mile RM 2.7. In *good* condition below the old capped Burgess Brother's landfill, above the wetland complex, at river mile 2.2. At river mile 1.5, both fish and macroinvertebrate communities are now consistently *poor* or *fair* below the wetland complex. Some recovery is observed by river mile 0.8 with macroinvertebrates again at the *good-fair* threshold and fish *good*. At the mouth of the river at mile 0.3 the macroinvertebrate community remains at the *good-fair* threshold, but the fish community degrades below ALS class B biocriteria to a *fair*, and *poor* condition.

These biological assessments, water quality sampling, habitat observations, and percentage landuse characteristics were done to provide initial insight into the physical and chemical stressors acting on the biological integrity of the stream fish and Macroinvertebrate communities, and to determine the stream miles not meeting aquatic life use Class B biocriteria guidelines. In 2009 a phase 1 geomorphic assessment has added additional insight into the level of modifications to and stressors on the physical stream channel.

Based on the weight of evidence presented from these assessments Barney Brook is biologically impaired for a 1.5 mile reach from its mouth to just below the wetland complex at RM 1.5. The stressors responsible for the impairment include sediment, and iron that are primarily degrading the aquatic habitat and water quality conditions of the stream. Both iron and sediment are primary stressors at the upper end of the impaired reach, and sediment, channel alteration, and general urban condition more responsible for the degraded biological condition at the lower end of the impaired reach.

Table 7. Physical habitat measures from Barney Brook.

Location	Site (RM)	Date	Embeddedness Rating (1 poor – 5 exc)	Silt Rating (1 low-5 high)	Sand %	Gravel %	Coarse Gravel %	Cobble %	Boulder %	Canopy %	Macro Algae (Filamentous) Cover Index (0-10)	Moss Cover Index (0-10)	Micro Algae (Also iron precipitate*) Thickness Index (0-10)
Barney Brook	0.3	9/28/2006	3	2	4	28	14	50	4	20	4.7	0	2.6
		9/11/2008	3	2	7	30	26	30	7	80	2.5	.3	.3
	0.8	9/10/2008	3	3	5	24	25	31	15	95	0	.4	.3
		9/10/2003	2	3	13	26	13	38	10	90	0	.2	.4
		10/4/2004	2	4	4	24	14	32	26	100	0	.1	0
	1.5	9/21/2005	3	4	6	18	15	41	20	95	0	1.4	1.8*
		9/21/2005	3	4	6	18	15	41	20	95	0	1.4	1.8*
		9/27/2006	2	5	5	27	12	41	15	90	0	.7	2.2*
		9/11/2008	3	3	3	12	20	30	35	100	0	.5	1.4*
	2.2	9/27/2006	2	4	14	18	25	39	2	100	0	.3	.5
2.7		9/27/2006	3	1	13	26	5	35	21	100	0	4.4	.9
Barney Brook wetland Tributary 2	0.1	9/11/2008		5						0	--	--	--

Table 8a. Barney Brook Water Chemistry 2008 Data in Bold

Location	Site (RM)	Sample Date	Water Temp (c)	Flow Type	Field pH	Alk mg/L	Lab Cond (umhos)	Color (Pt-Co units)	DO (mg/L)	DO %	Turb (NTU)	TSS (mg/L)	
Barney Brook	0.3	9/28/2006	13.4	Base	--	71.7	237	10	10.17	98.2	0.95	--	
		7/31/2008	19.6	Base	7.83	60	222*	--	8.46	100	--	--	
		9/11/2008	12.7	Base	7.7	65.8	228	15	9.86	93.8	1.48	--	
	0.8	7/31/2008	19.9	Base	7.64		201*	--	7.99	95.9		--	--
		9/10/2008	15.3	Base	7.43	55.5	182	30	10.32	106	2.45	--	--
	1.5	9/10/2003	17.3	--	--	--	79.1	250	--	8.93	93.1	3	--
		7/27/2004	14.16	Freshet	--	80.5	254	--	12.6	126	9.55	16.8	
		10/4/2004	14.2	Base	--	56.2	180	20	12.66	126.9	1.62	3.4	
		9/21/2005	16	Base	--	78.7	247	55	--	--	5.05	--	--
		9/27/2006	12.3	Base	--	69.4	215	20	10.18	97.9	--	--	--
		7/31/2008	21.6	Base	7.26	52.2	171.7*	--	7.55	93	--	--	--
		9/11/2008	14.5	Freshet	7.8	59.5	192	30	--	--	2.8	1.6	
	1.8	7/31/2008	26.2	Base	6.8	45.9	134*	--	6.62	87	--	--	--
	1.9	7/31/2008	17.8	Base	7.19		109*	--	8.46	96.3	--	--	--
	2.2	9/27/2006	12.4	Base	--	54.2	170	15	9.66	93.2	1.71	--	--
2.7	9/27/2006	12.7	Base	--	7.6	32.6	12.5	9.51	93.1	0.33	--	--	
Barney Brook Wetland Tributary 1	0.1	7/31/2008	21.5	Base	7.17	48.7	191*	--	9.52	116.8	--	--	
	0.2	7/31/2008	11.4	Base	6.78	93.9	656*	--	9.29	91.6	--	--	
Barney Brook Wetland Tributary 2	0.1	7/31/2008	21.9	Base	6.92	45.6	158*	--	6.76	84	--	--	
	0.1	9/11/2008	16.4	Freshet	7.9	56.1	176*	25	--	--	--	--	
	0.2	7/31/2008	16	Base	6.89	63.8	290*	--	7.84	86	--	--	
Barney Brook Private Pond Tributary	0.1	7/31/2008	19.25	Base	8.45	65.3	291*	--	10.9	126	--	--	
Barney Brook Landfill Tributary	0.1	9/27/2006	13	Base	--	278	885	30	--	--	5.85	--	
	0.1	10/17/2006	--	--	--	--	--	--	--	--	--	--	
Barney Brook Wetland Restoration Site	--	9/11/2008	--	--	7.1	105	256	--	--	--	--	<1	

*Field Measurement

Table 8b. Barney Brook Water Chemistry continued.

Location	Site (RM)	Sample Date	Flow Type	TP (ug/L)	TDP (ug/g)	TCL (mg/L)	TSO4 (mg/L)	TN (mg/L)	TNOX (mg/L)	THC	DCa (mg/L)	DMg (mg/L)	DNa (mg/L)	DK (mg/L)
Barney Brook	0.3	9/28/2006	Base	12.8	9.53	22.9	6.36	0.39	0.23	80.8	21	6.88	15.4	2.07
		7/31/2008	Base			24.2	6.73	0.53						
		9/11/2008	Base	15.3	8.42	24	7.04	0.66	0.47	70.2	18.6	5.74	16.6	1.88
	0.8	7/31/2008	Base			21.6	6.5	0.42						
		9/10/2008	Base	18.5	8.77	16.7	6.16	0.7	0.37	60.6	16.2	4.9	11.4	1.87
	1.5	9/10/2003		14		28.4	6.69	0.39			20.7	6.69	17.4	1.82
		7/27/2004	Freshet	32		24.5	5.63	0.38	0.07		24.1	7.1	15.9	1.89
		10/4/2004	Base	14	6	16.2	6.9	0.22	0.07	60.1	15.7	5.06	11.5	1.83
		9/21/2005	Base	15	7.61	24.9	3.67	0.24	0.07	83	21.3	7.22	16.1	2.09
		9/27/2006	Base	17.5	10.4	18.4	5.74	0.25	< 0.05	74.6	19.1	6.53	12.5	2.14
		7/31/2008	Base			16.6	5.99	0.27						
		9/11/2008	Freshet	17.2	5.57	18.6	6.53	0.46	0.24	63.1	16.8	5.1	12.3	1.91
	1.8	7/31/2008	Base			5.29	4.99	0.2						
	1.9	7/31/2008	Base			7.96	6.82	0.4						
2.2	9/27/2006	Base	14.3	13.3	11.3	9.71	0.4	0.1	56	14.8	4.64	9.5	2.48	
2.7	9/27/2006	Base	16.1	14.1	< 2	4.6	0.22	0.09	11.6	2.96	1.02	1.06	0.92	
Barney Brook Wetland Tributary 1	0.1	7/31/2008	Base			22.8	6.67	0.29						
	0.2	7/31/2008	Base			135	9.32	1.48						
Barney Brook Wetland Tributary 2	0.1	7/31/2008	Base			15.6	6.56	0.31						
	0.1	9/11/2008	Freshet							60.7	16.1	4.97	13.2	2.01
	0.2	7/31/2008	Base			44	7.27	0.15						
Barney Brook Private Pond Tributary	0.1	7/31/2008	Base			42.9	7.02	0.16						
Barney Brook Landfill Tributary	0.1	9/27/2006*	Base							257	67.9	21.3	61	13.1
	0.1	9/27/2006	Base	16.5	11.3	80.5	43.5	2.31	0.23	253	66.3	21.3	59.3	13.1
	0.1	10/17/2006												
Barney Brook Wetland Restoration Site	--	9/11/2008		11.6	9.2		2.79	0.26	<.05	118	27.6	11.9	8.4	.9

*Total Metals (unfiltered)

Table 8c. Barney Brook Water Chemistry continued.

Location	Site (RM)	Date	Diss Ag (ug/L)	Total Ag (ug/L)	Diss As (ug/L)	Total As (ug/L)	Diss Be (ug/L)	Total Be (ug/L)	Diss Cd (ug/L)	Total Cd (ug/L)	Diss Cr (ug/L)	Total Cr (ug/L)	Diss Cu (ug/L)	Total Cu (ug/L)	Diss Fe (ug/L)	Total Fe (ug/L)		
Barney Brook	0.3	9/28/2006			< 1				< 1		< 5		< 10		64.7			
		7/31/2008				< 1				< 1		< 5		< 10		222		
		9/11/2008	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 5	< 10	< 10	258	316	
	0.8	7/31/2008				< 1					< 1		< 5		< 10		289	
		9/10/2008	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 5	< 10	< 10	361	529	
	1.5	9/10/2003	< 1		< 5			< 1				< 5		< 10		521		
		7/27/2004										< 5		< 10		293		
		10/4/2004			< 1				< 1		< 1	< 5		< 10		277		
		9/21/2005			< 1				< 1		< 1	< 5		< 10		519		
		9/27/2006			< 1	1			< 1	1	< 5	5	< 10	10	402	1030		
		7/31/2008				< 1				< 1	< 1	< 5		< 10		719		
	1.8	9/11/2008	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 5	< 10	< 10	558	765	
		7/31/2008				< 1				< 1	< 1	< 5		< 10		991		
	1.9	7/31/2008				< 1				< 1		< 5		< 10		149		
	2.2	9/27/2006			< 1	1			< 1	1	< 5	5	< 10	10	93.8	197		
2.7	9/27/2006			< 1	1			< 1	1	< 5	5	< 10	10	< 50	50			
Barney Brook Wetland Tributary 1	0.1	7/31/2008				< 1				< 1		< 5		< 10		481		
	0.2	7/31/2008				< 1				< 1		< 5		< 10		< 50		
Barney Brook Wetland Tributary 2	0.1	7/31/2008				< 1				< 1		< 5		< 10		674		
		9/11/2008			< 1	< 1			< 1	< 1	< 5	< 5	< 10	< 10	283	445		
	0.2	7/31/2008				< 1				< 1		< 5		< 10		< 50		
Barney Brook Private Pond Tributary	0.1	7/31/2008				< 1				< 1		< 5		< 10		161		
Barney Brook Landfill Tributary	0.1	9/27/2006*			< 1				< 1		< 5		< 10		953			
		9/27/2006			< 1				< 1		< 5		< 10		< 50			
		10/17/2006																
Barney Brook Wetland Restoration Site	--	9/11/2008																

*Total Metals (unfiltered)

Table 8d. Barney Brook Water Chemistry continued.

Location	Site (RM)	Date	Diss Mn (ug/L)	Total Mn (ug/L)	Diss Ni (ug/L)	Total Ni (ug/L)	Diss Pb (ug/L)	Total Pb (ug/L)	Diss Se (ug/L)	Total Se (ug/L)	Diss Sb (ug/L)	Total Sb (ug/L)	Diss Tl (ug/L)	Total Tl (ug/L)	Diss Zn (ug/L)	Total Zn (ug/L)	
Barney Brook	0.3	9/28/2006	< 5		< 5		< 5								< 10		
		7/31/2008		< 5		< 5		< 1								< 50	
		9/11/2008	< 5	12.7	< 5	< 5	< 1	< 1	< 5	< 5	< 10	< 10	< 1	< 1	< 50	< 50	
	0.8	7/31/2008		< 5		< 5		< 1									< 50
		9/10/2008	6.28	29.3	< 5	< 5	< 1	< 1	< 5	< 5	< 10	< 10	< 1	< 1	< 50	< 50	
	1.5	9/10/2003	108		< 10		< 5		< 5		< 10		< 5		< 25		
		7/27/2004	97.1		< 5		< 5								< 10		
		10/4/2004	79.2				< 5								< 10		
		9/21/2005	215		< 5		< 5								< 10		
		9/27/2006	213	313	< 5	5	< 5	5							< 10	10	
		7/31/2008		70.4		< 5		< 1									< 50
		9/11/2008	97.4	108	< 5	< 5	< 1	< 1	< 5	< 5	< 10	< 10	< 1	< 1	< 50	< 50	
	1.8	7/31/2008		136		< 5		< 1									< 50
	1.9	7/31/2008		57.3		< 5		< 1									< 50
2.2	9/27/2006	311	303	< 5	5	< 5	5							< 10	10		
2.7	9/27/2006	< 5	5	< 5	5	< 5	5							< 10	10		
Barney Brook Wetland Tributary 1	0.1	7/31/2008		64.2		< 5		< 1								< 50	
	0.2	7/31/2008		< 5		< 5		< 1								< 50	
Barney Brook Wetland Tributary 2	0.1	7/31/2008		82.1		< 5		< 1								< 50	
		9/11/2008	77.2	75.5	< 5	< 5	< 1	< 1	< 5	< 5				< 50	< 50		
	0.2	7/31/2008		7.51		< 5		< 1								< 50	
Barney Brook Private Pond Tributary	0.1	7/31/2008		11.1		< 5		< 1								< 50	
Barney Brook Landfill Tributary	0.1	9/27/2006*	2450		< 5		< 5								< 10		
		9/27/2006	2370		< 5		< 5								< 10		
		10/17/2006															

*Total Metals (unfiltered)