Summary Report
of
Stormwater Activities for the
Town of Essex
As required by the NPDES Phase II
Stormwater Permit 3-9014
For Stormwater Discharges from
Small Municipal Separate
Stormwater Systems

March 2003 to April 2008

General

This report is a summary of the five-year stormwater activity of the Town of Essex operating under the requirements of:

General Permit 3-9014 issued by the State of Vermont Agency of Natural Resources effective for implementation on March 19, 2003
The Notice of Intent submitted by the Town in response to the permit
The Memorandum of Decision issued on July 21, 2005 requiring changes to the original permit

The intent of this summary is to provide an overview of the stormwater system improvement actions taken by the Town, alone or in cooperation with others, during the five-year period from March 2003 until April 2008. Each year, the Town has submitted a comprehensive annual report detailing the actions taken to meet each of the six minimum measures. This summary report will generally not repeat information contained in the annual reports but rather provide a broader perspective on meeting the permit objectives set forth in the Town's Notice of Intent.

Legally, the stormwater requirements set forth in the NPDES Phase 2 MS4 permit (General Permit 3-9014) apply only to the urban census designated area and the two impaired waterways within the Town (Sunderland and Indian Brook) – approximately 13 square miles. The total acreage in the Town outside the Village is 34.7 square miles. The Town's stormwater activities have not differentiated between the areas that are legally mandated for action from the land area that is outside this limit.

The objectives of General Permit 3-9014 fall within three broad categories -- improvement of water quality in the impaired watersheds, compliance with the issued TMDL requirements for Lake Champlain as the ultimate receiver of the Town's stormwater discharges and compliance with the six minimum control measures identified by EPA. The six minimum EPA measures are:

1) Public Education and Outreach
2) Public Involvement/Participation
3) Illicit Discharge Detection and Elimination
4) Construction Site Runoff Control
5) Post-Construction Stormwater Management in New Development and Redevelopment
6) Pollution Prevention/Good Housekeeping for Municipal Operations

The general strategy outlined by the Town in its NOI to comply with the first two objectives has been to:

1) reduce the level of sediment reaching the streams
2) reduce the level of dissolved nutrients reaching the streams
3) stabilize stream bank erosion and improve control of runoff
4) increase the attenuation of storm-water runoff
5) reduce the level of toxins reaching the streams

The activities outlined under the six minimum EPA measures fully support the objectives outlined in the NOI and in some cases provide benefits beyond the scope of the objectives. The summary report is formatted to demonstrate compliance with the six minimum measures; where applicable, the five objectives will be referenced and linked to the minimum EPA measures.

Program Costs

Compliance with the NPDES Phase 2 MS4 permit has had a significant financial impact on the Town. Some monetary assistance has been provided for specific activities and projects by both the state and federal government. So far, the support funds have equaled $14,007 in state aid, $55,000 in State and Tribal Assistance Grants and $126,149 in Federal Emergency Management Funds. The bulk of the program costs have fallen to the community.

Chart #1 identifies the program costs since the issuance of the NPDES Phase 2 MS4 permit. Excluding the Federal Emergency Management Funds provided to the Town for emergency restoration of gravel roads and ditches due to flood damage, the average annual expenditure over the period is $213,000, not adjusted for inflation. In comparison, the average stormwater system costs incurred in the three-years prior to the NPDES Phase 2 permit was $49,749. This represents a four–fold increase. It is indicative of the effort taken by the Town to be in compliance with the permit.

Summary of Actions under Public Education and Outreach

1. The single most significant accomplishment was the formation of the Regional Stormwater Education Program (RSEP) with the following municipalities/parties: Essex, Essex Junction, Burlington, Colchester, Milton, Shelburne, South Burlington, Williston, Winooski, Burlington International Airport, the University of Vermont and the Vermont Agency of Transportation. The regional stormwater education program developed by the group has been recognized nationally for its activities.

The group developed and utilized both a pre and post program survey to both identify where the stormwater education efforts should be directed and determine the success of the education effort. A marketing firm was hired (Marketing Partners, Inc) to develop the education program content and marketing effort. A summary of the program is contained in Appendix 1 of this report. The post survey results demonstrated that the education program was successful; it also identified where additional future educational efforts may need to be directed.

2. The Town has been an active member of the Chittenden Solid Waste District since its formation. An important element of the CSWD program is the collection of household hazardous wastes throughout the year at their central hazardous waste facility and at their Rover Unit which has been located in Essex for a week in the spring and a week in the fall. The program has been in place since 1991. Hazardous wastes that are diverted do not end up in the waste stream as stormwater, wastewater or indirect groundwater discharges. The types of hazardous wastes diverted include: acids, aerosols, alkalines, antifreeze, batteries, flammable liquids, fluorescent bulbs, latex paint, lead/mercury debris, mercury, oil base paint, oily debris, oxidizers, pesticides/poisons, PCB devices, photo chemicals, small paints, reactives, used oil, oil filters and other toxic materials.

From 2003 to 2007, a total of 1664 tons of this material was collected in Chittenden County. Of this total, it is estimated that approximately 15% came from Essex and Essex Junction. The Rover unit in Essex was responsible for 40% of the 15% total or about 6% of the total collected in the County. The specific degree to which this program has directly contributed to improving stream water quality is unknown; however, the tonnage of materials removed properly from the waste stream is an important element in reducing the potential discharge of toxic materials.

3. The Town instituted a program in Year One of the permit to try and reduce the amount of dog waste which has the potential to be washed into streams. Five pet waste stations were originally set up at key locations throughout Town - primarily in or near Town parks. The number of sites was expanded to eight in Year Three. The total number of pet waste bags distributed is not available for the first two years of the permit. However, over the past three years, the number has grown as indicated:

	Permit Year 3	Permit Year 4	Permit Year 5
Number of Pet Waste bags distributed	10,400	14,400	19,200

In addition to the pet waste disposal sites, Bags-on-Board ™ were purchased and given to residents at the time of annual dog registration. There has been a gradual increase in the numbers handed out each year; 1265 were purchased in 2007 -- 64% more than purchased the previous year.

Once again, it is difficult to establish a direct impact on stream water quality based on the increase in pet waste bags given out to the public. However, the clear indication is that if more pet waste is being disposed of via bags and deposited as solid waste, then a portion of the pollution from this source that could have been washed into the stream has now been removed.

4. Throughout the permit period, Essex residents and businesses were informed of pending stormwater decisions, ongoing actions and completed activities via the following:

a. Posted agendas for, televising of and web-site documentation on Selectboard meetings dealing with stormwater issues.
b. Provided access to stormwater information posted on the Town's webpage.
c. Advertised and held Conservation Committee meetings dealing with stormwater
d. Held public information meetings on specific stormwater topics, including topics such as the stream geomorphic studies of the impaired waterways in Essex, the Stormwater Ordinance, Riparian Buffer elements of the Zoning regulations.
e. Distributed stormwater information and flyers at the Town Offices and and Town Library as well as at Town meeting.
f. Included stormwater information and updates in the Public Works narrative section of the Town annual report.
g. Distributed Champlain Water District flyers on the importance of watershed protection and stormwater impact on the water treatment process.

5. Starting in year one, a storm drain stenciling project was undertaken using elementary school students. The stenciling project involved an overall educational effort on the function of catch basins, stormwater testing (optical brightener tests), discharge to the lake, pollutant components of stormwater and the like.

Summary of Actions under Public Involvement/Participation

1. Green-Up Day pick-up of trash and debris along roadways and in the impaired waterways resulted in removal of the following materials over the five year period:

1200 bags of collected trash
533 + tires
23+ cy of metal
20+ cy of wood
8 pieces of heavy furniture/appliances

The specific portion removed either from the streams or a given roadway cannot be determined from the collected data. However, unless the debris is very heavy, it is likely that a substantial amount of this waste would have reached the streams if it had not been picked up by volunteers. In 2007, over 372 Essex volunteers contributed their effort to this program.

2. Town Public Works staff has worked directly with many of the homeowners associations over the period of the permit. Initially, the primary effort was to insure that parties with expired permits within non-impaired waterways obtained new permits or turned the responsibility for permits in whole or in part over to the Town. These permits are:

Permit number	Name
3575-9010	Lang Farm Parcel I
3577-9010	Lang Farm Parcel H
3324-9010	Meadows Edge Development
4574-9010	Forestdale
3081-9010	Perkins Bend
3578-9010	Pinewood
3267-9010	Saybrook
3581-9010	Heritage
3579-9010	Old Stage Village
3580-9010	Rivers Bend
3201-9010	Pinewood Section G
Old 1-1381	The Commons
4367-9010	Autumn Knoll

3. A storm-water management plan was developed using an outside consultant, Forcier Aldrich and Associates, and adopted by the Town in Year One of the permit. The plan was used as a framework to develop the action plan for the five-year program. Over time, the management plan has become outdated. The current stormwater action plan is now the NOI for the next five years of the NPDES Phase 2 permit.

4. Marking of storm drains to alert the public to not use the drains for illicit discharges was initiated during the first year of the permit cycle using volunteer labor. The goal was to achieve 100% marking by the end of the five years. Lessons were learned regarding the type of marking and the use of volunteer labor. Initially, paint was used to mark the basins. This process was very applicable to the use of volunteers. However, the paint did not hold up and the level of participation was less than hoped. Flexible markers glued to curbing were tried next with only limited improvement. Finally, the Town used metal storm drain markers physically attached to the catch basin grates. Unfortunately, the grates are heavy and dangerous to lift, making the marking process less favorable to using volunteer labor.

All Town-owned catch basins were marked by the end of the permit period (1093 catch basins). The current system uses a combination of painted, plastic and metal markings. Some volunteer help will be used in the future for maintenance but only in very controlled and limited situations.

5. The Selectboard made a determination early in the permit process to utilize the Conservation Committee as the "citizen-input" committee on stormwater issues to avoid the proliferation of standing Town committees. During the five-year permit period, the Conservation Committee exerted a key role in two major areas:

a) Development of the Stormwater Ordinance and

b) Development of the Riparian Buffer provisions of the Proposed Zoning Ordinance changes (currently pending adoption by the Selectboard). It should be noted that the Planning Commission also played a key role regarding this issue.

Summary of Actions under Illicit Discharge Detection and Elimination

1. The storm drain systems, including pipes, catch basins, manholes and outfalls, all road/driveway culverts and all stormwater treatment systems have been identified, catalogued and mapped. The collected data has been placed on the Town's GIS system, so it can be easily retrieved and used for a variety of purposes. Each year the information is updated and in some limited cases corrected. With identification of all the stormwater infrastructure, there is now a common base of reference for managing permits, inspections, cleanings and other necessary actions. It has also helped to differentiate between those portions of the stormwater system that belong to the municipality and those that belong to others. There are currently 1470 total catch basins, 1093 of which belong to the municipality. Outfalls number 241, with 153 belonging to the municipality. There are also in excess of 619 municipal culverts in service.

2. The Town has assumed responsibility for a number of older permits within the non-impaired watersheds. These permits are listed in the previous section of this report. Of note is the fact that the Town has inspected its portions of those permits during the five-year period and provided semi-annual reports to the State on the condition of the infrastructure.

3. During the five year permit period, the Town performed a total of 256 optical brightener tests. In almost all cases, there was no visible indication of illicit discharges to the storm-water system. A few were inconclusive and are still being investigated. Limited water quality testing was done at select outfalls and nothing unusual or suspect was found.

4. In the fifth year of the permit, the Town completed and submitted to the State an Illicit Discharge Summary Report. It provided detailed information on the 241 identified outfalls in the community. The Summary Table and Summary Narrative are included here:

Summary Table

The following chart is a summary of the data from the five watersheds:

Item	Public Outfalls	Private Outfalls	Total
Results of optical brightener tests	3	1	4
Could not find outfall pipe due to time of year	9	9	18
Outfalls with no apparent problems	110	60	170
Outfalls to be checked in the summer of 2008 due to presence of 2 or more indicators	7	2	9
Outfalls with structural pipe problems	10	5	15
Outfalls with vegetation that needs to be cleared	14	11	25
Total	153	88	241

In addition to the inspections conducted in the late fall/winter by Town staff, The Village of Essex Junction provided testing analysis for outfalls number 3, 4 and 5 in the Sunderland drainage basin during the summer of 2007. The results from that testing are attached and they coincide with the results found by the Town.

Narrative Illicit Discharge Report Summary:

Overall, there is not a significant issue in Essex with regard to illicit discharges. The only significant discharge occurred this summer when old, clay-tile, private sewer lines in the Fort Ethan area belonging to UVM collapsed and wastewater found its way into a storm drain discharge pipe. It was discovered shortly after the event occurred and the Town immediately plugged the storm outfall pipe. It is still plugged. It was reported to the State as a wastewater spill. None of the material reached the waters of the State. UVM is in the process of replacing the sewer line.

The other three areas, where there was some indication of a problem through the optical brightener tests, did not demonstrate consistent results. These areas and the other nine areas noted in the "2008 check" category will be investigated in more detail during 2008. More optical brightener tests will be run as well as limited chemical and bacteriological tests on the outfall flow and upstream catch basins. In addition, investigation will be made into potential sources, such as a floor drains or washing machines connected into the stormwater system. Essex does not have a significant commercial or industrial base and it does not appear that any of the potential investigation locations involve a significant illicit discharge.

The public outfalls that exhibit a structural or erosion/vegetation problem will be addressed by the Town in the summer work plan. The owners of the private outfalls will be contacted by letter advising them of the inspections completed by the Town and their responsibility to insure that the piped systems are inspected and properly maintained.

In addition to targeted optical brightener tests, the Town will continue to test throughout the community on a random basis. In subsystems where a number of tests have been taken with a continuous history of negative results, future optical brightener tests will not be run, unless there is some visual or other indication that conditions in the subsystem have changed.

5. It took three years of effort to write and obtain Selectboard approval of a Town Stormwater Ordinance. One was adopted on November 22, 2005 and illicit discharges are addressed in the document. A copy of the Ordinance and attachments has been previously submitted.

6. Throughout the five-year permit period, a number of illicit discharges were found and corrected. The details of each are found in the annual reports. Most of the illicit discharges involved the one time placement of a substance into catch basins. The materials deposited included waste latex paint, a small quantity of waste oil, sediment from improperly protected private construction, a failed sewer line at Fort Ethan Allen, etc. Each case was handled separately and where the responsible party was identified, they were held responsible for the clean-up. None of the situations was of sufficient significance to warrant fines.

It appears that continuing education directed to specific trades and increased public awareness of the impact of discharging waste materials to catch basins are the key elements to reduction/elimination of the problem.

Summary of Actions under Construction Site Runoff Control

1. Although progress has been made on updating the Public Works Standards and Specifications, a fully updated document has not yet been completed. Most of the required stormwater standards have been included in the body of the Town Stormwater Ordinance and in Appendix D to the Ordinance—Stormwater Management Design Criteria. Updating the Public Works Specifications will not have a significant impact on the Town's stormwater program; however, it will pull together many of the separate elements incorporated in plan reviews and other documents into one location. It is anticipated that the Public Works Specifications will be ready for Selectboard review by late spring 2008.

2. The Town Public Works staff reviews all new development projects for compliance with Town standards and guidelines. For site plan review, it is a single review; for most subdivisions, it is a three part review –sketch, preliminary and final. Once a development project is approved by the Planning Commission or Zoning Board, construction overview inspection is performed by the Public Works Department. Projects are required to file financial letters of credit for the project and the Town retains at least 10% of the LOC for a period of three years. Each water and sewer service connection is physically inspected to insure that cross connections do not occur and that systems are watertight. Testing is required of all sewer and water infrastructure. Large construction projects are required to have either Town or State erosion control plans. Some must also have stormwater management plans in place. Every construction site in the Town must comply with the requirements found in the Ordinance, Appendix A -- the Town of Essex Small Site Erosion Control Guide. These guides are provided to parties seeking building permits.

3. The Town has not had construction projects that fall within the jurisdiction of the State – land disturbances over 1 acre or creation of impervious areas larger than 1 acre. However, the Town has instituted more stringent erosion control measures on Town projects that are either put out to bid or completed with its internal workforce.

4. At the start of the five year permit, there was every indication from the State that Town Highway garages would fall under the "then" proposed Multi-Sector General Permit. Eventually, highway garages were excluded from the requirement. However, the Town progressed on its own to upgrade facilities at the garage site. The improvements made were:

a) installation of a fuel island canopy and oil-water separator
b) disconnection of all floor drain lines in the buildings and connection to the municipal sewer system with oil-water separators
c) construction of a stormwater detention pond to collect and settle/treat onsite runoff with surface float filters
d) purchase of outside, environmentally-secure storage cabinets for waste oil products
e) movement of liquid calcium chloride storage to inside tankage with appropriate containment
f) creation of added vehicle storage space to enable more vehicles to be stored inside (especially during the winter and spring)
g) elimination of salt as an additive to the winter sand pile
h) maintenance of emergency spill clean-up supplies at the garage

5. The Town has complied with all stormwater or stormwater related permit requirements issued by the State or federal government within the permit period. Information has been provided annually to the State on all permits issued by the Town with 1 or more acres of disturbed area. In addition, a complete list is provided annually to the State of all building permits issued by the Town and all new developments that have been approved by the Town. On the reverse side, the State has notified the Town electronically on all stormwater applications it receives from within the community. The database is retained at Public Works for reference and site spot checks.

6. During the process of routine inspections and occasionally based on a received complaint, the Town has required that site erosion protection at specific projects be improved. The annual reports provide specific cases where major efforts had to be made. In all cases, voluntary compliance was obtained and corrections put in place without the need to institute tougher action or fines.

It is difficult to quantify this item in terms of a measurable achievement. It is often the situation that not all contractor employees or job site supervisors understand the importance using of good job-site, erosion-protection procedures on a daily basis. The keys to insuring that good erosion protection procedures are used continuously are:

Better training for contractors
More frequent onsite inspection by trained Town and State staff
Holding design engineers accountable through their project certifications
Enactment and enforcement of Ordinances and Standards

The process needs to be continuous and ongoing, because new contractors and employees enter the workforce or change employers on a frequent basis.

Summary of Actions under Post-Construction Stormwater Management in New Development and Redevelopment

1. As noted under item 2 of the previous section, the Town inspects new developments not only during construction but also during the three-year warranty period. Deficiencies found during this period are then identified for the developer to fix. The letters of credit are used as a lever to insure that the work is done. One of the most common deficiencies found during this period has been failed construction around catch basins. The primary issues have been: a) lack of adequate high strength mortar around top brickwork (between the concrete and the metal frame) which in combination with road salt washes the mortar out resulting in soil intrusion between the bricks, b) inadequate compaction around piping as it enters or leaves the catch basin and c) failure to provide a watertight seal where the storm drain pipelines enter or leave the catch basin. To fix this problem, the Town has gone to using poured concrete or short concrete risers to make up the elevation differences needed for final grade adjustments and use of rubber gaskets for pipe entries rather than concrete or hydraulic cement. Only increased inspection will resolve the compaction issues.

After the three-year warranty period is over, the Town agrees to maintain the public infrastructure. The inspections then fall within the municipal operations portion of this report. The Town attempts and has been successful so far to inspect all municipal catch basins at least once per year and those systems identified under specific 9010 permits twice per year. Municipal outfalls are inspected on the same schedule. An attempt has been made to inspect all culverts on a three-year cycle. We have been unable to maintain the three year cycle on all culverts due to manpower demands elsewhere.

2. The Town provides information annually to the State on all new development that has been approved and all new building permits that have been issued. This data is contained in the annual reports.

3. The Town has had an adopted Stormwater Ordinance since 2005. New regulations covering riparian buffers and increase wetland protection were developed by the Conservation Committee and Planning Commission. At this time, the new requirements, incorporated in changes to the Zoning Regulations, have been through two public hearings. It is anticipated that adoption will occur on or about the 24th of March 2008.

4. Although documented elsewhere in earlier annual reports, a significant effort was made by the Town to correct an erosion problem left as a result of earlier development (1960's). This is one example of the action taken by the Town to manage post

construction storm-water problems. In the Fern Hollow area of the Tanglewood Development, a great deal of erosion occurred over time due to the bankruptcy of the developer and abandonment of the project. This was before adequate development controls were in place in Vermont and the Town. The Town extended piping and refilled a very large gully that had washed out over time. Assistance was then provided by Essex Technical Center students and ultimately over the subsequent two years by the Vermont Youth Conservation Corps to build check dams downstream of the storm drain outfall. Although the work effort was extensive involving over 2000 hours of labor constructing or rebuilding 18+ check dams, a number of revetments and 102 feet of brush-roll, it has not "fixed" the problem. It has however, restored a portion of the area to pre-development conditions and reduced the rate at which the erosion is occurring. It is likely that a more permanent solution will be needed in the future for this project; however, the work done to date has helped to reduce the downstream sediment impact.

Summary of Actions under Pollution Prevention/Good Housekeeping for Municipal Operations

1. Training of municipal employees on stormwater has occurred throughout the five year permit period. This reportable work task is difficult to gauge only on the basis of a quantity measurement, such as man hours of training. Therefore, in this case only, a listing is provided of the training conducted or provided for employees during each year of the permit.

Year One

Training was developed and given to all Public Works employees on the following subjects: General overview of stormwater, what is the Town required to do via permits, the Town's stormwater management plan, municipal best management practices, general construction practices, and individual actions outside the workplace. In addition, the following people attended special classes/courses dealing with storm-water:

Eric Barkyoumb - AGC Erosion Control Class
Dennis Lutz – ASCE Urban Watershed Design
Dennis Lutz – Training at Phase II Storm-water Workshops
Dennis Lutz - Attendance at a workshop on Storm water

Year Two

Instruction was provided to the Town Highway crews on the following topics prior to the field work performed by the crews to obtain the field data for maintenance purposes: catch basin inspection, culvert inspection, culvert installation/replacement, cleaning and record keeping. In addition, the following people attended special classes/courses dealing with storm-water:

Dennis Lutz – Training in association with the Phase II Storm-water Workshops held the Thursday of every month in connection with the RSEP.

Todd Law – Training in association with the Phase II Storm-water Workshops held the Thursday of every month in connection with the RSEP

Dan Roberge- Road drainage through the "Roads Scholar Program"
Dennis Lutz - three-day workshop - Center for Watershed Protection

Year Three:

Instruction was again provided to the Public Works Employee crews as in the previous year before obtaining the field data for maintenance purposes. The following people attended special classes/courses dealing with storm-water:

Dennis Lutz – Training in association with the Phase II Storm-water Workshops held the third Thursday of every month in connection with the RSEP .

Todd Law- Attendance at a three-day storm-water workshop by the Center for Watershed Protection

Year Four:

Training was developed and conducted in the fourth year of the permit through the assistance of the Regional Stormwater Educational Committee and the Agency of Natural Resources. Two sessions were held: A Construction Field Workshop in May of 2006 and Good Housekeeping and Sediment Disposal Class in September of 2006.

The first class was attended by 76% of the Town employees and the second by 75%. In addition, instruction was again provided to the Town Highway crews prior to the fieldwork performed by the crews to obtain the field data for maintenance purposes. The following people attended special classes/courses dealing with storm-water:

Dennis Lutz, Katherine Bucke and Dana Farley at a Riparian Buffer Seminar in August of 2006

Dennis Lutz– Training in association with the Phase II Storm-water Workshops held the third Thursday of every month in connection with the RSEP

Aaron Martin - Attendance at a storm-water training workshop by the Water Resources Learning Center, Fairfax, Virginia, entitled "Design of Storm water Management Systems, October 10-11, 2006

Year Five:

Training was conducted in the fifth year of the permit through the assistance of the Regional Stormwater Educational Committee and the Agency of Natural Resources. Two Municipal Training sessions were held:

a) Developing and Implementing Stormwater Pollution Prevention Plans at Municipal Facilities for the MSGP permit (March 15, 2007) and
b) Municipal Employees Training Workshop (September 20, 2007)

The first class was attended by 76% of the Town employees and the second by 60 % In addition, instruction was provided to the Town Highway crews prior to the fieldwork performed by the crews to obtain the field data for maintenance purposes. The following people attended special classes/courses dealing with storm-water:

Dennis Lutz -- the following courses at the American Public Works Association Congress,
Dennis Lutz -- Storm-Con Workshops – New Jersey, October 3-5, 2007 BMP Selection, Inspection and Maintenance
Dennis Lutz– Training in association with the Phase II Storm-water Workshops held the third Thursday of every month by RSEP

2. The Town maintains the Highway garage in accord with environmental regulations. Per the most recent inspection of the facility by the Agency of Environmental Conservation, the written comments indicated that …"We are happy to see that you are committed to operating your facility in compliance with both state and federal regulations. I noted during the visit that you are doing an excellent job of managing your facility." The report is dated 4 February 2008. The report covers areas such as availability of spill kits, management of petroleum wastes, control of runoff, tank content containment, etc.

3. The Town has swept all of its paved roads at least twice per year, each year of the past five years. The roads are swept again during the summer on an "as-needed" basis. It is estimated, based on the capacity of the sweeper, the number of unloading trips per day and the length of the cleaning time that in excess of 2500 tons of street sweepings have been removed from the roads and buried. Although this material is not considered for waste disposal purposes as a pollutant, it nevertheless does contain a higher level of waste products than virgin soil or sand. This material has been diverted from stormwater runoff and will not end up in nearby streams or the Lake.

4. The Town has inspected virtually 100% of its catch basins at least one time during each year of the permit except for year one; some have been inspected more often than this. The number of inspections recorded for the period is 4,875. It generally takes one to two people, structurally inspecting each catch basin, probing for depth of sediment and recording results, approximately 25 man-hours. Office compilation adds to this workload. It is estimated that approximately 1500 man-hours total or 500 man hours per year is needed to perform this task in Essex. At the rate of pay for a standard college intern, this amounts to an added cost per year of at least $6000 for the inspections, which cost is not included in the compliance costs presented earlier.

As a result of the inspections, 97 catch basins were repaired or replaced during the five-year period and 847 catch basins were cleaned. The Town cleans the catch basins out when the debris level reaches 50% or 1 foot in the case of normal 2-foot deep basins. The Town has found that a standard soils probe (1/2 inch steel road with threaded connections purchased from any engineering or forestry field supply company) works the best. It fits between the catch basin openings and is flexible enough to allow sideward movement to accurately establish the level of debris below the stagnant fluid level. The probe has been lent to private homeowner associations to enable them to determine when their catch basins should be cleaned.

5. Over the five-year period, outfalls and treatment systems (ponds) were inspected and repaired as necessary. Unfortunately, an accurate yearly accounting for this work was not maintained. An estimate appears to be on the order of 10 to 12 outfalls over the five years. The fieldwork done in connection with the Illicit Discharge and Detection Report also identified structural outfall deficiencies (as of Dec 07). It shows 10 public and 5 private outfalls in some need of structural work (corrosion, stone, side slopes, pipe separation, etc.

6. Inspections under the Municipal Compliance program were made at periodic intervals throughout the permit life. The results were reported earlier in this summary.

Compliance with the Added Requirements Related to the Memorandum of Decision in the CLF Permit Appeal Issued on July 21, 2005

The Town has complied with the following permit requirements added to the original permit as identified in the Memorandum of Decision issued on July 21, 2005.

1. The Town submitted the report on legal strategies the Town adopted to protect and regulate development in the stream corridors of stormwater impaired waters.
2. The Town prepared and submitted prior to January 1, 2008 a plan outlining options for enhanced protection of stream corridors of storm-water impaired waters.
3. The Plan submitted prior to January 1, 2008 identified 1) options for minimum widths of stream channel buffers requiring protections , and 2)minimum setbacks requirements, and 3) proposed planning and zoning regulations, municipal ordinances or codes, policies or other requirements to enhance protection of undeveloped stream corridors.
4. The proposed Town Zoning Regulation changes identify the extent to which the Town of Essex will address the issues of 1) restoring stream buffers and 2) relocation of development outside stream corridor for redevelopment project. These issues will be handled on a case-by-case basis as projects seek permits for development or redevelopment within each stream corridor.

Documentation on the specific responses to the added permit requirements are contained in separate documents submitted to the Agency to meet the time frames noted in the amended permit.

Chittenden County Regional Stormwater Educational Program
Five-Year Program Summary: 2003 – 2008*

Over the Five-Year Program (March 10, 2003 - March 9, 2008*) RSEP developed, expanded and refined a toolbox of materials for public education and outreach. The multifaceted campaign used both paid and unpaid media to educate the public bout the effects of stormwater runoff on water bodies and simple steps that the public can take to reduce these effects. Key messages included stormwater runoff and stormwater systems, tips on prevention methods related to pet waste, car washing, fertilizer/chemicals, and home construction erosion or debris. Marketing Partners, Inc. worked on contract with RSEP to implement the public outreach for the five-year campaign.

The RSEP Program identified long-term program objectives, identified messaging and accomplished goals outlined in each of the annual Communication Plans, including:

- In year one produced five television spots, five radio spots, five print ads and fact sheets.
- Identified the need for and developed a website which was enhanced annually by:
  - Creating an interactive animation ("Stormville") to illustrate the RSEP key messages. Of note, municipalities from across the country requested copies of "Stormville" to add to their own websites.
  - Developing "Science Viewer" to existing Stormville animation, adding more depth and scientific explanation to the content in Stormville. "Science Viewer" content was designed to reach a teen/young adult audience segment with RSEP's 5 key messages.
  - Adding content pages for educators and middle-school students.
- Developed a five-minute video on stormwater and organized a comprehensive one-hour stormwater panel discussion on Vermont Public Television.
- Developed promotional items including a refrigerator magnet, a bookmark and a mini beach ball.
- Increasing visibility on stormwater runoff throughout Vermont by partnering with Governor James Douglas' Clean & Clear Action Plan 2003-2006 (Clean & Clear did not run a campaign in 2007).
- Used PR opportunities to earn unpaid media visibility such as results of the 2003 survey, rainy weather, or beach closings when possible.
- Developed and conducted a paid media campaign throughout Chittenden County which included highly targeted cable television, community newspapers and top rated radio stations each year. Findings concluded that adding broadcast television in summer and fall, supported by PR in the summer months increased website traffic. In year four and five, broadcast television was incorporated in order to gain greater reach among the target audiences.
- Reviewed objectives each year using the previous year's historical data to make refinements in the following year.

** As of November 30, 2007*

RSEP Gross Impressions/ Audience Reach

1. Unpaid Media (Public Relations)

Key Finding: Impressions from unpaid media have declined steadily after Marketing Partners initial donations of public relations services on a pro-bono basis.

Table 1: Unpaid Media Visibility based on Yearly Impressions*

	Year 1	Year 2	Year 3	Year 4	Year 5
Print:	777,700	838,900	583,690	250,869	94,590
Online:	123,000	2,566,352	889,008	446,504	148,168
TV:	275,000	369,000	139,000	369,000	0
Radio:	0	0	300,000	0	0
Insert:	0	47,000	47,000	47,000	47,000
TOTALS:	1,175,700	3,821,252	1,958,698	1,113,373	289,758
Notes:	1.) All public relations efforts donated by Marketing Partners, Inc. 2.) Stormwater survey results publicity on WCAX Ch 3. 3.) Four-part stormwater series in Burlington Free Press.	1.) All public relations efforts donated by Marketing Partners, Inc. 2.) Publicity around Smart Water Ways website launch. 3.) Three-part WCAX Ch 3 Stormwater & Lake Champlain Basin series.	1.) After the storm: Stormwater in VT panel discussion on Vermont Public Television.	1.) Three-part WCAX Ch 3 Stormwater series. 2.) Three-part Burlington Free Press Stormwater series. 3.) RSEP Governor's Award publicity.	1.) Media outreach for program year five was focused on paid media with no news releases being sent to media. 2.) Airport display was installed in Burlington International Airport.

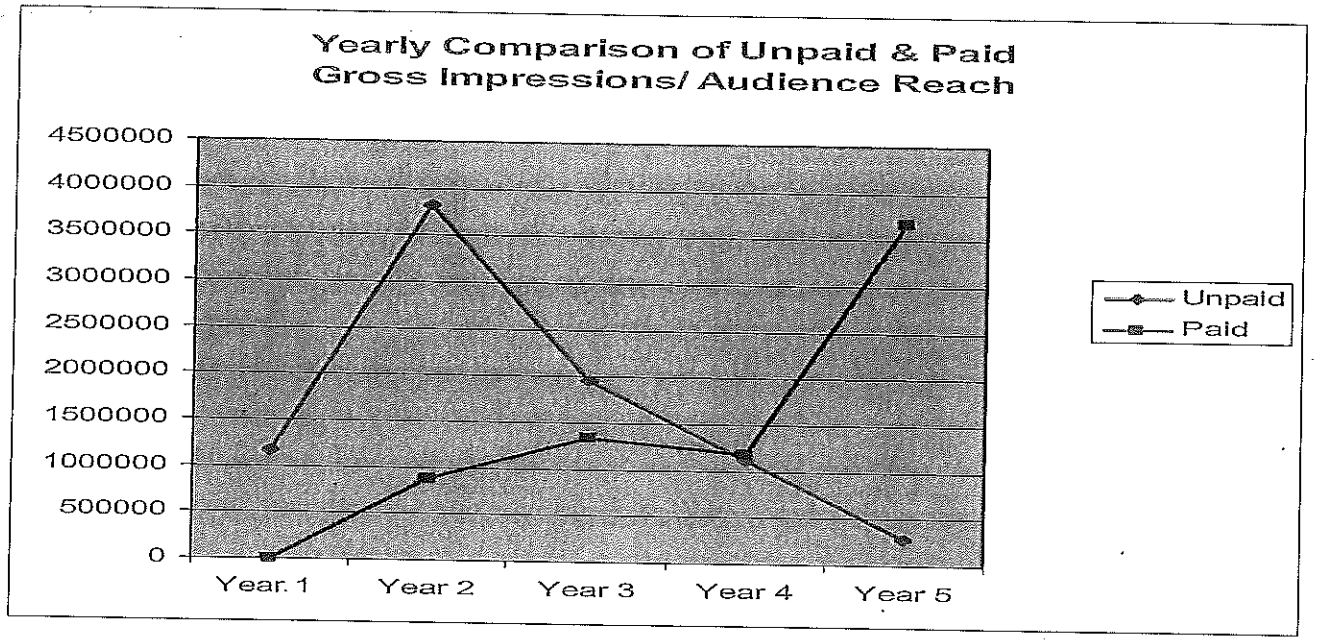
2. Paid Media (Advertising)

Key Finding: Whenever additional money has been made available to the program, advertising impressions from paid media have increased.

Table 2: Paid Media Visibility based on Yearly Impressions*

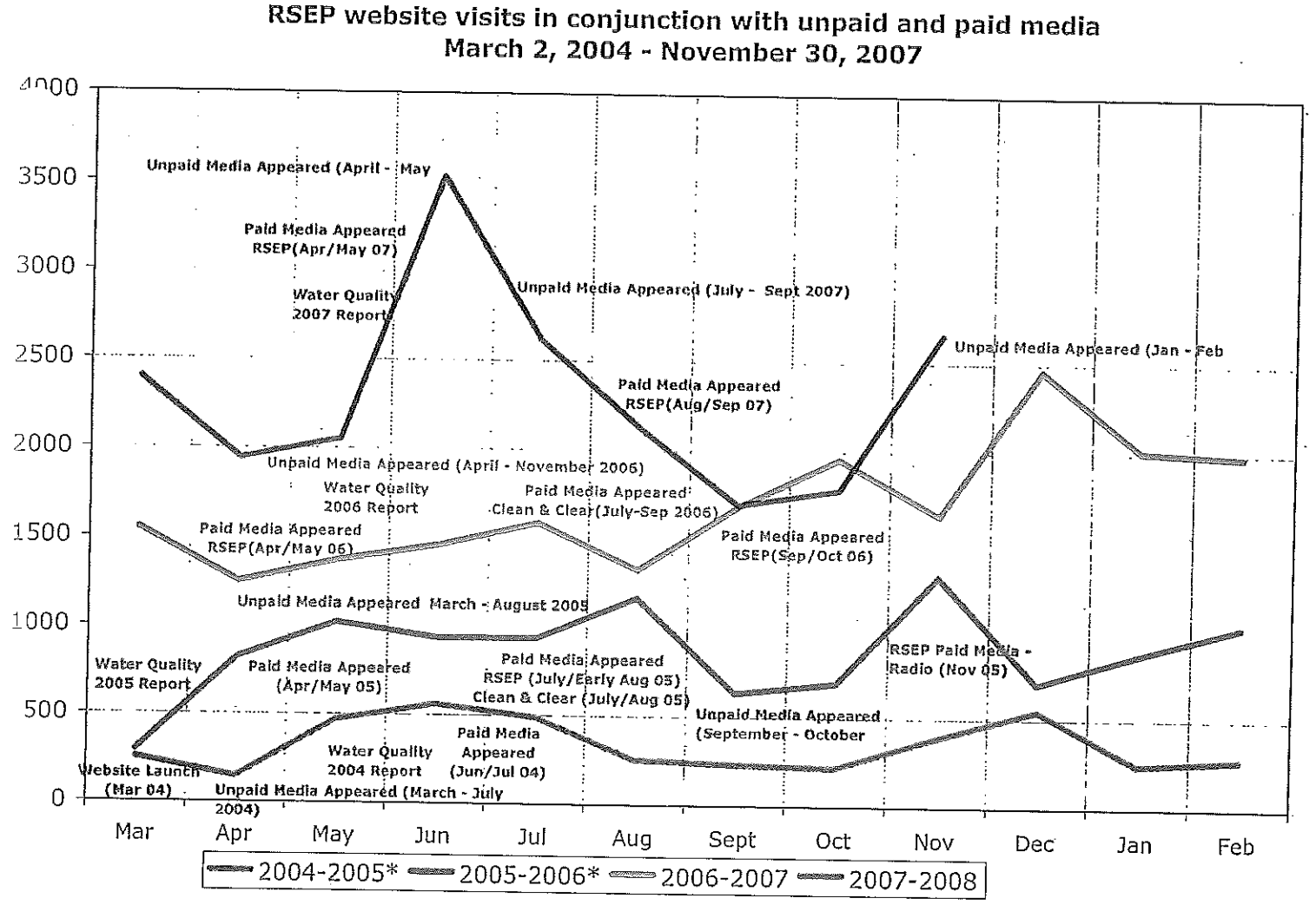
	Year 1	Year 2	Year 3	Year 4	Year 5
Print:	0	204,700	363,800	331,000	501,500
TV:	0	484,800	682,446	665,500	2,960,640
Radio:	0	199,500	300,900	186,300	214,800
TOTALS:	0	889,000	1,347,146	1,182,800	3,676,940
Notes:	1.) Ads being developed for spring 2004.	1.) First program year running ads.	1.) RSEP received 301B grant.		1.) $20,000 more for media buy allowed number of purchased spots to double.

(* Impressions represent the total number of times a spot is potentially heard/seen, not the number of actual persons who hear/see it. Print impressions are based on circulation reported by media outlet. Online impressions are based on monthly visits reported by media outlet and have been decreased to reflect an updated audited online and visitor number for the Burlington Free Press. *In 2005-2006, the BFP used 1,300,000; in late 2006 Nielsen Net Ratings audited and showed 148,000.* TV impressions are based on number of households reported by media outlet. Radio impressions are based on number of listeners age 12+ Mon-Fri. 6 a.m. to midnight. Insert impressions are based on number reported by the Champlain Water District.)



3. **Website**

Key Finding: Monthly Smart Water Ways website traffic has increased significantly every program year.

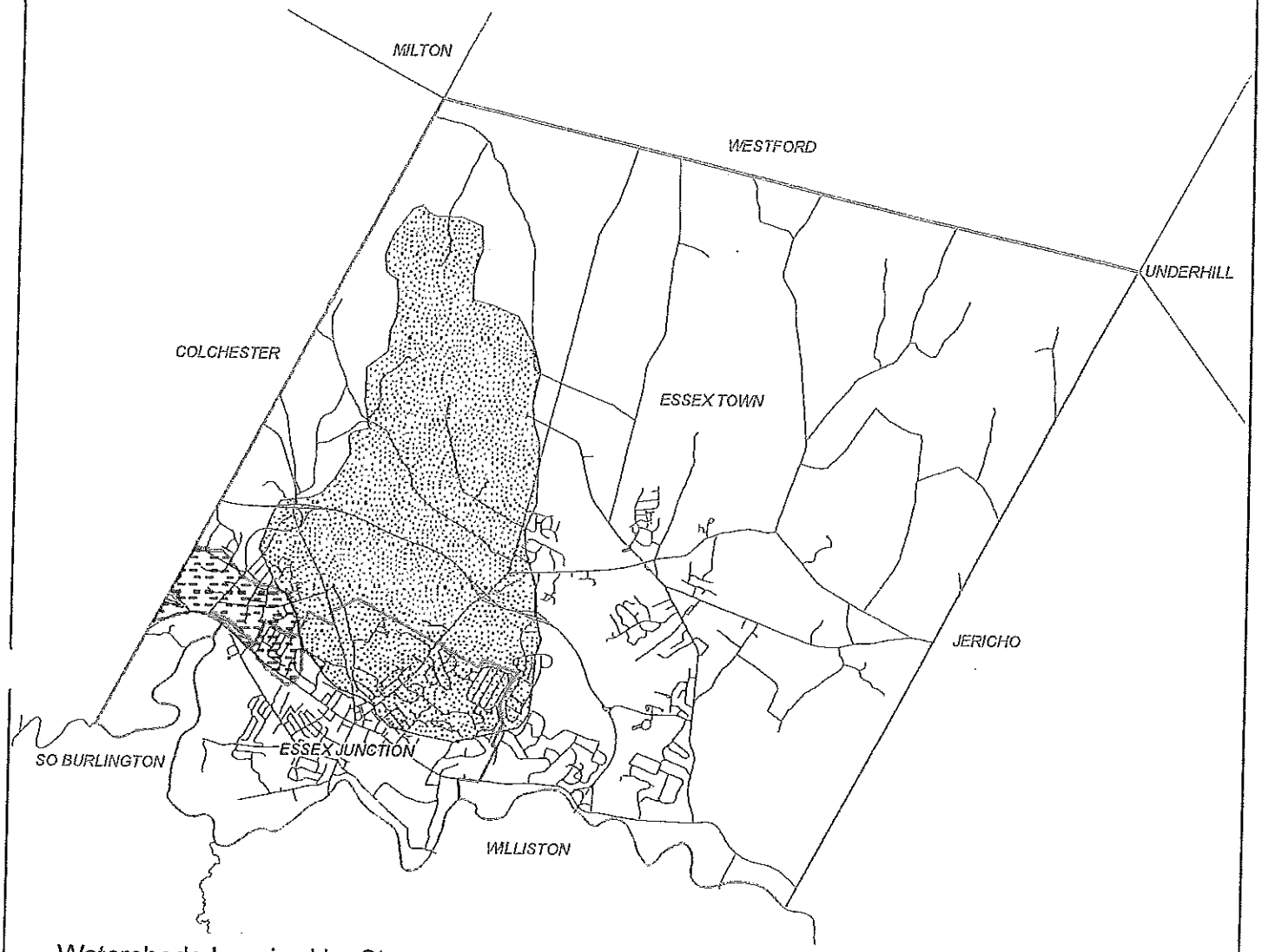


Summary of Key Findings

- ✔ There was a statistically significant increase in knowledge about storm water.
- ✔ There was a statistically significant increase in desired behavior reported for pet waste when walking a dog.
- ✗ Any change in behavior for car washing is unclear.
- ✔ There was a statistically significant increase in knowledge of the negative impact of household behaviors such as erosion from small home construction projects or hosing driveway debris into the street.
- ✗ Any change in behavior for fertilizer/chemical use is unclear.

SMART Water Ways
Add Up to Cleaner Water

Essex Areas Subject to the MS4 Rule



Watersheds Impaired by Stormwater :

Indian Brook Watershed - 7.43 sq. miles
Town of Essex - 6.07 sq. miles
Essex Junction - 1.36 sq. miles

Sunderland Brook Watershed - 0.72 sq. miles
Town of Essex - 0.54 sq. miles
Essex Junction - 0.18 sq. miles

Urban Census Designated Area

Urban Census Designated Area - 12.68 sq. miles
Town of Essex - 8.13 sq. miles
Essex Junction - 4.55 sq. miles

Intersection of the U.C.D.A. and the Impaired Watershed Areas

Indian Brook Watershed - 2.56 sq. miles
Town of Essex - 1.20 sq. miles
Essex Junction - 1.36 sq. miles

Sunderland Brook Watershed - 0.72 sq. miles
Town of Essex - 0.54 sq. miles
Essex Junction - 0.18 sq. miles

02-28-03

APPENDIX #2