Public Education and Outreach

Overall Public Education and Outreach Programs

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found:

Estimated costs of the public education and outreach program for the 2014 MS4 permit for MA

Estimated Costs	Small		Medium		Large	
	Low	*High*	*Low*	*High*	*Low*	*High*
Estimated Annual Cost	$9,500	$27,000	$10,100	$28,200	$11,300	$30,600
Estimated One-Time Costs	$4,100	$7,000	$4,900	$8,000	$5,700	$9,000
Estimated Intermittent Costs	$0	$0	$0	$0	$0	$0
Total Cost for Permit Term (5 years)	**$51,600**	**$142,000**	**$55,400**	**$149,000**	**$62,200**	**$162,000**

Some sources provided the overall cost of each program -

- *CA Cost Survey.pdf, 2005; Prepared by the Office of Water Programs California State University for the California State Water Resources Control Board*
    - Report funded by the CA State Water Resources Control Board.
    - Analyzed current stormwater program cost data for five CA municipalities and one metropolitan area with stormwater programs that are demonstrating meaningful progress toward compliance as identified by the Regional Water Quality Control Board.
    - Costs for the 2002/2003 fiscal year were collected directly from municipalities. Data collection included telephone and email conversations to each municipality. City staff member submitted cost and activity data (including city's annual stormwater reports, cost spreadsheets submitted by city staff, the NPDES stormwater permits , and SWMPs, SQIPs, or DAMPs. Data were then sorted and normalized to provide annual costs for each category.
    - Study recognizes the limitation of relying on city staff members as a sole source of data.

Total annual cost of the public education program in five CA municipalities and one metropolitan area.

Municipality	Total Annual Cost of Program	Area (sq. mi)	Population
Fremont, CA	$101,717	97	203,413
Sacramento, CA	$361,440	99	407,018
Encinitas, CA	$41,898	20	58,014
Corona, CA	$28,409	35	124,966
Fresno-Clovis Area, CA	$210,716	6,017	561,120
Santa Clarita, CA	$49,130	48	151,088

- Few specific costs were determined as many of the costs were lumped together (i.e. "school education"). Some discrete costs are provided below –
  - Sacramento
    - Storm drain stenciling program = $1,500
    - Pet outreach (doggie bags) = $4,100
  - Fresno-Clovis
    - Utility bill inserts = $2,525
  - Fremont
    - Creek clean-up = $5,200
    - Citywide newsletter = $12,500
    - Staff labor = $10,876

- *Comprehensive Cost Analysis of the 2014 MA MS4 Permit; Prepared by Worcester Polytechnic Institute and sponsored by MA DEP (2014).*
  - Costs range based on extent of public education campaign. Millbury is part of a larger watershed coalition and relies on the production of pamphlets from that organization and is only responsible for distribution. Southbridge is responsible for producing and distributing its own material.

Total annual cost of the public education and participation programs for three MA municipalities (2003 and 2014).

Municipality	Total Annual Cost of Program for 2003 MS4 permit	Total Estimated Annual Cost of Program for 2014 MS4 permit	Area (sq. mi)
Southbridge, MA	$10,952	$19,242	21
Holden, MA	$1,000	$9,908	36
Millbury, MA	$566	$12,106	16

- Few specific costs were determined as many of the costs were lumped together (i.e. "school education"). Some discrete costs are provided below –
  - Southbridge
    - Pamphlets = $6,500 (development and distribution)
  - Holden
    - Pamphlet distribution only = $500 (residential); $500 (commercial)

Continue public education program required by 2003 permit.

- ***WV estimate*** - Costs will vary based on existing program though all tasks will be covered in the other requirements of the permit.

Develop program - Define goals, express specific messages define audience for each message, identify parties responsible for implementation, and identify methods to evaluate effectiveness of messages.

- ***WV estimate*** - Costs will vary based on existing program (see Table 2) and number of residents.
  - Small – Population of 5,000
  - Medium – Population of 15,000
  - Large – Population of 50,000

2.1 Develop and send out two separate messages for each of four different audiences (residential, business/commercial/institution, developer & construction, industrial) – assume distribution annually.

- ***WV estimate*** - Costs will vary based on existing programs, access to available materials (i.e. part of a regional stormwater group that develops educational materials?), method of distribution (mailings, electronic delivery, mass media, workshops, displays in public areas).

  - Potential costs include –
    - Printed materials (brochures, flyers)
      - Cost to develop flyer/brochure
      - Cost to print brochure (depends on number of households in town (residents/2.5); ranges from $0.05 - $0.10 for black and white based on commercial copy rates for 2015)
    - Educational workshops
      - Costs to organize and advertise event (including contacting businesses)
      - Costs for speakers
      - Cost for printed materials, refreshments, etc.
    - Website development and maintenance

- Range of costs depending on extent of website (new, stand alone website; developed in house/consultant; part of existing website)
    - New basic stand-alone website could be developed for $2,500 - $5,000 based on 2015 prices
- Costs for website updates

2.2 Review program and modify ineffective messages or distribution techniques.

- **WV estimate -** Annual review of program; Cost to modify ineffective message of distribution techniques will range based on findings from 2.3 (assessment of effectiveness).

2.3 Document program in annual report: message for each audience; methods of distribution; measures/methods used to assess effectiveness of message; measures/methods to assess effectiveness.

- ***WV estimate*** - Costs can be lumped in with annual report (additional 4-8 hours).

- *Comprehensive Cost Analysis of the 2014 MA MS4 Permit; Prepared by Worcester Polytechnic Institute and sponsored by MA DEP (2014).*
    - Annual costs estimated to assess effectiveness of programs in MA = $8,820
        - Estimate based on a MA DCR estimate.

Public Participation

Overall Public Participation Program

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found. Cost is not expected to vary by community size.

Estimated costs of the public participation program for the 2014 MS4 permit for MA

Estimated Costs	Low	High
Estimated Annual Cost	$2,000	$3,800
Estimated One-Time Costs	$0	$0
Estimated Intermittent Costs	$0	$0
Total Cost for Permit Term (5 years)	**$10,000**	**$19,000**

- *Cost estimate from Weston and Sampson for Merrimack Valley Planning Commission (Dracut, MA) in 2011.*
  - Costs for public participation program = $500-$5K
  - No description of assumptions or number of facilities.

Comply with state public notice requirements. Make SWMP and annual reports available to the public.

- ***WV estimate*** - Most municipalities will continue to follow current town public notice requirements. This may include posting SWMPs, annual reports, and other information about the MS4 stormwater permit to an already established town website or on bulletin boards in town offices.

Provide annual opportunity for public to participate in review and implementation of SWMP. May include website, hotlines, clean-up teams, monitoring teams, advisory committee.

- ***WV estimate*** - Assume most municipalities will use current town forums (town meetings, websites). May include:
  - Present information at town meeting
  - Update website

Report activities in annual report.

- ***WV estimate*** - Assume an additional 2-4 hours to write this section of the annual report.

Pollution Prevention and Good Housekeeping

Overall Pollution Prevention and Good Housekeeping Program

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found:

Estimated costs of the public education and outreach program for the 2014 MS4 permit for MA

Estimated Costs	Small		Medium		Large	
	Low	*High*	*Low*	*High*	*Low*	*High*
Estimated Annual Cost - rented truck	$19,100	$36,700	$54,800	$113,300	$156,800	$318,600
Estimated Annual Cost - purchased truck	--	--	$14,800	$33,300	$36,800	$78,600
Estimated One-Time Costs - rented truck	$19,600	$31,000	$28,200	$45,400	$59,200	$76,400
Estimated One-Time Costs - purchased truck	--	--	$278,200	$615,400	$309,200	$646,400
Estimated Intermittent Costs	$0	$104,000	$0	$1,204,000	$0	$4,004,000
Total Cost for Permit Term (5 years) - rented truck	**$115,100**	**$318,500**	**$302,200**	**$1,815,900**	**$843,200**	**$5,673,400**
Total Cost for Permit Term (5 years) - purchased truck	**--**	**--**	**$352,200**	**$1,985,900**	**$493,200**	**$5,043,400**

  - Costs for this program do not include some "intermittent costs" associated with repair or replacement of control measures (3.5) for regulated properties. It is difficult to cost this task as problems can range from small-scale fixes to large-scale replacement.
  - Costs for a small community purchasing trucks for catch basin cleaning and street sweeping are not included as truck rental was more appropriate for these communities.

Some sources provided the overall cost of each program -

- *CA Cost Survey.pdf, 2005; Prepared by the Office of Water Programs California State University for the California State Water Resources Control Board*
  - Report funded by the CA State Water Resources Control Board.
  - Analyzed current stormwater program cost data for five CA municipalities and one metropolitan area with stormwater programs that are demonstrating meaningful

progress toward compliance as identified by the Regional Water Quality Control Board.

- Costs for the 2002/2003 fiscal year were collected directly from municipalities. Data collection included telephone and email conversations to each municipality. City staff members submitted cost and activity data (including city's annual stormwater reports, cost spreadsheets submitted by city staff, the NPDES stormwater permits , and SWMPs, SQIPs, or DAMPs. Data were then sorted and normalized to provide annual costs for each category.
- Study recognizes the limitation of relying on city staff members as a sole source of data.

Total annual cost of the good housekeeping program in five CA municipalities and one metropolitan area.

Municipality	Total Annual Cost of Program	Area (sq. mi)	Population	Curb Miles Swept
Fremont, CA	$2,128,175	97	203,413	31,405
Sacramento, CA	$3,510,806	99	407,018	26,450
Encinitas, CA	$528,252	20	58,014	5,832
Corona, CA	$720,222	35	124,966	20,877
Fresno-Clovis Area, CA	$2,240,605	6,017	561,120	142,411
Santa Clarita, CA	$859,754	48	151,088	46,800

- *Comprehensive Cost Analysis of the 2014 MA MS4 Permit; Prepared by Worcester Polytechnic Institute and sponsored by MA DEP (2014).*
  - Report submitted to the Faculty of Worcester Polytechnic Institute for the partial fulfillment of the requirements for the Degree of Bachelor of Science. The report was sponsored by the MA DEP as part of the Worcester Community Project Center.
  - The project aimed to provide three MA towns (Southbridge, Holden, and Millbury) with a cost analysis for implementation of the 2014 draft MS4 permit.
  - Data collection included review of the 2003 and 2014 permits including additional requirements of the 2014 permit, interviews with town officials, and water quality sampling.
  - The report found that the 2014 Pollution Prevention and Good Housekeeping control measures represent an on average 20% increase in annual costs in comparison to the 2003 permit.

Total annual cost of the good housekeeping program for three MA municipalities (2003 and 2014).

Municipality	Total Annual Cost of Program for 2003 MS4 permit	Total Estimated Annual Cost of Program for 2014 MS4 permit	Area (sq. mi)
Southbridge, MA	$255,200	$283,258	21
Holden, MA	$180,246	$220,562	36
Millbury, MA	$555,123	$693,578	16

Develop Operation and Maintenance Procedures

1.1 Develop an inventory of all permittee owned facilities within the following categories: parks and open space, buildings and facilities, vehicles and equipment.

- ***WV estimate*** - Assume time for site visits and for preparing table/report.

1.2 Develop or update written O & M procedures for listed municipal facilities.

- ***WV estimate*** - Based on review of O & M procedure documents found online, an overall template with general procedures could be developed for 8 hours. Specific facility procedures would take approximately 4 hours per facility. Falls in range found in literature.
- *Cost estimate from Weston and Sampson for Merrimack Valley Planning Commission (Dracut, MA) in 2011.*
  - Costs for O and M procedures = $5,000-$10,000.
  - No description of assumptions or number of facilities.

1.3 Review inventory annually and update as necessary.

- ***WV estimate*** – Hours based on annual review.

Develop Infrastructure O & M Procedures

2.1 Catch Basin Cleaning

2.1.1. Develop a written optimization plan detailing procedures and schedule for cleaning and maintaining catch basins to ensure no catch basin is more than 50% full.

- ***WV estimate*** – Assume hours to work with town to develop an appropriate plan for their system including developing GIS map and tracking tools.

2.1.2. Clean catch basins.

- ***WV estimate*** –
  - Two costs generated (truck rental vs truck purchase).

- Rental = $50-$100 per structure (based on range of values found in literature).
- Purchase - $125K-$320K based on range of values found in literature.

- *Pennichuck Brook Watershed Commercial/Industrial Sweeping/Catch Basin Cleaning Feasibility Final Report (12/17/2013); Prepared by CEI for Pennichuck Water Works.*
  - Received quotes from 3 vendors for contracting CB cleaning (includes disposal, travel, etc) for 930 CBs two times per year = $83K - $175K ($45 - $95/CB).
  - Received quotes to purchase vactor truck ($290K-$320K)
    - Overall annual costs for in house (including purchase) = $143K

- *CA Cost Survey.pdf, 2005; Prepared by the Office of Water Programs California State University for the California State Water Resources Control Board*
  - Cites annual cost data for City of Corona, CA (2002/2003)
    - $36,211 for equipment rental
    - $188,856 for personnel cost
    - $26,569 for motor pool rental

- *Tech Memo2Summary Municipal Practices.pdf*
  - CB cleaning costs in the Chesapeake Bay watershed (2002) –
    - Communities spent between $50,000 and $2,000,000 per year on CB cleaning (7 reporting; average of $312,500).
    - Average cost for CB cleanouts = $58 per inlet; $1.39 per linear foot of storm drain pipe.
  - Notes: Data sources for report -
    - Summary of Municipal Practices Survey prepared by the Center for Watershed Protection (2006).

- *non-structural BMPs.doc*
  - Cost of vactor truck = $125,000 – 150,000 (1 truck can clean 750 – 1,000 CBs)
  - Cost of pre-cast CB = $2,000 - $3,000
  - Notes: Data sources for spreadsheet
    - Pollution Prevention Fact Sheets (Stormwater Managers Resource Center website www.stormwater.net)

- *Detroit Water and Sewerage Department Wastewater Master Plan (2003) prepared by Tucker, Young, Jackson, Tull Inc.*
  - Cost per CB (cleaning) = $59.

- Includes labor, truck cost, and disposal.

- *Source – Comprehensive Cost Analysis of the 2014 MA MS4 Permit; Prepared by Worcester Polytechnic Institute and sponsored by MA DEP (2014).*
  - Annual costs to conduct CB cleaning to satisfy 2003 MS4 Permit -
    - Southbridge, MA = $23,056
    - Holden, MA = $7,040
    - Millbury, MA = $26,535

2.1.3. If more than 50% full during two routine cleanings, investigate the cause for excessive sediment loading.

- ***WV estimate*** - Only scoping to investigate cause, not fix. Estimate approximately 0-4 hours per CB (most would take approximately 1 hour unless being traced upstream). Estimate range of 0-max number of CBs cleaned per year.

2.1.4. Describe action taken to assess and abate catch basins that are more than 50% full during two consecutive cleanings.

- ***WV estimate*** – Assume basic report.

2.1.5. Document in first annual report the plan for optimizing catch basin cleaning, inspections, or scheduling.

- ***WV estimate*** - Assume simple write-up as most work is completed under other PAIs..

2.1.6. Maintain a log of catch basins cleaned or inspected.

2.1.7. In each annual report, list the total number of catch basins, number inspected and/or cleaned and the volume or mass of material removed from each catch basin draining to water quality limited waters and the total volume or mass of material removed from all catch basins.

- ***WV estimate* –** Information should be available through other PAIs. Hours for assembling report and calculating material removed.

2.2 Street Sweeping

2.2.1. Develop and implement procedures for sweeping streets and municipal lots. Include more frequent sweeping of targeted areas determined by the permittee on the basis of pollutant load reduction potential, based on inspections, pollutant loads, catch basin cleaning or inspection results, land use, water quality limited or TMDL waters of other relevant factors as determined by the permittee.

- ***WV estimate*** - Assume hours to work with town to develop an appropriate plan for their system including developing GIS map and tracking tools.

2.2.2. Sweep all streets (rural exceptions apply) a minimum of once a year in the spring.

- ***WV estimate*** –
  - Two costs generated (truck rental vs truck purchase).
    - Rental = $50-$100 per curb mile (based on range of values found in literature).
    - Purchase - $125K-$250K based on range of values found in literature.

  - *Pennichuck Brook Watershed Commercial/Industrial Sweeping/Catch Basin Cleaning Feasibility Final Report (12/17/2013); Prepared by CEI for Pennichuck Water Works.*
    - Received quotes from 5 vendors for contracting street sweeping services for 300 acres of parking lot = $83K - $103K.
    - Received quotes to purchase vacuum sweeper truck ($175K-$250K)
      - Overall annual costs for in house (including purchase) = $130K

  - *Tech Memo2Summary Municipal Practices.pdf*
    - Street sweeping costs in the Chesapeake Bay watershed (2002) –
      - $14.75 - $158/curb mile (average of $62.45/curb mile).
      - Communities spent between $50,000 and $2,000,000 per year on street sweeping (16 reporting).
    - Notes: Data sources for spreadsheet
      - Summary of Municipal Practices Survey prepared by the Center for Watershed Protection (2006).

  - *Preliminary data summary of urban storm water BMPs_1999.PDF*
    - Cost to purchase Street Sweeper
      - Mechanical = $75,000; 5-year life span; O & M costs = $30/curb mile.
      - Vacuum = $150,000; 8-year life span; O & M costs = $15/curb mile.
    - Assumes one sweeper serves 8,160 curb miles/year.

  - *Final Street Sweeping_Low Estimate.xlsx - 2009*
    - Cost to purchase Street Sweeper
      - Mechanical = $110,000; 5-year life span; O & M costs = $45/curb mile.
      - Vacuum = $150,000; 8-year life span; O & M costs = $45/curb mile.
    - Cost to Hire a Street Sweeping Company
      - $104/curb mile.
    - Cost to dispose of sweepings = $5,000
    - Annual cost based on sweeper frequency–

Annual cost of street sweeping from Sweeping Report 1: State of Practice, Ramsey- Washington Metro Watershed District (based on 2009 dollars)

Annualized Sweeper Costs		
Sweeping Frequency	Mechanical Sweeper	Vacuum-Assisted Sweeper
Weekly	$1680/curb mi/yr	$946/curb mi/yr
Bi-weekly	$840/curb mi/yr	$473/curb mi/yr
Monthly	$388/curb mi/yr	$218/curb mi/yr
Quarterly	$129/curb mi/yr	$73/curb mi/yr
Semi-annually	$65/curb mi/yr	$36/curb mi/yr
Annually	$32/curb mi/yr	$18/curb mi/yr

- Notes: Data sources for spreadsheet
  - Sweeping Report No.1: State of Practice. Ramsey-Washington Metro Watershed District June 2005
  - 2005 dollars converted to 2009 dollars using inflation calculator at http://cost.jsc.nasa.gov/inflation/nasa/inflateNASA/html

- *CA Cost Survey.pdf, 2005; Prepared by the Office of Water Programs California State University for the California State Water Resources Control Board*

Total annual cost of the street sweeping program in five CA municipalities and one metropolitan area.

Municipality	Annual Street Sweeping Costs ($)	Annual Curb Miles Swept	Cost per Curb Mile ($/curb mile)	Estimated Annual Frequency
Fremont, CA	1,915,000	31,405	61	12
Sacramento, CA	1,322,748	26,450	50	12
Encinitas, CA	117,962	5,832	20	12
Corona, CA	414,125	20,877	20	26
Fresno-Clovis Area, CA	2,193,296	142,411	15	12
Santa Clarita, CA	557,443	46,800	12	50

- *www.stormwatercenter.net (Stormwater Manager's Resource Center website managed by the Center for Watershed Protection funded through a grant from the EPA, Office of Water, Office of Wastewater Management).*
  - Cites cost data (1999) for two cities in Michigan -
    - Average cost = $68 per curb mile with 11 curb miles per day swept.
    - Cites Ferguson et al., 1997. *Cost estimating Guidelines: Best Management Practices and Engineered Controls*. Rouge River National Wet Weather Demonstration Project. Wayne County, MI.

Total annual cost of the street sweeping program in two MI municipalities (1999 dollars).

Municipality	Labor	Equipment	Materials and Services	Total
Livonia	$23,840	$85,630	$5,210	$114,680
Plymouth Township	$18,050	$14,550	$280	$32,880

- *Comprehensive Cost Analysis of the 2014 MA MS4 Permit; Prepared by Worcester Polytechnic Institute and sponsored by MA DEP (2014).*
    - Annual costs to conduct CB cleaning to satisfy 2003 MS4 Permit -
        - Southbridge, MA = $40,624
        - Holden, MA = $10,560
        - Millbury, MA = $66,000

2.2.3 Each annual report shall include number of miles cleaned and volume or mass of material removed.

2.2.4 For rural exception areas, either sweep once each spring, or develop specific procedures and place in first annual report.

- ***WV estimate*** – Most communities will already be sweeping all roads. For rural communities, costs for developing a plan and conducting a windshield survey are conducted.

2.2.5 Properly store and dispose of catch basin cleaning and street sweeping so they do not discharge to receiving waters.

- ***WV estimate -*** Likely no cost as storage and disposal are regulated elsewhere; if truck is rented, disposal is included in costs.

2.3 Winter Road Maintenance

2.3.1. Establish written procedures for winter road maintenance including storage of salt and sand; minimize use of sodium chloride and other salts; ensure snow disposal activities do not result in disposal of snow into surface waters.

2.3.2. Implement procedures for winter road maintenance.

- ***WV estimate*** - No sources but likely minimal cost as winter road maintenance costs may already be factored elsewhere.

2.4. Maintenance of Town-owned Stormwater Treatment Structures

2.4.1. Establish written O & M procedures for all permittee-owned stormwater BMPs.

- ***WV estimate*** - Assume 8 hours for general procedures and 4-16 for specific BMPs.

2.4.2. Inspect all such structures at least once annually.

- ***WV estimate*** – Time to inspect BPs and to generate report.

2.4.3. Report in the annual report on the status of all O & M activities.

- ***WV estimate*** - .Materials for task should be available through task 2.4.2.

2.4.4. Keep a written record of all required activities.

3.0 SWPPP

3.1 Develop a SWPPP for maintenance garages, public works yards, transfer stations, and other waste handling facilities where pollutants are exposed to stormwater.

- ***WV estimate*** –
    - Estimate $5,000 per facility. Not all facilities regulated under permit will require SWPPP.
- *Analysis for the Compliance Costs for the IGP (2012) developed by the CA State Water Board's Division of Water Quality Storm Water Program.*
    - Costs for SWPPP development = $5K-$10K.
    - No description of assumptions or number of facilities.
    - Recognizes that facilities that already have SWPPPs may cost less.
- *Cost estimate from Weston and Sampson for Merrimack Valley Planning Commission (Dracut, MA) in 2011.*
    - Costs for SWPPP development = $3K-$10K.
    - No description of assumptions or number of facilities.

3.2 Fully implement SWPPPs for each of the listed facilities.

- ***WV estimate*** –
    - Costs will vary based on extent of SWPPPs but assume approximately $1,000-$1,500 per facility.
- *CA Cost Survey.pdf, 2005; Prepared by the Office of Water Programs California State University for the California State Water Resources Control Board*
    - Cites annual cost data for City of Corona, CA (2002/2003)
        - $10,000 for implementation of SWPPPs at nine facilities = $1,000 per facility.

3.3 Regularly train employees who work in areas where materials or activities are exposed to stormwater. Document training date, title and duration, attendees; subjects covered during training.

- ***WV estimate*** - Assume one annual training (8 hours of training) and time for prep and documentation
- *Source – Analysis for the Compliance Costs for the IGP (2012) developed by the CA State Water Board's Division of Water Quality Storm Water Program.*
    - Training costs may range from $450 - $1850 (14 – 155 training hours)
    - Costs will vary depending on employees and training needs.

3.4 Inspect all areas exposed to stormwater and all stormwater control measures at least every calendar quarter, with one when a stormwater discharge is occurring.

- ***WV estimate*** - Assume approximately 2-4 hours per facility (quarterly).

3.5 Repair or replace any control measures needing repair before the next anticipated storm event.

- ***WV estimate***- Could range from $0 on, depending on type of control measure and problem. Not included in costs.

3.6 Report the findings from the Site Inspections in the annual report.

- ***WV estimate*** - Material available from task 3.4. Assume an additional 4 hours per facility.

3.7 Keep a written record of all activities required under the SWPPP.

- ***WV estimate*** - General record keeping estimated at an additional 8-16 hours per year.

Notice of Intent

Overall NOI Program

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found. Cost is not expected to vary by community size.

Estimated costs of the NOI program for the 2014 MS4 permit for MA

Estimated Costs	Low	High
Estimated Annual Cost	$0	$0
Estimated One-Time Costs	$5,000	$11,200
Estimated Intermittent Costs	$0	$1,600
Total Cost for Permit Term (5 years)	**$5,000**	**$12,800**

Endangered Species

1.1.1: Step 1 - Complete Information, Planning and Conservation (IPaC) online system process to determine if federally listed species or designated critical habitats are present in the area. If not present (i.e., meet Criterion A), skip to Step 4, otherwise go to Step 2.

- ***WV estimate -*** Assume 4 hours to query online system and document results in a letter.

1.1.2: Step 2A - Review potential impacts of discharges to species/habitats to determine if your discharges have "no affect", "may affect" or are "not likely to adversely affect" species/habitat. If you determine "may affect" or "not likely to adversely affect", go to Step 2B, otherwise go to Step 3.

- ***WV estimate*** **-** Combine with Step 2B (PAI 1.1.3).

1.1.3: Step 2B - Contact USFWS for consultation and opinion. If opinion is "no jeopardy" or you receive concurrence that discharges are "not likely to adversely affect", and you agree to implement all measures upon which the consultation was conditioned and you agree to re-initiate consultation with USFWS as necessary, skip to Step 4, otherwise go to Step 3.

- ***WV estimate*** **-** Assume hours to review discharge locations in relation to query findings, phone conversation with USFWS, and brief letter report, follow-up correspondence and ultimate decision. Note this step may not be necessary pending Step 2A results.

1.1.4: Step 3 - If you determined there would be "no affect" on listed species, contact EPA to obtain concurrence with that determination. If they concur, agree to conduct an endangered species screening for proposed structural BMPs and contact USFWS as appropriate (e.g., new activity "may affect" or is "not likely to adversely affect"). If these conditions are met, you meet Criterion C and go to Step 4. Any other scenarios are not eligible for coverage under the MS4.

- ***WV estimate*** **-** Not likely, however, assume 10 hours for phone conversation and brief letter report, follow-up correspondence and ultimate decision.

1.1.5: Step 4 - Include documentation of USFWS ESA eligibility in the SWMP.

- ***WV estimate*** Assume 2 hours to incorporate results into the written SWMP Plan.

Historic Properties

1.2.1: Q1 - If the facility is an existing facility authorized by the previous permit or a new facility not undertaking any activity involving subsurface land disturbance less than an acre, then certify that fact in writing and file the statement with the EPA, otherwise go to Q2.

- ***WV estimate -*** Assume hours to prepare brief cover letter. Note: it is assumed that most facilities were authorized under the previous permit.

1.2.2: Q2A - Review National Register of Historic Places. If no properties listed, or discharges do not have the potential to cause effects on historic properties, then certify that fact in writing and file the statement with the EPA, otherwise go to Q2B.

- ***WV estimate -*** Assume hours to query National Register and document results in a brief letter report.

1.2.3: Q2B - Initiate request for project review by SHPO - prepare Completed Project Notification Form, USGS map with area of concern, Scaled project plans showing existing and proposed conditions, photos where available. Include description of measures/conditions to be taken to avoid or minimize adverse impacts where applicable.

- ***WV estimate -*** Assume 8 hours for a consultant to prepare a PNF, USGS map and other information, and 8 hours to develop a list of conditions to avoid impacts. Note: Likely not required.

NOI Form

1.3.1: Provide information on status of mapping and bylaws completed under 2003 permit.

1.3.2: Provide summary of receiving waters - waterbody segment that receives flow from the MS4, number of outfalls into receiving water, impairment, pollutants causing impairment, whether there is a TMDL.

1.3.3: Identify new BMPs and goals to meet new permit.

- ***WV estimate -***: Combined cost for PAI 1.3.1, 1.3.2 and 1.3.3
  Assume 72 hours to meet with town (8), review impaired waters (16), review existing BMPs implemented under the 2003 permit (16), develop new BMPs to meet the six minimum measures under the new permit (24), and complete the NOI (8).

- Similar work in Haverhill: $7,200 conducted by CEI.

Note: cost is for preparation of entire NOI, compared with CEI's entire cost of $10,500.

Stormwater Management Program (SWMP) Plan

Overall SWMP Program

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found. Cost is not expected to vary by community size.

Estimated costs of the SWMP program for the 2014 MS4 permit for MA

Estimated Costs	Low	High
Estimated Annual Cost	$0	$0
Estimated One-Time Costs	$12,800	$20,400
Estimated Intermittent Costs	$0	$0
Total Cost for Permit Term (5 years)	**$12,800**	**$20,400**

1.1: Develop/update written SWMP to include: people responsible for program implementation; listing of all receiving waters, their classification, impairments, pollutants of concern, TMDLs, number of outfalls (included in NOI); surface drinking water supplies; listing of interconnected MS4; endangered species & historic properties documentation; documentation of authorization of new or increased discharges; map of MS4; practices to achieve compliance with TMDLs & non-TMDL impaired waters; practices to comply with six minimum measures; measures to avoid or minimize impacts to surface water supplies.

- ***WV estimate*** - Assume hours for preparation of written components, reation of maps and figures and for meetings.

- *CEI preparation for Haverhill*: $14,400
  Cost is for preparation of entire written SWMP Plan.

1.2: Self-evaluate compliance with the terms and conditions of the permit including appropriateness of selected BMPs.

- ***WV estimate*** - Will be performed as part of the annual report items.

Illicit Discharge, Detection and Elimination

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found:

Estimated costs of the IDDE program for the 2014 MS4 permit for MA

Estimated Costs	Small		Medium		Large	
	Low	*High*	*Low*	*High*	*Low*	*High*
Estimated Annual Cost	$4,500	$8,100	$4,500	$8,100	$4,500	$8,100
Estimated One-Time Costs	$71,266	$92,488	$136,313	$282,925	$250,356	$604,766
Estimated Intermittent Costs	$10,000	$107,109	$10,000	$107,109	$10,000	$107,109
Total Cost for Permit Term (5 years)	**$103,766**	**$240,097**	**$168,813**	**$430,534**	**$282,856**	**$752,375**

Inventory Sanitary Sewer Overflows

1.1: Identify and develop inventory of all known locations where SSOs have discharged to the MS4 in last 5 years. Include location, discharge to surface water or MS4, dates & time of each known SSO occurrence, volume, description of occurrence including cause, completed & planned mitigation & corrective measures with dates.

- ***WV estimate*** – Will be zero for communities without SSOs (most communities). Most communities should know where their SSOs are located. Assume maximum of 24 hours to compile a written inventory of SSOs and discharges and to locate them on a map if required.

1.2: Update inventory annually and report in annual report.

- ***WV estimate*** – Minimal cost, if required at all. To be included in Annual Report cost estimate.

1.3: Provide oral notice to EPA within 24 hours upon becoming aware of an SSO to the MS4. Provide written notice to EPA & MassDEP within 5 days, include inventory information.

- ***WV estimate*** – Minimal cost, if required at all. Notification only. Assume a high of 4 hours per notification for correspondence and a brief letter report. Assume one notification a year.

Develop Outfall Interconnection Survey

2.1: Identify each outfall & interconnection discharging from MS4, record location & condition. Include: unique identifier, receiving water, date of most recent inspection, dimensions, shape, material, lat/long, physical condition & indicators of non-stormwater discharges.

- ***WV estimate*** - Outfall location and mapping should already be completed from 2003 permit. Inventory will be compiled from combination of mapping and outfall screening performed under other PAIs, therefore no cost carried here.

2.2: Update inventory annually to include data collected from monitoring program.

- ***WV estimate*** - Assume 0 to 16 hours to update database containing investigation information. Mapping updated under PAI 3.5.

2.3: Physically label all MS4 outfall pipes.

Per EPA, removed from permit.

System Mapping

3.1: Develop a revised map of system showing outfalls & receiving waters (required by MS4 2003 permit), pipes, open channel conveyances, catch basins, manholes, interconnections, municipally-owned structure BMPs, and receiving waters by name (include indication of all impairments from 303(d) and 305(b) list). Map can be produced by hand or computer-aided methods.

- ***WV estimate*** - $Varies

To physically map in the field, assume 2 field personnel at 25 structures per day (average based on CEI experience of mapping several stormwater systems using GPS equipment). Assume another 2 hours per field day to pull the data into GIS, review and correct inconsistencies and produce usable maps. Total cost will depend on the number of structures. This cost also covers field investigation of structures under the catchment investigations (PAI 4.4.4).

- *CEI - Holyoke*: $60,000

Take existing outfall map and add additional stormwater infrastructure. 3,300 catch basins or manholes and 75 outfalls.

- *CEI - Haverhill:* $60,000

150 outfalls, unknown number of catch basins and manholes.

- *CEI - Reese*: $7,000 for small community, $150,000 for mid-sized community

Assumes mapping of outfalls only for small community (population 10,000) based on 5 hours plus contract. Assumes mapping of entire drainage system for mid-sized community (population 50,000) based on 60 hours plus contract.

- *CWP IDDE Manual* – Outfall Investigation: $5,700-$12,800, labor combined with PAI 4.3.2

Annual cost for outfall inspection $5,700-$12,800. Low assumes 10 miles of stream per year with 2-person crew and high assumes 20-miles per year with 3-person crew. All rates assumed at $25/hr.

- *CWP IDDE Manual* – Mapping of Outfalls from Existing Information: $1,500-$5,000

Desktop analysis to gather outfall mapping information (assumes 1 week for low and 4 weeks for high) at a cost of $1,000-$4,000. Mapping costs $500-$1,000 assumes paper maps for low (CWP, 1998) and GIS for high (40 hours). All rates assumed at $25/hr.

3.2: Delineate catchment areas for each MS4 outfall or interconnection.

- ***WV estimate -*** $Varies by number of outfalls

Assume delineation of 20 outfall catchment areas per day in GIS.

- *CEI Holyoke*: $17,000.

75 outfalls, or $267 per outfall.

3.3: Where available, include municipal sanitary sewer system & municipal combined sewer system.

- ***WV estimate -*** Will depend on availability of information and current state (in GIS/CAD software, paper maps, etc.) and whether it needs to be added to the storm system map or can be a standalone map in whatever condition it is available. Assume that CSOs will be mapped as part of PAI 1.1. For costing purposes, assume $0 for communities with no available mapping and 20 hours for communities with GIS mapping to overlay existing GIS layers with MS4 information.

3.4: Recommended mapping elements - storm sewer material, size & age; sanitary sewer system material, size & age; properties served by septic (when sewer & septic exist); areas where MS4 could receive flow from septic systems (e.g., areas with poor soils, or high groundwater elevations); seasonal high water table elevation impacting sanitary alignments; topography; orthophotography; alignments; locations of illicit discharges.

- ***WV estimate -*** No cost, not required.

3.5: Update mapping as necessary to reflect newly discovered information & required corrections or modifications.

- ***WV estimate -*** Varies depending on the amount of new construction and corrections per year. Assume 20-80 hours per year to update map in GIS with new subdivision information.

- *CEI - Reese*: $3,000

Assume 60 hours ($3,000 per year).

3.6: Report on progress of map in annual report.

- ***WV estimate -*** Minimal cost. Can be absorbed into cost of preparing an annual report.

Written IDDE Program

4.1: Develop and adopt a regulatory mechanism providing legal authority to municipality to regulate illicit discharges.

- *CWP IDDE Manual*

  $1,000 - $17,000 to adopt ordinance. Low cost from Reese (2000) high from CWP (1998) adjusted and rounded for inflation (2002 $).

- *CEI - Reese*: $1,000 for small town, $20,000 for mid-sized town

  Assume 20 hours to adopt an ordinance in a small town (10,000 population) using a generic ordinance as a basis. Assume $20,000 (contracted) to develop an ordinance with public participation for a mid-sized community (50,000 population).

Assessment & Priority Ranking of Catchments

4.2.1: Assess and classify each catchment into one of 4 possible categories (Excluded, Problem, High Priority, Low Priority).

- ***WV estimate -*** Cost to delineate under PAI 3.2. Will depend on availability of classification factor information. Assume 40 hours minimum to collect data, develop a matrix and rank catchments. Increase up to 80 hours for more complex data. This cost covers 4.2.1 and 4.2.2.

- *CEI - Haverhill*: $14,280

  Delineate catchments (PAI 3.2) and complete illicit discharge potential assessment and prioritization (4.2.2) of catchments (150 outfalls).

4.2.2: Priority rank each catchment within each category (except those "excluded") using 8 factors (past complaints, poor dry weather receiving water quality, density of generating sites (e.g., car dealers, car washes, gas stations, garden centers, industrial, manufacturing), age of surrounding development & infrastructure, sewer conversion, historic combined sewer, density of aging septic systems, culverted streams). May also consider drinking water supplies, shell fishing areas, beaches or recreation waters, impaired waters.

- ***WV estimate -*** Cost to delineate under PAI 3.2. Will depend on availability of classification factor information. Assume 40 hours minimum to collect data, develop a matrix and rank catchments. Increase up to 80 hours for more complex data. This cost covers 4.2.1 and 4.2.2.

- *-CEI / Haverhill*: $14,280 combined with PAI 3.2 and 4.2.1 (150 outfalls).

4.2.3: Update assessment & priority ranking annually based on results of screening and new information and include in annual report. Include listing of all catchments and results of ranking, summary of evidence of known or suspected illicit discharges and SSOs by catchment, corrective measures taken or planned, schedule for completing and verifying measures correcting the confirmed illicit discharges and SSOs.

- ***WV estimate -*** Varies depending on the amount of construction or newly identified outfalls per year and the amount of updated screening information. Assume 20-40 hours per year to update ranking with new information.

Outfall and Interconnection Screening and Sampling

4.3.1: Develop written procedure for screening and sampling of outfalls - include sample collection, use of field kits, storage and conveyance of samples. Adopt a screening and sampling protocol consistent with EPA New England Bacterial Source Tracking Protocol (Draft 2012) (Appendix I).

- ***WV estimate -*** (combined with PAI 4.5.1)
  Assume 60 hours at $100/hour to develop a written IDDE Plan that includes procedures for screening and sampling, outlines responsibilities and measures for identifying sources and removing them. Based on CEI experience with writing IDDE plans.

- *CEI - Haverhill*: $4,200
  Establish written protocol which clearly identifies responsibilities with regard to eliminating illicit discharges and the systematic procedure for locating and removing illicit connections.

4.3.2: Perform dry weather screening of every outfall (if inaccessible, proceed to first accessible upstream structure) when and how prescribed; identify in annual report any follow-up needed. Begin investigations within 15 months of effective date.

- ***WV estimate -*** Assume field screening and inspection labor costs combined with PAI 2.1 (2 staff at 16 outfalls per day – may get up to 20). Assume an additional 80 hours ($8,000) per year to prepare a report outlining results of dry (PAI 4.3.2) and wet weather screening (PAI 4.3.3) results, catchment investigations (PAI 4.4.4), follow up actions, next steps and a map of locations.

- *CWP IDDE Manual*:
  Annual cost for outfall inspection $5,700-$12,800. Low assumes 10 miles of stream per year with 2-person crew and high assumes 20-miles per year with 3-person crew.

- *CEI - Reese*: $12,000
  Assumes 240 hours using student volunteers to screen outfalls in key parts of the system (community population of 50,000). This does not include any mapping.

- *CEI - Haverhill*: $31,500, labor combined with PAI 2.1
  Field locate, inspect and sample (assume 20% have flow) 150 outfalls, dry weather, 20 outfalls/day.

4.3.2A Perform follow-up sampling to identify source if outfall sample comes back dirty.

- ***WV estimate -*** Permit just says to find source and remove. Assume there will be some follow-up sampling to do this. Assume a field crew of 2 people for 8 hours to investigate each incident, with up to 3 incidents per year. Assume an additional 5 samples per incident to help identify the source.

4.3.3: Perform wet weather screening for outfalls with identified System Vulnerability Factors.

- ***WV estimate -*** Low assumes SVF applying to 25% of outfalls, high assumes 75%. Assume 5 outfalls per person per day. Note there can be substantial variation when performing wet weather sampling. To be completed as catchment investigations are completed, so could be spread over 10 years. Annual reporting and mapping costs included under PAI 4.3.2.

4.3.4: Sample dry and wet weather flows for ammonia, chlorine, conductivity, salinity, E.coli (freshwater) or enterococcus (saline or brackish), surfactants, and temperature. All analyses with the exception of indicator bacteria can be performed with field test kits or field instrumentation.

- ***WV estimate -*** Costs provided below. Communities may save on laboratory analysis of bacteria if they have their own in-house lab.

		per sample	Source
bacteria	$50.00	$50.00	
ammonia, package of 30	$57.50	$1.92	http://www.benmeadows.com/chemets-ammonia-water-test-kit_s_16806-1/
chlorine and salinity, package of 50	$45.80	$0.92	http://www.benmeadows.com/lamotte-chloride-salinity-test-kit-pkg-of-50-tests_s_221784/
conductivity and temperature multimeter	$469		http://www.benmeadows.com/hanna-waterproof-portable-low-range-multiparameter-meter-_s_57565/
surfactants kit and 20 tests	$78.64	$3.93	http://www.chemetrics.com/Detergents+%28anionic+surfactants%2C+MBAS%29/Visual+Kits/K-9400
surfactants refills 20 tests	$59.82		
		$56.76	

- *CWP IDDE Manual*: Dry weather - $9,000-$21,200 per year for sample analysis. Assumes 80 samples per year. Low costs assume in-house analysis. High assume contract lab analysis for 11 parameters.

4.3.5: Report screening data annually; identify any follow-up needed. Include date, outfall ID, location, weather conditions, precipitation in previous 48 hours, field screening parameter results, and results of all analyses.

- ***WV estimate -*** Assume minimal cost. Provide a copy of summary tables prepared under other tasks with the annual report.

Catchment Investigation Procedure

4.4.1: Develop written Catchment Investigation Procedure including review of maps and historic records; a manhole inspection methodology; and procedures to isolate and confirm sources of illicit discharges. Include in written IDDE Plan.

- ***WV estimate -*** Combined with PAI 4.3.1.

4.4.2: Review sanitary sewer and storm sewer construction plans for each catchment. Identify and record the presence of System Vulnerability Factors: history of SSOs; areas that could readily result in SSOs; inadequate sanitary sewer level of service; common or twin-invert manholes serving storm & sanitary alignments; common trench construction serving both storm & sanitary; crossing of storm & sanitary; sanitary sewer with possible underdrain; sanitary sewer defects areas formerly served by combined sewer; sanitary sewer & storm drain infrastructure greater than 40 years old in medium and densely developed areas; widespread code-required septic upgrades; history of BOH actions addressing widespread septic failures. Include in IDDE Plan.

- ***WV estimate -*** Assume 16 to 50 hours to assess system vulnerability factors for a mid-sized town. 16 hours is for towns with no sewer, 50 is for towns with sewer. Note that large towns with numerous SSOs may be substantially more.

4.4.3: Document and annually report presence or absence of the 12 System Vulnerability Factors for each catchment.

- ***WV estimate -*** Included in the cost to prepare an annual report.

4.4.4: Perform dry weather investigation of key junction manholes by opening and inspecting for visual and olfactory evidence of illicit connections. *In a minimum of 80% of the MS4 area serviced by Problem Catchments within 3 years and 100% within 5 years. *For all catchments where sampling indicates sewer input within 5 years. *In 40% of all area served by all MS4 catchments within 5 years and in 100% of 4 area in 10 years.

- ***WV estimate -*** **If a Town's system has not yet been mapped and will be through field mapping, then the costs will be covered under PAI 3.1. If the system is already mapped and only need to perform the catchment investigation, then use this cost.** Costing assumes 20% of catch basins are key junction manholes as a low, or 3 per outfall for a high and covers investigation of all, which needs to be spread over 10 year period based on prioritization. Assume 30 structures per day with 2 field personnel. Additional annual reporting covered under PAI 4.3.2. Assume some additional funding for travel time and miscellaneous equipment.

4.4.5: Sample dry flows at key junction manholes for ammonia, chlorine, conductivity, salinity, E.coli (freshwater) or enterococcus (saline or brackish), surfactants, and temperature. All analyses with the exception of indicator bacteria can be performed with field test kits or field instrumentation.

- ***WV estimate -*** Assumed 10% would have dry weather flows (same assumption as flowing outfalls) and applied per sample costs, with purchase of meter covered under outfall screening and sampling.

4.4.6: Perform wet weather screening for outfalls with identified System Vulnerability Factors. Sample for same parameters as dry weather flows.

- ***WV estimate -*** Included in 4.3.3.

4.4.7: Track progress of Catchment Investigations in each annual report.

- ***WV estimate -*** Included in annual report costs.

Written IDDE Plan

4.5.1: Develop written IDDE plan documenting SSOs, outfall/interconnection inventory, statement of program responsibilities, prioritization, outfall screening, catchment investigation procedures, procedures to isolate and verify sources, procedures for removal and confirmation, procedures and schedule for follow-up screening and illicit discharge/SSO prevention procedures.

- ***WV estimate -*** (combined with PAI 4.3.1)
  Assume 60 hours at to develop a written IDDE Plan that includes procedures for screening and sampling, outlines responsibilities and measures for identifying sources and removing them.

4.5.2: Upon detection of an illicit discharge, identify and notify all responsible parties and require immediate cessation. Should be eliminated within 60 days of identification, or if longer, a schedule developed and report dates of identification and schedules for removal in the permittee's annual reports.

- ***WV estimate -*** Assume investigation performed under PAI 4.3.2A. Assume 8 hours for a brief report. Cost will vary depending on # of illicit discharge discovered. Assume varies from 0 to 3 per year.
- *CWP IDDE Manual*:
  $1,000-$5,000, average of $2,500 typical costs per correction provided by five Phase I communities. This does not include investigation. Investigation to isolate assumes a one day investigation by a 2-person team per incident ($400) plus $100 in equipment and supplies per incident.

4.5.3: Implement measures to control non-stormwater discharges if they add significant pollution.

- ***WV estimate -*** Minimal cost. Not expected to be very common.

4.5.4: Define or describe indicators for tracking program success. Should include measures that demonstrate efforts to locate illicit discharges, the number of SSOs and illicit discharges identified and removed, the percent and area in acres of the catchment area served by the MS4 evaluated using the catchment investigation procedure, and volume of sewage removed. Include in IDDE Plan.

- ***WV estimate -*** (combined with PAI 4.3.1)

Removal and Confirmation

4.6.1: For each confirmed illicit discharge or SSO, include in the annual report the location of the discharge and its source, a description of the discharge, method and date of discovery, date of elimination, mitigation or enforcement action, and estimate volume removed.

- ***WV estimate -*** Covered under the annual report costs.

4.6.2: Within one year of illicit discharge removal, perform confirmatory screening; wet (if System Vulnerability Factors present), dry or both. $1,600 each

- ***WV estimate -*** $1,600 each

Assume 2 people for 4 hours to investigate each incident, and additional 8 hours for a brief report. Cost will vary depending on # of illicit discharge discovered. Assume varies from 0 to 3 per year, consistent with PAI 4.5.2.

Follow-up Screening

4.7.1: Upon completion of catchment investigations and illicit discharge removal and confirmation (if necessary), the catchment outfall or interconnection shall be scheduled for follow-up screening within five years.

- ***WV estimate -***

This is after the 5-year permit period so no cost carried. In future years, it should be equivalent to dry and wet weather catchment investigations under PAIs 4.3.2, 4.3.3, and 4.3.4.

Training

4.8.1: Provide annual training to employees involved in IDDE program.

- ***WV estimate -*** Assume 12-hours to prepare training materials, 8 hours of training, plus miscellaneous correspondence, handouts and travel time.

- *CEI - Haverhill*: $1,920/year; $1,920 per year, $9,600 over 5-year permit term.

4.8.2: Include type and frequency of training in the annual report.

- ***WV estimate -*** Will be included within the annual report preparation costs.

Construction Site Control

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found. Estimates are not expected to vary with community size:

Estimated costs of the construction site control program for the 2014 MS4 permit for MA

Estimated Costs	Low	High
Estimated Annual Cost	$0	$0
Estimated One-Time Costs	$14,000	$21,600
Estimated Intermittent Costs	$72,000	$160,000
Total Cost for Permit Term (5 years)	**$86,000**	**$181,600**

1.1: Develop an ordinance that requires sediment and erosions controls and for other wastes at construction sites. This was required by 2003 MS4 Permit.

- ***WV estimate*** – Existing Ordinance: $0 (already implemented)
  As this item was required by the 2003 MS4 Permit, the implementation cost required under the new permit is zero. If communities have not yet performed this action, they are in non-compliance with the 2003 permit.

- *CEI Ordinance Support (Reese)*: $2,000 for small town, $3,000 for mid-sized town
  Modify and pass new erosion control ordinance: assume 40-hours for small town, 60 hours for mid-sized town at $50/hour.

1.2: Adopt written procedures for inspections and enforcement of the ordinance. Clearly define who is responsible for site inspections and who has authority to implement enforcement procedures. Document in SWMP.

Combined under PAI 1.4

1.3: Update ordinance/bylaw to include requirements for site operators to implement BMPs (e.g., reduce disturbed area, protect slopes, etc.) and to control other wastes, if not already included.

- ***WV estimate*** – Ordinance Updates

  Low - Assume 8 hours for meeting with Town including meeting prep time, and 24 hours to review and provide recommendations on regulations. Assume additional legal fees of $1,000. High - Increase meeting time to 16 hours and increase legal fees to $2,000.

- *CEI - Ordinance Support (Reese):* $2,000 for small town, $3,000 for mid-sized town

  Modify and pass new erosion control ordinance: assume 40-hours for small town, 60 hours for mid-sized town at $50/hour.

1.4: Develop written procedures for site plan review and inspection and enforcement within 1 year, if not already completed. Include pre-construction review, consideration for protection of water quality impacts, LID components, receipt of information from the public, inspections during and after BMP installation, qualifications necessary to perform the inspections, inspection forms and procedures for tracking the number of site reviews, inspections, and enforcement actions.

PAI 1.4 Plan Review, Procedures, and Enforcement

WV estimate – Low - Assume 16 hours to outline procedures, 24 hours to develop inspection forms and tracking worksheets, and 8 hours for meetings. Assume town will track site reviews & inspections. Assume additional $1,000 per year for legal to discuss enforcement, etc.). High - Increase meetings to 16 hours and legal to $2,000/yr.

- *CEI - Reese*: $12,000 for mid-sized town

  Add BMP section to design manual, 140 hours plus printing costs for mid-sized town. Note that the hours and rates used by Reese ($50/hour) don't support a cost of $12,000. Small town is only $200 with 4 hours allocated).

- *CEI - Haverhill*: $5,600

  Note: similar to CEI's estimated cost.

- Source - Receipt of Information from the Public (Reese): $800 up-front and $500/year for small town, $500 up-front and $10,100/year for mid-sized town

  Small town: assume base of $800 to train secretary to receive calls, plus additional 10 hours per year for $500/year annually. Mid-sized town: $500 to set up hotline and $4,000 for staff training. Annual costs of $1,600/year for training, $8,500/year for hotline operations (150 hours/year).

PAI 1.4a Pre-construction peer review

- ***WV estimate*** –

  Assume 5 projects per year. Low - Assume 24 hours per project. High - Assume 40 hours per project, including meetings. Communities can pass peer review costs on to the developer, which would eliminate consultant costs and minimize this to staff hours.

PAI 1.4b Inspections

- ***WV estimate*** –
  Assume 8 hours per inspection for site visit, travel, and memo. Could be 4-8 hours depending on proximity to consultant. Assume 3 inspections per project per year. Low - Assume 3 projects per year. High - Assume 10 projects per year

- *CEI - (Reese):* $2,500/year for small town, $45,000/year for mid-sized town
  Assumed 50 hours per year for inspections in a small town. Mid-sized towns are assumed to employ 1 person for 2 days per week.

- *California WRCB:*

From the NPDES Stormwater Cost Survey by the California State Water Resources Control Board, implementation of the Construction Site Stormwater Runoff Control portion of the NPDES permit for six different cities varied between 1% and 16% of the total program cost, with an average of 5.3% and a median of 4.0%. Costs per construction site varied from $628 to $4,244 per site, with an average of $1,617 and a median of $1,172. Costs per site inspection varied from $29 to $423 per inspection, with an average of $182 and a median of $95. Therefore, median values are likely the most accurate when performed by local staff that does not include travel time, however all values should be updated from 2004 dollars to 2016 dollars. Corona performed 564 inspections, Encinitas 401 inspections, Fremont had 24 sites, Sacramento 6,375 inspections.

1.5: Include tracking information as part of each annual report.

- ***WV estimate*** – Assume tracked as part of above items, however need to compile at end of the year. Compilation costs included in annual report costs.

Post - Construction Site Control

- ***WV estimate*** – Estimate based on literature, where available, and through cost estimates based on previous experience where no sources were found. Estimates are not expected to vary with community size:

Estimated costs of the post - construction site control program for the 2014 MS4 permit for MA

Estimated Costs	Low	High
Estimated Annual Cost	$0	$0
Estimated One-Time Costs	$24,200	$41,600
Estimated Intermittent Costs	$0	$0
Total Cost for Permit Term (5 years)	**$24,200**	**$41,600**

1.1: Adopt or amend a local ordinance to control projects that disturb an acre or more. Incorporate design standards included in the permit.

- ***WV estimate*** - Ordinance Updates:

Regulatory review will differ by town, however will typically need to review and update two or three documents. Low - Assume 8 hours for meeting with Town including meeting prep time, and 24 hours to review and provide recommendations on regulations. Assume additional legal fees of $1,000. High - Increase meeting time to 16 hours and legal fees to $2,000. Could be additional cost if regulations, ordinances, bylaws must be put to a public vote (cost of printing ballots, poll workers, etc.)

- *CEI - Ordinance Support (Reese*): $2,000 for small town, $100,000 for mid-sized town

Small towns are estimated at 40 hours to modify and get ordinance passed. Per Reese, mid-sized towns should "work on major policy changes in land use regulations with a cost of $100,000.

1.2: Develop procedures to ensure O&M, such as dedicated funds or escrow accounts, acceptance of ownership by permittee, development of maintenance contracts between owner & permittee, submission of an annual certification documenting maintenance.

- ***WV estimate*** - O&M Procedures

Low - Assume 8 hours to prepare documentation and $1,000 in legal fees. High - Increase hours to 40 and legal fees to $2,000. Note: There will also be an annual fee for the Town to track and follow-up on annual certifications, maintenance contracts, etc.

1.3: Annual report shall include measures that the permittee has done to meet these requirements.

- ***WV estimate*** - Included with annual report cost estimate.

2.1: Develop report assessing local regulations that affect the creation of impervious cover. Include recommendations and proposed schedules to incorporate into regulations. Involve local planning board and local transportation board. Include in SWMP.

- ***WV estimate*** Regulatory Updates:
  Low - Assume 40 hours to review regulations and draft report with recommendations, 16 hours to draft regulatory changes, 8 hours for meetings with Town. Include legal fees of $1,000. High - Assume 80 hours to review regulations and draft report with recommendations, 20 hours to draft regulatory changes, 16 hours for meetings with Town. Assume additional legal fees of $2,000. Includes PAI 2.1 and 3.1. (Bumped up the hours a bit because this may be done by someone at a higher rate).

- *CEI Regulatory Updates (Haverhill):* $7,200
  Note: cost combined with PAI 3.1.

2.2: Annual report shall contain an update on this requirement, including any planned or completed changes.

- ***WV estimate*** - Regulatory Updates: Included with annual reporting costs.

3.1: Develop report assessing local regulations to determine feasibility of making green roofs, infiltration practices and water harvesting devices allowable. Include recommendations and proposed schedules to incorporate into regulations.

- ***WV estimate*** Regulatory Updates: Costs included under PAI 2.1.

- *CEI Regulatory Updates (Haverhill*): $7,200
  Note: cost combined with PAI 2.1.

3.2: Annual report shall contain an update on this requirement, including any planned or completed changes.

- ***WV estimate*** Regulatory Updates: Included in annual report costs.

4.1: Estimate the annual increase or decrease in Impervious Area and Directly Connected Impervious Area using EPA initial estimates of IA and DCIA as baseline. Tabulate results by delineated catchment areas and break out by development, redevelopment, or retrofit projects by permittee; or by private developers and other parties in a voluntary manner or in compliance with the permittee's regulations. Include in annual report.

Per EPA, removed from permit.

5.1: Complete inventory and ranking of Municipal property (including ROWs) suitable for modification or retrofit to reduce runoff/pollutants from MS4. Perform screening level of ranking considering access, geology, depth to water table, proximity to aquifers & subsurface infrastructure, opportunities for public use and education, schedules for planned capital improvements to municipal infrastructure.

- ***WV estimate*** MS4 Property Inventory :
  Low - Assume 40 hours of field work to visit all sites, collect information and develop preliminary BMP ideas, 40 hours for desktop mapping, 40 hours to develop costs, prioritize and document in a report. High - Add 60 hours to develop conceptual designs of the top 3 sites. Although permit just says to prepare an inventory - really need to evaluate BMP options as well for them to take action on, which is included in this cost.

- *CEI MS4 Property Inventory (Haverhill)*: $4,800

5.2: Starting with fifth year annual report, report on status of all such inventoried properties.

- ***WV estimate*** - Include with annual report.