POTASH BROOK STORMWATER MANAGEMENT EVALUATION

Prepared For:
Lake Champlain Basin Program
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PART 2: Individual Watershed Stormwater Management Evaluations

The findings of this project are presented in the following individual watershed evaluations. The intent of reporting results in watershed format is to facilitate the incorporation of these findings into comprehensive watershed management plans for each of the project watersheds. These evaluations are not comprehensive management plans and should not be viewed as such. The intent is for these evaluations to serve to focus planning efforts and to provide a basis for evaluating specific implementation activities that will most likely result in environmental benefits in the form of minimized pollutant loadings to the target watersheds and to Lake Champlain and restoration of impaired riparian and aquatic habitat and the biologic communities that those habitats support. Above all, it is the hope of this project that these findings will stimulate the development of comprehensive multi-jurisdictional watershed planning efforts within the project area, resulting in watershed management conducted across political boundaries with full investment by local and regional authorities.

This project has assembled and/or created a number of Geographical Information System (GIS) data layers relevant to watershed planning in the project area (see Part I). Information from these data layers is presented in a series of figures attached to each watershed evaluation. These data layers with their associated data tables, will be available to local and regional planners. It should be recognized that the pollutant projections presented here are planning estimates and caution should be exercised when interpreting these values.

This project recognizes that local governments in the project area have made tremendous commitments to protecting and preserving the natural resources associated with surface waters. Local and regional planning, zoning, and conservation commissions have established a strong record of environmental concern. In order to fully realize effective watershed management, it is critical that individual missions, goals, objectives, and policies be consolidated under the umbrella of comprehensive watershed planing and management. It is hoped that the findings of this project will assist those responsible for planning and environmental management in the project area in their efforts to restore, protect, and preserve the aquatic resources of these highly vulnerable developing watersheds.

Potash Brook Stormwater Management Evaluation

Watershed Description

Potash Brook was originally called Louis Creek. This name was intended to honor the King of England's youngest son who later became Louis XIII of France. It was presumably later renamed for potash kilns built on or near the brook. Two dams were constructed on it although their use is unclear. The remains of both exist today, one is in UVM East Woods and one is on City of S. Burlington conservation lands adjacent to I-189. A sawmill was also once active at the Queen City Park Road crossing. Evidence of Algonquin Indians has been found in the watershed. Much of the watershed was converted from forest to agriculture in the late 18th and early 19th centuries. The beauty of the stream and its delta in Lake Champlain has been preserved in a painting by the 19th century Vermont artist CL Heyde entitled "View of Potash Brook and Shelburne Bay."

Potash Brook watershed is located in the city of South Burlington and encompasses an area of approximately 5300 acres (21 km2) **(Figure 7.1)**. The stream rises in the city's growing southeast quadrant between Dorset and Spear Streets. It flows north and west through a series of wetlands and natural areas to Lake Champlain near Red Rocks beach. A northern tributary drains UVM agricultural lands and the Williston Road area of South Burlington.

Land Use

Current land use in the watershed (1995) is approximately 25% commercial-industrial, 35% residential, 30% agricultural and, 10% protected open space. Projected future land use designates the watershed as 20% subregional growth center, 30% industrial and 50% mixed urban use. The watershed is approximately 18% impervious **(Figure 7.2, Table 7-1)**.

Table 7-1. Potash Brook: Current and Projected Land Use as percent watershed area. Projected land use is indicated in terms of zoning or planning categories.

	Open Protected	Ag	Res/Dev	Com/Ind	Urban/ Mixed	Regional Growth Center	*Impervious Surface Area*
1995	10%	30%	35%	25%			*18%*
Projected				30%	50%	20%	

Soils

Highly erodible clays (Vergennes and Covington) are ubiquitous in the southeast quadrant of the watershed. Emphasis on best management practices during construction and stormwater controls that adequately remove sediment (infiltration, porous pavement, wetponds) would help to protect wetlands and water quality in the stream. Erodible soils are also present in the northwest corner of the watershed. Soils suitable for offline stormwater treatment ponds and wetlands are abundant throughout the watershed. Adams soils suitable for infiltration BMP's are also abundant in the northern half of the watershed as well as the west central section paralleling Farrell Street **(Figures 7.3-5)**.

Riparian Corridor and Biological Evaluation

The riparian corridor of Potash Brook is in relatively good condition **(Figure 7.6)**. However over

100 permitted and unpermitted stormwater discharges have caused a significant deterioration of the biological community in the lower watershed. The northern tributary is particularly degraded. The main stem has a series of protected natural areas that provide treatment and a recovery zone for stormwater pollutants. The southern tributaries are currently experiencing the greatest amount of development pressure and may degrade in the near future.

Potash Brook has severe sedimentation in the lower watershed and the north tributary (**Figure 7.7**). Evidence of sediment "plugs" exist in these reaches. The presence of wetlands and ponds in the middle reach has significantly reduced sediment levels in pools. Severe sedimentation impacts from interstate highway construction in the lower reach occurred between the years 1987-1992 but some recovery has occurred. Evidence of enrichment exists in the lower reach below the Shelburne Road stormwater discharges and in tributary 7 which is currently experiencing rapid growth and development.

Good pool habitat and healthy riparian habitat is reflected in the relatively strong fish populations in the brook. A project by the VT Fish and Wildlife Department to enhance fish habitat adjacent to I-189 appears to be successful (Langdon, personal communication). Macroinvertebrate sampling at 6 sites in the watershed indicates moderate sediment impacts and poor aquatic health with the exception of the reach between milepost 1-3. This reach is the only part of the stream which meets the Class B water quality standard for biological integrity (**Figure 7.8**).

Watershed Management Goals

The following are watershed management goals suggested by the findings of this evaluation:

1. Have in place the appropriate watershed planning and management infrastructure for the Potash Brook watershed such that comprehensive watershed management issues become an integral part of local planning processes. Watershed management should emphasize stream buffer protection, land acquisition, and watershed restoration.

2. Ensure the maintenance and protection of any existing high quality biological communities and habitats, including all existing wetlands, natural areas, and natural heritage sites through appropriate planning.

3. Ensure the protection of public water supplies and recreational beaches by minimizing the discharge of bacterial pollutants throughout the watershed.

4. Restore impaired aquatic and riparian habitat such that biological integrity consistent with Class B water quality standards is attained.

5. Ensure that watershed residents are aware of watershed management issues and are well educated in the principles of stream and watershed protection.

6. Minimize the discharge of pollutants from stormwater discharges in the Potash Brook watershed.

Existing Zoning

Potash Brook is located in S.Burlington and therefore is protected by a 100' conservation buffer (100'/side) on its main reach and a 50' buffer (50'/side) on its tributaries. New development is prohibited within the zone. Agriculture is exempt from the zone. The only active farm in the watershed, the University of Vermont Dairy Farm, has voluntarily agreed to maintain a 25'(25'/side) wildlife conservation buffer on the stream where it traverses the farm. The UVM East Woods Natural Area consisting of about 50 acres straddles the central reach of the stream and along with the Interstate-189 right of way protects a significant amount of riparian habitat. The city of S.Burlington's Farrell Park also protects a significant amount of habitat on one tributary of the stream.

Additional watershed features, including wetlands, 100 yr floodplain, Natural Heritage sites, natural biological areas and public lands, are mapped on **Figure 7.8**. **Figure 7.9** shows mapped impervious surface, **Figure 7.10** shows sewershed outlines, and **Figure 7.11** shows nonpoint sources such as eroding banks, identified during watershed surveys.

Education Strategy

An education strategy for urban nonpoint source pollution should include the following actions: 1) informational mailings and public service announcements to watershed residents on clean stream habits, 2) public involvement in cleanup, erosion and habitat restoration projects, 3) storm drain stenciling, 4) school natural history programs and, 5) citizen monitoring (Drinkwin, 1995; Lake Champlain Committee, 1992).

Implementation Strategy

There are 11 targeted storm sewers and 7 targeted discharge permits in this watershed **(Table 7-2, Figures 7.12-7.15)**. Seven of the sewers and 5 of the permits are located on sites highly suited for infiltration BMP's (map 3; Part 1). The remaining 4 sewers are located at the I-189-Shelburne Rd. cloverleaf. Wetpond BMP's are more suitable at this location due to soils and proximity to municipal swimming beaches (map 16; Part 1).

Implementation at all 11 storm sewers would result in a sediment reduction of 62,217 kg/yr and a phosphorus reduction of 82 kg/yr. Modification of the 7 discharge permits to include 5 infiltration systems and 2 wetponds would result in a TSS reduction of 40,285 kg/yr and a TP reduction of 47 kg/yr. The University Mall storm water permits are currently being modified for additional expansion and provide an optimal time for incorporating water quality goals.

Overall TSS and TP reduction from this strategy would be 66% and 54% respectively of existing load from the targeted sewersheds. Estimated capital cost for full implementation of this strategy ranges from $87,657-$687,098. A regional facility at the Shelburne Rd.-I-189 site would be the most economical strategy.

Implementation recommendations, estimated treatment efficiencies and loading reductions, and estimated capital and annualized capital costs are summarized in **Table 7-3.** Estimated annualized capital costs for phosphorus and suspended solids loading reductions at individual sites range from $12 - $1,705 per kg/yr for phosphorus and $0.01 - $1.50 per kg/yr for suspended solids.

Recommendations: The following recommendations, deriving from the findings of this evaluation, are made as technical suggestions that, if implemented, have a high likelihood of positively influencing water quality goals for the watershed. They are not intended to replace the development of a fully comprehensive watershed management plan.

1. The most significant recommendation that can be made here is for the establishment of a watershed planning process that will be able to incorporate the findings of this evaluation into a comprehensive watershed management plan. Such a plan would institutionalize stormwater and watershed management policies. Such a plan would also necessarily address the implementations issues such as prioritization and financing (Schueler, 1996).

2. Restoration of Impaired Habitat - The most highly impacted areas in the watershed occur in the lower reach below Shelburne Road and in the heavily developed northern tributary. Riparian and aquatic habitat in these areas are impaired. It is likely that measures to reduce the release of sediments and suspended solids to this portion of the watershed through riparian habitat restoration and BMP implementation at targeted sewersheds will result in improved habitat and biological integrity. Therefore:

- Additional feasibility studies for BMP implementation recommendations for targeted sewersheds

(**Table 7-3**), prioritized by estimated Total Suspended Solids loading (**Table 7-2**), should be initiated (see implementation strategy).

- Efforts to reduce discharges from significant sources of nonpoint sediment ,such as eroding or unstable banks identified by this (**Figure 7.11**) or other evaluations, should be pursued. Opportunities to implement stream and riparian habitat restoration and improvement activities should be fully explored. Programs such as the Youth Conservation Corps and the USFW Partnership program are likely resources for implementing watershed restoration activities. Cooperative efforts between landowners and various State, private, and Federal Agencies should be encouraged and coordinated.

3. Coordination - Resources should be allocated to provide for coordination of activities, including the acquisition of implementation resources, related to urban watershed management. VTDEC and USEPA are currently funding a limited service position to provide this function. If multi-jurisdictional urban watershed management is to be effective in the future, this function must be maintained, ideally through institutionalized regional planning.

4. Watershed Monitoring - Continued monitoring of watershed condition should be conducted. BMP implementation effectiveness should be monitored. While VTDEC plans to maintain a minimal level of biological monitoring at many of the sites previously monitored, its resources are limited. Monitoring issues should be developed through the watershed planning process that should evolve at the regional or local level (Brown, 1996).

5. Education - A watershed management educational strategy should be developed and implemented for the Indian Brook watershed. Generalized materials related to watershed protection are available from various private and governmental organizations (Lake Champlain Committee, 1992; Drinkwin, 1995).

Potash Brook Resources

Nutrient Loading to Shelburne Bay and St. Albans Bay, 1975-1976. 1977. K.Little. Department of Water Resources, Agency of Natural Resources, State of Vermont.

The Relations of Road Salt to Conditions in Potash Brook, Winter 1977-1978. 1979. Jerry Fagliano and George Terwilliger, Department of Zoology, University of Vermont, Burlington, Vermont.

Fish Community Sampling In District 4.1990. Memorandum from Biomonitoring and Aquatic Studies Section to Department of Fish and Wildlife, Agency of Natural Resources, State of Vermont.

Potash Brook Tributary,South Burlington, Vermont, Watershed Model Report. 1992. Lamoureux and Stone Consulting Engineers, Inc., Essex Junction, VT.

Champlain Water District Discharge-Potash Brook. 1994. Memorandum from Biomonitoring and Aquatic Studies Section to Permits, Compliance and Protection Division, Agency of Natural Resources, State of Vermont.

Muddy Brook, Boyer Quarry and Potash Source: A Miniplan for the Southeast Quadrant of South Burlington. 1972. South Burlington Natural Resources Committee, City of South Burlington, South Burlington, VT.

Unpublished data. 1995. Ray Belair, South Burlington Natural Resources Committee, City of South Burlington, South Burlington, VT.

Table 7-2. Significant Stormwater Discharges in the Potash Brook Watershed: Discharges are targeted based on estimated exceedence of annual loading thresholds for: suspended solids (4,536 kg/year); total phosphorus (6.8 kg/year); total metals (5.4 kg/year); total PAHs (36 kg/year); fecal coliform (500,000 colonies/yr). Existing treatment structures are indicated. *Italics indicate stormwater discharges with VTDEC stormwater permits.* EIA% is the percent surface area as Effective Impervious Surface Area. Loadings are calculated from the means of ranges in export coefficients taken from the literature. See Part 1 of this report for loading calculation methods.

Recwater	Storm sewershed	Treatment (Appendix 4)	EIA%	Loading kg/yr
		Highest Total Suspended Solids		
Potash	*University Mall 1*	*CB/PP/GT/RS*	95.3	20353
Potash	San Remo Dr.	CB	84.6	15728
Potash	Williston Rd.-Pinetree	CB	15.6	11584
Potash	*Burlington Interntl. Airport 4*	*CB/LU*	28.6	10374
Potash	Williston Rd. 2	CB	67.5	10312
Potash	Kmart	CB	80.7	8875
Potash	*Oak Ridge-Butler Farm 2*	GS	6.4	8384
Potash	*Lane Press-New England Telep.*	DP/CB	34.6	7609
Potash	Shelburne Road 7	CB	80.6	7283
Potash	Digital Equipment Building 1	DP/CB	57.5	7212
Potash	*University Mall 2*	*CB/PP/GT/RS*	61.4	7162
Potash	Timber Lane	CB	26.8	7112
Potash	Shelburne Road 8	CB	69.8	6896
Potash	Mills Ave	CB	12.3	6815
Potash	Williston Rd.	CB	61.7	6396
Potash	Laurel Hill Dr.	CB	12.5	6050
Potash	Corporate Way 1	CB	57.6	5988
Potash	South Burlington High School	CB	64.2	5417
Potash	Grandview Road 2	CB	100	5080
Potash	Stonehenge Drive	CB	8.7	4827
Potash	Grandview Road 1	CB	43.5	4675

Table 7-2 (cont)

Recwater	Storm sewershed	Treatment (Appendix 4)	EIA%	Loading kg/yr
		Highest Total Phosphorus		
Potash	*University Mall 1*			32
Potash	San Remo Dr.			25
Potash	Williston Rd.-Pinetree			18
Potash	*Burlington Interntl. Airport 4*			16
Potash	Williston Rd. 2			16
Potash	Kmart			14
Potash	*Oak Ridge-Butler Farm 2*			13
Potash	*Lane Press-New England Telep.*			12
Potash	Shelburne Road 7			11
Potash	Digital Equipment Building 1			11
Potash	*University Mall 2*			11
Potash	Timber Lane			11
Potash	Shelburne Road 8			11
Potash	Mills Ave			11
Potash	Williston Rd.			10
Potash	Laurel Hill Dr.			10
Potash	Corporate Way 1			9
Potash	South Burlington High School			9
Potash	Grandview Road 2			8
Potash	Stonehenge Drive			8
Potash	Grandview Road 1			7
		Highest Total PAH (Commercial Landuses Only)		
Potash	*University Mall 1*			218
Potash	San Remo Dr.			168
Potash	*Burlington Interntl. Airport 4*			111
Potash	Williston Rd. 2			110
Potash	Kmart			94
Potash	*Lane Press-New England Telep.*			82
Potash	Shelburne Road 7			78
Potash	Digital Equipment Building 1			77
Potash	*University Mall 2*			77
Potash	Timber Lane			76
Potash	Shelburne Road 8			74
Potash	Williston Rd.			68
Potash	Corporate Way 1			64
Potash	South Burlington High School			58
Potash	*Burlington Interntl. Airport 1*	*CB*	53.6	41
Potash	*Burlington Interntl. Airport 2*	*CB*	21.0	40

Table 7-2 (cont)

Recwater	Storm sewershed	Treatment (Appendix 4)	EIA%	Loading kg/yr
		Highest Total Metals		
Potash	University Mall 1			25
Potash	San Remo Dr.			19
Potash	Williston Rd-Pinetree			14
Potash	Burlington Interntl. Airport 4			13
Potash	Williston Rd 2			13
Potash	Kmart			11
Potash	Oak Ridge-Butler Farm 2			10
Potash	Lane Press-New England Telep.			9
Potash	Shelburne Road 7			9
Potash	Digital Equipment Building 1			9
Potash	University Mall 2			9
Potash	Timber Lane			9
Potash	Shelburne Road 8			8
Potash	Mills Ave			8
Potash	Williston Rd			8
Potash	Laurel Hill Dr.			7
Potash	Corporate Way 1			7
Potash	South Burlington High School			7
Potash	Grandview Road 2			6
Potash	Stonehenge Drive			6
Potash	Grandview Road 1			6
		Highest Total Fecal Coliform (Colonies/year)		
Potash	*University Mall 1*			3.2×10^6
Potash	San Remo Dr.			2.5×10^6
Potash	Williston Rd.-Pinetree			1.8×10^6
Potash	*Burlington Interntl. Airport 4*			1.6×10^6
Potash	Williston Rd. 2			1.6×10^6
Potash	Kmart			1.4×10^6
Potash	*Oak Ridge-Butler Farm 2*			1.3×10^6
Potash	*Lane Press-New England Telep.*			1.2×10^6
Potash	Shelburne Road 7			1.2×10^6
Potash	Digital Equipment Building 1			1.1×10^6
Potash	*University Mall 2*			1.1×10^6
Potash	Timber Lane			1.1×10^6
Potash	Shelburne Road 8			1.1×10^6
Potash	Mills Ave			1.1×10^6
Potash	Williston Rd.			1.0×10^6
Potash	Laurel Hill Dr.			9.6×10^5
Potash	Corporate Way 1			9.6×10^5
Potash	South Burlington High School			8.7×10^5
Potash	Grandview Road 2			8.1×10^5
Potash	Stonehenge Drive			7.7×10^5
Potash	Grandview Road 1			7.5×10^5
Potash	*Burlington Interntl. Airport 1*			6.2×10^5
Potash	*Burlington Interntl. Airport 2*			6.0×10^5
Potash	Sears 2	CB	49.3	5.2×10^5
Potash	Outlet Mall	CB	91.8	5.0×10^5

Table 7-3. Potash Brook Watershed: Stormwater BMP implementation treatment and capital costs estimates for targeted sewersheds. All estimates are based on a mean of a range of export coefficients for TP and TSS.

Rec. Wat.	Sewershed	BMP	TP Pre BMP Kgs/year	TP Post BMP Kgs/year	TP Reduction Kgs/year	TSS Pre-BMP Kgs/year	TSS Post-BMP Kgs/year	TSS Reduction Kgs/year	Capital Cost-Low dollars	Capital Cost-High dollars
Potash	Corporate Way	Infiltration	9	4	5	5988	1797	4191	$2,362	$14,173
Potash	Laurel Hill Dr.	Wetpond	10	5	5	6050	2420	3630	$4,183	$83,659
Potash	Williston Rd.	Infiltration	10	4	6	6396	1919	4477	$2,370	$14,218
Potash	Mills Ave.	Infiltration	11	4	7	6815	2044	4771	$9,504	$57,027
Potash	Shelburne Rd.8	Wetpond	11	6	5	6896	2758	4138	$1,141	$22,827
Potash	Timber Lane	Infiltration	11	4	7	7112	2134	4978	$5,478	$32,868
Potash	Shelburne Rd.7	Wetpond	11	6	5	7283	2913	4370	$1,054	$21,074
Potash	K-Mart	Wetpond	14	8	6	8875	3550	5325	$1,282	$25,643
Potash	Williston Rd.2	Infiltration	16	6	10	10312	3094	7218	$3,517	$21,102
Potash	Williston Rd. Pine	Infiltration	18	7	11	11584	3475	8109	$13,659	$81,956
Potash	San Remo Dr.	Infiltration	25	10	15	15728	4718	11010	$4,351	$26,107
Potash	Oak R.-Butler Fm2	Infiltration	9	5	4	8384	2515	5869	$17,472	$104,829
Potash	Univ. Mall 1	Wetpond	32	18	14	20353	8141	12212	$2,516	$50,327
Potash	Univ. Mall 2	Wetpond	11	6	5	7162	2865	4297	$1,334	$26,687
Potash	Lane Press-NET	Infiltration	12	5	7	7609	2283	5326	$4,729	$28,373
Potash	BI Airport 1	Infiltration	6	2	4	3852	1156	2696	$1,624	$9,742
Potash	BI Airport 2	Infiltration	6	2	4	3747	1124	2623	$3,519	$21,112
Potash	BI Airport 4	Infiltration	16	7	9	10374	3112	7262	$7,562	$45,374
		TOTALS	238	109	129	154520	52018	102502	$87,657	$687,098

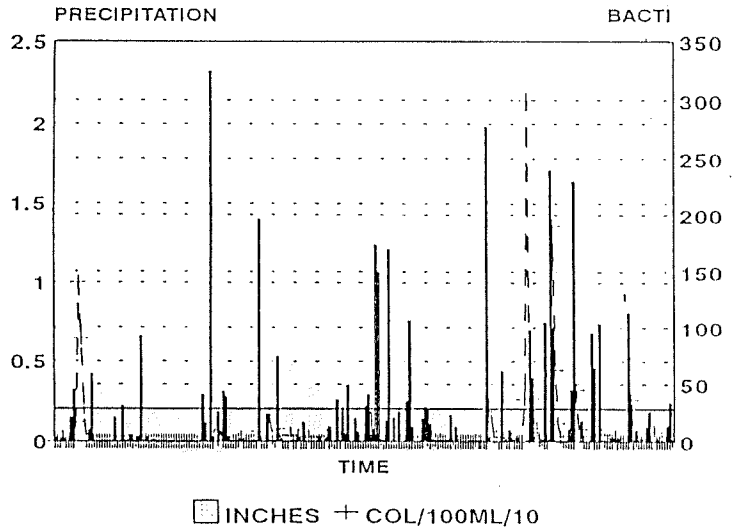
Table 7-3. Potash Brook Watershed: Stormwater BMP implementation treatment and capital costs estimates for targeted sewersheds (cont).

	Capital Costs/kg				*Annualized Capital Costs*					
Sewershed	TP Cost Low Dollars/kg	TP Cost High Dollars/kg	TSS Cost Low Dollars/kg	TSS Cost High Dollars/kg	Annual TP Costs $/kg 30 yrs @ 5% Low	Annual TP Costs $/kg 30 yrs @ 5% High	Annual TSS costs $/kg 30 yrs @ 5% Low	Annual TSS costs $/kg 30 yrs @ 5% High	Total Annualized Costs 30 Years @ 5% Low	Total Annualized Costs 30 Years @ 5% High
Corporate Way	$472	$2,835	$0.56	$3	$31	$184	$0.04	$0.22	$154	$922
Laurel Hill Dr.	$837	$16,732	$1.15	$23	$54	$1,088	$0.07	$1.50	$272	$5,442
Williston Rd.	$395	$2,370	$0.53	$3	$26	$154	$0.03	$0.21	$154	$925
Mills Ave.	$1,358	$8,147	$1.99	$12	$88	$530	$0.13	$0.78	$618	$3,710
Shelburne Rd.8	$228	$4,565	$0.28	$6	$15	$297	$0.02	$0.36	$74	$1,485
Timber Lane	$783	$4,695	$1.10	$7	$51	$305	$0.07	$0.43	$356	$2,138
Shelburne Rd.7	$211	$4,215	$0.24	$5	$14	$274	$0.02	$0.31	$69	$1,371
K-Mart	$214	$4,274	$0.24	$5	$14	$278	$0.02	$0.31	$83	$1,668
Williston Rd.2	$352	$2,110	$0.49	$3	$23	$137	$0.03	$0.19	$229	$1,373
Williston Rd. Pine	$1,242	$7,451	$1.68	$10	$81	$485	$0.11	$0.66	$889	$5,331
San Remo Dr.	$290	$1,740	$0.40	$2	$19	$113	$0.03	$0.15	$283	$1,698
Oak R.-Butler Fm2	$4,368	$26,207	$2.98	$18	$284	$1,705	$0.19	$1.16	$1,137	$6,819
Univ. Mall 1	$180	$3,595	$0.21	$4	$12	$234	$0.01	$0.27	$164	$3,274
Univ. Mall 2	$267	$5,337	$0.31	$6	$17	$347	$0.02	$0.40	$87	$1,736
Lane Press-NET	$676	$4,053	$0.89	$5	$44	$264	$0.06	$0.35	$308	$1,846
BI Airport 1	$406	$2,436	$0.60	$4	$26	$158	$0.04	$0.24	$106	$634
BI Airport 2	$880	$5,278	$1.34	$8	$57	$343	$0.09	$0.52	$229	$1,373
BI Airport 4	$840	$5,042	$1.04	$6	$55	$328	$0.07	$0.41	$492	$2,952
AVERAGE	**$680**	**$5,326**	**$0.86**	**$7**	**$44**	**$346**	**$0.06**	**$0.44**	**$5,702**	**$44,697**

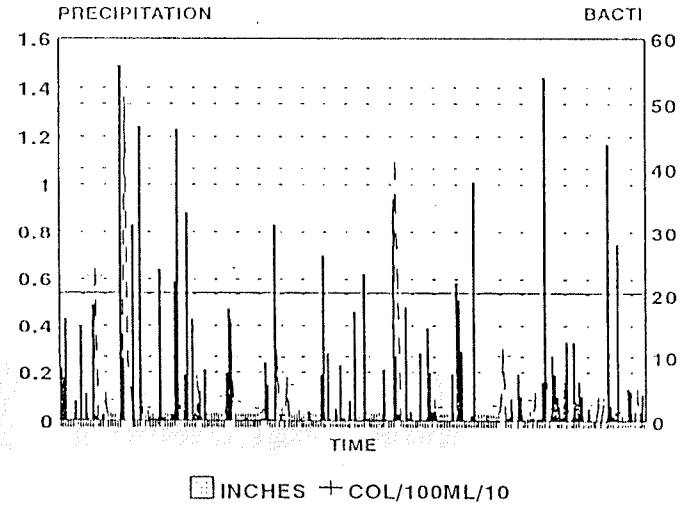
Appendices

POTASH BROOK AT REDROCKS BEACH

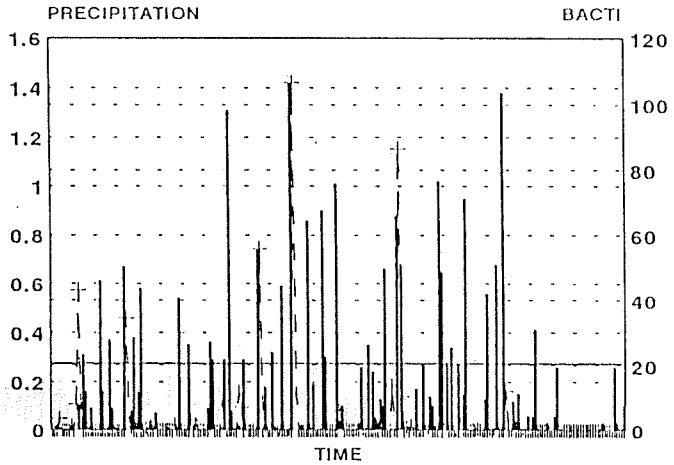
1988-1995(June-September)



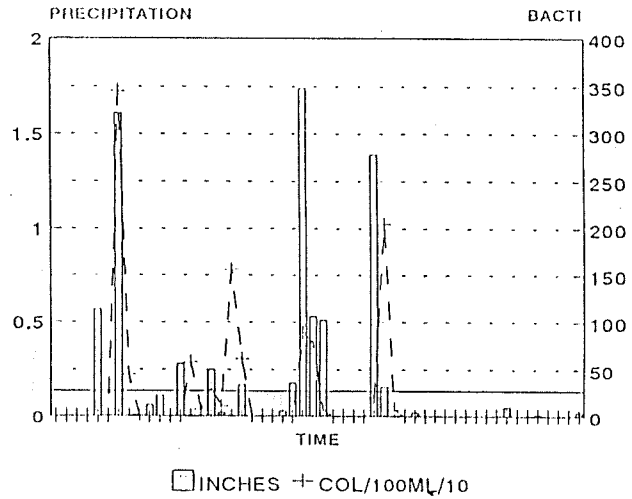
1988-1990 1=Beaver Removal Policy



1991-1992



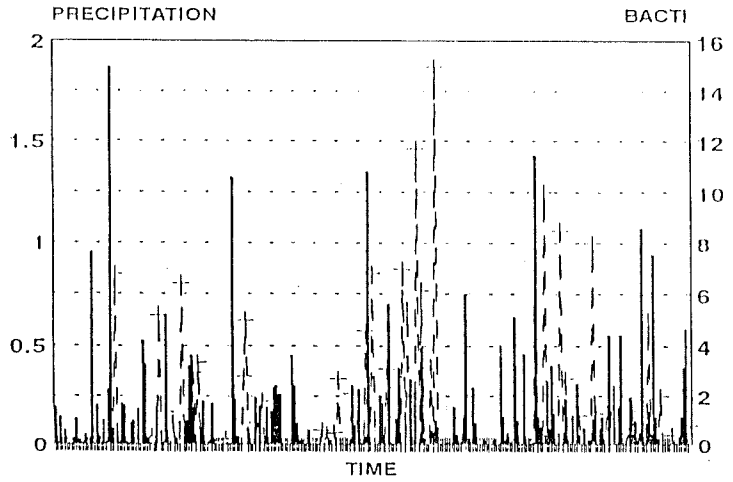
1993-1994



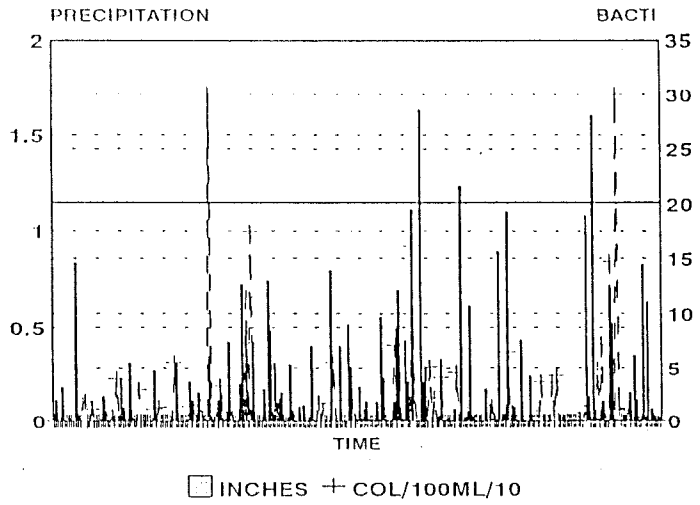
1995

Line indicates 200 col/100 ml swimming water quality limit

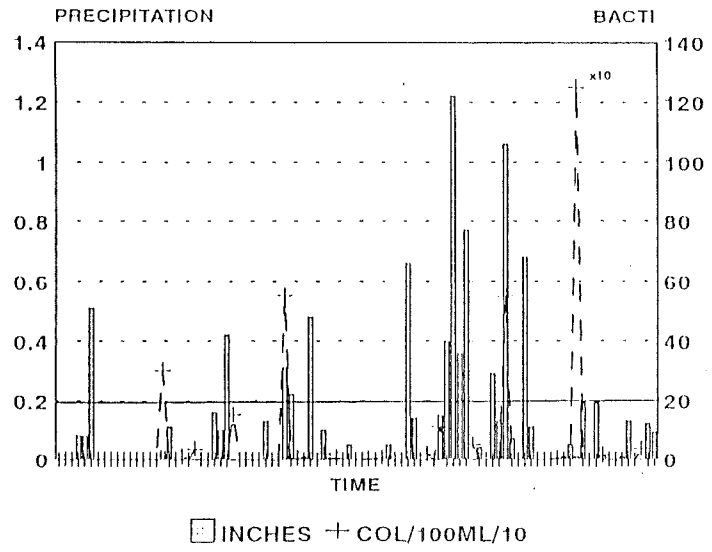
POTASH BROOK AT REDROCKS BEACH
1974-1987 (June-September)



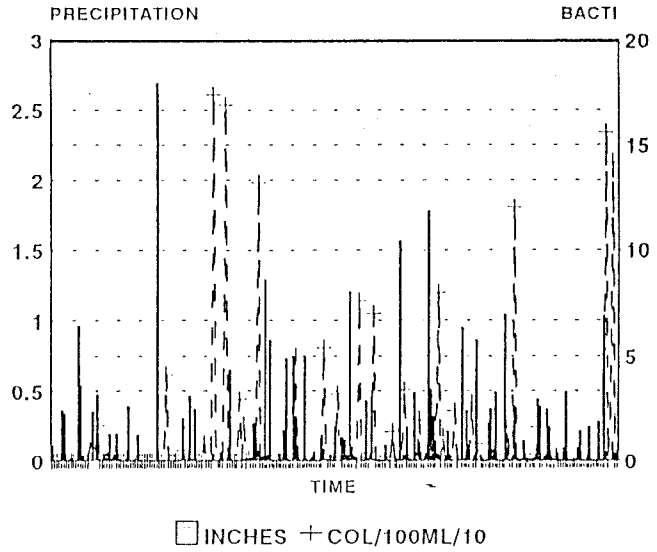
1974-1978



1979-1982



1983

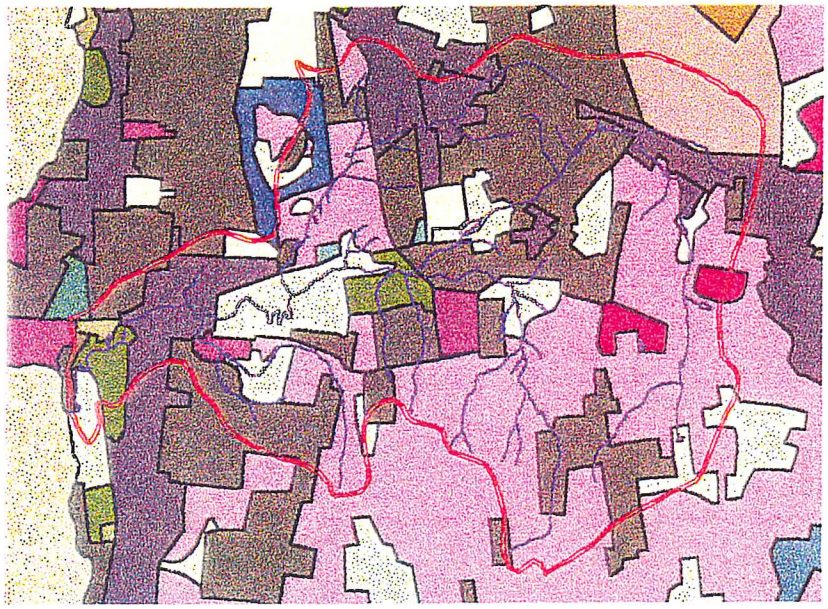


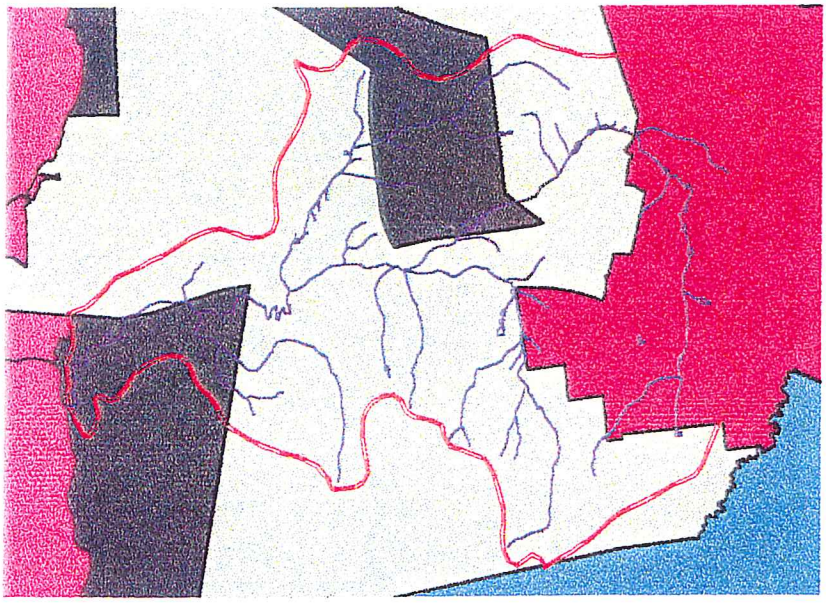
1985-1987

Line indicates 200 col/100 ml swimming water quality limit

Potash Brook

Figure 7.1: Potash Brook watershed showing roads and biological monitoring sites.





Potash Brook Watershed
Land Use 1995

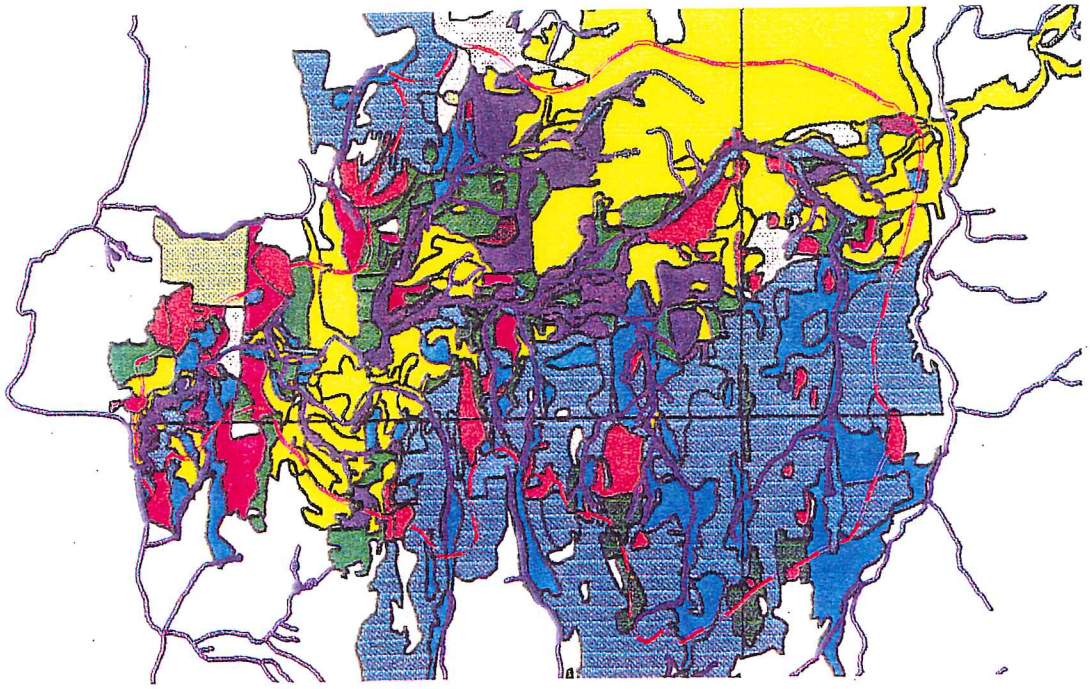
- 0
- 1100
- 1130
- 1190
- 1200
- 1210
- 1250
- 1252
- 1260
- 1270
- 1281
- 1300
- 1330
- 1370
- 1373
- 1400
- 1410
- 1412
- 1440
- 1460
- 1470
- 1480
- 1481
- 1482
- 1500
- 1510
- 1600
- 1700
- 1720
- 1730
- 1734
- 1735
- 1736
- 1737
- 1740
- 1790
- 2100
- 2200
- 2430
- 3000
- 3300
- 4100
- 4200
- 4300
- 5100
- 5200
- 5210
- 6000
- 6100
- 7200

Potash Brook Watershed
Future Landuse

- 1200
- 1500
- 1600
- 1700
- 1730
- 2100
- 3000
- 4000
- 7000
- 7500

Figure 7.2: Potash Brook watershed 1995 actual land use; and future land use as defined by zoning designation.

Figure 7.3: Potash Brook generalized soils map.



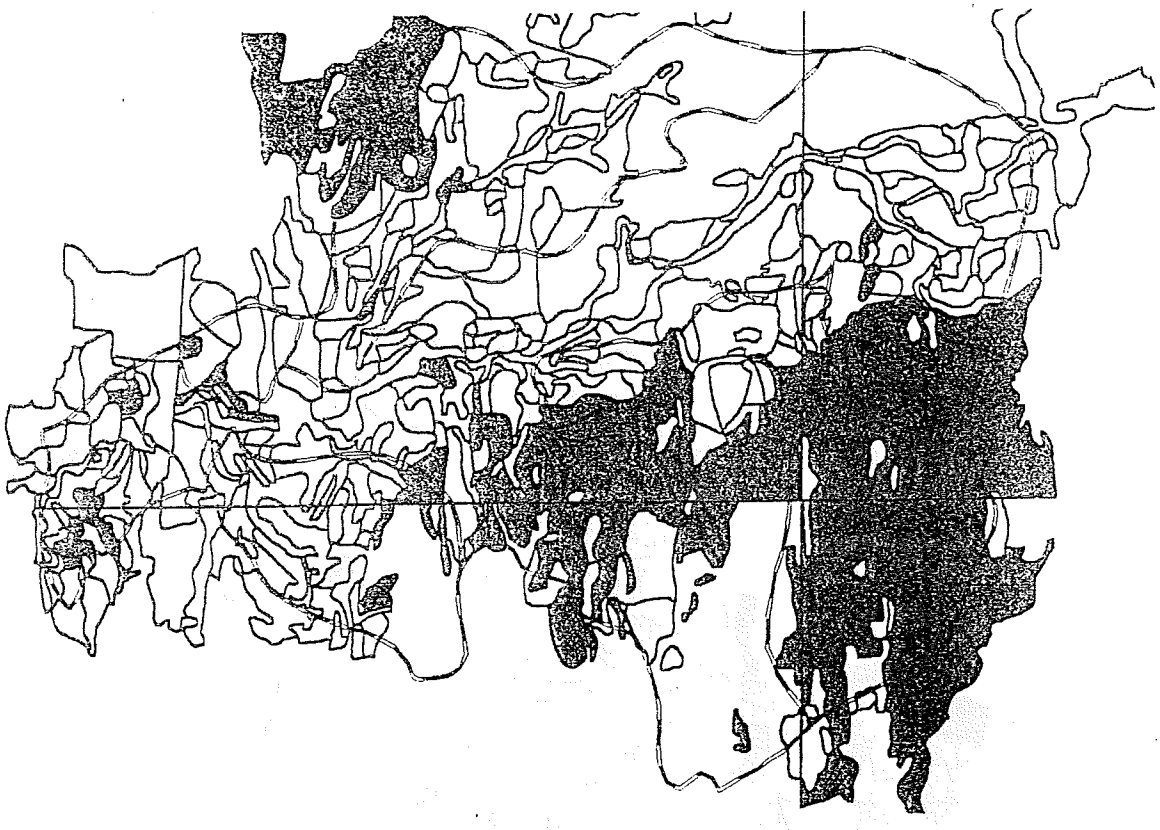


Figure 7.4: Potash Brook watershed - areas of highly erodible soils. These soils are easily displaced.

Potash Brook - Wetpond/Wetland Soils

Figure 7.5: Potash Brook watershed - wetpond/wetland soils.

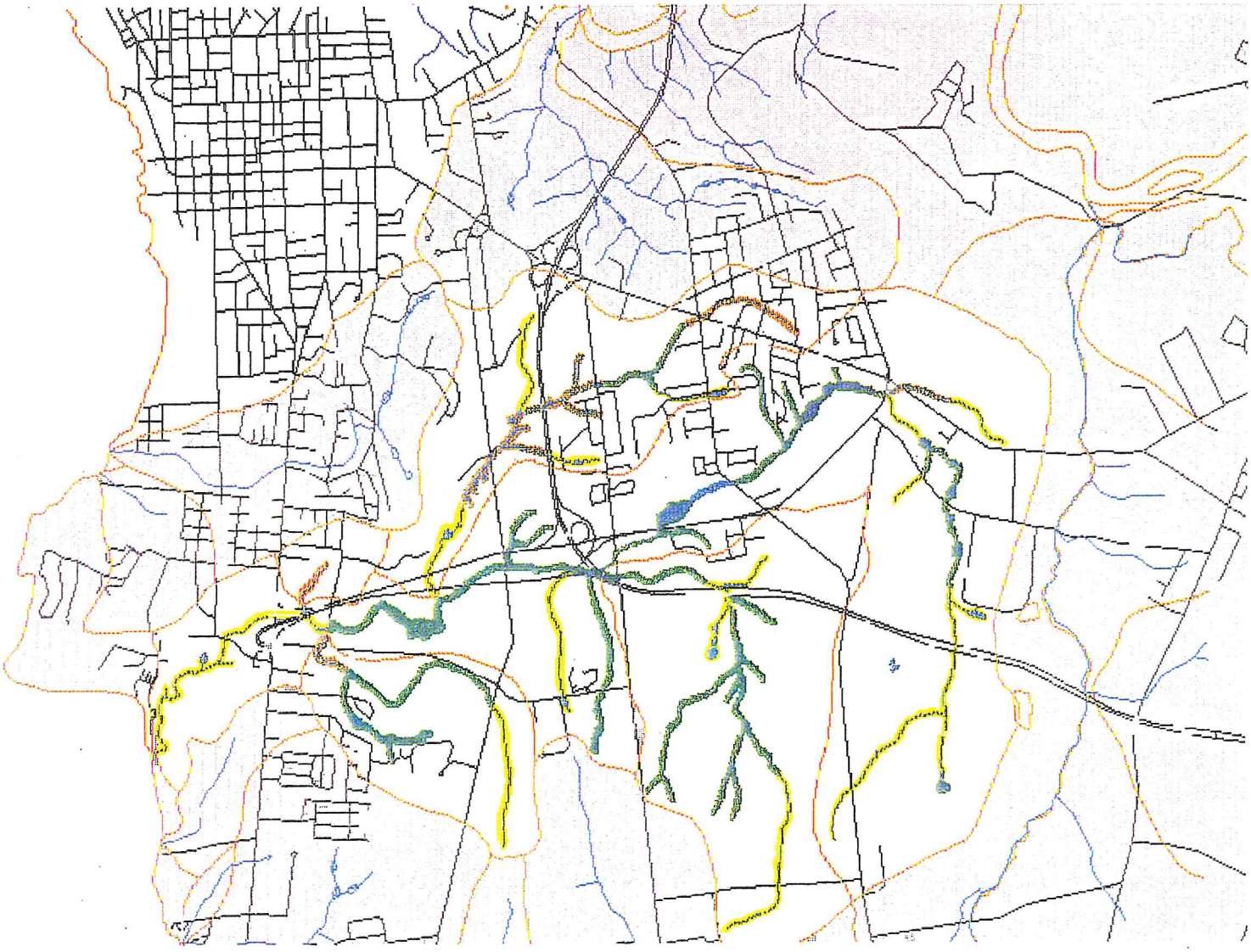


Figure 7.6: Potash Brook Riparian Corridor Evaluation. Evaluation was conducted using the Riparian Corridor Evaluation methodology (Petersen, 1992). A series of measurements and observations are recording while walking the stream channel.

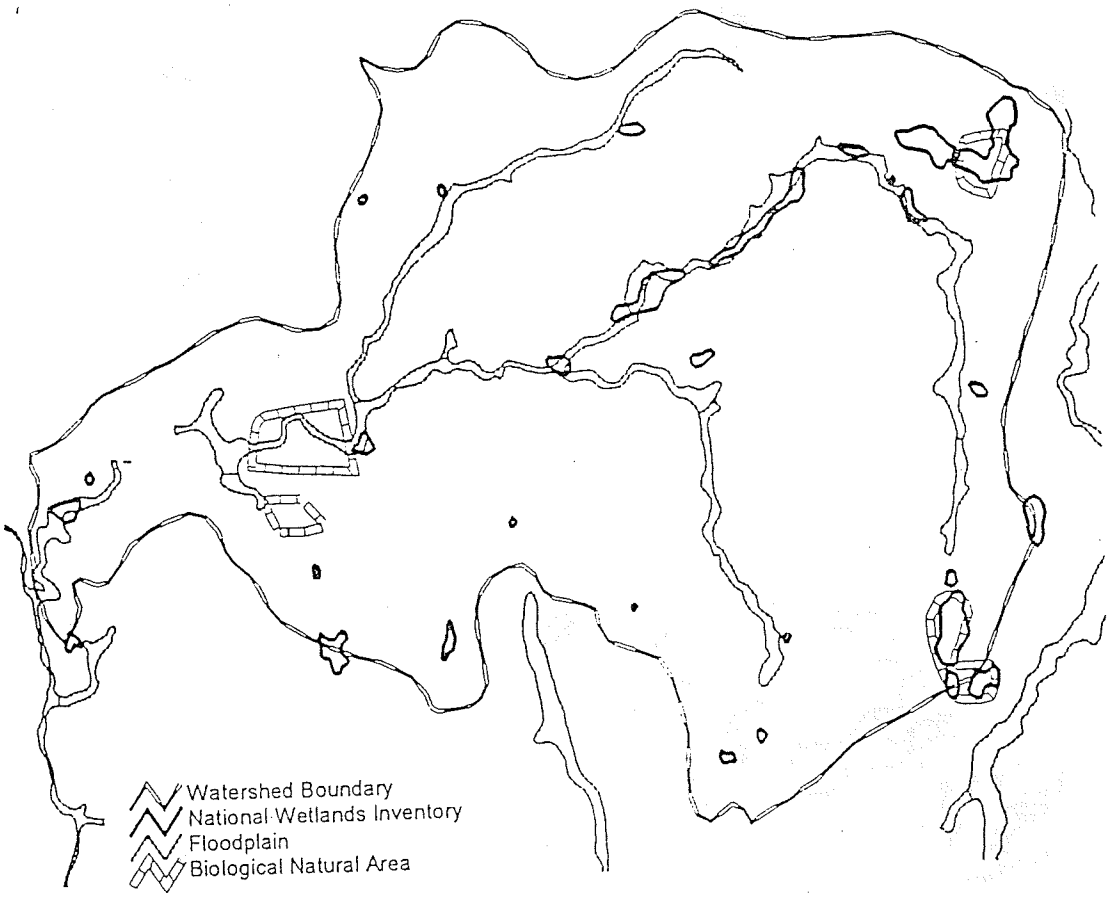
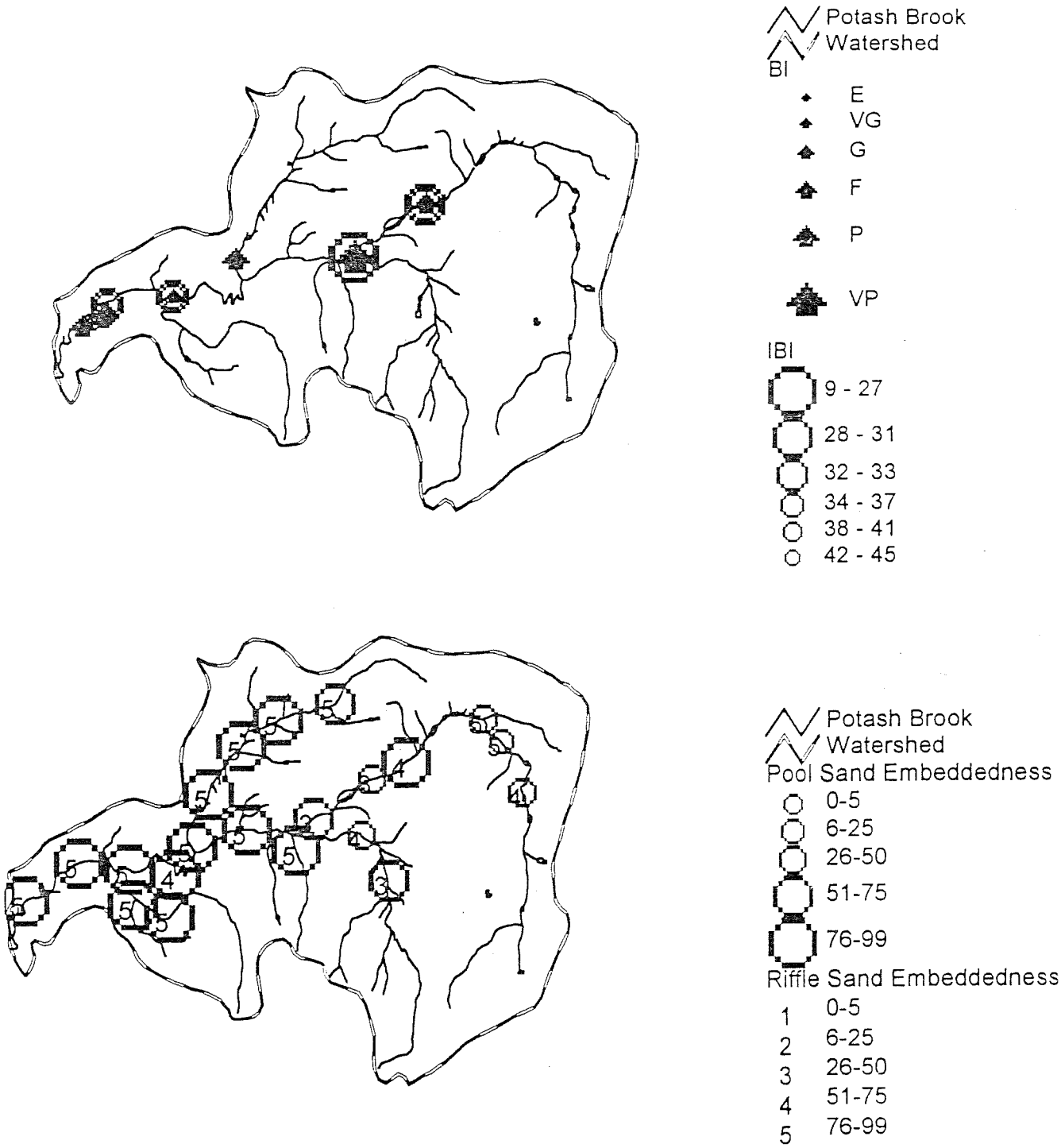


Figure 7.7: Potash Brook watershed - mapped wetlands, 100 yr. floodplain, biological natural areas, parks, and Natural Heritage sites.

Figure 7.8: Potash Brook watershed - biological condition. Fish and macroinvertebrate community measures of integrity. A macroinvertebrate biotic index (BI) rating of less than good is indicative of sub-Class B condition. A fish Index of Biotic Integrity (IBI) rating of less than 31 is indicative of sub-Class B condition.



Watershed measure of pool and riffle sedimentation. A high degree of sand embeddedness indicates excessive erosion and impairs aquatic habitat and the biological communities that are supported by that habitat.

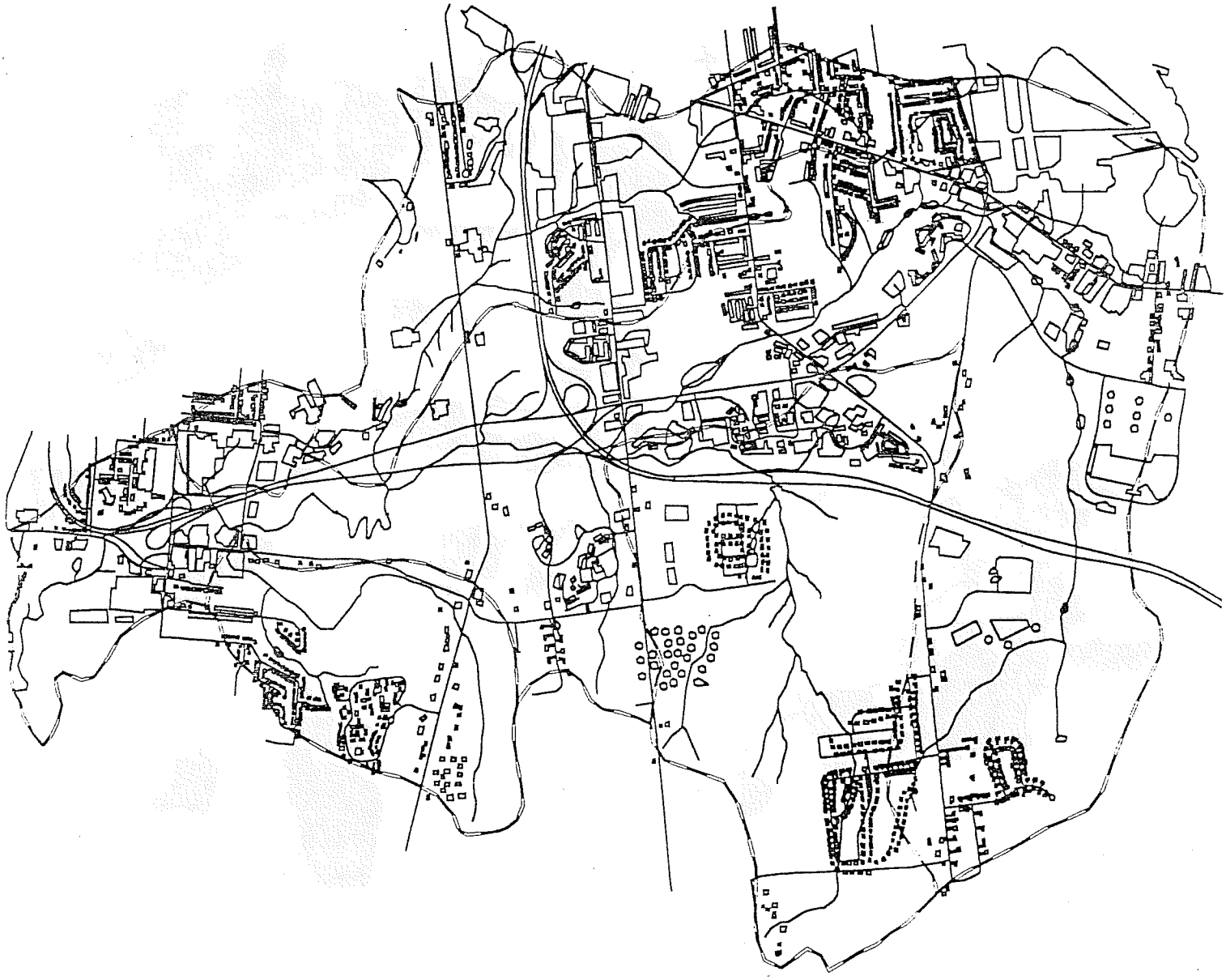


Figure 7.9: Potash Brook watershed mapped impervious surface - 1996.

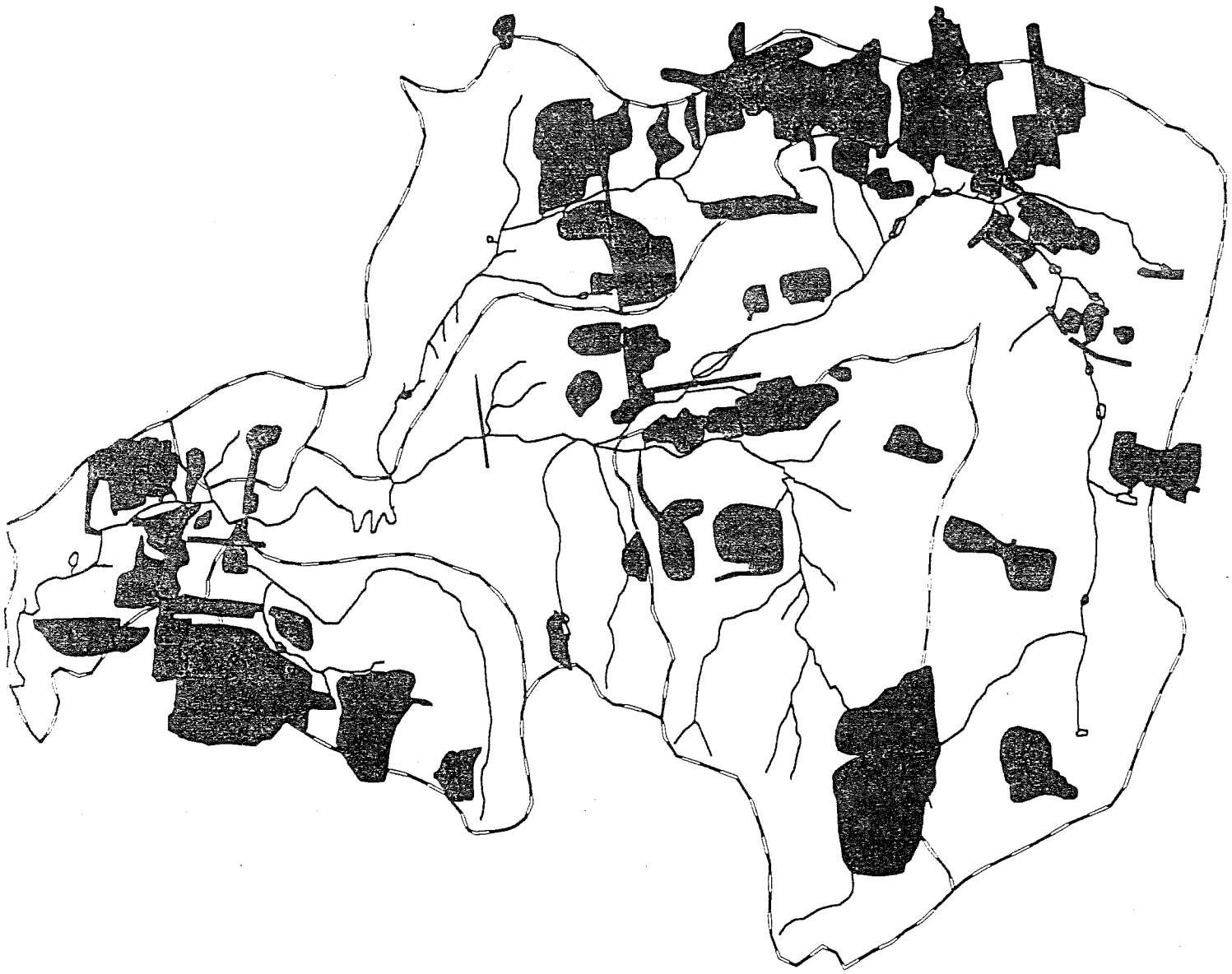


Figure 7.10: Potash Brook watershed mapped sewersheds - 1996.

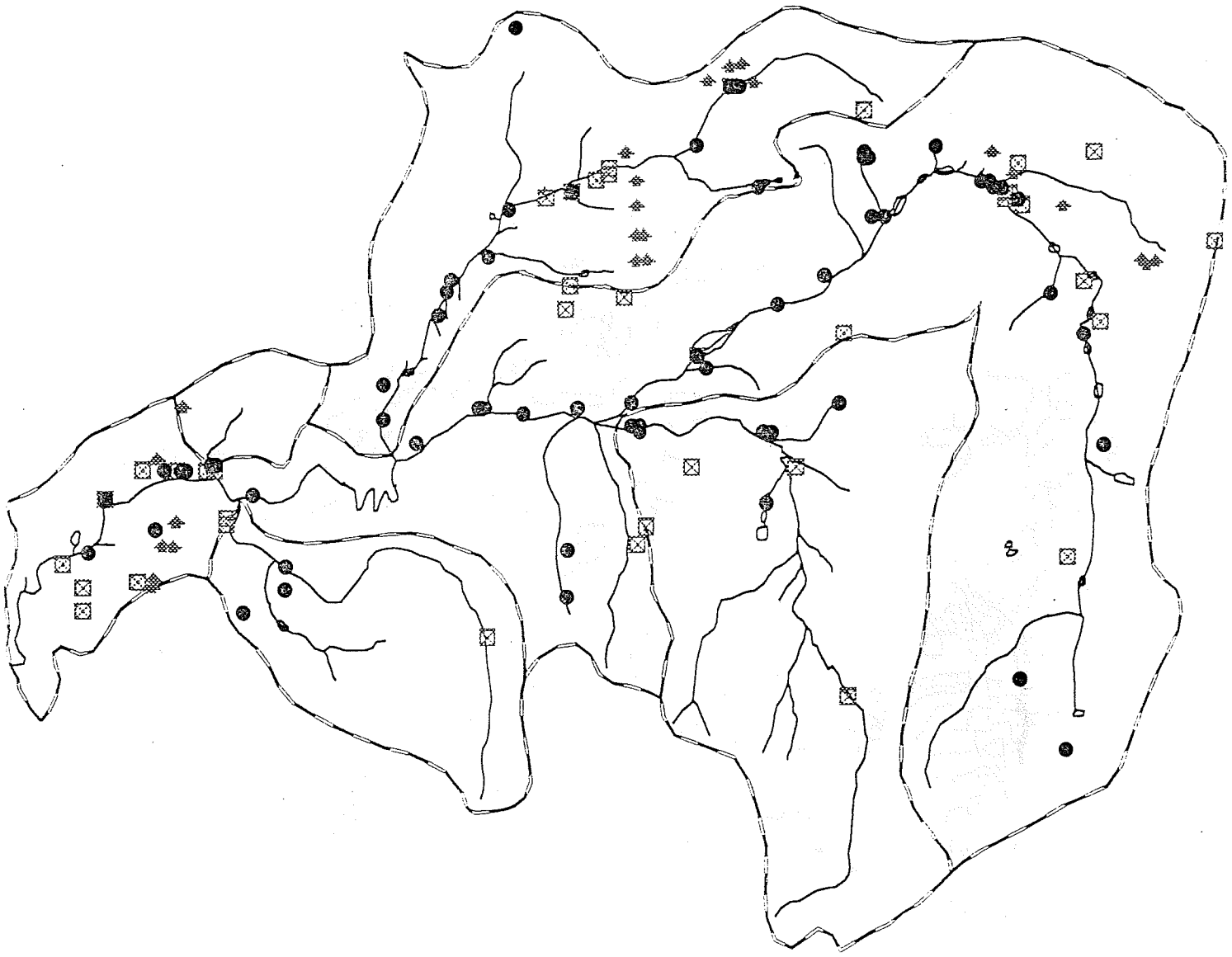


Figure 7.11: Potash Brook watershed mapped nonpoint sources. Mapped sources include: nonpoint sources such as eroding banks identified during RCE; stormwater permitted discharges; EPA hot landuses (quik-stops with gas pumps, gas stations).

Targeted Stormwater Sewersheds
Potash Brook Watershed

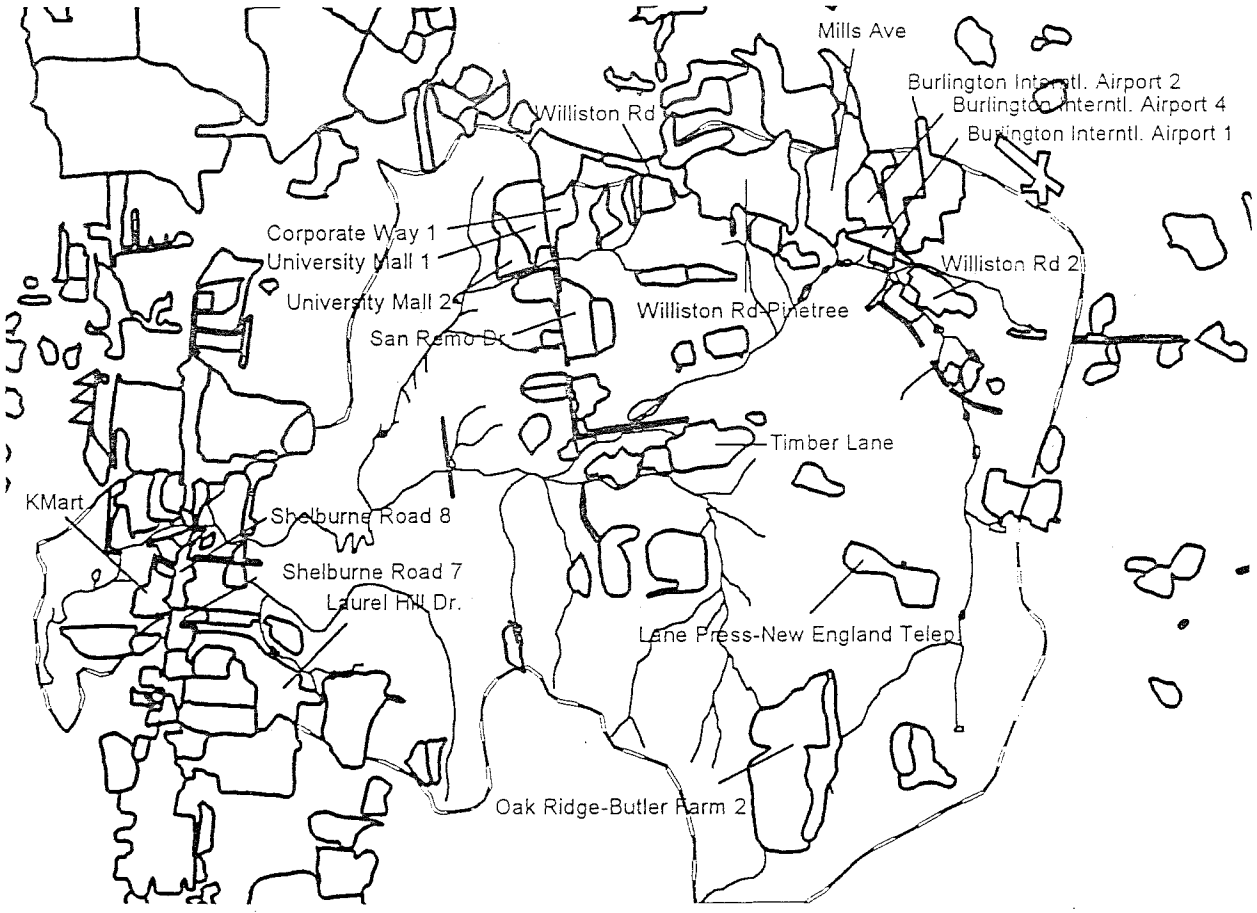


Figure 7.12: Targeted Stormwater Sewersheds in Potash Brook Watershed - Sewersheds were targeted based on exceedences of loading thresholds as described in Table 2.2. BMP recommendations are made for each targeted sewershed. Eighteen sewersheds in the Potash Brook watershed have been targeted.

Figure 7.13: Estimated total suspended solids loading from sewersheds in the Potash Brook watershed.

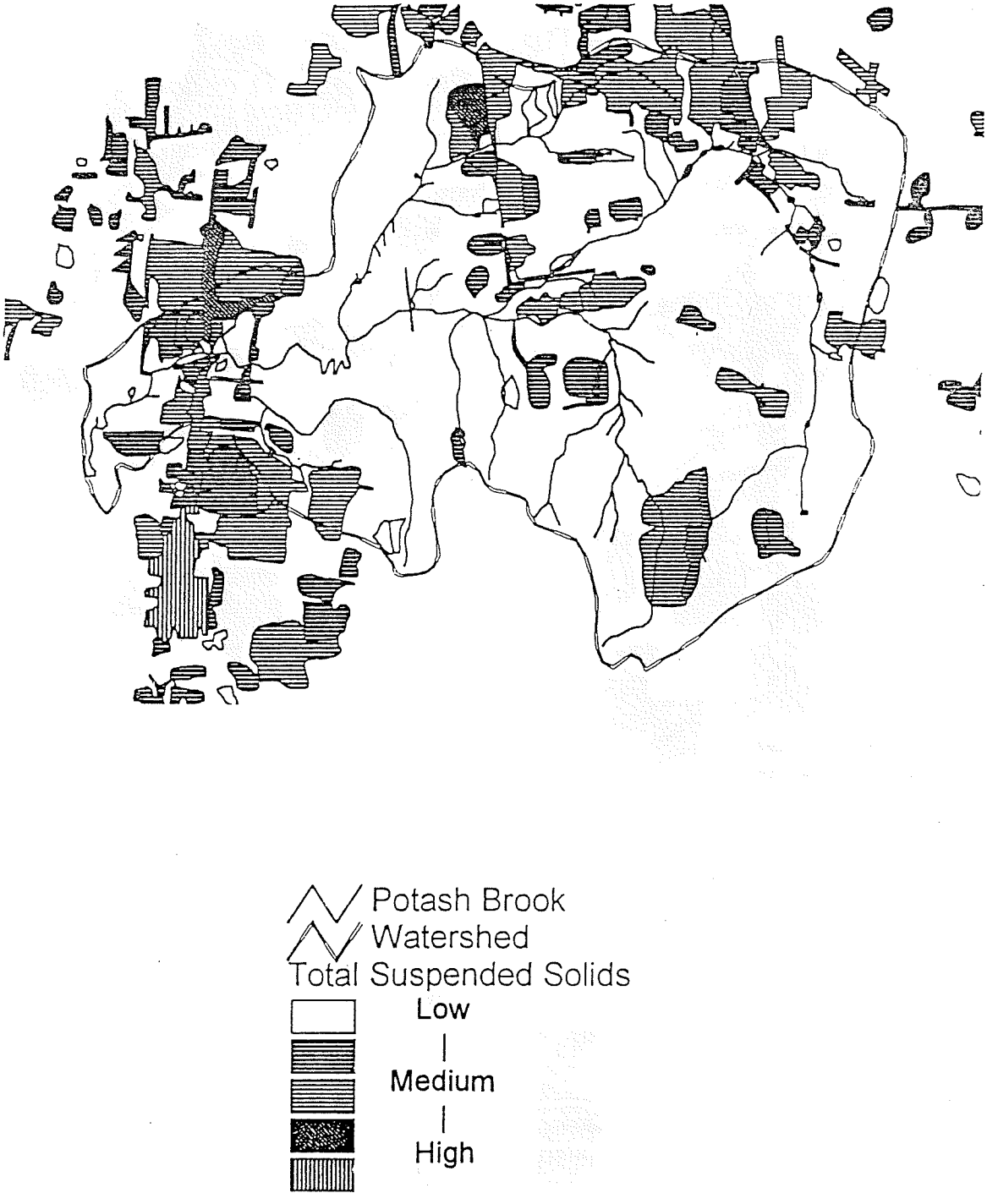


Figure 7.14: Estimated total phosphorus loading from sewersheds in the Potash Brook watershed.

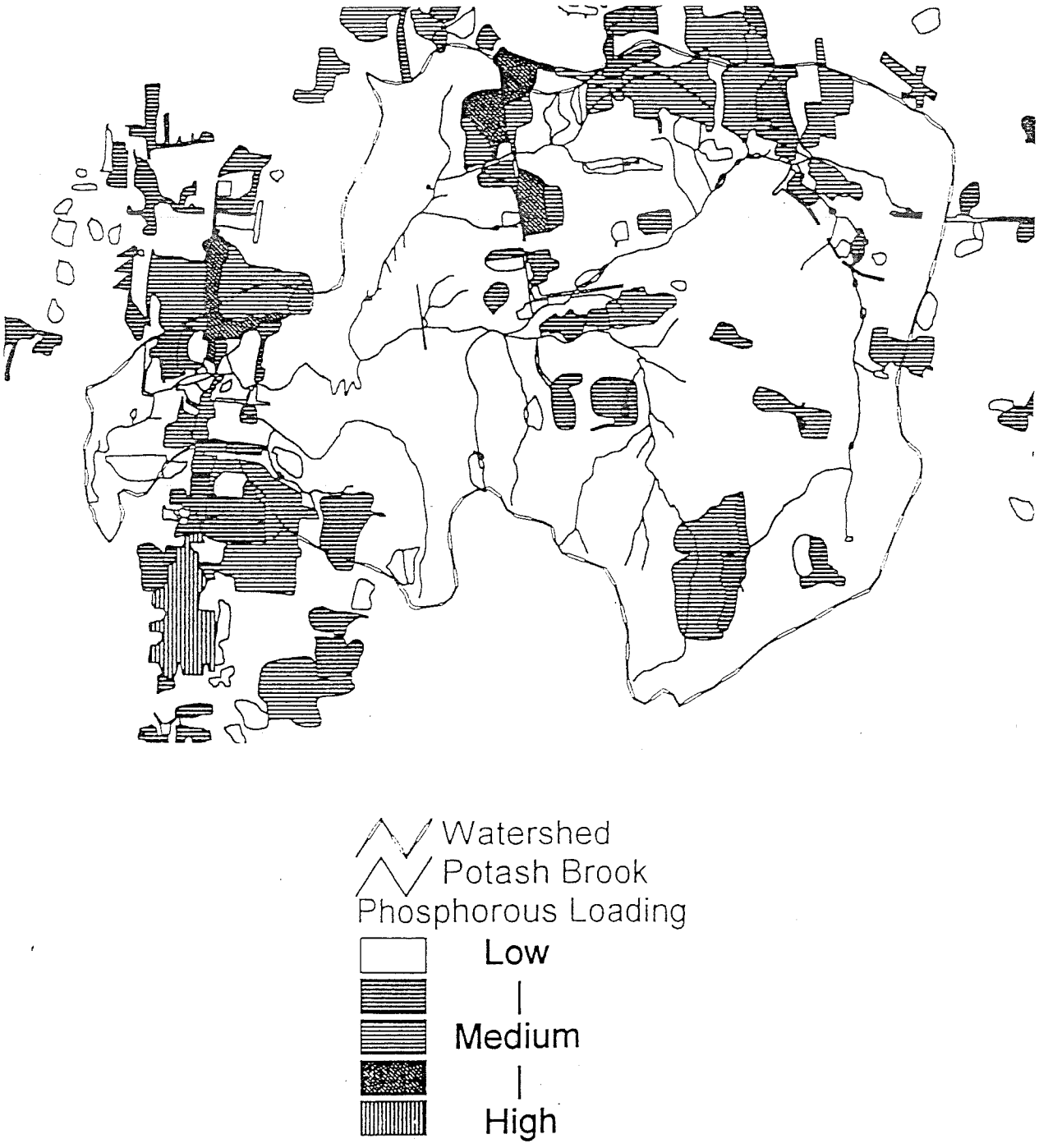
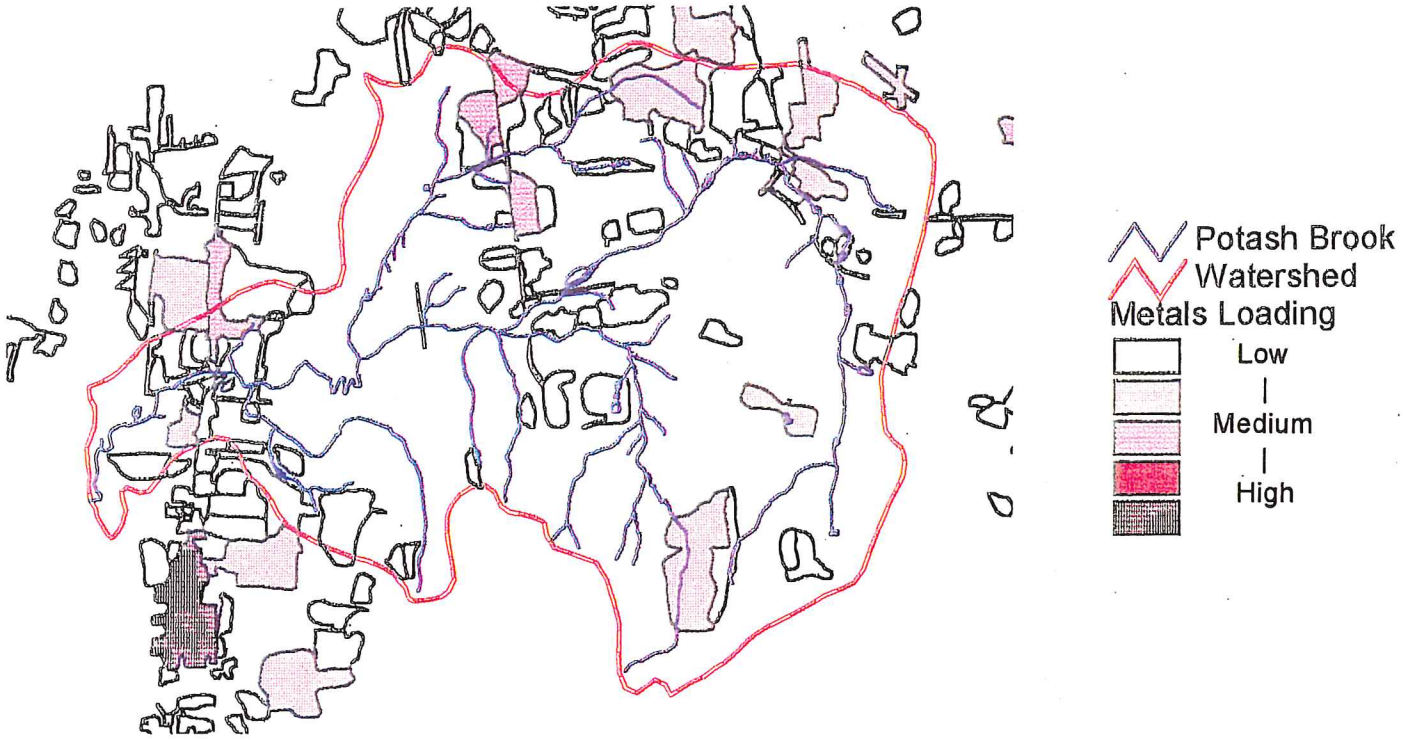
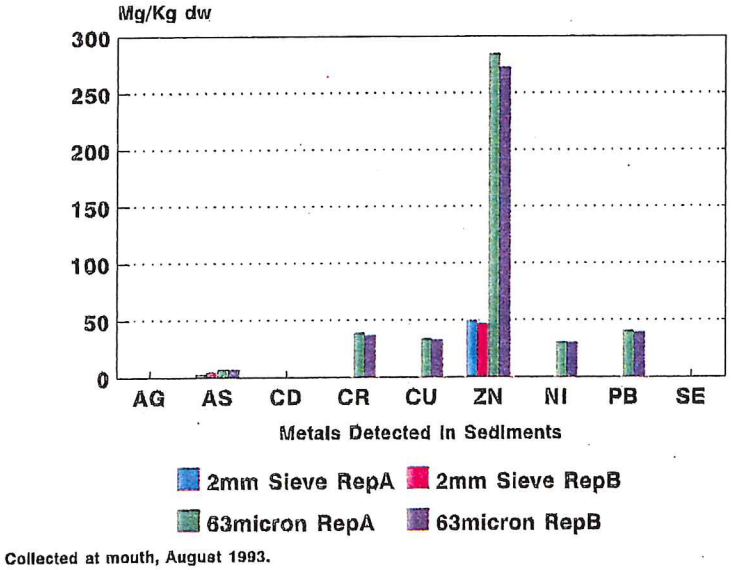


Figure 7.15: Estimated total metals loading from sewersheds in the Potash Brook watershed. Graph at bottom shows concentrations of metals in whole (2mm) and fine fraction (63u) sediments at the mouth of the Potash watershed. Samples collected in 1995.





Soils

- AdA
- AdA
- AdA - AdB
- AdB - AdD
- AdD - AdE
- AdE - Au
- Au - BlA
- BlA - Br
- Br - Cv
- Cv - DdA
- DdA - EwA
- EwA - FaC
- FaC - FaE
- FaE - FsB
- FsB - Fu
- Fu - HlB
- HlB - HlE
- HlE - HnB
- HnB - Le
- Le - Lf
- Lf - MuD
- MuD - MyB
- MyB - MyC
- MyC - Rk
- Rk - ScB
- ScB - TeE
- TeE - W
- W - Wo

Land Use 1995

- 0
- 1100-Residential
- 1130-Residential-Single Family
- 1190-Residential-Other
- 1200-Commercial
- 1230-Commercial Services
- 1250-Government
- 1252-Military
- 1260-Institutional
- 1270-Educational
- 1281-Museum
- 1300-Industrial
- 1330-Industrial-Stone
- 1370-Industrial-Mining
- 1373-Sand/Gravel
- 1400-Transportation
- 1410-Transportation-Air
- 1412-Transportation-Air
- 1440-Transportaiton-Road
- 1460-Utilities
- 1470-Utilities
- 1480-Utilities
- 1481-Utilities
- 1482-Utilities
- 1500-Industrial
- 1510-Industrial Park
- 1600-Mixed Use
- 1700-Outdoor Built
- 1720-Outdoor Built
- 1730-Outdoor Recreation
- 1734-Ski Area
- 1735-Golf Course
- 1736-Campground
- 1737-Parks
- 1740-Cemetaries
- 1790-Other outdoor built
- 2100-Cropland
- 2200-Orchards
- 2430-Other Agriculture
- 3000-Brush
- 3300-Mixed Brush-grass
- 4100-Broadleaf Forest
- 4200-Coniferous Forest
- 4300-Mixed Forest
- 5100-Rivers
- 5200-Lakes/Ponds
- 5210-Lakes/Ponds
- 6000-Wetlands
- 6100-Forested Wetland
- 7200-Beaches/River banks
- 7400-Exposed Rock

Future Landuse

- 1200-Commercial
- 1500-Industrial
- 1600-Mixed Use
- 1700-Outdoor Built
- 1730-Outdoor Recreation
- 2100-Cropland
- 3000-Brush
- 4000-Forest
- 7000-Growth Center
- 7500-Subregional Growth Center