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Department of Conservation and Recreation (DCR)

NPDES Storm Water Management Program

Permit Year 9 Annual Report

For Coverage Under
National Pollutant Discharge Elimination System (NPDES)

General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)

Department of Conservation and Recreation
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Submittal: April 27, 2012

Municipality/Organization: Department of Conservation and Recreation

EPA NPDES Permit Number: MAR043001

MaDEP Transmittal Number:

Annual Report Number & Reporting Period: **No. 9: April 2011 – March 2012**

Department of Conservation and Recreation NPDES PII Small MS4 General Permit Annual Report

Part I. General Information

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Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on myinquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonmentfor knowing violations.

Signature:

Printed Name: Edward M. Lambert, Jr.

Title: Commissioner

Date: 4/30/12

Part II. Self-Assessment

The Department of Conservation and Recreation (DCR) has completed the required self-assessment and has determined that we are in compliance with all permit conditions, except as noted in the following tables. DCR received authorization to discharge under the general permit from EPA on November 8, 2007 and from DEP on November 21, 2007. DCR understands that coverage under the MS4 is continued until a specified time after the new permits that are currently in draft format are issued by EPA.

DCR continues to implement a comprehensive storm water program with limited fiscal and labor resources. DCR storm water management efforts are supported by operating and capital appropriations that remained level from FY11 to FY12 (July 2011 – June 2012) at $3.9 million. As a water quality demonstration project, DCR is restoring Blair Pond in Cambridge, part of headwaters of Alewife Brook and Mystic River watersheds. DCR expects to utilize all available funds and to implement practices to reduce pollution in runoff from parks and parkways. The Governor's FY13 budget provisions for DCR are currently proposed at $3.9 million.

Part III. Summary of Minimum Control Measures

The Department of Conservation and Recreation owns and operates many different types of facilities and parkways which are covered by the NPDES Phase II General Permit. In order to accurately reflect the programs DCR has accomplished, both state-wide and for specific facilities, this annual report has been divided into separate tables. Table 1 describes the control measures which are not site specific. Tables 2 through 7 describes site or facility type specific BMPs that are being implemented specifically at water supply/ reservoirs, state forests, state parks, beaches, construction sites or parkways.

A few of the BMPs included in DCR's Storm Water Management Plan(SWMP) are for facilities outside of the urbanized area. Therefore, the facilities addressed by these BMPs are not listed in the site specific tables. We continue to include these BMPs in Table 1 to demonstrate the many diverse programs being implemented by the DCR to raise awareness of storm water and water quality issues in the general public. We have noted these BMPs as facilities that are "outside of the urbanized area" in the table below.

Table 1: State-wide Best Management Practices (BMPs)

1. Public Education and Outreach

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April '12 to March '13
1-1	DCR Storm Water Web Page	External Affairs/IT Dept. (SJ Port)	Develop web page and publish storm water related publications (inc. SWMP and NOI), information and links on web page.	*Goal Met* – The following documents were posted on DCR's web site for public access and review: ▪ Permit Year 8 Annual Report. ▪ Hammond Pond Bathymetry and Water Quality Assessment	Continue to update as necessary. Post a copy of Permit Year 9 Annual Report. Post Authorization to Discharge letters from EPA and DEP.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April '12 to March '13
1-5	Mobile Water Quality Education Seminars (statewide)	Operations (Curt Rudge)	Provide storm water/ water quality education educational events at a minimum of nine different locations. These events would be in addition to the facility/ program specific BMPs also listed in this SWMP.	*Goal Met* – DCR offered state-wide Public Education Events including water quality, storm water education (includes forestry practices, healthy ecosystems, water cycle, children's programs) at many DCR facilities statewide at least once. • Ocean Outfall Symposium • CPWB Washburn Island Clean-Up • Bayside Buddies • Shoreline Stories • Estuary Explorations • Coastal Encounters • Science in the Community	Provide educational events at a minimum of nine different locations during the year. Environmental education programs planned in the North Region parks and reservations include: • DCR Coastal Awareness Environmental Education Program on DCR coastal properties; • numerous clean-up days at beaches, marshes and ponds; • canoe trips, • birding trips; • beach activities such as tidepool explorations.
1-6	Charles River Conservancy Volunteer Clean Up Program	Operations (Jack Murray)	Continue to partner with Conservancy on Charles River Clean Up Program	Goal Met - DCR assisted with and coordinated support for this year's Clean Up Day held on 4/21/12. More than 3,000 volunteers participated. More than 130 groups from local schools, businesses, neighborhoods, and clubs volunteered. Nearly 44 tons of trash were removed including 1000s of cigarette butts and plastic bags, many bottles and cans and several cell phones.	DCR continues to assist with this Clean Up Day, which is scheduled annually.
1-7	Charles River Reservation School Program	Operations (Curt Rudge)	Provide 1 storm water/ water quality related educational program each year.	Environmental education through the Charles River Reservation School Program was cancelled as of June 2007 due to inadequate staffing. There has continued to be a lack of funding for staffing these programs.	No planned activities.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April '12 to March '13
1-8	Camp Nihan	Operations (Curt Rudge)	Provide 1 storm water/ water quality related educational program each year.	Environmental education programs at Camp Nihan were cancelled as of June 2007 due to inadequate staffing. There has continued to be a lack of funding for staffing these programs.	No planned activities.
1-9	Quabbin Educational Programs (*outside of the urbanized area*)	Water Resources (Ann Carroll)	Continue to provide multi-session watershed related education programs on an annual basis to two schools in the Quabbin Reservoir watershed.	Interpretive Services staff conducted 73 educational programs for 3,200 student and adult participants. In addition, tours were led for a number of local, regional, and even international groups on a variety of watershed-related topics. Staff also served on the Steering Committee for the Massachusetts Envirothon, and as DCR liaison with the Swift River Valley Historical Society, Friends of Quabbin, Valley Environmental Education Collaborative and the Student Conservation Association.	Continue activities.
1-10	Wachusett Educational Programs (*outside of the urbanized area*)	Water Resources (Ann Carroll)	Continue to provide multi-session watershed related education programs on an annual basis to two schools in the Wachusett Reservoir watershed.	Staff continued to implement the Wachusett Watershed Education Program in five communities: Holden, Boylston, West Boylston, Princeton, and Rutland, with the expansion to additional schools in Holden and Rutland. Public Education Brochures for the Wachusett Watershed have been published regarding pet wastes, car washing practices and seagull control and can be found in Appendix D.	Continue activities.
1-11	Project WET	Water Resources (Ann Carroll)	Maintain sponsorship of state water education for teachers program.	Program WET was cancelled as of summer 2007. There has continued to be a lack of funding for staffing these programs.	No planned activities.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April '12 to March '13
1-12	"DownStream" Newsletter	Water Resources (Ann Carroll)	Continue to develop and disseminate newsletter regarding issues relevant to Wachusett Reservoir/ Quabbin Reservoir watersheds twice a year.	*Goal Met* - DCR published and circulated this newsletter. The Spring 2011 issue included discussions on invasive species in MA water bodies, the 2011 ranger programs, national drinking water week, and facts about the 2010 spring rains. The Fall 2012 issue included discussions on how the Wachusett Rangers protect drinking water and serve the public, "creeping normalcy" and how land protection helps, 10 simple steps to protect ground and surface waters, DCR's National Clean Drinking Water Award, and the Quabbin cemetery. Copies of the newsletters can be found at http://www.mass.gov/dcr/waterSupply/watershed/dwmfactsheets.htm and as Appendix B of this report. The newsletter is sent to members of the Friends of the Watershed (Wachusett, Quabbin and Ware River) Group.	Publish newsletters in May and November 2012. Place newsletters on web page.
1-13	Massachusetts Drinking Water Education Partnership (MADWEP)	Recreation (Gary Briere)	Maintain membership.	*Goal Met* – DCR is an active member of MADWEP.	Maintain membership.
1-14	Low Impact Development Project	Water Resources (Anne Carroll)	Pursue the inclusion of public education component within the planning, permitting and implementation of one LID project a year.	DCR implemented LID rain gardens along Nonantum Road in conjunction with MassDOT upgrades and populated repaired drainage outfalls with native wetland plantings.	Options for permeable pavement replacement at Herter Lot 1 and cart path at Ponkapoag Golf Course..

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April '12 to March '13
1-15	DCR Storm Water Training Workshop	Engineering (Mike Misslin)	Provide ½ day training program to address storm water management regulation, policies and procedures relevant to DCR staff.	*Measurable Goal Previously Completed.*	Working on implementing Storm Water Handbook training to similar group of staff members within six months of being issued.
1-16	Ipswich River Demonstration Projects	Director of Water Resources (Anne Carroll)	Continue to include public education and outreach in the projects funded through the EPA Watershed Grant, as appropriate.	*Goal Met* – The **Whipple Annex Green Roof** results report was published and posted to the website along with a fact sheet, and DCR held a formal presentation to review the results. **Weather Based Irrigation Demonstration project** - Analysis of savings and a report was produced April 2, 2009, and has been posted to the website.	DCR and the USGS have published a pre- and post-construction groundwater data assessment report for the **Silver Lake Permeable Pavement** and the **Silver Lake Raingardens** Demonstration Projects. The report, a circular, and a fact sheet have been posted on the DCR website.
1-17	Partner with Center for Urban Environmental Studies	Chief Engineer (Michael Misslin)	Partner with Northeastern University to assist development of new pollution control methods for storm water.	*Goal Partially Met* – DCR developed Notice to Partner with Northeastern and National Science Foundation in Permit Year 5. No additional work occurred during this permit year due to attention to other priorities.	No activities are planned.

Additional Practices:

- The Stillwater Farm Educational Site continues regularly scheduled open hours seasonally. The building is open to the public four daysa week from Memorial Day through Labor Day.

2. Public Involvement and Participation

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
2-1	Formalize Partnerships with CLF and CRWA	General Counsel (Douglas Rice)	Continue to work with CLF and CRWA and abide by Memo of Understanding (MOU)	*Goal Met* - DCR provided CLF/ CRWA with the final report summarizing the actions taken to meet the criteria outlined in the MOU.	No activities are planned.
2-2	UMass/DCR Program to monitor WQ in target areas of Wachusett Reservoir (*outside of the urbanized area*)	Water Resources (Ann Carroll)	Continue program with UMass.	*Goal Met* - Program is ongoing. Current focus is development of hydro-dynamic model of Stillwater Basin section of reservoir and invasive species.	Subject will be developed for summer 2012 study.
2-3	Public NPDES Meetings to Discuss Annual Report	Engineering (Mike Misslin)	Hold one meeting at three locations each year for internal staff, interested parties and public. Track and record comments received.	*Goal Met* – DCR presented results of its Year 8 NPDES annual report at 2 public meetings held in Boston and West Boylston.	Once the new MS4 watershed based permits are issued DCR will follow public meeting requirements outlined in those permits.
2-4	Partnership and Friends Database	External Affairs (SJ Port)	Send an annual letter regarding storm water/ NPDES issues to the watershed advocacy groups included in their Partnership and Friends database.	*Goal Met* - Database has over 346 contacts. Use database to send notification of annual report review.	Send annual email regarding storm water/ NPDES issues once issued. Maintain database. Send email regarding new MS4 permits once issued.
2-5	Storm Water Related Concerns/ Feedback Reported on DCR Web Site	External Affairs (SJ Port)	Continue to maintain staffing to forward concerns/ feedback to appropriate department and track response to concerns submitted by the public via DCR's web site.	*Goal Met* - Web site is active. DCR Commissioner has implemented concern/feedback letter tracking and response system.	Continue program.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
2-6	DCR Stewardship Council	External Affairs (SJ Port)	Continue to participate. Raise storm water issues, as appropriate. Present summary of annual report to council.	*Goal Met* - DCR attends monthly and is an active participant.	Continue participation. Present summary of Annual Report for Permit Year 8.
2-7	Massachusetts Water Resource Commission (MWRC)	Water Resources (Ann Carroll)	Continue to be involved in program and provide technical and staff support to MWRC.	*Goal Met* - DCR attends monthly and is an active participant.	Continue participation.
2-8	Lakes and Ponds Program	Water Resources (Ann Carroll)	Continue to sponsor program.	*Goal Met* - DCR continues to sponsor this program. Examples of LID installations and demonstration projects for the Ipswich River watershed are available through http://www.mass.gov/dcr/waterSupply/lakepond/lakepond.htm	Continue sponsorship.
2-9	Think Blue Campaign	Engineering (Mike Misslin)	Explore a partnership with Think Blue. Provide update on program and schedule in annual reports.	*Goal Not Met* – Think Blue has experienced budget and staffing issues and therefore progress did not occur this year.	Once the new MS4 watershed based permits are issued DCR will follow public meeting requirements outlined in those permits
2-10	Partnership with MyRWA	Engineering (Mike Misslin)	Explore a partnership with MyRWA. Include a summary of collaborative activities in annual reports.	*Goal Met* – DCR staff has volunteered to be on MyRWA Science sub-committee and shared drainage information with MyRWA.	Further define partnerships and implement water quality monitoring program.

3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./ Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
3-1	Drainage Outfall Inventory	Engineering (Mike Misslin)	Locate all known outfalls owned and operated by DCR within urbanized areas. Explore possibility of providing inventory for public review and include "Contact Us" Link.	*Goal Met* - DCR located all known outfalls owned and operated by DCR within urbanized areas by the end of Permit Year 5. The drainage outfall information was gathered from either scanned construction drawings or field surveys. During this past permit year, DCR has continued to add to and update the stormwater infrastructure database by verifying and updating the database during illicit discharge detection field work and catch basin cleaning and maintenance efforts. DCR has used the database to support maintenance activities, quickly understand the scope of potential drainage failures, and facilitate work related to adjacent municipalities. DCR has shared drainage information on infrastructure that was handed over to MassDOT.	DCR will continue to verify the location and condition of outfalls located from paper maps during illicit discharge detection field tasks. DCR will continue to use the "Contact Us" link as the primary method for the public to request drainage system mapping information. The information will be provided to the public in a timely fashion.

BMP ID #	BMP Description	Responsible Dept./ Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
3-2	Drainage Inventory Specification	Chief Engineer (Michael Misslin/AECOM)	DCR will develop and implement a Drainage Inventory Specification which will require submission of drainage infrastructure information from construction and redevelopment projects to add to the infrastructure database.	*Goal Met* - Drainage specifications have been included in revised contract language and standard contract documents for newly issued contracts. DCR received as-built plans for the Mt. Greylock project.	All new construction projects will continue to include the Drainage Inventory Specification. Incorporate as-built information from Mt. Greylock in to drainage mapping.
3-3	Illicit Drainage Connection Policy	General Counsel (Douglas Rice)	DCR is preparing a policy prohibiting illicit discharges to the DCR storm water system. The Policy will be finalized and issued during Fall 2006. Develop formal agreement with Attorney General's office.	*Goal Not Met* - DCR has developed a drainage connection policy. The draft was circulated last July for comment. The final policy is awaiting final signature from the Director of Policy.	Receive signature and issue drainage connection policy.

BMP ID #	BMP Description	Responsible Dept./ Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
3-4	Drainage Infrastructure Inventory	Chief Engineer (Michael Misslin)	Identify DCR's roadway, parkway and boulevard drainage infrastructure and add to GIS Drainage Outfall Inventory/ database.	Goal Met - At the end of 2008, DCR's consultant had mapped drainage information for each of the urbanized area DCR properties. The drainage information was gathered from either scanned construction drawings or field surveys. DCR has continued to update the drainage inventory during its catch basin cleaning, maintenance, and illicit discharge detection efforts this permit year.	The infrastructure database is a dynamic work in progress. Updates are made to the database when new construction takes place. Corrections to the database will be made as areas are visited during the illicit discharge investigation and during catch basin cleaning and maintenance efforts. DCR's infrastructure database is now linked to inspection, maintenance and illicit discharge investigation records, providing consolidated records of the features and all work performed on the feature over the years. In addition, DCR will add features identified during maintenance work that were missed from the infrastructure database. DCR will update the database when construction activities alter drainage infrastructure.

BMP ID #	BMP Description	Responsible Dept./ Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
3-5	Illicit Connection Sampling Program	Engineering (Mike Misslin)	Continue to prioritize and review known potential illicit connections. Once DCR, or its consultant, completes large portions of the drainage infrastructure inventory (BMP 3-4), DCR will develop a priority area list and focus on those systems. DCR will summarize the systems reviewed, the outcome of the reviews and any proposed follow up work in each annual report. The annual report will also include the priority areas list for the next permit year.	*Goal Met* - DCR's consultant performed the third year of a five-year rotating illicit discharge inspection program. The urban stormwater system was split spatially into five regions to facilitate inspections. All regions contain approximately 20% of DCR's system and all contain areas of special concern including public beaches impaired waters, etc. Over this past permit year, areas that primarily drained to the Charles River were inspected for illicit discharges according to the Charles River Illicit Discharge Detection and Elimination Protocol. This region encompasses the Charles River Reservation, and major roads such as Storrow Drive, Memorial Drive Charles River Road, Nonantum Road, Soldier's Field Road, Birmingham Parkway, Greenough Boulevard, Park Drive, and the Fenway. On-site sample analysis was employed to get real-time results to help identify potential sources of illicit flows. *(continued on next page)*	DCR will inspect 20% of their stormwater system within the urbanized area during the summer and fall of 2012. TDCR will continue to update the drainage inventory and identify needs for maintenance and cleaning as part of this field effort. DCR will follow up on cases of suspect illicit connections from Permit Year 8 inventory.

BMP ID #	BMP Description	Responsible Dept./ Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
3-5 (cont'd)				Over Permit Year 8, 1,625 stormwater features were inspected on 29 miles of DCR property. Ten cases of dry weather flow were identified with seven suspected of illicit connections. A copy of the report is included as Appendix B. The drainage inventory was used to systematically locate stormwater features and trace sources of illicit connections. During the inspections, field crew updated the drainage inventory when data was inaccurate.	
3-6	Drainage Tie-In Policy	General Counsel/ Chief Engineer (Douglas Rice / Michael Misslin)	Develop a SOP regarding drainage tie-ins from private entities to DCR's MS4.	*Goal Met* – DCR utilizes their access permit program to "permit" drainage tie-ins when requested or when un-permitted connections are identified in the field. Seventeen drainage connections were made in Permit Year 8. See Appendix C.	Continue to review requested drainage connections through access permit program.

BMP ID #	BMP Description	Responsible Dept./ Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
3-7	Develop Storm Water Control Agreements with Other MS4s	General Counsel (Douglas Rice)	DCR will implement a program to work cooperatively with operators of interconnected MS4s in the instance where storm water discharges impact either system. DCR will develop control agreements with the discharging municipality.	*Goal Not Met* –DCR has identified interconnections with municipal systems during the infrastructure mapping. Control agreements have not been explored.	No further action is planned. If interconnections with town MS4s are identified related to illicit discharges, DCR will work collaboratively with the town to identify a solution and remove the discharge.
3-8	Illegal Dumping	Operations (Curt Rudge)	Continue training of rangers regarding illegal dumping and work with law enforcement when necessary.	*Goal Met* –DCR cleaned the Muddy River again in December and March. They removed 22 CY's of refuse DCR picks up and appropriately disposed of waste abandoned on the side of road on an on-going basis. DCR also properly disposed of materials from maintenance yards in Stoneham, Cambridge, and Milton.	DCR will perform cleaning at the Alewife Culvert along Route 2 in 2011. Debris such as white goods and a safe have been removed. DCR will again perform cleaning and debris removal at Muddy River. A solid waste dumping investigation is on-going at the Bradley Palmer State Forest.

Additional practices outside the urbanized area:

- EQ staff continued with water quality sampling efforts to characterize storm events. Staff completed a report of options for addressing or eliminating the 50 direct discharges to the Reservoir. This report will be used to discuss implementation with MassDOT and Massachusetts Water Resources Authority. Will talk to staff continuing to work with municipalities to discuss connections.

4. Construction Site Stormwater Runoff Control

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
4-2	E&S/ NPDES Contract Bid Item and Special Provisions	Engineering (Mike Misslin)	Prepare contract bid item and special provisions. Include in all new contracts which disturb more than one acre. Bid item will include erosion control specifications.	*Goal Met* - Erosion and sedimentation control specifications are included in revised contract language and standard contract documents.	Continue to include Erosion and Sediment Control Specification in all new construction projects.
4-3	Construction SWPPP Template	Engineering (Mike Misslin)	DCR will develop a SWPPP Template for use by Contractors on DCR projects. Template will be placed on DCR website for download by contractors.	DCR is currently instructing consultants and in-house staff to use EPA's template for appropriate projects.	DCR will continue using EPA's template.
4-5	On-going Construction Projects Web Page	External Affairs/ IT Dept. (SJ Port)	DCR will maintain the construction related web page that includes information regarding on-going DCR construction projects.	*Goal Partially Met* – The front page of DCR's web site highlights on-going design and construction projects. Information regarding projects that are subject to the Construction GP were not added.	DCR will add a link to EPA's eNOI web site for the public to use in accessing a list of DCR construction sites that exceed 1 acre disturbance.
4-6	Annual Erosion Prevention/ Sediment Control Training	Engineering (Mike Misslin)	Provide annual training to DCR construction management staff. Report number of attendees, topics covered and dates of training in annual report.	*Goal Not Met* – Training was not performed this year due to staff shortage and agency priorities.	Provide annual training, proposing to do this with Engineering this year.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
4-7	Technical Assistance to ConComs	Water Resources (Ann Carroll)	Continue to provide technical assistance and the staffing level necessary to provide timely responses.	*Goal Met* - Technical assistance was provided to twelve (12) Conservation Commissions regarding projects within the Quabbin and Wachusett Reservoirs. *Wachusett:* EQ continued to attend meetings of local boards and commissions and provide assistance to the volunteer boards. Technical Assistance funds were expended to provide trainings to watershed Planning Boards and Conservation Commissions. Three workshops were held on Riverfront and the Wetlands Protection Act, Review of Development Plans and on DEP revised Stormwater Regulations. *Quabbin:* Staff continued to provide direct technical assistance to a number of watershed communities on zoning, planning and technical engineering issues. In addition, they continued work on development of model wetland bylaws, a permit checklist, and a USFS-funded guidebook on watershed forest management. Also, the limited funds available this year for community technical assistance were used to pay registration fees for Conservation Commission members from watershed communities to attend a wetland conference, and to set up three evening workshops that were offered to planning boards, conservation commissions and select boards in watershed communities.	Continue to provide assistance as requested by Conservation Commissions.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
4-8	Contract Bid Item and Special Provisions Enforceability	Engineering (Mike Misslin)	Include notice, which defines the procedure to address storm water related problems identified at construction sites, in all new contracts.	*Goal Met* – Continued to require development of SWPPP and filing of NOI for construction sites which disturb more than one acre.	Continue to implement in all new projects which disturb more than one acre. Coordinate on contracts transferred to MassDOT, such as bridge work.
4-9	Construction Runoff Enforcement from DCR and/or Offsite Construction Pollution	General Counsel (Douglas Rice)	Refer offsite/ non-DCR construction projects that are causing construction related pollution on DCR property to Attorney General's office as necessary. Refer to EPA is appropriate.	*Goal Met* – No construction related pollution action was necessary this year.	Refer problems identified to AG or EPA. Document in annual report.
4-10	Utility/ Drainage Tie-In Permit	Permitting (Christian Delaney)	Continue to require all offsite projects which need to tie into a DCR MS4 to receive a permit under this program.	*Goal Met* – Offsite projects are required to receive this permit before tying into a DCR MS4. Seventeen (17) permits were issued in Permit Year 8. See Appendix C.	Require tie-ins to apply for a permit.

5. Post-Construction Stormwater Management in New Development and Redevelopment

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-1	Compliance with MA DEP Stormwater Management Policy	Engineering (Mike Misslin)	Apply Stormwater Management Policy Guidelines to all development/ redevelopment projects.	*Goal Met* - All new/ redevelopment projects were designed to incorporate the current stormwater best management practices.	All new/ redevelopment projects will be designed to incorporate the most current stormwater best management practices. Storm water discharges to tributaries to the Quabbin or Wachusett watersheds will be reviewed for applicable storm water policy and standards.
5-2	DCR Storm Water Handbook	Engineering (Mike Misslin)	Develop Handbook and issue department-wide and to Contractors. New projects will be designed in accordance with the Handbook.	*Goal Partially Met* - Storm Water Handbook has been updated to be consistent with the 2008 Massachusetts DEP Stormwater Policy. The Handbook is still in draft form.	Finalize Handbook. Conduct appropriate training sessions.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-3	Storm Water Handbook Training	Director of Human Resources (Penny O'Reilly)	Provide 2 seminars within 6 months of issuing handbook to train internal personnel and consultants. Provide annual seminars thereafter. Record # of attendees and dates of training.	*Goal Met* – No action required since Handbook was not finalized.	Once Handbook is finalized, provide two seminars to train internal personnel and consultants on Handbook.
5-4	BMP Long-Term Operation and Maintenance	Operations / Engineering (John Murray/ Mike Misslin)	DCR has committed 1.9 million dollars annually to provide long-term maintenance of BMPs on the schedule indicated in the Maintenance Activity Schedule of the SWMP.	*Goal Met* - Long-term operation and maintenance was accomplished using contracts established for pavement resurfacing and deferred maintenance. DCR's storm water management efforts are supported by operating and capital appropriations that totaled approximately $3.9 million in FY10 and expects to utilize all available funds to provide an appropriate level of service and to identify better practices to reduce pollution in runoff from roads and parkways.	DCR has requested $4.1 million for long-term operation and maintenance of BMPs in FY12. Budget process/ deliberations are still in process.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-5	Low Impact Development Projects	Water Resources (Anne Carroll)	Actively work on the planning, permitting and implementation of one Low Impact Development (LID) project each year.	DCR constructed LID project at Herter Parking Lot #2 on Soldiers Field Road, and permeable pavement was installed in Memorial Drive sidewalk at Jerry's Landing. Also see response to BMP 5-8 and 5-9 below.	Design and permit an LID project with Charles River Watershed Association (CRWA) and at Fort Phoenix. Also see response to BMP 5-8 and 5-9 below.
5-6	Walden Pond Stormwater Improvements *(outside of urbanized area)*	Engineering (Mike Misslin)	Complete design of storm water improvements and install.	*Goal Met* – Project complete in Permit Year 5. Parking lot with pervious pavement was vacuum swept to maintain infiltration.	Parking lots with pervious pavement will be cleaned using vacuum sweeping equipment.
5-7	Post Construction Runoff Enforcement from Offsite Pollution	Engineering (Mike Misslin)	Refer off site projects that runoff to DCR property to Attorney General's office as necessary.	*Goal Met* – No post construction runoff enforcement actions necessary this permit year.	Refer problems identified to AG or EPA. Document in annual report.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8	Ipswich River EPA Targeted Watershed Grant – Low Impact Development (LID) Subdivision Demonstration Project	Water Resources (Anne Carroll)	The DCR received a $1.04 million grant from the Environmental Protection Agency's Targeted Watershed program to demonstrate an integrated approach to addressing the problems facing the Ipswich River. This approach encompasses two strategies: • Low-Impact Development (LID) – landscaping and design techniques that capture stormwater and recharge it to the groundwater • Water Conservati	On June 9, 2009, more than 100 people participated in a full-day presentation and tour of the LID Subdivision (Project #1), the Green Roof (Project #2), and the Silver Lake LID parking lot and neighborhood demonstration projects (Projects #3 and 4). On November 4, 2009, DCR and the Ipswich River Watershed Association hosted a forum for Massachusetts legislators and staff to inform and educate them about the grant-funded projects, to share results from the five years of studies funded by the grant, and to stimulate discussion about issues affecting Massachusetts watersheds.	For up-to-date planned activities for all Ipswich River Targeted Watershed Grant projects, please visit http://www.mass.gov/dcr/waterSupply/ipswichRiver/index.htm

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8a	Ipswich River EPA Targeted Watershed Grant - Green Roof Demonstration Project	Water Resources (Anne Carroll)	Monitor quality and quantity of runoff from the green roof at Whipple Annex and conventional roof at Ipswich Town Hall. Summarize results and include in annual report.	The green roof demonstration site, Whipple Annex, is being redeveloped as affordable housing for seniors. Water quality samples collected from the green roof by USGS in 2008 were analyzed for a range of parameters, including conductivity, pH, nitrogen, phosphorus, metals, and total petroleum hydrocarbons. DCR presented the results to a legislative forum on November 4, 2009. The report has been prepared and a link to it can be found here http://pubs.usgs.gov/sir/2010/5007/.	No activities planned.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8b	Ipswich River EPA Targeted Watershed Grant - Permeable Paving Demonstration Project	Water Resources (Anne Carroll)	Continue groundwater quality sampling for one year upon completion of project construction. Summarize results in annual report.	This project incorporated three LID practices (permeable paving materials, bioretention cells, and vegetated water quality swales) designed to reduce runoff volume, improve water quality, and enhance groundwater recharge. There have been no beach closures, due to fecal bacteria, starting in 2006 and continuing until 2009. However, there was one closure due to a cyanobacteria bloom. USGS installed seven wells in the parking lot to provide data on groundwater levels and groundwater quality. USGS monitored preconstruction conditions quarterly and after a few large storms. Following construction, USGS began monitoring groundwater levels and collecting samples monthly. Sampling is designed to detect any changes in groundwater quality associated with recharge from the parking lot.	USGS has published a report of pre- and post- construction groundwater data, and a link to the report is posted on their website at http://www.mass.gov/dcr/watersupply/ipswichriver/progress.htm

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8c	Ipswich River EPA Targeted Watershed Grant - LID at Silver Lake	Water Resources (Anne Carroll)	Perform sampling of stormwater volumes and water quality for one year upon completion of project construction. Summarize results versus pre-construction in Year 5 annual report.	This project incorporates several LID techniques to replace the conventional stormwater collection system in two streets draining to Silver Lake. Stormwater flow paths were disconnected from the piped drainage system by directing stormwater to rain gardens and porous pavers. Eleven rain gardens are located in the roadway rights-of-way. The roadway edges in three areas along Silver Lake Avenue were resurfaced with porous pavers with underlying infiltration beds. Sampling for changes in water quality and discharge quantity continued for 15 months, post-construction, concluding in October 2007.	USGS has published a report of pre- and post- construction groundwater data, and a link to the report is posted on their website at http://www.mass.gov/dcr/watersupply/ipswichriver/progress.htm

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8d	Ipswich River EPA Targeted Watershed Grant - Rainwater Harvesting	Water Resources (Anne Carroll)	Continue data collection of outdoor water use or each participating household with rainwater harvesting systems. Compare use with historic records and summarize in annual report. Install large underground system.	This project funded installation of roughly 40 rainwater harvesting systems in residential settings. The systems consist of a storage tank, a pressure pump to aid in water distribution, a spigot for a hose, and a water meter to measure flow. Three sizes of storage tanks were installed. The water meter attached to each rainwater harvesting system provided data on the volume of rainwater pumped from the storage tanks for outdoor use. In addition, Wilmington Water Department records on each residential participant's domestic water use were analyzed to compare domestic water demand before and after installation of the rainwater harvesting system. Rainwater was used for outdoor purposes by all participants. Survey results indicate that, in general, the rainwater that participants used replaced the use of domestic water.	A paper has been accepted but not yet published by the Journal of American Water Resources Association.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8e	Ipswich River EPA Targeted Watershed Grant - LID Ball Field	Water Resources (Anne Carroll)	Begin data collection of water use and continuous soil moisture retention on field in 2007 and continue through summer of 2008.	A portion of a municipal athletic field complex, located adjacent to the river at Ipswich River Park and totaling eight acres, was redeveloped to maximize infiltration and minimize irrigation requirements and application of fertilizer and pesticides. The town monitored the soil moisture of the amended field and the control fields; and the volumes of water used on each of the four fields in the complex. The watering needs of the amended field were much less compared to the conventionally treated fields.	A paper has been accepted but not yet published by the Journal of American Water Resources Association.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
5-8f	Ipswich River EPA Targeted Watershed Grant - Weather Based Irrigation	Water Resources (Anne Carroll)	Compile and analyze post-installation water use records for the 25 weather-based irrigation controllers through summer 2008. Summarize in annual report.	A paper has been accepted but not yet published by the Journal of American Water Resources Association.	**No planned activities.**

5. Additional

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
	Breakheart Reservation Pond Improvements Project	Planning & Engineering (Mike Misslin)		DCR's consultant performed site visits, survey and hydrologic analysis of the Breakheart Reservation's pond system (two ponds). During the analysis, DCR discovered that the two ponds are held by poor condition dams. DCR stormwater personnel met with DCR dam personnel to discuss the issues at both ponds and possible improvements.	DCR will continue discussions with DCR dam personnel to determine a course of action at the Breakheart Reservation dams/pond to reduce beach erosion and improve the condition of the dams. It is on a priority list and will be addressed as the priority is reached. They are not high hazard dams.
	Mt. Greylock	Engineering (Mike Misslin)		DCR is in the process of designing a lodge/conference center and camp ground at Mt. Greylock. 220 catch basins were inspected and maintained in compliance with historic parkway guidelines.	
	Mt. Wachusett (out of UA)	Engineering (Mike Misslin) Environmental Quality staff		DCR used construction controls during utility installation at this facility. Continued involvement in the planning of a major road upgrade projects in Princeton. DCR EQ staff continued to review YOPs for National Grid and the Providence and Worcester Railroad.	DCR is working to rebuild the roadway, Administration Road (haul road) and replace the fire tower. The project will include construction controls.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
	Improvements to drainage system.			Plans for a new stormwater treatment system for the area in front of the Quabbin administration building were largely completed, but the project is now on hold pending the availability of funding and staff time. However, a number of other drainage improvements (replaced culverts, drainage ditch and catch basin maintenance) were achieved during the year. Staff worked closely with local and state officials in monitoring and enforcing stormwater regulations and design requirements at a large residential subdivision in Rutland. They also worked with DEP in reviewing several NPDES General Construction Permit applications.	

6. Pollution Prevention and Good Housekeeping

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-1	Vehicle Washing Policy	Operations (Jack Murray)	Maintain practice of washing vehicles at off-site locations into state-wide written policy and implement. Identify off-site commercial (snow plow equipment) vehicle washing facility.	*Goal Met* - Policy implemented in Winter 06-07 for smaller cars and trucks. Pursued locating off-site commercial (snow plow equipment) vehicle washing facility but were not successful.	DCR is still working with MassDOT to identify off-site commercial (snow plow equipment) vehicle washing facility/vendor.
6-2	Floor Drain Policy	Engineering (Mike Misslin)	Maintain plan for floor drain use and servicing.	*Goal Met* - Plan is maintained, staffed and funded under Clean State Initiative.	Maintain plan.
6-3	CB Cleaning Policy	Chief Engineer/ Operations (Michael Misslin/Jack Murray)	DCR will develop a written plan for regular catch basin cleaning to be implemented in DCR's fiscal year 2006 and thereafter.	*Goal Met* - Policy finalized and implemented statewide.	Continue to implement policy.
6-4	CB Inspection/ Repair Policy	Stormwater (Rob Lowell)	DCR will develop an agency wide policy for implementing a schedule for inspecting catch basins and prioritizing repairs of catch basins and implement.	*Goal Met* – Policy has been finalized. From April 2011 through March 2012, 3,996 ft. of drainage pipe at 60 locations was replaced, 257 catch basins repaired, 41 outfalls replaced and 31 manholes and catch basins replaced. Approximately 95% of the repairs were on parkways and 5% on state and urban parks.	Continue to implement policy.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-5	Street Sweeping Policy	Operations (Jack Murray)	Create and implement agency-wide policy on all roads, parkways and parking lots.	*Goal Met* – Policy has been finalized and implemented. From September through November DCR and contractors swept Urban Parks and parkways monthly in accordance with DCR's Maintenance Activity Schedule. DCR added parking lots along the Charles River and the Fells. April 2011 to March 2012 a total of approximately 5,229 cubic yards of street sweeping were removed from DCR roads and parkways during the last reporting year. The new contractor can target hard to reach areas using hand brooms in coordination with vacuum sweeping equipment.	Continue to implement policy.
6-6	IPM Policy	Water Resources (Ann Carroll)	Create and implement agency-wide policy.	*Goal Partially Met* - Create draft plan for internal review. Test studies being performed.	Continue to develop policy.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-7	VMP Training	Engineering (Mike Misslin)	Provide training on DCR Vegetation Management Plan (VMP) to internal maintenance staff once every two years. Provide training, if required, for seasonal workers without prior experience on off years.	*Goal Met* – DCR follows VMPs provided by municipalities to the extent possible.	Continue to provide training for seasonal workers. Training will include review of VMPs prior to seasonal brush cutting.
6-9	EMS	Engineering (Mike Misslin)	Continue to provide first response for emergency management situations such as spills and/ or coordinate with Mass. State Police, as appropriate. Continue to provide annual training in spill response coordinated with DEP, MWRA, emergency responders and other local responders.	*Goal Met* - DCR coordinates responses with Mass State Police, Coast Guard and DEP as necessary.	Continue to coordinate responses and provide annual training.
6-10	Waste Disposal	Engineering / Operations (Mike Misslin/ Jack Murray)	DCR will continue to properly dispose of waste.	*Goal Met* - DCR has budgeted for disposal of catch basin and street sweeping wastes. Spent $195K on waste disposal, including abandoned hazardous wastes during last year.	Continue to properly dispose of waste and include in budgets.
6-11	Beneficial Use Determination (BUD)	Engineering (Mike Misslin)	DCR will work to determine a beneficial use determination (BUD) for catch basin residuals.	*Goal Partially Met* – DCR identified a facility, Apple d'Or, to compost street sweepings. Apple d'Or compost facility in Boston has Beneficial Use Determination. Apple D'Or lost its permit to operate on DCR property in January 2012.	DCR to seek new facility with BUD for street sweepings.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-14	CB Repair/ Discharge Pipe Cleaning Needs Assessment	Engineering (Mike Misslin)	Perform an annual state wide assessment of the condition and cleaning requirements of visible proximate DCR lateral piping and catch basin repair needs. Pilot project in 2005. Agency wide program in 2006. Annual reports will summarize piping requiring cleaning and catch basin to be repaired and report on progress.	*Goal Met* - Over the spring and summer, DCR continued to systematically clean catch basins and water jet the associated outlet drain pipes using private contractors overseen daily by DCR staff. From September through December, 1,653 catch basins were cleaned and water jetted and their locations recorded using GPS. (See individual tables for locations) For the fiscal year ending in June 2012, DCR spent $1.6 M to clean and repair catch basins. DCR implemented drainage repairs at several locations on Memorial Drive.	DCR will continue to systematically clean catch basins and water jet the associated outlet drain pipes, as determined necessary, using private contractors overseen daily by DCR staff. DCR anticipates dedicating similar budget ($1.6 M) and level of effort this year for catch basin cleaning and repair. DCR will investigate additional areas where drainage infrastructure has been identified as obstructed or broken during statewide CB cleaning activities. Use CCTV and/ or magnetic probes to identify necessary repairs or remedy. Areas will include: ▪ Storrow Drive/ Esplanade ▪ Charlesgate ▪ Truman Highway ▪ Riverway ▪ Mystic Valley Parkway ▪ Jamaica Way ▪ West Roxbury Parkway ▪ Morrisey Boulevard ▪ Blue Hills Parkway

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-14 (cont'd)				DCR repaired catch basins at: ▪ Morrissey Boulevard ▪ Day Boulevard ▪ McGrath Highway ▪ Embankment Road ▪ Memorial Drive ▪ Soldiers Field Road ▪ Storrow Drive	
6-17	Maintenance Tracking System	Engineering/ Operations (Mike Misslin/ Jack Murray)	Develop a maintenance tracking system. Add storm water infrastructure information inventoried in BMP 3-4. Include inspection/ maintenance schedule and create reports of BMPs that are "scheduled" for cleaning.	DCR's consultant has developed a global positioning system (GPS) program to work with DCR's GPS operating systems and the existing geospatial stormwater infrastructure database to record maintenance activities. DCR employees have been trained in recording and processing data using the new system. The consultant has organized previous DCR maintenance records into a database linked to the stormwater infrastructure database.	DCR's consultant will continue to work with DCR's maintenance team to track maintenance needs and actions. DCR plans on updating their data collection equipment to better work with the growing infrastructure and tracking database and continue to use the GPS program to efficiently track inspections and activities.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-18	Maintenance Activity Schedule	Operations (Jack Murray)	Maintain infrastructure and roadways in compliance with maintenance activity schedule.	*Goal Met* – **Street Sweeping**: To insure adequate street sweeping frequency, DCR entered into a three-year renewable contract in 2011 with a street sweeping contractor to clean certain DCR parkways and parking lots. The contract provides for sweeping roadways that discharge to impaired receiving waters using mechanical and vacuum sweeping equipment at least four times per year, and monthly in areas where cars are allowed to park. Car parking in these areas has restricted access to the curb line thereby reducing the effectiveness of street cleaning. The program is outlined on DCR's web site at http://www.mass.gov/dcr/sweep.htm The DCR street sweeper fleet (nine sweeper units) received maintenance periodically during the year and were operated as necessary by DCR to keep parking lots and roadways parkways as clean and trash free as possible. *(continued on next page)*	Continue to comply with maintenance activity schedule. **Street Sweeping**: Continue to provide and fund contract for sweeping roadways that discharge to impaired receiving waters using mechanical and vacuum sweeping equipment at least four times per year, and monthly in areas where cars are allowed to park.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-18 (cont'd)	Maintenance Activity Schedule			Beach sand screener/sanitizers were operated on a daily basis at Revere Beach, Nantasket Beach, Wollaston Beach, Nahant Beach and other high use beach areas to reduce contaminants in the beach sand (cigarette butts, plastic bottles, etc.) that threaten surface water quality and to improve beach experiences for visitors. These beach maintenance services are performed by staff that also operates street sweepers when not operating beach sanitizers. DUPR district managers have the responsibility to prioritize and schedule these tasks. DCR also composted algae pulled from Carson Beach, Revere Beach and Wollaston Beach this last year. *(continued on next page)*	

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-18 (cont'd)	Maintenance Activity Schedule			**Leaf Removal:** Composted leaves at Apple D'Or compost site. **Catch Basins**: Over the spring and summer DCR continued to systematically clean catch basins and water jet the associated outlet drain pipes using private contractors overseen daily by DCR staff. From April 2011 to March 2012, 3,341 catch basins were cleaned and water jetted with these locations recorded using GPS. For the fiscal year ending in June 2012 DCR spent $750K to clean catch basins. DCR repaired its vacuum truck and hired dedicated staff to clean our catch basins and drain pipes to outfall. DCR services will supplement contracted services. *(continued on next page)*	**Leaf Removal:** DCR will continue to remove leaves ahead of streets being swept. **Catch Basins**: DCR will continue to systematically clean catch basins and water jet the associated outlet drain pipes using DCR equipment and private contractors overseen by DCR staff. DCR anticipates a similar budget for FY13 as compared to FY12 expenditures.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-18 (cont'd)	Maintenance Activity Schedule			**Material Storage Yard Maintenance**: MassDOT has taken over the deicing and snow operations for all DCR roads. Four urban parks do store street sweeping and catch basin cleaning on-site. The accumulation areas are marked off for collection to reduce illegal dumping. **Fleet Maintenance**: DCR fleet manager (Joe Suppa) oversees the compliance with fleet maintenance. Individual facilities are reviewed in Table 2-7 of this report.	**Material Storage Yard Maintenance:** Not applicable. **Fleet Maintenance:** Fleet manager will review fleet maintenance schedule.
6-19	Winter Storm Plan	Operations (Jack Murray)	Continue to maintain a responsible winter storm program and provide sufficient funding.	*Goal Met* – DCR continued to maintain a winter storm program, where DCR retains responsibility (e.g. sidewalks, parking lots, certain bike paths, etc.). MassDOT has responsibility for snow and ice control on most other DCR roads and parkways.	Continue to maintain winter storm program where DCR retains responsibility.
6-20	Pet Waste Management	Operations (Jack Murray)	Continue pet waste management program. Continue to train DCR park rangers to monitor this program. Coordinate with law enforcement if necessary.	*Goal Met* – " Mutt Mitt" Dog Waste Collection Stations were maintained.	Maintain pet waste management program. Install additional new collection stations at Charles River Reservation.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
6-21	Pool Discharge SOP	Engineering (Mike Misslin)	Update and re-issue SOP. Provide training to pool staff.	*Goal Met* – DCR updated and re-issued SOP including de-chlorinization procedures.	Provide training to pool staff, as necessary.

7. BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA)

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
7-1	Wetland Protection Act Compliance	Operations/ Engineering (Jack Murray / Mike Misslin)	Continue compliance with WPA.	*Goal Met* - Wetlands Protection Act is actively enforced at all DCR properties including those not located within urbanized areas. DCR has staff specifically dedicated to WPA compliance in Wachusett and Quabbin Reservoir watersheds. DCR received multiple Orders of Condition in Boston, Cambridge, Newton, Milton and Somerville for work within wetland resources.	Continue compliance. DCR will be filing for Order of Conditions for work within wetland resources in: • Boston • Milton • Somerville
7-2	401 Water Quality Certification	Operations/ Engineering (Jack Murray / Mike Misslin)	Continue compliance with 401 WQ Certification.	*Goal Met* - DCR received a 401 WQ certification for Blair Pond during Year 8 & 9.	Continue compliance.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
7-3	Cultural Resources Review	Chief Archeologist (Ellen Berkland)	Continue to review potential impact to historic properties during conceptual design stage.	*Goal Met* - DCR reviews all projects for potential impact to historic properties during design phase.	Continue reviews and use subcontractors as necessary.
7-4	Chicopee Basin, French Basin, Mill River Basin, Northern Blackstone and Connecticut River TMDLs	Water Resources/ Chief Forester (Ann Carroll/ Peter Church)	These TMDL Reports recommended that during timber harvesting practices DCR shall check that an approved forest cutting plan and BMPs for erosion are followed. DCR will provide a summary table of timber harvesting activities, the date forest cutting plan was approved and proposed BMPs in each annual report.	*Goal Met* – No timber sales were conducted in the Northern Blackstone Basin due to present cutting moratorium.	Perform presentations during Spring 2012 in advance of proposed sales, if moratorium lifted.
7-5	Connecticut Basin TMDL - Train Conservation Commission on Timber Harvest BMPs	Chief Forester (Peter Church)	Present short seminar for each Conservation Commission.	*Goal Met* - Training provided for vernal pool identification and erosion control measures.	Perform presentations during Spring 2012.
7-6	Permit Year TMDL Summary	Engineering (Mike Misslin)	Include summary of TMDL reports approved by EPA during the previous permit year which include recommendations for actions by DCR in annual report.	*Goal Met* – Section 7b of this annual report includes a summary of the current Final TMDLs and those that include implementation recommendations which impact DCR (Table 8).	Continue to be involved in the development of draft TMDLs and implement recommendations summarized in Table 8.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9	Planned Activities – April 12 to March 13
7-7	Priority Resource Area Review Program	Planning (Joe Orfant)	Implement a program to review the outfalls identified in the outfall inventory which discharge to one or more of the resources outlined in Part V and IX of the permit.	*Goal Partially Met* – DCR has updated the receiving water body table (Appendix C of the March 2008 SWMP) to reflect the outfalls identified in the drainage inventory. The table summarizes the number of outfalls by sub-basin number and identifies the impaired waterbody included in the sub-basin. This analysis showed priority areas distributed throughout the state. From this list, DCR has developed a 5-year illicit discharge inspections rotation that groups areas spatially for ease of program operations. DCR focused its illicit discharge program this year on areas adjacent to the Charles River which is impaired with a TMDL. **Blair Pond Improvement** – DCR bid and awarded the project with anticipated completion date of Fall 2012. **Lower Charles River**– DCR addressed several failing stormwater systems and outfalls to impaired waters including: Charles River.	DCR will continue the illicit discharge inspection program performing inspections on the third one-fifth of the system. This upcoming program will include systems that discharge to several impaired waters including the Charles River. DCR will continue to address failing stormwater systems and outfalls to reduce flooding, erosion, rutting and sedimentation. When possible, DCR will include structural stormwater Best Management Practices (BMPs) to improve the quality of water being discharged. **Blair Pond Improvements** – Finalize construction and vegetation plantings as per City of Cambridge Order of Conditions.

AECOM Environment

Prepared for:
Department of Conservation and Recreation
Boston, Massachusetts

Submitted by:
AECOM
Chelmsford, MA
60138611
November 2011

Illicit Discharge Detection Report

Permit Year 9 - 2011

AECOM Environment

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Boston, Massachusetts

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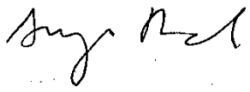
Illicit Discharge Detection Report

Permit Year 9 - 2011

Suzy Baird



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1.0 Introduction

At the request of the Massachusetts Department of Conservation and Recreation (DCR), AECOM Environment (AECOM) developed and performed an illicit discharge detection (IDD) program to identify possible illicit discharge sources in urbanized portions of the DCR's stormwater collection system. This project supports the provisions of Minimum Control Measure No. 3 of DCR's NPDES Small MS4 General Permit. This provision mandates the development and implementation of an illicit discharge detection and elimination plan to identify potentially hazardous releases into the stormwater system and establish the means to eliminate these discharges.

The U.S. Environmental Protection Agency (EPA) defines illicit discharges as any non-permitted discharge to a storm sewer system that is not composed entirely of stormwater. Sources for these flows include direct connections to a sanitary sewer line, piped floor drains from garages or basements, and illegally dumped fluids like motor oil and paint. These discharges can result in serious consequences for the ultimate receiving waterbody, including decreased water quality, the destruction of wildlife habitat, and a decrease in the aesthetic value of the waterbody. Illicit discharges are of particular concern in urbanized areas because of the high concentration of development and industrial and commercial facilities. However, non-permitted discharges that do not carry pollutants are not considered illicit including culverted streams, groundwater seepage, and potable water (Brown, Caraco & Pitt 2004).

Since this program began in 2008, AECOM has performed the following tasks to assess DCR's stormwater systems for illicit discharges:

- Program Year One - 2008
  - Produced a five year inspection schedule and rotation
  - Developed an illicit discharge identification and testing protocol
  - Performed illicit discharge inspections on approximately 20% of the DCR's stormwater systems in urban areas
- Program Year Two – 2009
  - Modified the IDD protocol to reflect improvements identified in Program Year One
  - Performed illicit discharge inspections on approximately 20% of the DCR's stormwater systems in urban areas
- Program Year Three – 2010
  - Modified the IDD protocol to reflect changes to field testing procedure
  - Modified the IDD rotation to reflect new priority areas
  - Performed illicit discharge inspections on approximately 20% of the DCR's stormwater systems in urban areas

- Program Year Four – 2011
  - Modified the IDD protocol to reflect changes to field documentation procedure
  - Performed illicit discharge inspections on approximately 20% of the DCR's stormwater systems in urban areas

The next sections detail the procedure and summarize the results from year four of the IDD Program.

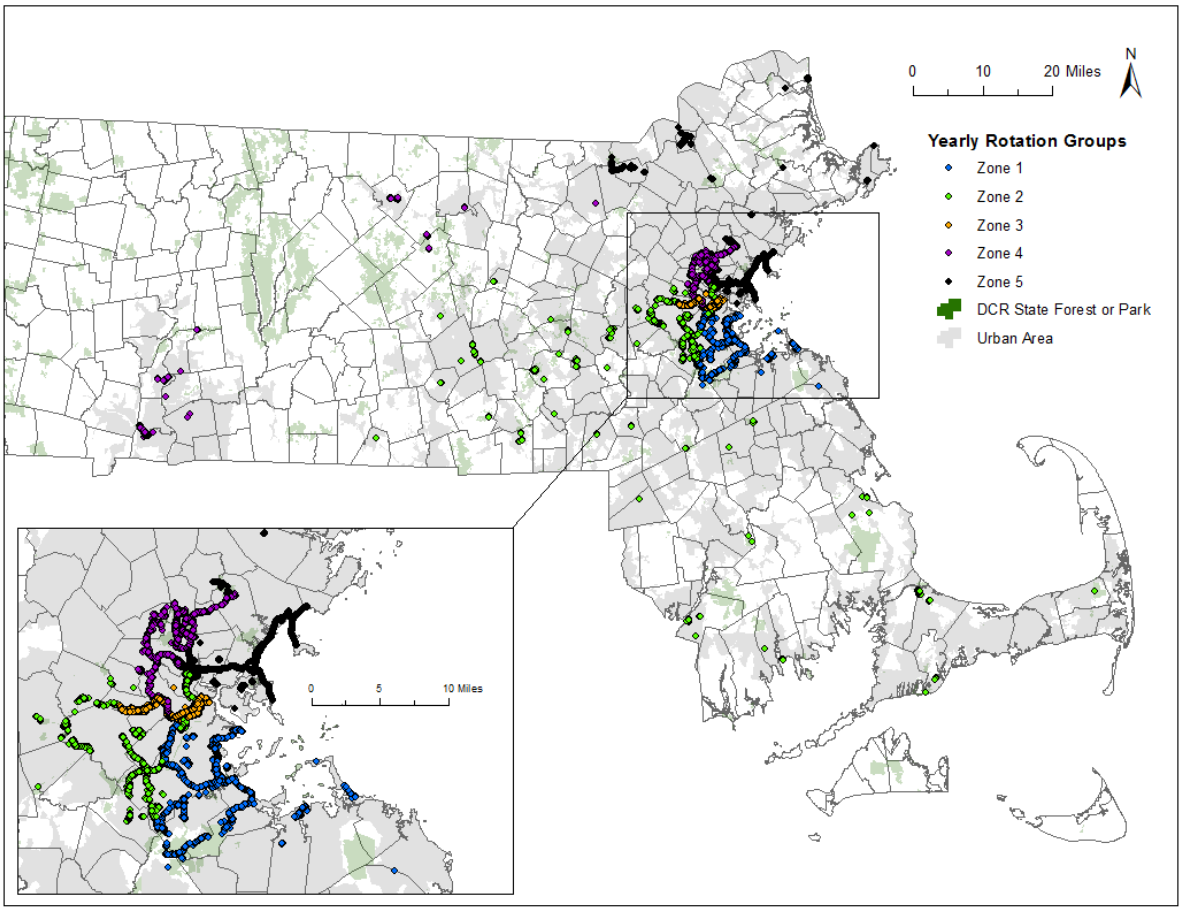
2.0 Methods

This section presents the methods AECOM used to develop and implement an IDD program for the DCR. In Program Year One (2008), AECOM divided the DCR's urban stormwater systems into five inspection zones, as presented in Section 2.1 and Figure 2-1. The IDD protocol developed in Program Year One was updated in the second, third, and fourth year of the program to reflect improvements and modifications as explained in Section 2.2. Section 3.0 describes AECOM's results for Program Year Four.

2.1 Five Year Inspection Rotation

In support of NPDES requirements, AECOM designed a rotating schedule to ensure that urban portions of DCR's stormwater systems will be investigated once every five years. AECOM previously mapped DCR's stormwater infrastructure in urban areas using digitized, scanned drainage plans, and field recorded global positioning system (GPS) data. Several aspects of these data were analyzed to establish five comparable IDD zones, shown in Figure 2-1, including: spatial continuity, number of stormwater features, total road miles, and proportion of data from drainage plans versus GPS surveys.

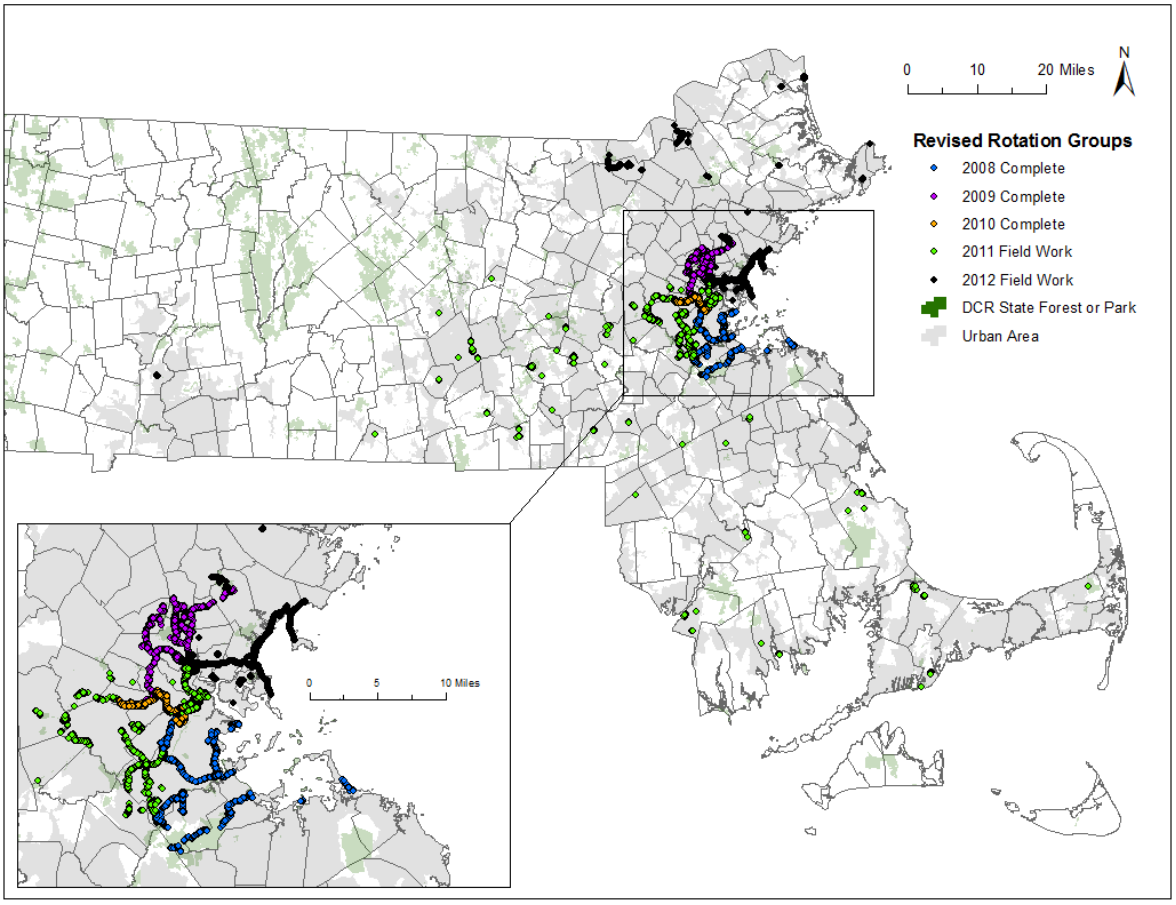
Figure 2-1. Yearly Rotation Groups



Prior to developing an inspection rotation, AECOM examined priority areas listed in the Stormwater Management Plan including suspected illicit connections based on previous site visits and direct discharges to impaired waterbodies. With the DCR, AECOM determined that these priority areas have a state-wide spatial distribution that would hinder IDD program implementation. Therefore, each rotation zone contains stormwater features and road miles grouped by spatial location. Approximately 50 percent of the infrastructure data for each zone are from scanned plan data and therefore had not been field verified prior to AECOM's IDD investigations.

At the request of the DCR, AECOM modified this inspection rotation prior to implementing Program Year Three. The new survey zones prioritized the parkways and parks that drain to the Charles River for Program Years Three and Four (Figure 2-2).

Figure 2-2. Revised IDD Inspection Zones



2.2 Illicit Discharge Detection Procedure

AECOM performed illicit discharge detection investigations according to the protocol developed with the DCR in 2008, and revised in 2009, 2010, and 2011 (see Appendix A), based on the Charles River Illicit Discharge Detection and Elimination Protocol, adopted from BWSC (2004) and Pitt (2004). The protocol relies primarily on visual observations and the use of field sampling and analysis using portable instrumentation during dry weather to complete a preliminary inspection and analysis of stormwater

systems. AECOM compiled a field analytical kit designed to isolate the general source of a discharge based on its chemical characteristics. This process of testing samples and reviewing results in real-time provides a significant advantage in allowing field crews to perform further field reconnaissance and potentially identify the source of flow as a sanitary sewer, industrial discharge, natural source, or domestic water.

The AECOM team attempted to schedule field investigation activities to occur at times with less than a tenth of an inch of rain in the preceding 48 hours to ensure observed flows were the result of non-stormwater discharges. However, in cases when surveys took place within 48 hours of a rain event, field teams noted any observed flows and flagged those stormwater systems for a future visit during dry weather conditions. Using the stormwater system spatial database as a guide, field crews visited each accessible manhole or catch basin in a stormwater system, removed their covers and performed a thorough visual inspection. Notable visual indicators of illicit discharges consisted of dry weather flow, suspicious pipes, or any evidence to suggest potential contamination from intermittent sources. Signs of potential contamination included odors, staining, floatables, and foaming which could indicate the presence of sewage or wash water. Non-debris floatables could also indicate the presence of sanitary sewer water. Flows that field crews determined to be culverted streams or groundwater (by visual observation) were not noted as potentially illicit.

The field crew recorded illicit discharge observations and updates to the stormwater system spatial database in real-time on a hand-held field computer (Panasonic CF-U1 Toughbook). Field crews used a Trimble Pro XT external GPS receiver with sub-meter accuracy connected via Bluetooth technology to the handheld computer to record locations and data. Field crews recorded IDD program data in AECOM-designed data entry forms and associated data tables on the handheld computer using ESRI ArcPad version 10.0. The field computer contained aerial photographs, road maps, and the existing stormwater system data for reference and editing purposes. In areas where the stormwater system had been previously field surveyed, the field crew only recorded IDD program specific observations. When stormwater data originated from scanned design plans, the field crew took GPS coordinates and updated attributes for features within that system. Following field inspections, illicit discharge records and revised infrastructure data were then downloaded into Geographic Information System (GIS) software to update the DCR's stormwater database.

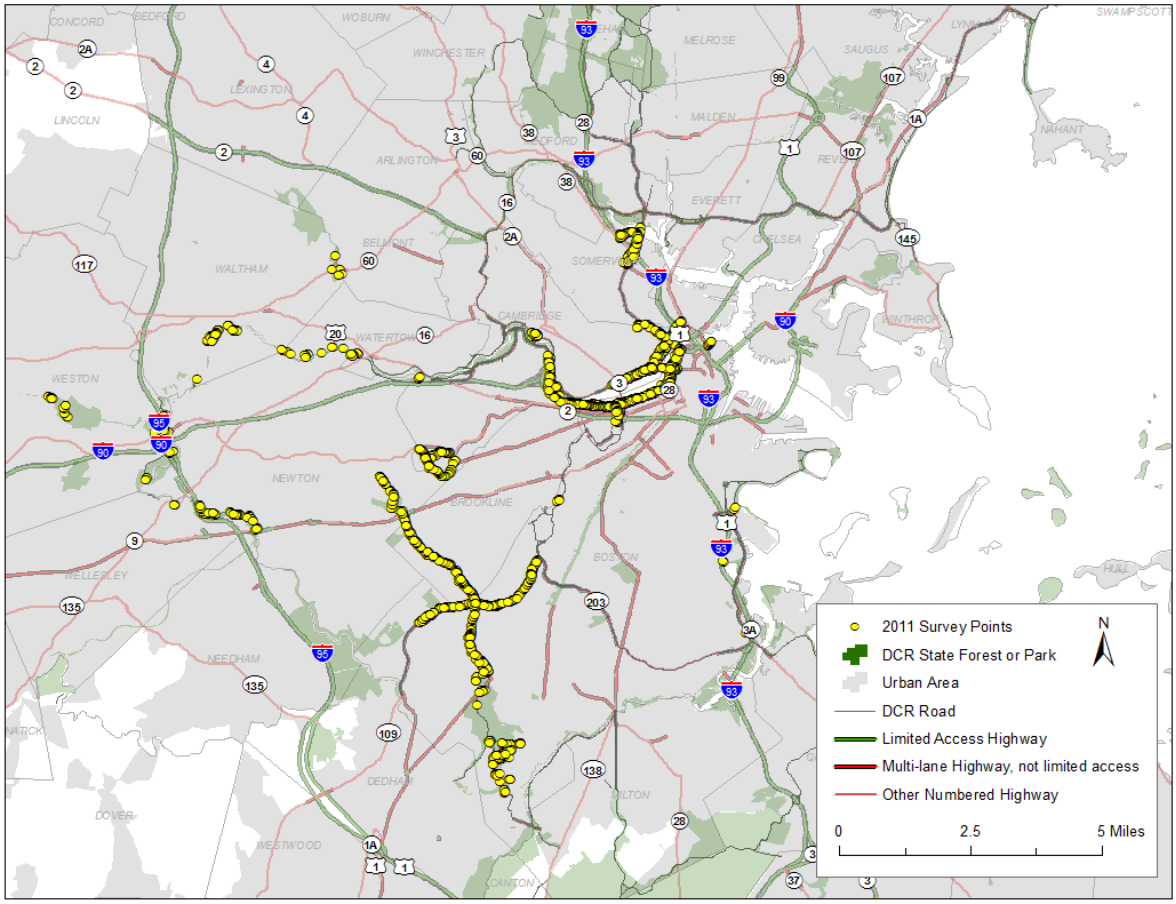
Improvements to the IDD Protocol made prior to the Program Year Two field season included use of the Toughbook hand-held computer, implementing advanced feature symbology, and enhancing data validation tools. These modifications led to the field inspection of nearly 100% of the stormwater features in the Program Year Two and Three investigation areas. A further modification made prior to Program Year Three was to replace the previously used boron test with an anionic surfactant test to identify non-borate based detergent contamination in analyzed flows. An improvement made prior to Program Year Four was to require field crews to fill out a summary form at all features where flows were observed to enhance the documentation process (Appendix B). Another improvement made prior to Program Year Four was the introduction of a GPS-equipped camera. The GPS camera, when paired with GIS, linked photographs taken in the field with features mapped in GIS and streamlined desktop analysis of illicit flows.

AECOM notified the DCR of observations and sampling results that indicated the presence of an illicit discharge. Evidence of intermittent illicit discharges, including staining and odors, noted during the field effort are recorded in DCR's stormwater database and will be available to future field and maintenance crews to help identify potential problem areas.

3.0 Program Year Four Results

AECOM implemented the IDD protocol outlined in Appendix A, commencing the fourth year of field investigations of the DCR's stormwater systems on June 2, 2011. The effort focused on the DCR parks and parkways located in the Charles River watershed, including the Charles River Reservation, a large sprawling park that lines a majority of the Charles River, as well as parks not associated with the Charles River, such as Ashland State Park and several other parks (Figure 3-1; Table 3-1). Major roads surveyed in this area included Storrow Drive, Memorial Drive, Soldier's Field Road, McGrath Highway, West Roxbury Parkway, and Veterans of Foreign Wars Parkway. This section presents AECOM's Program Year Four inspection activities and results.

Figure 3-1. Program Year Four Survey Area



NOTE: Not all features surveyed in state parks included on figure

3.1 Sample Location Statistics

During the 2011 field season, AECOM field crews investigated over 2,480 stormwater features, mostly in in the Charles River watershed. Work was conducted in 18 cities and towns on 43 miles of roadway and included features in 30 DCR parks, as shown in Table 3-1.

Table 3-1. Summary of Work by Town

Town	Features	Roads (miles)	Parks
Ashland	25	*	Ashland State Park
Belmont	3	*	Beaver Brook Reservation
Boston	1249	27.4	Charles River Reservation, Chestnut Hill Reservoir, Kelly Rink, Malibu Beach, Museum of Science, Neponset Valley Parkway, North End (Steriti) Rink, Old Harbor Reservation, Stony Brook Reservation, West Roxbury Parkway
Brookline	183	2.0	Hammond Pond Parkway
Cambridge	491	4.0	Gore Street (Simoni) Rink, Kennedy Park
Clinton	6	*	Philip J. Weihn Memorial (Clinton) Pool
Marlborough	1	*	Sudbury Reservoir
Natick	16	*	Cochituate State Park
Newton	121	2.8	Hammond Pond Reservation
Shrewsbury	3	*	Oak Island Boat Ramp
Somerville	147	4.5	Foss Park, Mystic River Reservation
Southborough	14	*	Sudbury Reservoir
Waltham	53	0.3	Riverwalk Park
Watertown	29	*	Dealtry Pool
Wayland	3	*	Cochituate State Park
Wellesley	3	0.2	Charles River Reservoir
Weston	51	1.6	Leo Martin Golf Course, River St., Weston Reservoir
Worcester	82	*	Dennis F. Shine Memorial Swimming Pool, Quinsigamond State Park
Total	2480	42.9	-

*Features in parks only

Table 3-2 shows the breakdown of stormwater features by type. The stormwater systems were comprised primarily of catch basins, manholes, outlets and inlets, but also include other features such as yard drains, drywells, and oil/grit separators.

Table 3-2. Summary of Features Investigated in Program Year Four

Feature	Total
Catch basin	1,349
Manhole	550
Outlet	381
Inlet	67
Other	133
Total	2,480

3.2 Sampled Flow Results

Field crews collected samples from nine features with flow and field tested the discharge for a series of analytes according to the IDD protocol, described briefly in Section 2.2 and outlined in Appendix A. Based upon field analytical test results and field observations, AECOM crews categorized flows as either possibly illicit or not likely illicit. Figure 3-2 shows the procedure used to characterize flow samples from chemical analysis results based on the Charles River Illicit Discharge Detection and Elimination Protocol. In general, high surfactant levels indicate a wastewater source (sanitary sewer or washwater contamination, depending on ammonia to potassium ratio); low surfactant and high fluoride levels indicate a tap or irrigation source; and low surfactant and fluoride levels indicate a natural water source. Field tested temperature and pH, as well as visual inspection of the flow and stormwater system, also contributed to flow characterization. Table 3-3 details the visual observations, analytical results, and recommendations for each flow.

Figure 3-2. Field Analysis Flow Chart

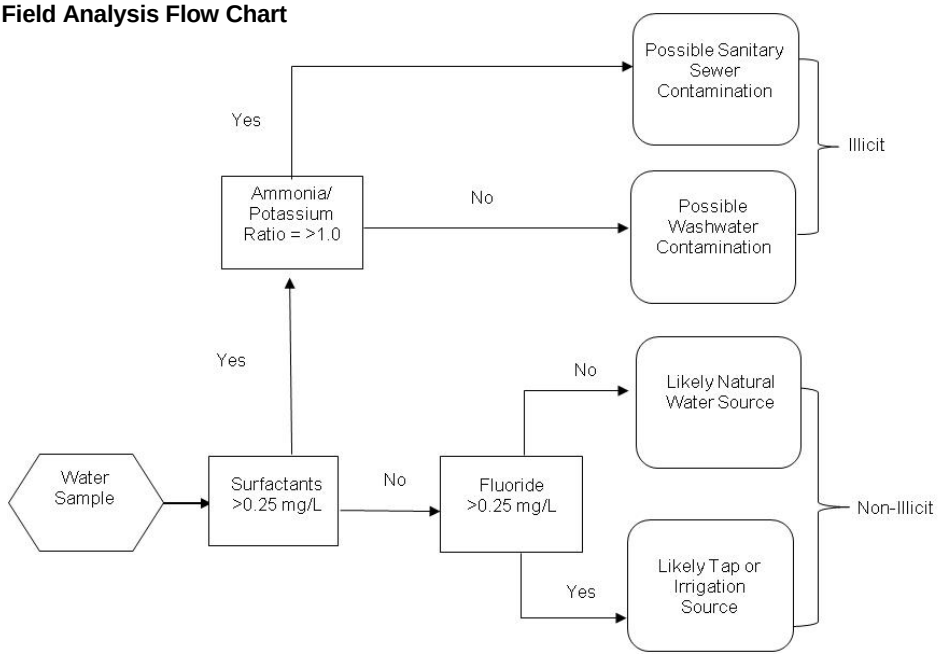


Table 3-3. Summary of Program Year Four IDD Analytical Results

Figure	Feature ID	Flow	Turbidity	Floatables	pH	Temp (°F)	Surfactants (mg/L)	NH_3 (mg/L)	K^+ (mg/L)	NH_3/K^+ Ratio	Fluoride (mg/L)	Potential Source	Justification	Recommended Action
Not Likely Illicit														
	26688	1/4 Full	None	None	7.6	73.9	0.15	NT	NT	NT	0.17	Natural water	Low surfactants, low fluoride	No action necessary
	27624	Trickle	Slightly Cloudy	None	7.6	79.2	0.25	NT	NT	NT	0.19	Natural water	Low fluoride	No action necessary
Possibly Illicit														
3-3	16058	Trickle	None	None	7.3	64.0	0.50	0	600	0	NT	Washwater	High surfactants, low NH_3/K^+ ratio	TV inspect for cracks in pipe
3-4	19440	1/2 Full	None	None	10.0	100.6	0.15	NT	NT	NT	1.45	Tap or irrigation	High temperature, low surfactants, high fluoride	Flow likely coming from adjacent cogeneration plant; revisit and work with property owners to determine extent of system and determine if flow was permitted discharge
3-5	22513	Trickle	Clear	None	7.0	64.8	0.75	2	19	0.1	NT	Washwater	High surfactants, low NH_3/K^+ ratio	Visited within 48 hours of rain event; revisit during dry weather
3-6	26885	1/4 Full	None	None	9.0	67.8	0.15	NT	NT	NT	1.13	Tap or irrigation	Low surfactant, high fluoride	Visited within 48 hours of rain event; revisit during dry weather and investigate potential irrigation sources
3-7	34787	Trickle	Clear	None	7.0	72.0	0.50	2	2	1	0.52	Washwater or groundwater seepage	High surfactants; field crew observed groundwater seepage in upstream catchbasin	Visited within 48 hours of rain event; revisit during dry weather and investigate upstream
3-8	35743.1	Trickle	None	None	7.7	62.6	0.25	1	5	0.2	NT	Washwater	Low NH_3/K^+ ratio	Visited within 48 hours of rain event; revisit during dry weather and investigate upstream
3-9	35806.1	Trickle	Clear	None	6.8	66.6	0.00	NT	NT	NT	0.11	Natural water	Low surfactants, low fluoride	Visited within 48 hours of rain event; revisit and inspect for dry weather flow

NT=Not tested

3.3 Summary of Suspected Illicit Discharges

The following figures summarize the results of the analytical tests and field observations for the discharges determined by the field crew to be possibly illicit. The summaries include:

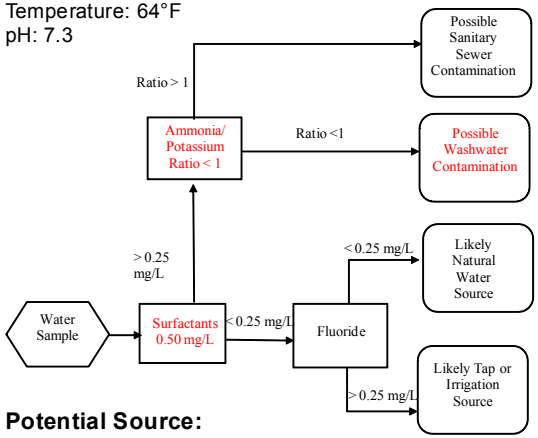
- Feature location
- Associated stormwater system
- Descriptions of the discharge
- Suspected source
- Recommended actions
- Photograph of feature (when available)

Figure 3-3.
Summary for Feature 16058
Fellsway and Shore Drive, Somerville, MA
Inspection Date: 6/28/11

Colorless, odorless flow was observed in manhole 16058. Flow was not observed in the downstream outfall. A trickle was observed in the nearest upstream manhole but no flow was observed in the catchbasins farther upstream.

IDD Test Results:

Days since last rain event: 3 (0.27")
Temperature: 64°F
pH: 7.3

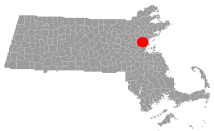


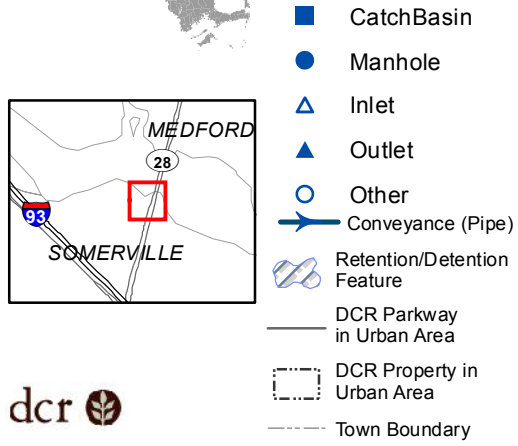
Potential Source:

-Washwater

Recommended Actions:

-TV inspect for cracks in pipe





Note: Red features represent observed dry weather flow path

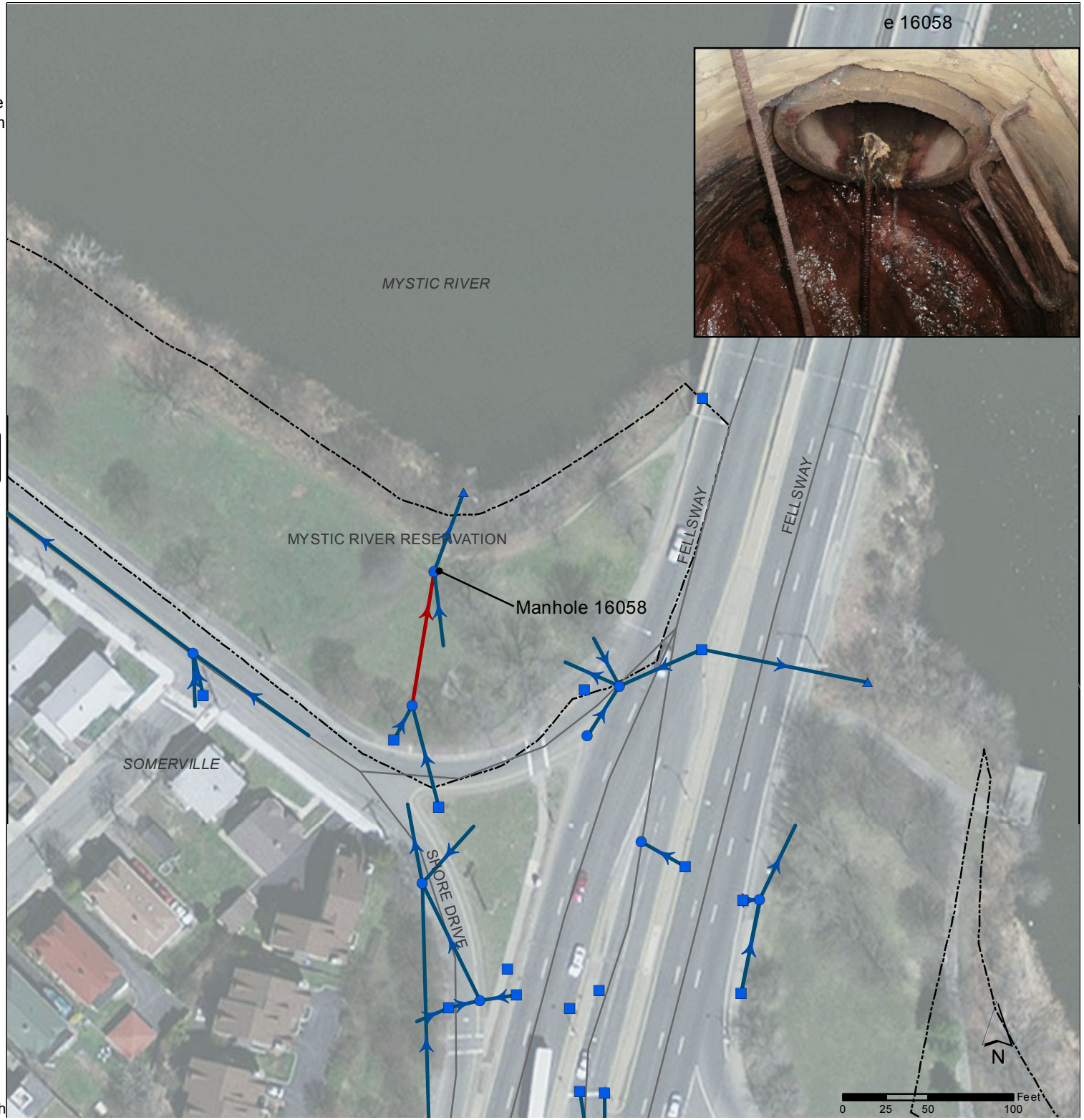
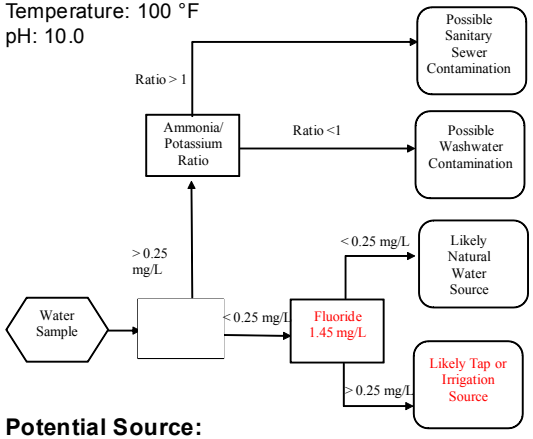


Figure 3-4.
Summary for Feature 19440
Memorial Drive, Cambridge, MA
Inspection Date: 6/28/11

Dry weather flow observed at manhole 19440 and traced to a manhole off DCR property located near the Kendall Cogeneration Station. During the observation period, flow began as a trickle and increased to 1/2 full flow. Flow was very hot and may have been used as coolant at the cogeneration station.

IDD Test Results:

Days since last rain event: 3 (0.27")
Temperature: 100 °F
pH: 10.0

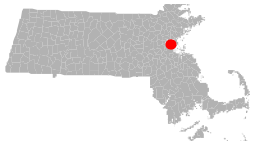


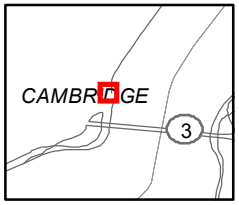
Potential Source:

-Likely tap water used as coolant for cogeneration plant on Memorial Drive

Recommended Actions:

-Follow up with cogeneration station owners to determine upstream source and determine if there is a permitted discharge





- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

Note: Red features represent observed dry weather flow path

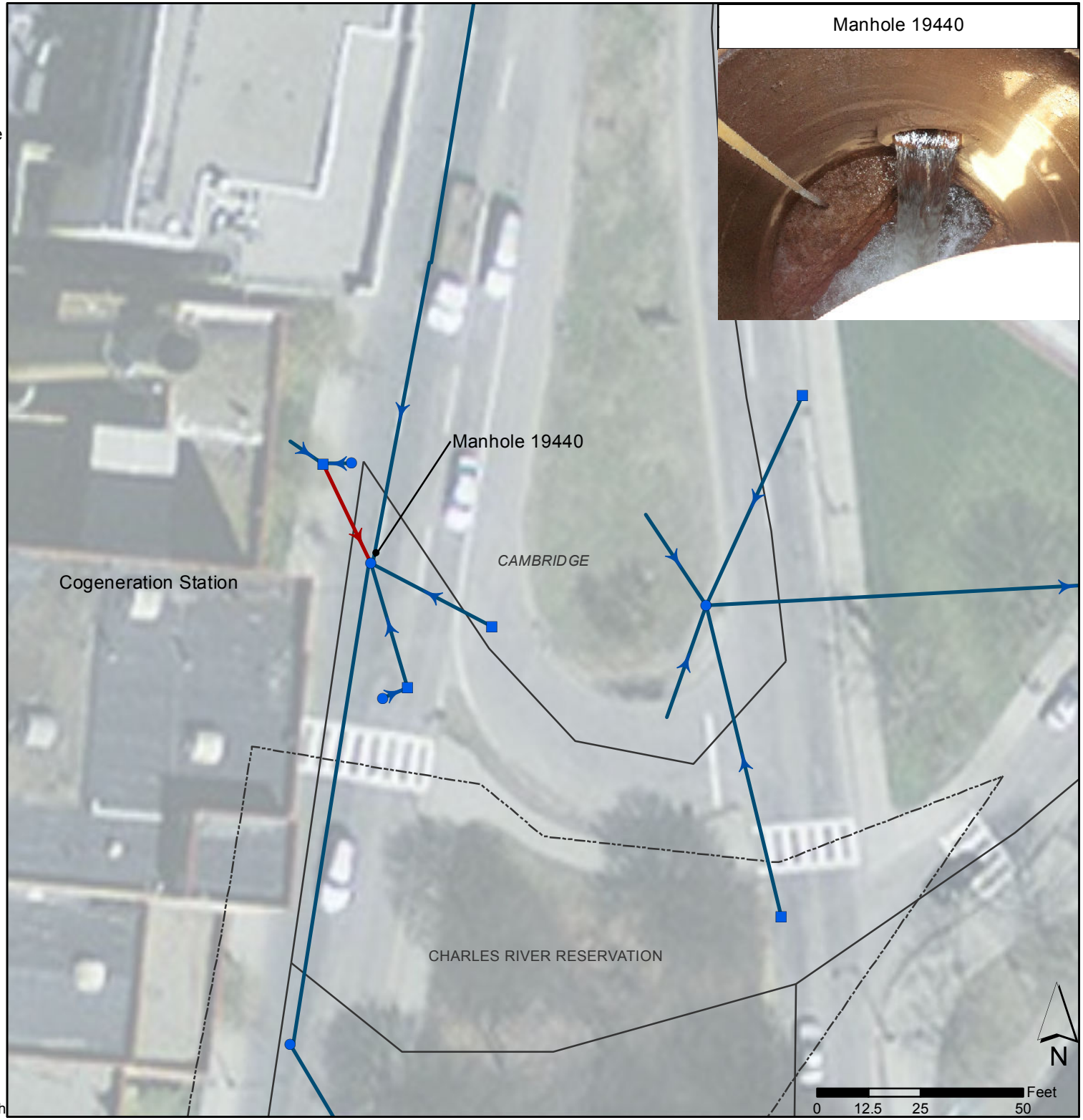
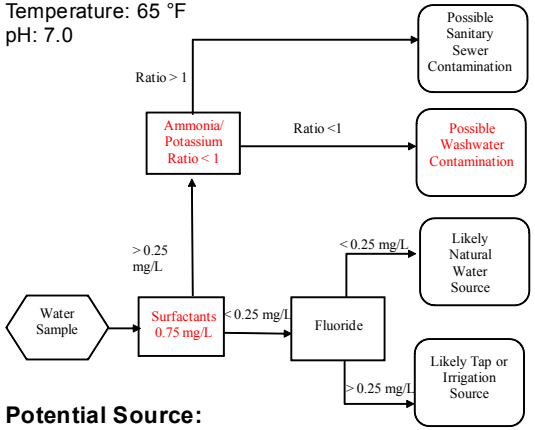


Figure 3-5.
Summary for Feature 22513
Shore Dr., Somerville, MA
Inspection Date: 6/30/11

Colorless, odorless flow was observed in outfall 22513. One day prior, a 0.18" precipitation event ocurred. The flow was followed upstream to a manhole nearby which contained water but did not have any incoming flow or visible turbulence at the water surface. The crew observed staining in the outlet pipe.

IDD Test Results:

Days since last rain event: 1 (0.18")
Temperature: 65 °F
pH: 7.0

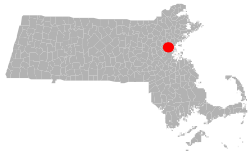


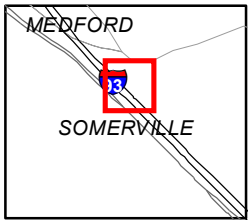
Potential Source:

-Washwater contamination from commercial area across I-93.

Recommended Actions:

-Revisit during dry weather conditions.
-Follow up with private property owners to determine upstream source.





dcr

AECOM

- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

Note: Red features represent observed dry weather flow path

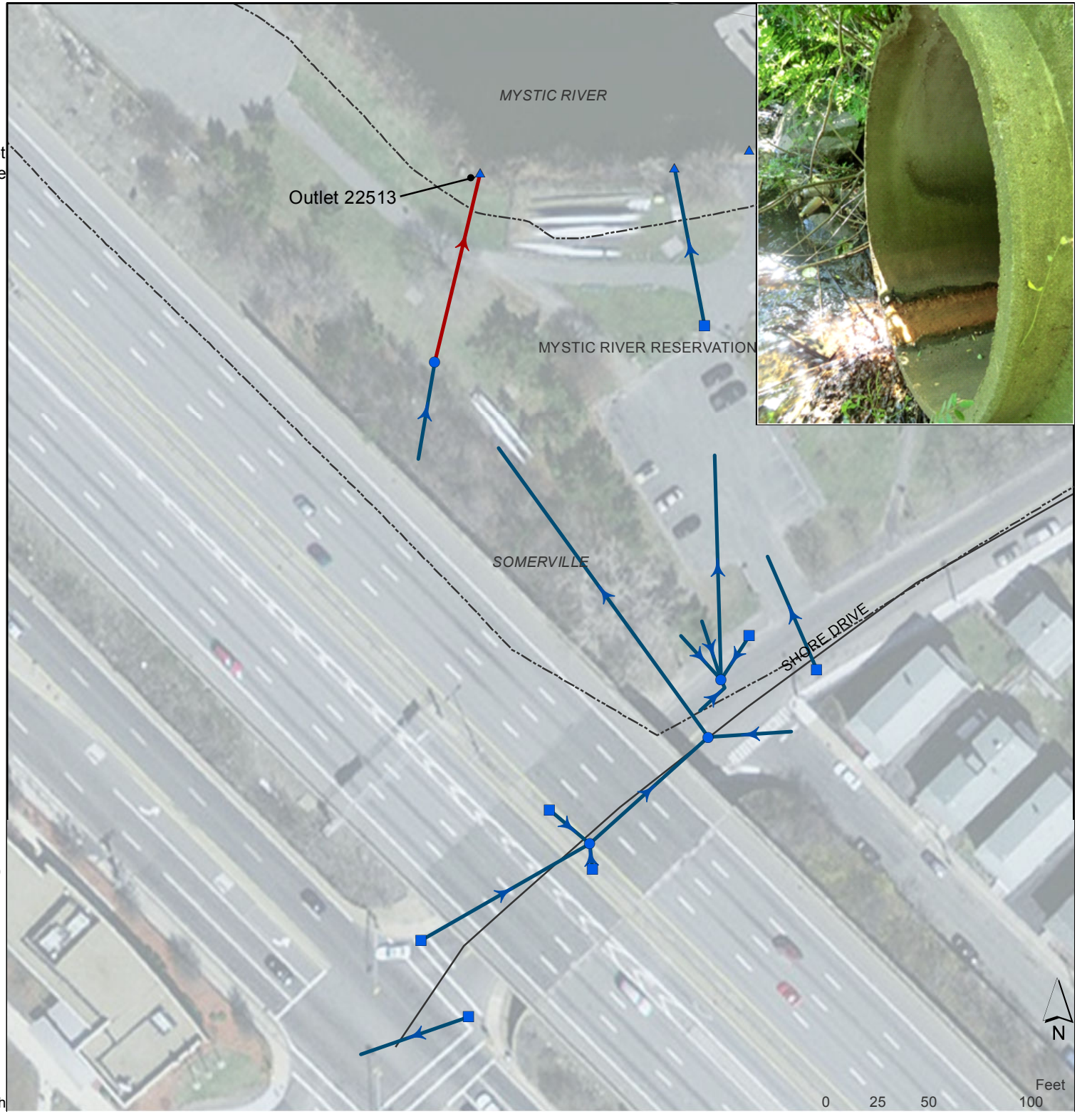
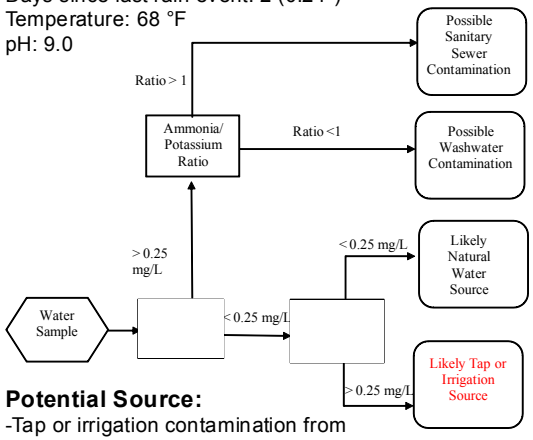


Figure 3-6.
Summary for Feature 26885
Waltham, MA
Inspection Date: 7/27/11

Colorless, odorless flow was observed in outfall 26855. A precipitation event of 0.21" ocurred 2 days prior to the investigation. The flow was followed upstream to a catchbasin which did not have flow. The flow may have been related to the prior precipitation or there may be a crack in the pipe allowing groundwater seepage.

IDD Test Results:

Days since last rain event: 2 (0.21")
Temperature: 68 °F
pH: 9.0

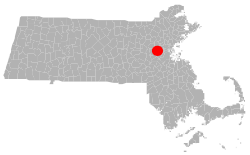


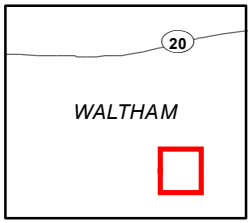
Potential Source:

-Tap or irrigation contamination from private property
-Groundwater seepage

Recommended Actions:

-Revisit during dry weather conditions and resample if flow observed





dcr

AECOM

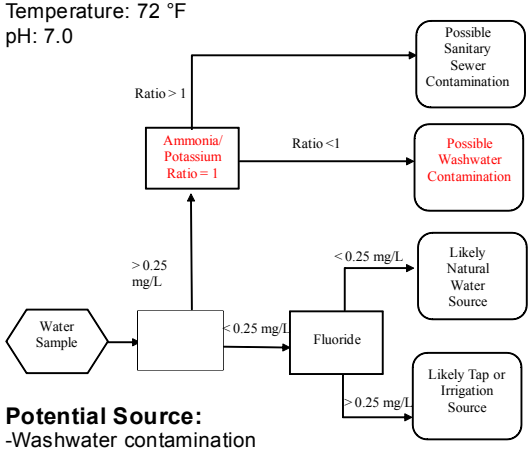
- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

Note: Red features represent observed dry weather flow path

Figure 3-7.
Summary for Feature 34787
Storrow Dr., Boston, MA
Inspection Date: 7/15/11

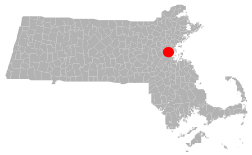
Colorless, odorless flow was observed in manhole 34787 and cloudy-colored standing water was present in the feature. During the previous week, groundwater seepage was observed in an upstream catchbasin. A precipitation event of 0.72" ocurred 1 day prior.

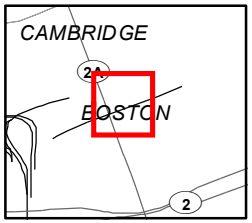
IDD Test Results:
Days since last rain event: 1 (0.72")
Temperature: 72 °F
pH: 7.0



Potential Source:
-Washwater contamination
-Groundwater seepage

Recommended Actions:
-Revisit during dry weather conditions and check for upstream groundwater seepage





- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

Note: Red features represent observed dry weather flow path

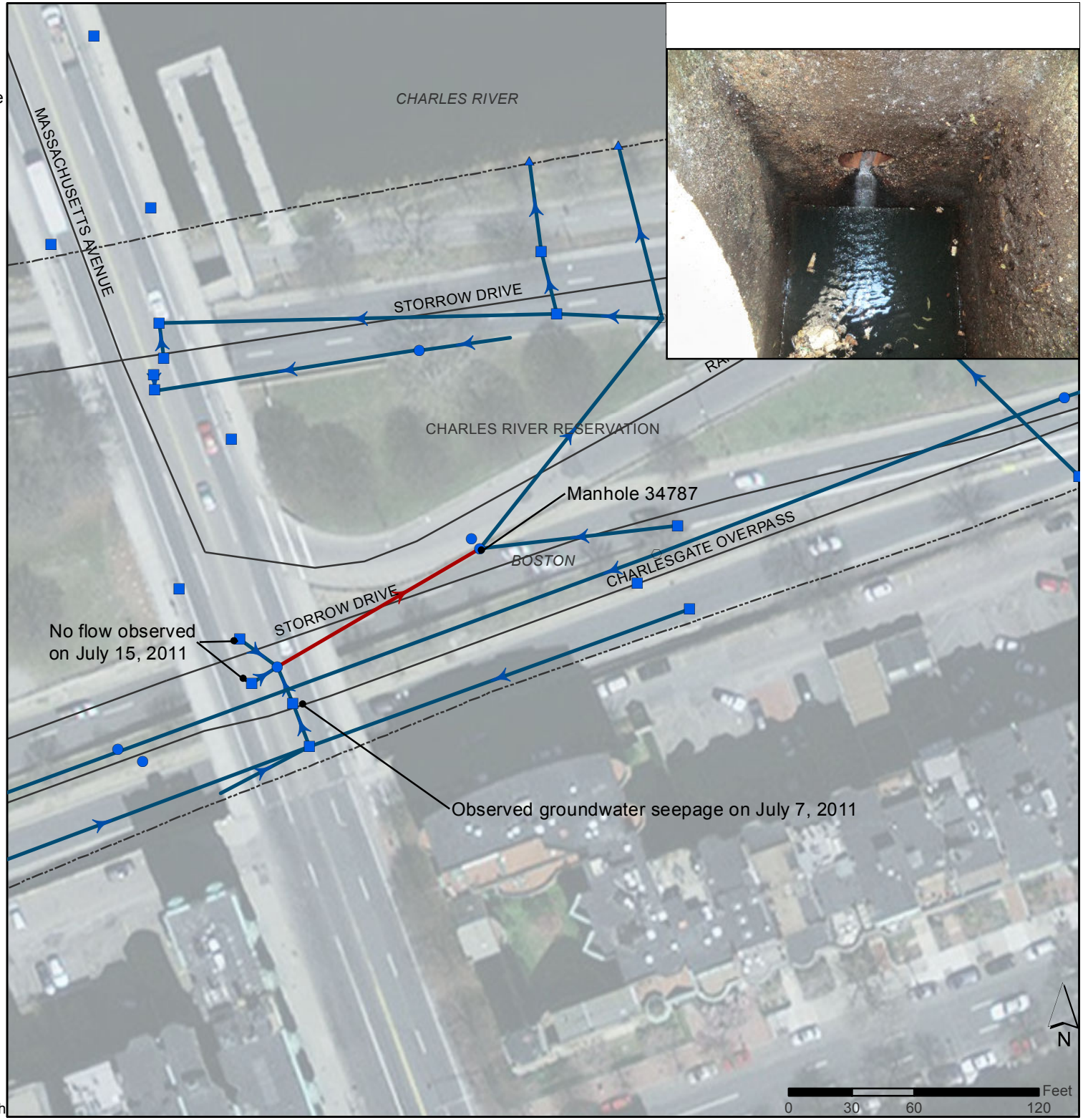
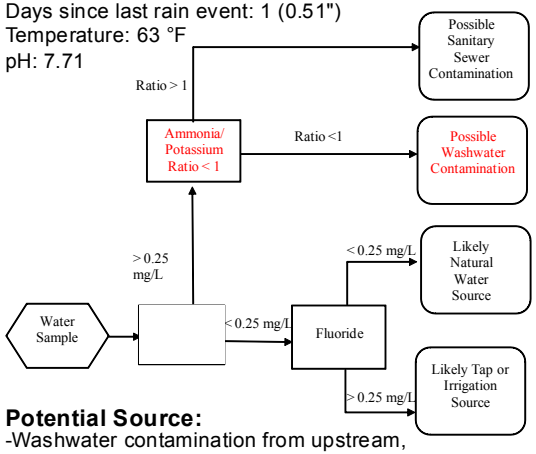


Figure 3-8.
Summary for Feature 35743.1
Beacon St., Boston, MA
Inspection Date: 6/10/11

Flow was observed in manhole 35743.1 near Chestnut Hill Reservoir in Boston. A flow was also observed in the upstream catchbasin but was too small to sample. A precipitation event of 0.51" occurred 1 day prior. There is a residential area upstream that may have contributed to the flow.

IDD Test Results:

Days since last rain event: 1 (0.51")
Temperature: 63 °F
pH: 7.71

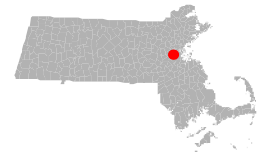


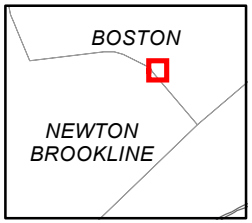
Potential Source:

-Washwater contamination from upstream, private property

Recommended Actions:

-Revisit during dry weather conditions and investigate upstream





- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

dcr

AECOM

Note: Red features represent observed dry weather flow path

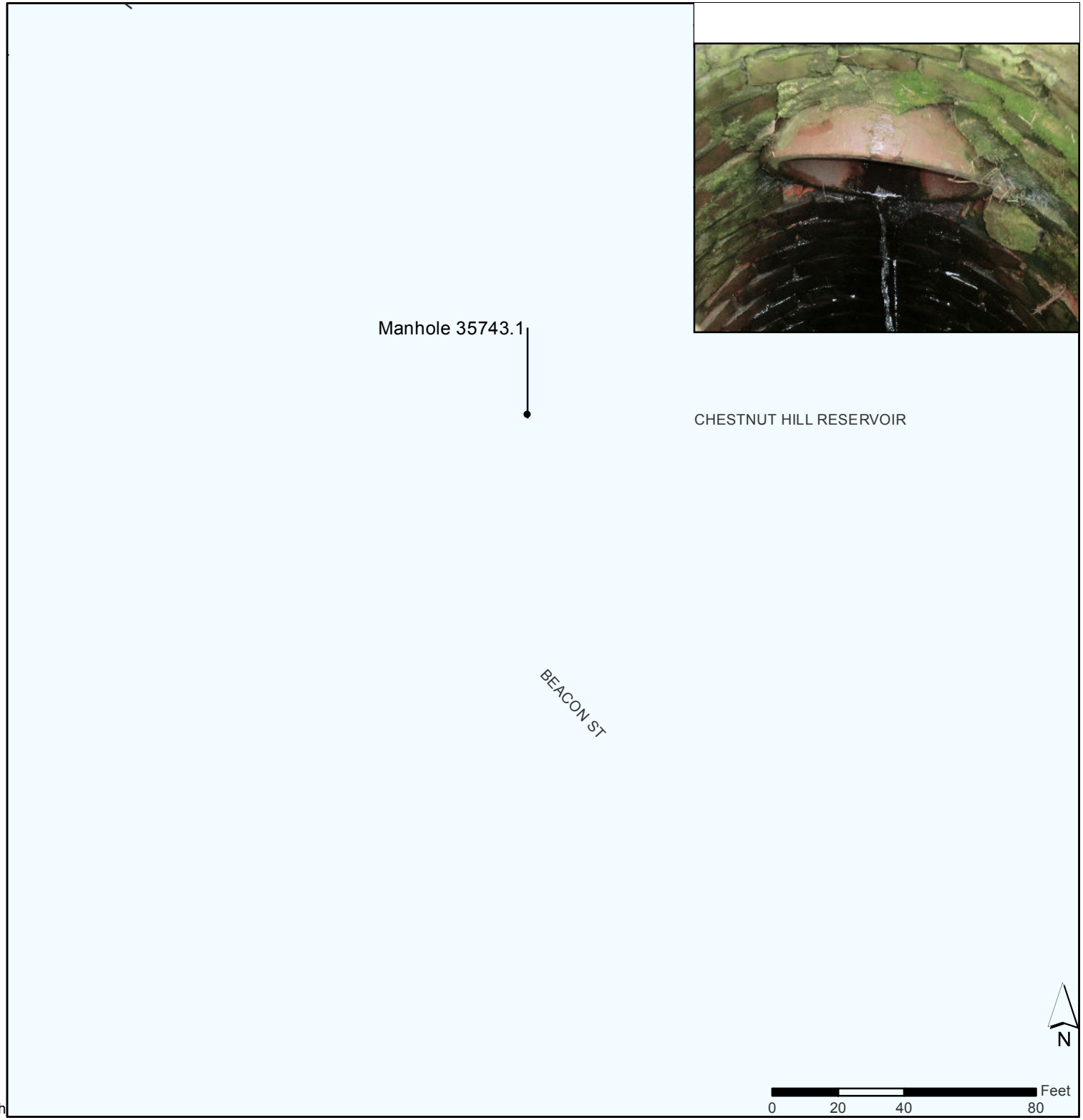
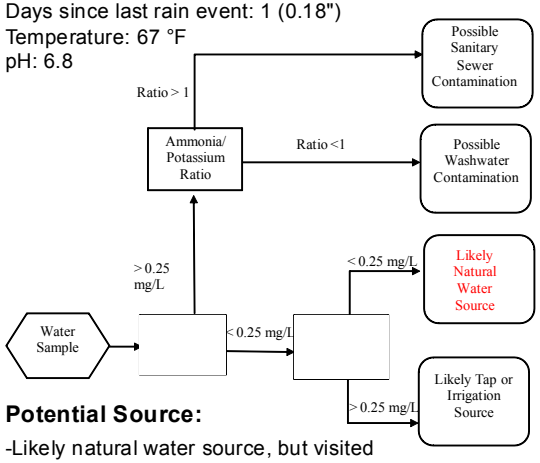


Figure 3-9.
Summary for Feature 35806.1
Foss Park, Somerville, MA
Inspection Date: 6/30/11

A steady trickle was observed in manhole 35806.1 with a layer of orange precipatate in the incoming pipe. No feature was visible upstream along a straight path of pipe for several hundred feet and no flow was observed in the downstream manhole. There are many mapped features in Foss Park that are no longer visible and may be covered with grass. A rain event of 0.18" occurred 1 day prior.

IDD Test Results:

Days since last rain event: 1 (0.18")
Temperature: 67 °F
pH: 6.8

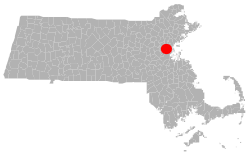


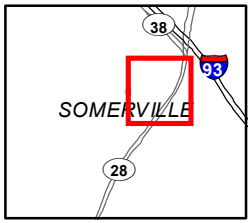
Potential Source:

-Likely natural water source, but visited within 2 days of rain event

Recommended Actions:

-Revisit during dry weather conditions





- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

dcr

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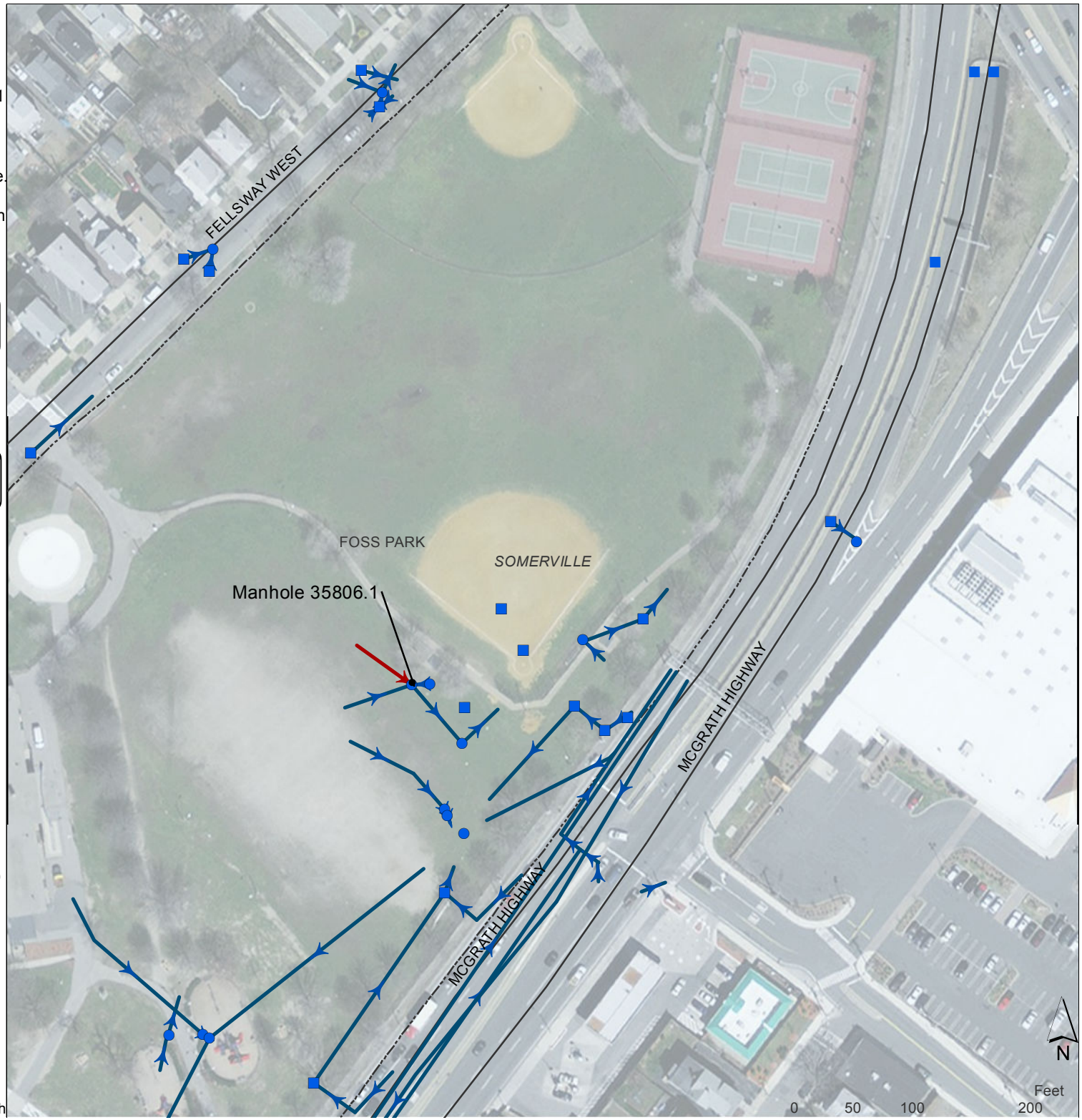
Note: Red features represent observed dry weather flow path



4.0 Follow Up of IDD Investigations from Previous Rotations

In addition to features investigated as part of the regular rotation, AECOM conducted follow up visits of potentially illicit features from past rotations. Features with illicit flows during past rotations were targeted for follow up visits if the original visit was conducted during wet weather or if the potential illicit connection was not determined. Features selected for follow up investigations are presented in Table 4-1.

Table 4-1. Features from Past Rotations Requiring Follow Up

Report Year	Feature ID	Flow	Potential Source	Justification
2008	18300	Trickle	Wastewater	High boron level
2008	18313	1/2 Full	Wastewater	High boron levels
2008	18480	Trickle	Wastewater	High boron level
2008	18571	1/2 Full	Tap or Irrigation - Possible Sewer	Low boron, high fluoride levels
2009	2116	Trickle	Wastewater	Very high boron; soapy smell
2009	13267	Trickle	Wastewater	High boron level
2009	15578	Trickle	Wastewater	High boron level
2009	21518	Trickle	Wastewater or Natural	Borderline boron, low fluoride
2009	22028	Trickle	Tap or Irrigation	High fluoride; sudsy
2009	22265	Trickle	Sanitary, tap, or irrigation	Borderline boron; NH_3/K^+ ratio >1; high fluoride
2009	23278	Trickle	Wastewater	High boron and fluoride; brown color
2009	30606	Trickle	Wastewater	High boron levels
2009	30901	Trickle	Wastewater	High boron levels
2010	3171	Trickle	Washwater	High surfactant, low ratio
2010	19196	Trickle	Washwater or tap or irrigation	Borderline surfactant, high fluoride, low ratio
2010	19571	Trickle	Natural or tap or irrigation	Low surfactant, borderline fluoride
2010	20036	Trickle	Washwater	High surfactant, low ratio
2010	20057	Trickle	Washwater	High surfactant, low ratio
2010	21250	Trickle	Tap or irrigation	Low surfactant, high fluoride

Follow up investigations were conducted according to the protocol described earlier in Section 2.2 and in Appendix A. Features were only investigated during dry weather conditions (> 48 hours since last rain event).

4.1 Flow Results

Follow up investigations were conducted from August 5th to October 7th, 2011. AECOM field crews investigated all 19 features listed in Table 4-1 and observed flows at 16 features. With the exception of one feature with flow too minor to sample, all flows were sampled and field tested for a series of analytes according to the IDD protocol. Table 4-2 details the visual observations, analytical results, and recommendations for each suspected illicit discharge.

Table 4-2. Summary of IDD Analytical Results of Follow Up Investigations

Figure	Feature ID*	Flow	Turbidity	Float-ables	pH	Temp (°F)	Surfactants (mg/L)	NH_3 (mg/L)	K^+ (mg/L)	NH_3/K^+ Ratio	Fluoride (mg/L)	Potential Source	Justification	Recommended Action
Not Likely Illicit														
	2116 (21435)	Trickle	Not Noted	Not Noted	7.8	63.1	0.15	0	0	0	0.18	Natural water	Chemistry; observed seepage upstream	No action necessary
	13267**	Not Noted	Cloudy	None	8.4	63.6	0.18	0.5	2.5	0.2	0.32	Tap or irrigation	Low surfactants, high fluoride	No action necessary
	15578	Trickle	None	None	8.5	60.1	0.15	1	15	0.1	0.13	Natural water	Low surfactants, low fluoride	
	18300	Trickle	None	None	7.2	79.0	3.00	0	260	0	1.84	Natural water-Tidal backwash	Similar salinity in bay	No action necessary
	18480	Trickle - too small to sample										Natural water-Groundwater seepage	No upstream feature, seepage through cracks in feature	No action necessary
	19196	1/4 Full	None	None	7.8	63.2	0.40	0	0	0	NT	Natural water	Field crew observed flow as a culverted stream	No action necessary
	20036 (34318.1)	Trickle	Clear	None	7.9	72.7	0.15	0	7	0	0.61	Tap or irrigation, overflow from nearby fountain	Low surfactants, high fluoride, proximity and likely connection to fountain overflow drains	No action necessary
	21250 (2703)	Trickle	Clear	Oil	7.7	77.2	0.25	7	6	1.2	0.45	Trickle from upstream, partially clogged catch basin with standing water	Clogged catch basin upstream with standing water but no incoming flow.	Clean catch basin

Table 4-2. Summary of Follow Up Investigations (continued)

Figure	Feature ID	Flow	Turbidity	Float-ables	pH	Temp (°F)	Surfactants (mg/L)	NH_3 (mg/L)	K^+ (mg/L)	NH_3/K^+ Ratio	Fluoride (mg/L)	Potential Source	Justification	Recommended Action
Not Likely Illicit (continued)														
	21518	Trickle	None	None	7.9	79.9	0.12	0	0	0	0.80	Tap or irrigation or natural	Seepage observed, no upstream source	No action necessary
	22028	Trickle	None	None	8.4	72.7	0.15	NT	NT	NT	0.84	Tap or irrigation	Low surfactants, high fluoride	No action necessary
	22265	Trickle	None	None	7.1	64.2	0.20	2	13	0.2	0.31	Tap or irrigation	Low surfactants, high fluoride	No action necessary
	23278	Trickle	Not Noted	Not Noted	8.2	61.2	0.20	0	28	0	0.03	Natural water	Low surfactants, low fluoride	No action necessary
	30901	Trickle	Clear	None	NT	NT	NT	NT	NT	NT	NT	Natural water-groundwater seepage	Observed no illicit connection or potential for connection	No action necessary
Possibly Illicit														
4-1	18571 (13218)	1/4 Full	Clear	None	7.5	62.1	0.50	1	1	1	0.30	Sanitary or washwater	High surfactants	TV inspect
4-2	19571 (35951.1)	1/4 Full	None	None	7.3	69.8	0.70	6	0	>>1	NT	Sanitary	High surfactants	Revisit and open feature
4-3	20057	Trickle	None	None	7.5	71.6	0.68	0	0	0	0.26	Washwater	High surfactants, low NH_3/K^+ ratio	Follow up with property owners upstream

* Flows were traced and tested at upstream feature listed in parentheses. At feature 19571 only, flow tested at downstream feature because target feature could not be opened

** Flow tested twice; average presented

NT=Not tested

4.2 Summary of Suspected Illicit Discharges

The following figures summarize the results of the analytical tests and field observations for the discharges determined by the field crew to be possibly illicit. The summaries include:

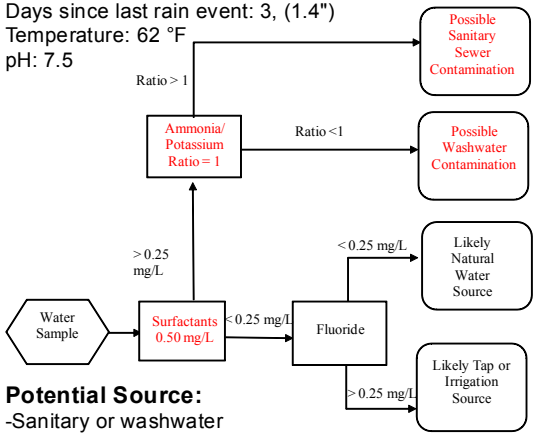
- Feature location
- Associated stormwater system
- Descriptions of the discharge
- Suspected source
- Recommended actions
- Photograph of feature

Figure 4-1.
Summary for Feature 18571
Jamaicaway,Boston, MA
Inspection Date: 8/18/2011

Manhole 18571 was originally investigated in 2008 and the field crew suspected a tap or irrigation source, or possibly sewer contamination. During the 2011 investigation, the field crew observed flow in manhole 18571 and traced the flow upstream to manhole 13218. The flow was colorless, odorless, and had no floatables. The flow was rushing into manhole 13218 from the upstream clay pipe and flowed through a round brick channel in the base of the manhole. The pipe upstream leads to a parking lot. No upstream feature was observed in the grass, parking lot, street, or area immediately across the street and therefore the source of the flow could not be identified. The AECOM crew sampled the flow from manhole 13218. The chemistry of the sample from manhole 13218 indicates possible sanitary sewer or washwater contamination.

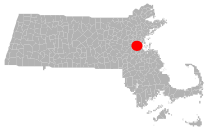
IDD Test Results:

Days since last rain event: 3, (1.4")
Temperature: 62 °F
pH: 7.5



Potential Source:
-Sanitary or washwater contamination; potential sewer line input

Recommended Actions:
-TV inspect



dcr

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- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

Note: Red features represent observed dry weather flow path

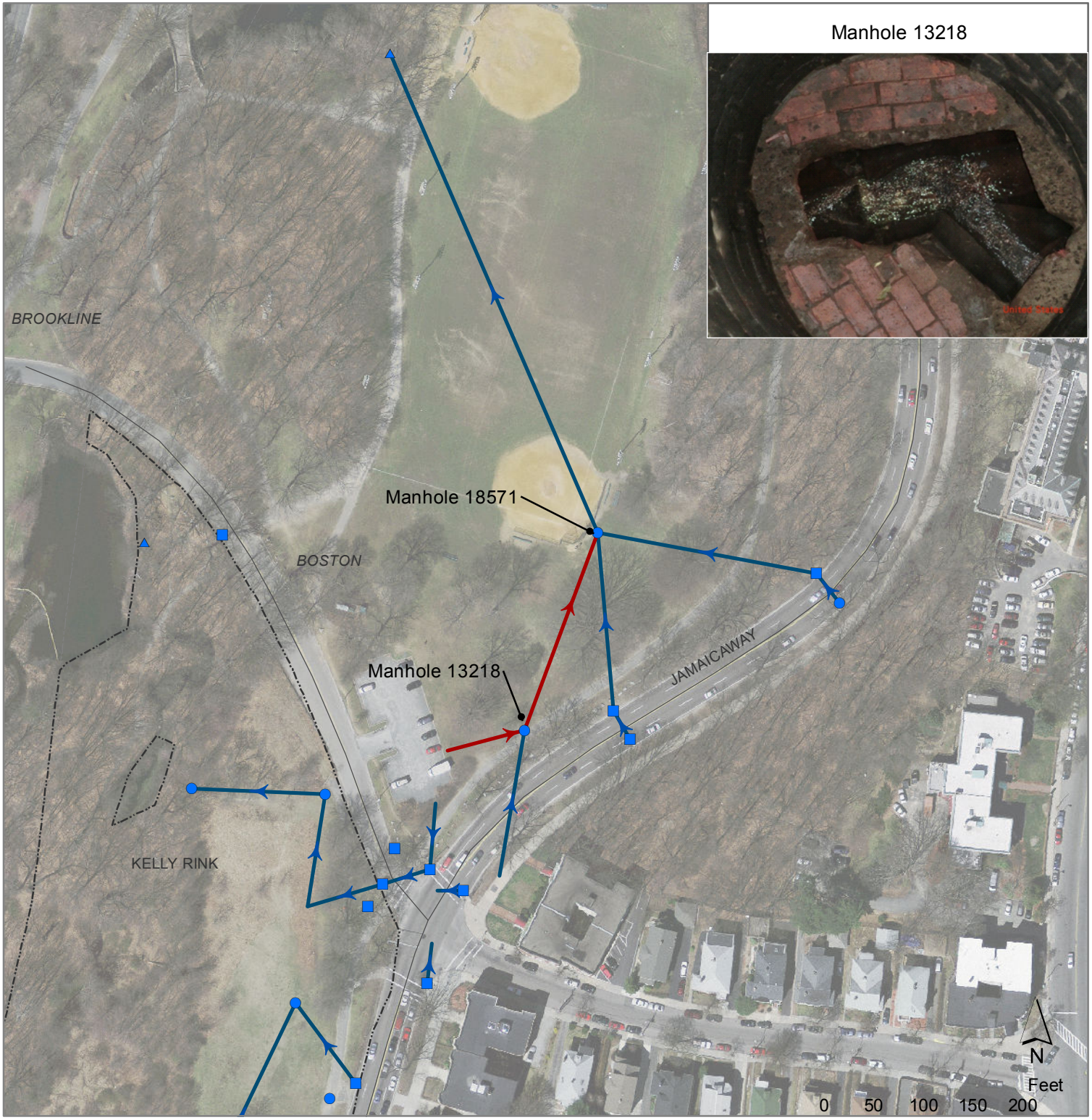
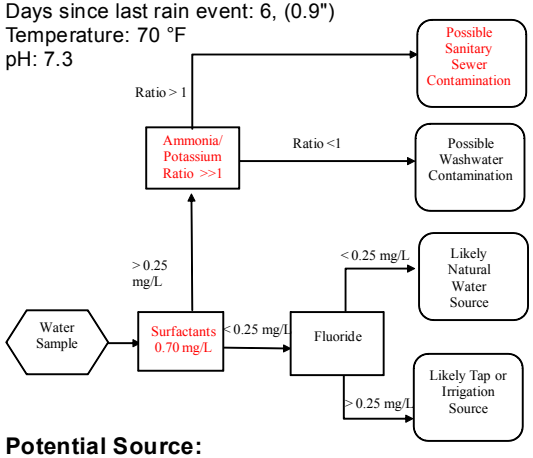


Figure 4-2.
Summary for Feature 19571
Charles River Road,Watertown, MA
Inspection Date: 9/14/2011

Manhole 19571 was originally inspected in 2010 during wet weather conditions. During the dry weather, 2011 field visit, the field crew was unable to open the manhole; therefore, the field crew opened and inspected manhole 35951.1, directly downstream of manhole 19571. In manhole 35951.1, the field crew observed a 1/4 full flow from the direction of feature 19571. No flow was observed entering manhole 35951.1 from the two upstream catch basins. Testing indicated possible sanitary sewer contamination.

IDD Test Results:
Days since last rain event: 6, (0.9")
Temperature: 70 °F
pH: 7.3

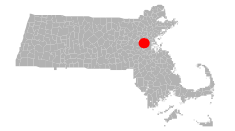


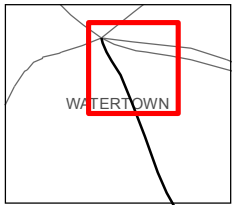
Potential Source:

-Sanitary or washwater contamination from private property

Recommended Actions:

-Revisit and open feature





- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

Note: Red features represent observed dry weather flow path

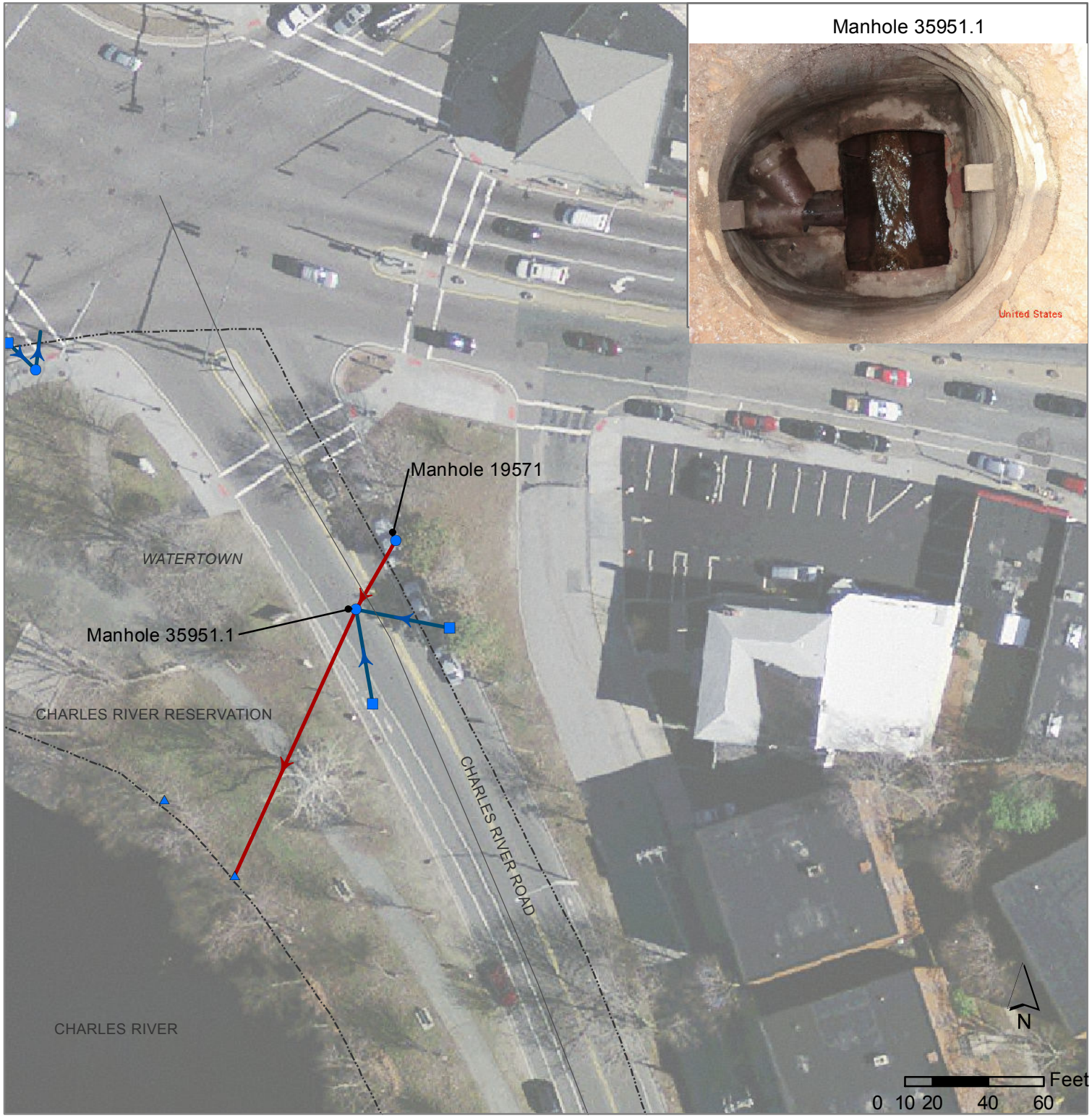
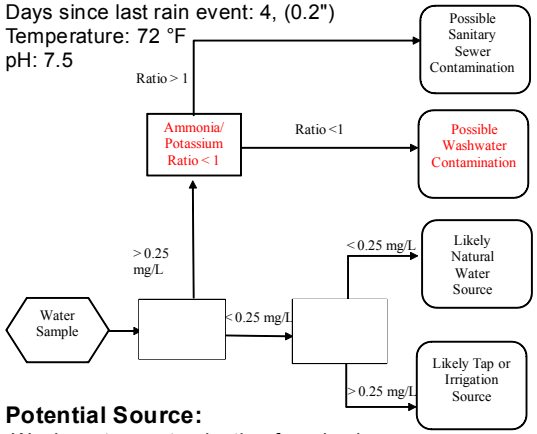


Figure 4-3.
Summary for Feature 20057
Soldiers Field Road,Boston, MA
Inspection Date: 9/01/2011

Feature 20057 was originally investigated in 2010 and the field crew suspected potential washwater contamination in the flow. During the follow up investigation, the team observed dry weather flow (trickle) in manhole 20057. Flow was odorless and colorless and testing indicated possible washwater contamination. The system originated upstream from private property. No irrigation, above ground illicit connections, or sources of dry weather flow were observed.

IDD Test Results:

Days since last rain event: 4, (0.2")
Temperature: 72 °F
pH: 7.5

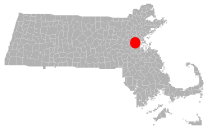


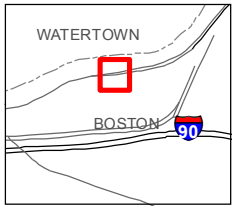
Potential Source:

-Washwaster contamination from business on private property.

Recommended Actions:

-Follow up with private property owner to determine upstream source.



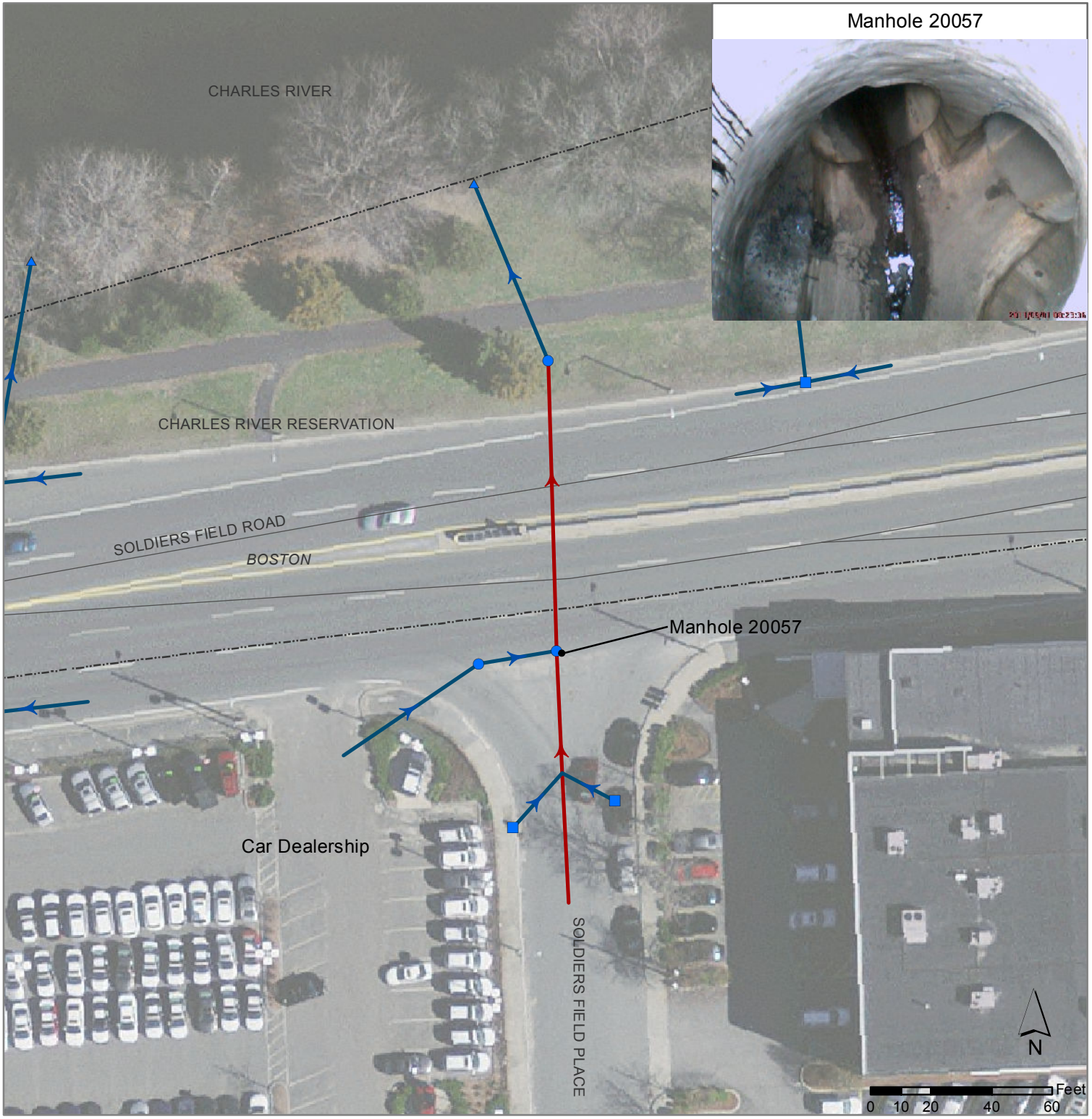


- CatchBasin
- Manhole
- Inlet
- Outlet
- Other
- Conveyance (Pipe)
- Retention/Detention Feature
- DCR Parkway in Urban Area
- DCR Property in Urban Area
- Town Boundary

dcr

AECOM

Note: Red features represent observed dry weather flow path



5.0 Discussion and Conclusions

5.1 Program Year Four

The AECOM field team collected samples from nine flows within the 2011 survey area. For two of the locations, analytical results of the samples and field observations suggested a natural water source for the discharge, such as groundwater seepage into the stormwater system. Analytical results and field observations suggested that seven identified flows were potentially illicit discharges.

AECOM recommends further investigation of the seven potentially illicit discharges, including additional follow up visits and extended surveys of the stormwater system in conjunction with adjacent property owners to identify, characterize, and eliminate the potentially illicit flows. In cases where flows originated from or continued onto property not owned by DCR, DCR will need to work with local municipalities or private landowners to address the suspected flows.

The field teams surveyed five of the potentially illicit flows (Feature 22513, Figure 3-5; Feature 26885, Figure 3-6; Feature 34787, Figure 3-7; Feature 35743.1, Figure 3-8; and Feature 35806.1, Figure 3-9) less than 48 hours after rain events greater than 0.1 inches. Therefore, these samples may have consisted of stormwater runoff; AECOM recommends that these features be reevaluated under dry weather conditions to verify the presence of the discharge.

The flow at Feature 16058 (Figure 3-3) likely originated on DCR property, either from the Mystic River Reservation where the feature was located or the DCR owned roads upstream from the feature. AECOM recommends that DCR work with Mystic River Reservation staff to identify any potential sources of washwater into the system.

The flow at Feature 19440 (Figure 3-4) appeared to originate from the nearby Kendall Cogeneration Station. Although the flow testing indicated possible tap or irrigation source and high pH indicated potential surfactant contamination, the field crew determined that the flow may be a result of cooling water discharge. During the site visit, the field crew observed the flow rate in Feature 19440 increase from a trickle to ½ pipe full and recorded an unusually high sample temperature (100.6 °F), indicating that the flow was potentially coolant water from the cogeneration station. Also, during a previous site visit, the AECOM field crew observed a flow in a manhole upstream from Feature 19440, in the direction of the cogeneration plant. AECOM recommends that DCR follow up with the staff at the cogeneration plant to determine the upstream extent of the system and to determine if the observed flow was a permitted cooling water discharge.

The Illicit Discharge Detection Program developed in 2008 and improved upon over three field seasons allowed AECOM field crews to efficiently and safely investigate 2,480 features on 43 miles of highly urbanized roadway during Program Year Four. Field crews identified potentially illicit flows at seven out of the 2,480 features, or 0.28%. This occurrence of illicit discharges is similar to the low rates observed in Program Year One (0.19%), Program Year Two (0.63%), and Program Year Three (0.43%) and suggests that the study area, which included features in Boston and Cambridge, is not more likely to have illicit connections despite the highly developed nature of the surrounding neighborhoods.

5.2 Recommendations for Flows Observed in Program Year Four

DCR will work to schedule the follow up site visits recommended in Table 3-3. Due to winter weather conditions, these follow up visits may be scheduled for Spring 2012. Results from these visits will be included in the 2012 IDD Report

5.3 Follow Up IDD Investigations

During follow up visits, AECOM revisited 19 features, observed 16 flows, and collected and tested 15 samples. At three features, no flow was observed; at one feature, the flow was too small to sample. Of the 15 tested flows, the majority were from non-illicit sources, such as culverted streams or irrigation sources, and three flows were potentially illicit. Many flows were originally classified as illicit as the result of high boron concentrations, boron is no longer used in the IDD investigations because it is not an ideal indicator of soaps and detergents. Although boron levels can be indicative of soaps, they may be the result of other sources and many soaps do not contain boron. The boron test was replaced with an anionic surfactants test during the 2010 field year to more accurately determine the presence of soaps and detergents.

During follow up investigations, flow was not observed in three features (features 3171, 18313, and 30606) that were originally inspected during wet weather conditions. Natural source flows were observed in six features (features 2116, 15578, 18480, 19196, 23278, and 30901). Non-illicit flows, determined to be from tap or irrigation sources based on field observations and flow chemistry, were observed in five features (13267, 21250, 21518, 22028, and 22265). Although tap or irrigation discharges are not considered illicit according to EPA standards, DCR has the option to follow up with the adjacent business and private property owners to determine any sources of tap or irrigation to the stormwater system. Also, the field crew noted a clogged catch basin in the vicinity of feature 21250 and AECOM recommends that DCR clean the catch basin to improve the drainage of that system.

Non-illicit flows were also observed during the follow up visits at features 18300 and 20036. At feature 18300, field crews tested both the flow in the feature (an outfall into the bay) and a sample from the bay for salinity, conductivity, and the required suite of IDD parameters. Both samples had similar salinities and conductivities; based on these similar chemistries and the absence of upstream features, the field crew determined that the flow was a result of tidal backwash. During the follow up visit at feature 20036, the field crew traced the flow upstream and observed a fountain with overflow drains that were possibly connected to feature 20036. Flow testing indicated a tap or irrigation source and the AECOM field team determined that the flow was likely a result of fountain runoff. Features 18300 and 20036 are no longer suspected of containing illicit flows and do not require additional follow up.

Three potentially illicit flows were observed during the 2011 follow up investigations. In 2008, testing at feature 18571 indicated a tap or irrigation source, but the field team observed the potential for sewer contamination. During the 2011 follow up investigation, the field crew traced the flow upstream to a manhole where sample testing indicated possible sanitary sewer or washwater contamination (Figure 4-1). Although pipes were observed entering the manhole, the field crew did not observe any upstream features. Based on the absence of upstream features and the results of the flow testing, AECOM recommends a TV inspection of this system to identify the source of the flow.

Feature 19571 (Figure 4-2) was first inspected in 2010 during wet weather conditions and the flow testing indicated potential sanitary sewer or washwater contamination. During the 2011 follow up investigation, the field crew was unable to open manhole 19571. However, the field crew opened the manhole directly downstream and observed a flow from the direction of feature 19571; the flow was tested and revealed potential sanitary sewer contamination. This feature is connected to a manhole

which drains to an outfall on the Charles River. AECOM recommends that this site is revisited and manhole 19571 is opened and inspected for illicit connections.

Flow was first observed in feature 20057 (Figure 4-3) in 2010 and again during the 2011 follow up visit. During both field visits, testing indicated possible washwater contamination. The flow appeared to be coming from the main trunk line under a private road with businesses including a car dealership. This stormwater system has an outfall along the Charles River, but the field crew was unable to locate the outfall during the 2011 field visit. AECOM recommends that DCR work with the upstream private property owners to inspect for illicit connections. Although the field team did not observe any activity at the car dealership, runoff from car washing may be a contributor to the observed flow.

5.4 Recommendations for Follow Up Investigations

The follow up visits revealed past potentially illicit flows as non-illicit for several reasons. For example, flows may have been originally sampled during wet weather conditions and the follow up visit revealed that the original flow was a result of precipitation, or the original illicit designation was based on boron concentrations which have since been determined to be an unreliable indicator of surfactants. For the three features with potentially illicit sources during both the original and follow up visits, AECOM recommends further investigation including working with nearby private property owners and utilizing TV inspections of the system.he AECOM field team collected

6.0 References

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Appendix A

Standard Operating Procedures

DCR Illicit Discharge Detection

Field Investigation

Standard Operating Procedure

Summer 2011

1.0 Site Characterization Notes

- Review stormwater infrastructure map of area and determine most effective approach for IDD survey.
- Establish safe working area using traffic control contractor and state police detail.
- Open stormwater feature and confirm/update attributes in database for both points and lines. If from plans you will be prompted to collect a GPS location for the feature.
- If change point location, then also need to move line endpoints.
- Deleted features Points: Delete box set to yes, feature should disappear once map is refreshed
- Deleted features Lines: actually delete features by selecting and deleting
- Duplicate points: Choose which one is “more right” and update that feature. Set the duplicate feature to Delete “yes” and in the Notes include the ENSR_ID of the “right” feature we are keeping.
- If a feature does not appear on the GPS unit, create a new feature and enter attributes. A GPS point will automatically be collected for point features.

2.0 GPS Notes

- To open program, either choose Button 1 or click on IDDE shortcut folder and choose the map file.
- Bluetooth trouble shooting: The GPS should automatically connect. Note that it may take a few minutes. Try the following actions:

  <u>On Computer:</u>

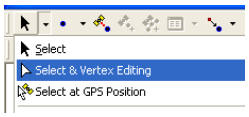
  - Check GPS Preferences:
    - Protocol-- NMEA 0183
    - Port-- COM Port 40
    - Baud Rate-- 4800
  - Check to see if the Wireless Switch is turned on

-  : Indicates that the wireless devices are enabled.
-  : Indicates that the wireless devices are off.
-  : Indicates that the wireless devices have been disabled in the Setup Utility.

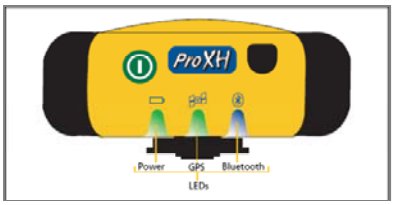
On GPS Reciever:

- Make sure GPS receiver is on and Bluetooth is activated (blue light slowly flashes) If not, press and hold power button for >5 seconds to turn on Bluetooth

- Camera instructions: Choose Button 2 or Start>Programs>AMCap
  - Will save picture to folder with shortcut on desktop
- Must be in editor mode to change point/record data and must click “OK” to save GPS form.



- To edit pipes, choose the vertex editor. Digitize pipes from upstream to downstream.
- The GPS unit must be turned off during lunch and at the end of the day to save battery.
- The GPS unit needs to be charged every night; either in the office or at home (make sure you have the charger).



During operation, the LEDs provide the following status information:

LED	Color	Mode	Status
Power	Green	Solid	Good
	Red	Short flash[1]	Low
	Amber	Short flash	Charging
	Amber	Solid	Fully charged and on external power
GPS	Green	Long flash[2]	Generating positions
	Green	Rapid flash[3]	Too few satellites or poor geometry
Bluetooth	Blue	Waiting heartbeat flash[4]	Activated and waiting
	Blue	Long flash	Activated and connected
	Blue	Off	Bluetooth has not been activated or has been turned off
	Blue	Toggle flash[5]	Bluetooth toggled on and off event

[1] Short flash - one flash ever three seconds
[2] Long flash - one flash per second
[3] Rapid flash - two flashes per second
[4] Waiting heartbeat flash - one flash every three seconds
[5] Toggle flash - five short flashes over two seconds

3.0 Illicit Discharge Detection Steps

1. Examine stormwater feature for dry weather flow.
2. If no flow is present look for signs of potential contamination from intermittent sources (staining, floatables, foam etc.), input observations on the IDD page of the GPS form and photograph the evidence (noting the photo filename in the IDD record).
3. If dry weather flow present don latex gloves and safety glasses and collect a water sample using the remote collection device. Use caution to only sample the dry weather flow and avoid sampling water from the sump.
4. Immediately measure pH and temperature using the YSI pH10. Record the results, along with physical observations of the flow, on the GPS form.
5. Cap, label with feature ENSR ID and store the sample jar. Note on the maps and in the field book the location of any samples taken.
6. Photograph the discharge and note the photo name any additional relevant information on the GPS form. Save the GPS data by clicking “OK”.
7. Continue to survey the remaining features of the system. Trace the dry weather flow upstream until the source is discovered, the drainage comes from off DCR property, or the flow disappears.
8. Collect, label and retain the most upstream water sample of the dry weather flow. The previous downstream flow samples are not required and can be emptied into the stormdrain.
9. Once the most upstream location of the discharge has been identified, edit the feature point which will create another IDD record for that feature, perform chemical analysis on this sample and enter the new temperature and sample analysis results in the GPS form. Complete flow summary form.

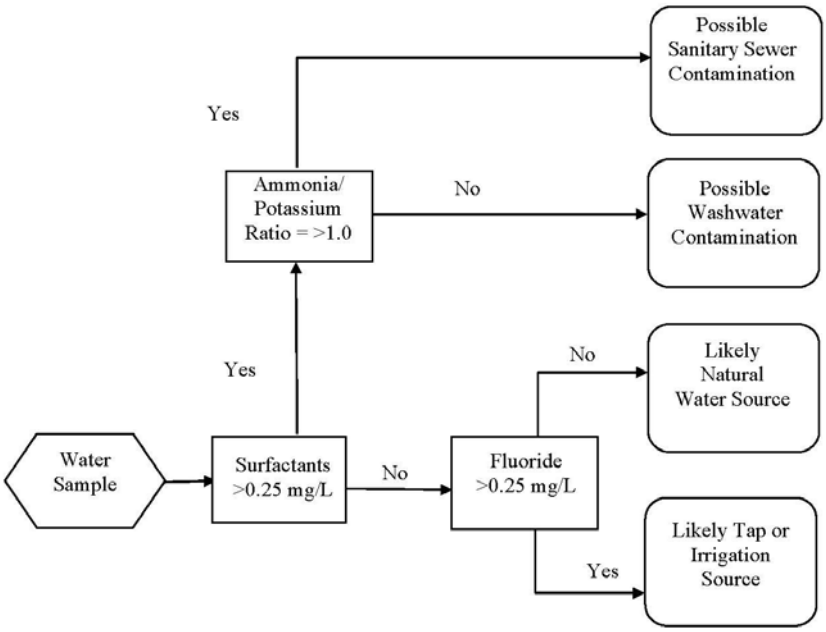
4.0 Calibration of Equipment

- Kaitlin Hartman will calibrate the YSI pH10 weekly and record the calibration results in the field notebook.
- The Horiba Compact Ion meter must be calibrated using the 1-point calibration before use (max once per day) and record the calibration results in the field notebook.
- The 2-point calibration for the Horiba Compact Ion meter should be preformed once a month and record the calibration results in the field notebook.

5.0 Chemical Analysis Steps

1. Temperature and pH of the sample is taken a second time preceding the testing.
2. For Ammonia and Fluoride, test using the DR/890 Colorimeter and follow the appropriate HACH procedures included in the field kit. For Potassium, test using the Horiba Compact Ion Meter. For Surfactants use the Detergents detection kit and follow appropriate procedures in the field binder.
3. Press the “Ratio” button the GPS form to calculate the NH_3/K Ratio for comparison with the benchmark.

4. Visually inspect surroundings and note the land use, buildings and utilities in the area. Also note any non-stormwater surface water; landscaping, irrigation, streams, etc.
5. If possible, determine the likely source of the discharge using the chemical results, physical conditions, visual observations and the information on Tables 1 and 2.
6. Notify Theresa McGovern or Aaron Hopkins about the location, characteristics and likely source of any illicit discharges encountered during the survey.



6.0 Contaminated Equipment and Disposal

- All samples and liquids exposed to testing chemicals must be stored in an appropriate waste holding container for proper disposal and ***not*** discharged back into the stormdrain.
- Any remaining sample which has not been tested can be placed back into the stormdrain.
- Contaminated testing supplies should be rinsed once with tap water and separated from the remaining equipment. Place the rinse water in the waste container for proper disposal.
- Residuals from the Surfactants analysis must be placed in a Ziploc bag, and secondly contained in a plastic Nalgene container labeled “surfactants waste”. This waste will be transferred in Westford to a holding container and contained in a chemical waste cabinet to later be disposed of appropriately.
- Supplies which need to be used multiple times per field day must be thoroughly cleaned. Wash twice with tap water then a third time using deionized water.
- At the end of the day, properly dispose all chemicals down a sink drain with running water to dilute. If appropriate, the waste container can be emptied directly into a sewer main in the field.

- Before reuse, all used equipment should be thoroughly washed with Liquinox detergent in the office, rinsed three times and allowed to air dry.

Appendix B

Illicit Flow Form

Potential Illicit Flow Details

Date/Time: _____ Sampler initials: _____ Feature # (AECOM ID): _____

Field Logbook #: _____

Responsible person for follow-up documentation: _____

Location: _____

Potential Source according to flow chart (see back page):

- ☐ Sanitary Sewer Contamination
- ☐ Natural Water
- ☐ Washwater Contamination
- ☐ Washwater Contamination

☐ Re-test same sample for any parameters on border of values on flow chart. Document both results.

☐ Sample any potential source discharge if possible and if unclear if actual source (ie. water bubbler overflowing)

☐ Add a note in the upstream structure when observered. Even if no flow is seen upstream, please note. Make note to future crews if not able to get to structure that day

☐ Make notes on surroundings (building types, landscaping with irrigation, etc)

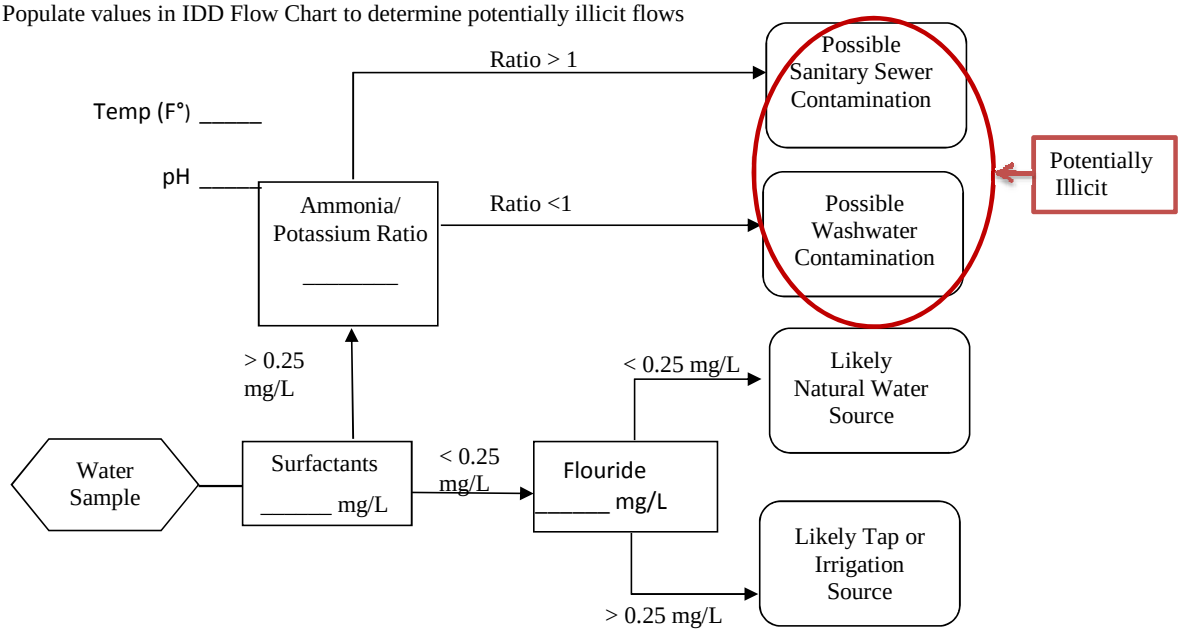
☐ Photograph surroundings and flow

☐ Call office and discuss observations.

Detailed Site Drawing

Be sure to: label the features where flow was observed, label other mapped features, label pipes according to flow direction, potential sources, and include other pertinent information. Document entire flow path (source to outfall) if possible, if flow is not seen upstream or downstream note where the flow ends.

Populate values in IDD Flow Chart to determine potentially illicit flows



Use this space for additional notes and/or site sketches

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DCR DRAINAGE CONNECTION PERMITS 2011-2012

Permit #	LOCATION	SOURCE
P#24782	Arborway	BWSC
P#24758	Fenway	BWSC
P#24699	Lake Street, Natick	Barberry Homes
P#24709	Mill Creek	Fort Hill Infrastructure
P#24673	Mystic Valley Pkwy.	AECOM
P#24680	Draw 7 Park	Federal RE Trust
P#24689	Taylor Street	Draper
P#24666	Fellsway West	Legacy Construction
P#25654	10 Church Lane	W. Cummington Church
P#24636	Fitchburg SF	MassDOT
P#24632	Soldiers Field Road	BWSC

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www.mass.gov/dcr

Deval L. Patrick
Governor

Timothy P. Murray
Lt. Governor

Richard K. Sullivan Jr., Secretary
Executive Office of Energy & Environmental Affairs

Edward M. Lambert Jr., Commissioner
Department of Conservation & Recreation

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Massachusetts

The newsletter for owners of land protected by Watershed Preservation Restriction (WPR) held by the Department of Conservation and Recreation (DCR), Division of Water Supply Protection.

Summer 2011

Contents:

Contact:

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Watershed Currents

Love, Land, and Legacy

Opportunity awaits in Land Trusts, Conservation Commissions and Open Space Committees

You may have combined these three L's – love, land, and legacy – when explaining why you own wild and quiet acres beyond a lawn and garden. The "beyond" places under your stewardship nurture souls while providing biological diversity, forestry opportunities, innumerable benefits to wildlife, and clean air and water.

Did you know that three-fourths of Massachusetts forestland, some 2.12 million acres, is privately owned in tracts ranging from a handful to hundreds of acres? Just 31,600 landowners hold deeds to forested tracks greater than 10 acres in size, which combine into an aggregated area of 1.88 million acres. Most of the state's viable working woodlands belong to just .5 percent of the Commonwealth's six million residents.

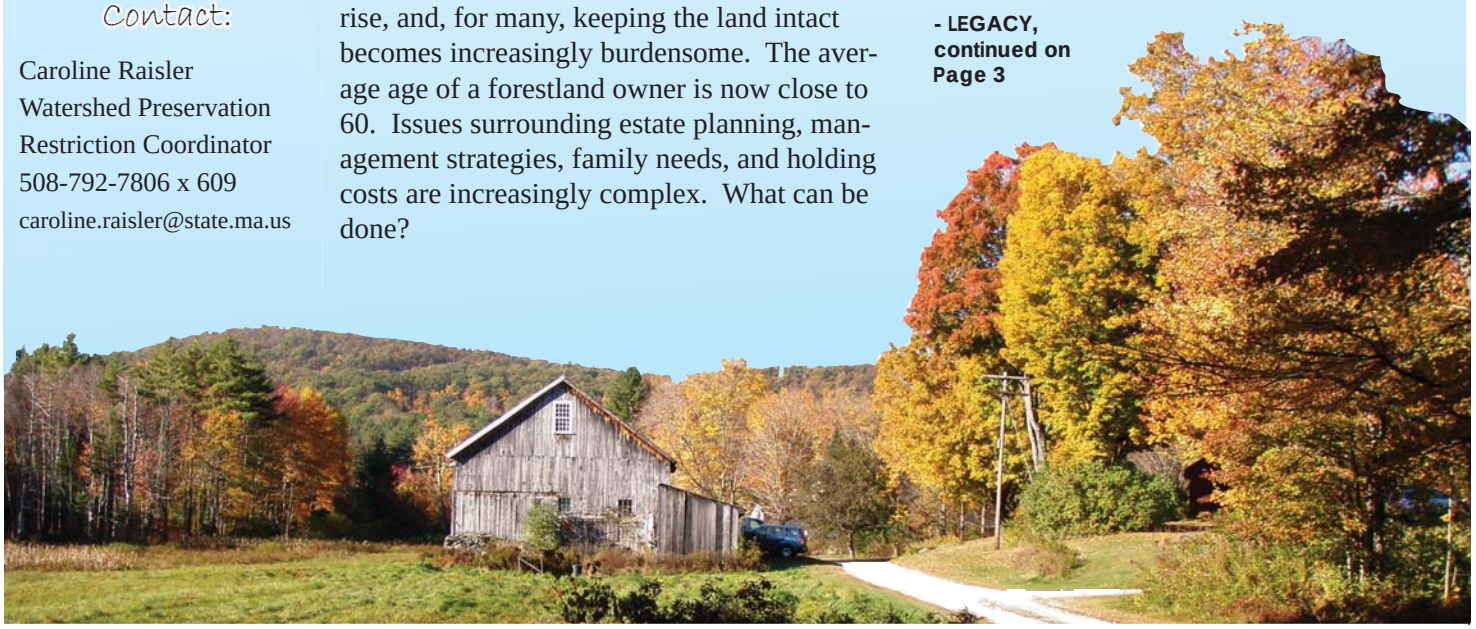
You play a critical role as part of this tiny minority that is responsible for the well being of vast swaths of productive forested landscape, as well as the irreplaceable amenities that landscape affords our society. Borrowing Winston Churchill's praise for RAF pilots, you too can be lauded, "Never have so many owed so much to so few."

This vast forest base, however, is eroding as suburban sprawl expands, values and taxes rise, and, for many, keeping the land intact becomes increasingly burdensome. The average age of a forestland owner is now close to 60. Issues surrounding estate planning, management strategies, family needs, and holding costs are increasingly complex. What can be done?

Fortunately, landowners have choices, like you have already made, to protect land from changes that do not resonate with their preservation ethic. Massachusetts is one of the most progressive, and successful, states in helping individuals and families achieve their land protection goals. This article is a reminder that there is a full suite of options that can be tailored to accommodate each individual's circumstances. Perhaps you are interested in preserving more land, or you know someone who is considering these options. Highly qualified land professionals in all levels of government and private non-profit organizations are ready to help.

Finding the right fit depends on personal and family goals for the land, preservation organizations active in the area, criteria for protection projects, partnering opportunities, and significant landscape attributes such as rare

- LEGACY, continued on Page 3



Meet the Staff

Caroline Raisler, WPR coordinator

Caroline Raisler joined DCR's Division of Water Supply Protection in 2009 as the Watershed Preservation Restriction Coordinator. You'll see Caroline when she comes to your property for regular monitoring visits, and she is also the person to call if you have a question about your WPR. She enjoys having a job in which she gets to walk in the woods and meet interesting people.

Prior to this position, Caroline was attending graduate school, earning a Masters in Environmental Management from the Yale School of Forestry and Environmental Studies. Prior to graduate school, she worked for The Nature Conservancy in Maryland, monitoring restrictions and managing nature preserves.

Caroline lives in Northampton and works out of both DCR's West Boylston and Belchertown offices. When she's not walking in the woods for work, she can often be found walking in the woods for fun with her dog Maddy. She recently had the opportunity to test first-hand the skunk spray removal recipe on Page 4 when Maddy got sprayed by a skunk in the middle of the night. It took a few baths, but the recipe worked!

Caroline at work monitoring a WPR (left). Caroline and Maddy at home (below).

Landowner Profile

Henry Cramer produces wildlife documentary on his WPR

Henry Cramer, one of DCR's WPR landowners, moved to New Salem in the 1970s so that he and his family could enjoy living in the country. They eventually had a need to get some equity out of the property but wanted the land to stay undeveloped. That led them to sell a WPR on the property in 1996. He said that he thought of it as a "win-win-win" solution.

Over the time Henry's lived in New Salem, he has enjoyed watching the wildlife on his property increase in number and diversity. He designed his property for optimal wildlife viewing, clearing several narrow, long views from his kitchen window out across the WPR, so he can see wildlife moving around the property while he eats at his kitchen table. He now sees many more turkeys, great blue herons, bears, coyotes and moose than in the early years.

Five years ago, his enjoyment watching the wildlife from his window led him to buy a video camera and begin recording the activity. He invested in better equipment when he realized he was recording some unique sights. Henry has now produced, with the help of his son, David Cramer, a documentary, *Wild Things of New Salem*, that shows a year in the life of the wildlife on his protected property. Scenes from this engaging movie include beavers stockpiling brush for winter, a fox looking for food under the snow, and a young bear playing with (and destroying) the railing on the Cramers' footbridge. He recently showed the movie at New Salem's "Old Home Day" annual celebration, where it was well-received.

- Caroline Raisler

These two images are from the video documentary, *Wild Things of New Salem*. The documentary was filmed by Henry Cramer on his WPR.

Love, Land and, Legacy - From Page 1

or important habitat, water resources, scenic vistas, trail systems, exemplary forest stands etc. Space limits a full discussion of all options; the following organizations and agencies provide resources to help landowners achieve their conservation objectives.

Land Trusts – Most towns are served by non-profit local or regional land trusts. These groups provide expertise in land preservation efforts. Look up nearby groups on the MA Land Trust Coalition website at www.massland.org.

This lithograph from the *American Land Forum* (Vol. 5 No. 4, Fall 1985) illustrates the article, "What To Do About Grandfather's Place", an early discussion on the beauty and heritage, as well as the responsibilities, that comes with being a land conservator.

Town Hall – Conservation Commission and Open Space Committee members are versed in land protection measures or can help owners in their conservation decisions. Some towns have funding for land protection initiatives. On-line resources include www.maccweb.org.

The State – The Department of Conservation and Recreation (DCR), the Department of Agriculture (DAR), and the Division of Fish and Game (DFG) all have land programs that are generally well budgeted from a variety of funding sources. State grant programs, some garnering matching federal funds, are often an option in accomplishing preservation objectives. A description of Commonwealth land protection programs can be found at www.mass.gov/eoeea.

State and federal tax incentives for donating conservation interests in land have never been more attractive. Both the private and public sectors are encouraging landowners, even those who already have conservation restrictions in their portfolio, to consider gifts and bargain sales of land or restrictions to conservation entities. No matter the potential choices, it is wise to consult with an attorney or CPA with land protection expertise.

It can seem overwhelming figuring out the best approach to conserving land and deciding who to consult. Fortunately, an easy way to begin is by getting on the phone or computer, as it is a great way to meet like-minded folks. Since you have already taken steps to protect your land, DCR encourages you to be an ambassador for helping others to follow a similar path, as your experiences and accomplishments provide us all with an invaluable land legacy.

-Jim French

Landowner outreach workshops offer assistance

Many WPR landowners have been attending educational events put on by the Nashua River Watershed Association (which covers the Wachusett Watershed) and the North Quabbin Regional Landscape Partnership (which covers the Quabbin and Ware River Watersheds). These two organizations received a grant from the USDA Forest Service to put on three workshops for owners of privately protected land.

The first workshops in the spring of 2010 went over the basics of what it means to have a CR or WPR on your property. About ten WPR holders attended one or the other of these workshops, along with many landowners whose CRs are held by other state agencies or non-profits. The feedback was positive, but many landowners indicated that they wanted to see what other landowners were doing to manage their land. Both organizations obliged this summer, having landowners lead tours of their properties and make presentations on how they got grants to do forest management activities. Once again, about ten WPR landowners attended. Each organization will hold one more event, in spring or summer of 2012; the focus of these last workshops will depend on participant feedback. Look for more details at the beginning of next year.

- Caroline Raisler

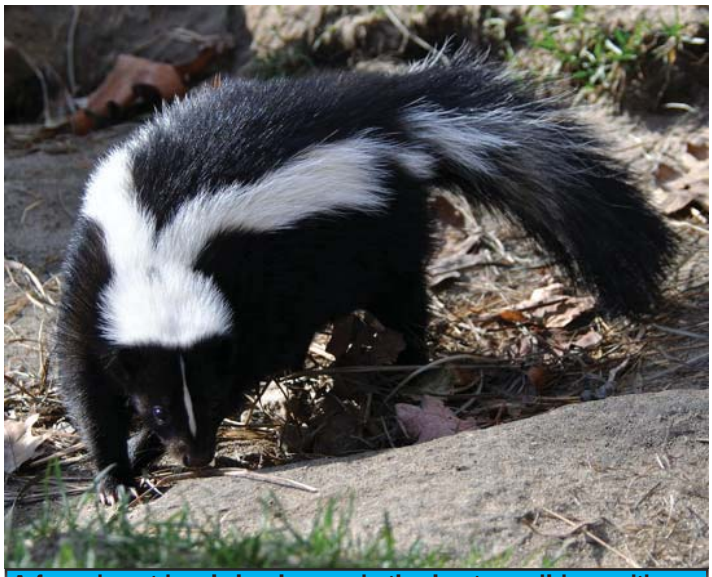
Landowners meet and take a guided educational forest tour in July of this year.

Wildlife on Your Land

The Striped Skunk

The striped skunk (*Mephitis mephitis*) is common in Massachusetts, and is often seen (or smelled) dead along roads and highways. The striped skunk is easily recognized. It has a black body, a narrow white stripe up the middle of its forehead, and a broad white area on its nape, which typically divides into a V around its shoulders. The two white lines may continue to the tail, which is bushy and may have a white tip. The amount of white varies in each individual and gives each skunk a unique "fingerprint" that can be used to identify specific animals.

Skunks are primarily nocturnal and begin their day shortly after sunset. They are omnivorous and will eat insects, berries, grubs, eggs, and carrion. In addition, they will also eat human garbage, bird seed, pet food, and compost. Skunks can be found in mixed woods, brushy areas, and semi-open country. Suburban neighborhoods are ideal for skunks because they provide a mixture of habitats and abundant sources of food.



A foraging striped skunk seen in the best possible position: facing forward and tail down!

In early May, pregnant female skunks will excavate a ground den or burrow under a building, rock pile or boulder. Five to six young are typically born and will begin following their mother in late June or July, trailing behind her single file. Skunks do not hibernate and will be active during winter when temperatures are at or above freezing.

Avoiding conflicts:

- Never feed skunks.
- Feed pets inside and lock pet doors at night.
- Store garbage indoors until collection day.
- Compost in containers that keep skunks out while allowing for ventilation.

In case of a skunk encounter:

- If eyes get irritated, flush them liberally with cold water.
- Wash all other parts of the body with mildly acidic substances such as carbolic soap, tomato juice, diluted vinegar, or the following home remedy: 34 oz. of 3% hydrogen peroxide solution, 3 oz. of baking soda and .15 oz. of liquid soap.
- Always mix the solution in a large, open container. Use the entire mixture while it is still bubbling. Wearing rubber gloves, apply the solution, work it into lather, and leave it on for 30 minutes.
- After washing, follow with a long hot shower. You may have to repeat the process two or three times.

See MassWildlife's website, www.mass.gov/dfwele/dfw/wildlife/living/living_with_skunks.htm, for more information on the striped skunk in Massachusetts. *- Dan Clark*

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Department of Conservation and Recreation
Division of Water Supply Protection
Office of Watershed Management
180 Beaman Street
West Boylston, MA 01583

Watershed Currents is produced semi-annually for WPR/CR landowners in the DCR water supply watersheds.

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Lt. Governor: Timothy P. Murray
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DWSP Director: Jonathan L. Yeo
Editor: James E. Taylor

Watershed Currents

The newsletter for owners of land protected by Watershed Preservation Restrictions (WPRS) held by the Department of Conservation and Recreation (DCR), Division of Water Supply Protection. Winter 2011

dcr Massachusetts

Contents

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Forestry on Watershed Lands

Tasked with the responsibility of assuring the availability of pure water for future generations, DCR's Division of Water Supply Protection recognizes that forest cover is the best type of land cover and provides for unparalleled long-term water quality. The Division has been actively managing its forests for decades. Guided by publicly reviewed Land Management Plans for each watershed (see www.mass.gov/dcr/watersupply/watershed/dwmplans.htm), the Division strives to diversify both the age structure and species composition of its forested lands. A vigorous, species-diverse, multiple-aged forest offers the most stable land cover in the face of potentially large-scale disturbances by wind, insects, ice, or disease.

In order to diversify the forest, openings are created in the canopy to provide sunlight to new tree seedlings and stump sprouts. Forest openings range - FORESTRY, CONTINUED PAGE 3

What is a WPR?

Watershed Preservation Restriction (WPR) and Conservation Restriction (CR) are terms used interchangeably to describe the written agreement between you and the Department of Conservation and Recreation, Division of Water Supply Protection (DCR – formerly the Metropolitan District Commission or MDC) that you will refrain from certain activities on your property in order to protect water quality.

Caroline Raisler

An Introduction to the DCR Watersupply WPR/CR Staff

DCR's WPR stewardship program mainly involves four staff people:

- Caroline Raisler, Watershed Preservation Restriction Coordinator. You will see Caroline on regular monitoring visits to your property. She is mainly responsible for the administration of the WPR program. If you have any questions about what you can do on your WPR, give her a call or send her an email.
- Jim Taylor, Regional Planner. You will likely see Jim on monitoring visits as well. When he is not monitoring, he often works on graphic design projects, like this newsletter and our boundary signs.
- Jim French, Land Acquisition Coordinator. You won't see Jim on monitoring visits because he is busy acquiring new WPRs and land for the Agency. However, if you have recently become involved in the program, it is very likely that you already know him well.
- Dan Clark, Natural Resources Director. Dan supervises the rest of us, and occasionally gets to come out in the field and meet all of you.

Landowner Profile

Helen Haddad's Art Is Inspired by the Quabbin Landscape

One of my favorite parts of this job is getting out into the field and getting to know you – our landowners. I thought it would be fun to let you get to know each other through this series of landowner profiles. If you would like to be profiled for this series, please let me know.

- Caroline

Helen Haddad, one of our WPR landowners, placed a WPR on her property in Wendell in 2007. She wanted her property to be protected "for when I'm not there to look after it."

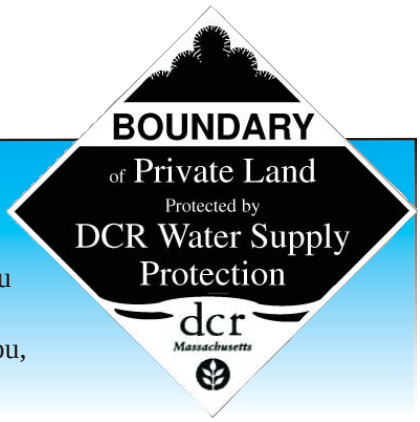
She says that being in such a beautiful landscape inspires her as she creates extraordinary art out of potatoes. Her potato prints involve cutting a potato in half, carving it, painting it, and then printing it onto paper. Each potato can make several prints before it is retired. She sometimes grows the potatoes she uses for her art (in the area excluded from the WPR). It is not safe to eat the potato after it is used for printing, but she reports that if she has an especially delicious looking potato, sometimes she uses half for printing and cooks the other half.

This print of a red eft by Helen Haddad (approximate actual size) was inspired by one she saw while walking her property with her grandchildren.

You can see more of Helen Haddad's potato print art as well as art by other western Massachusetts artists inspired by the natural world at an exhibit called Four Seasons/5 Artists at the Artspace Gallery in Greenfield. The exhibit runs March 8 – April 15. Her prints are also shown at North Quabbin Woods in Orange and at the Salmon Falls gallery in Shelburne Falls.

Know Your Boundaries

Clearly marked boundaries are important for helping to protect your property against encroachment or trespassing. We have recently designed new boundary signs that you can use for this purpose. Boundary posting is not mandatory, but if you would like to post signs we can send you some. If you would like us to post your boundaries for you, we occasionally have time for that, too. Let us know and we will put you on the list.



FORESTRY ON WATERSHED LANDS - From Page 1

in size from single trees up to two acres and total less than 1% of the forest area per year. This deliberate pattern is spread over space and time and will produce a forest that is diverse, actively reproducing, multi-layered, and more resistant and resilient than the forest we have today.

In order to achieve its forest management goals, the Division relies on private loggers to bid on specific forestry lots set up by Division Foresters. The winning bidder is awarded the lot. During harvesting, the logger is closely supervised by Division Foresters and must meet stringent Best Management Practices (BMPs), equipment requirements, and timing restrictions. Careful planning and execution ensures that water resources are securely protected and the forest can continue to act as a biological filter for pure water.

- Dan Clark

Thom Kyker-Snowman

This is a typical ½ acre forest opening, showing exceptional new tree regeneration and growth.

If you'd like to consider forest management on your land...

The WPR on your property allows for forest management. Each WPR, however, is different; your WPR documentation explains the specific forest management requirements that are in place on your property. Please ask us if you have any questions about what your WPR allows.

There are a lot of good reasons to do forest management. Some people like to manage their forest to attract certain wildlife species, such as deer, moose, or birds. Other people want to manage their forests as a source of income.

If you want to manage your forest, the first thing to do is find a licensed forester for advice. A good forester will listen to your goals for the property and help you develop a plan to achieve them. This plan can be written up as a Forest Management Plan or Forest Stewardship Plan (grants are sometimes available to help with the cost). Having a plan also makes your land eligible for the Chapter 61 open land management program, which can reduce your property taxes. You should make sure that your forester has a copy of your WPR so they can integrate its requirements into your plan.

If you decide to harvest timber from your property, you will need to follow both the Massachusetts Forest Cutting Practices Act and the terms of your WPR. Your forester should be familiar with the terms of the Forest Cutting Practices Act, which requires that you file a Cutting Plan. Our WPRs differ with respect to what they require for forest management. Even if your WPR does not require it, we recommend following Best Management Practices to protect water quality, such as planning logging roads to avoid wetland and stream crossings, minimizing harvesting in wetlands, and doing the logging work when the ground is dry or frozen. We would also like to meet with you and your forester prior to a harvest to go over Best Management Practices and how you can do your timber harvest in a way that protects water quality.

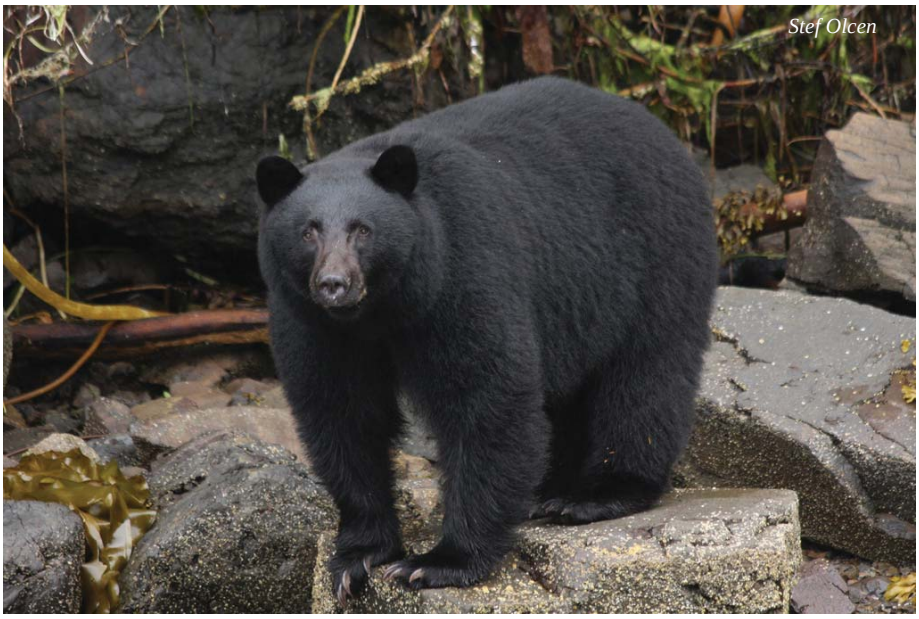
- Caroline Raisler

For more information on forest management, please visit these web sites:

- www.mass.gov/dcr/stewardship/forestry/service/steward.htm (*description of forest stewardship program*).
- www.mass.gov/dcr/stewardship/forestry/service/fortax.htm (*description of Ch. 61/61A Current Use Forest Tax Program).*
- www.mass.gov/dcr/stewardship/forestry/docs/MA%20Licensed%20Foresters%20Directory.pdf *(listing of licensed foresters in Massachusetts).*

The Wildlife on Your Land: Black Bears

Black bears, the only species of bear that lives in Massachusetts, were relatively rare in the state during the 1970s. Today, there are over 3,000 bears in the Commonwealth. Black bears are fairly common in the western part of the state, relatively common in central MA, and very rare or absent in the east. Black bears have a tremendous sense of smell, which they use to locate food and identify danger. Though not as sensitive, bears have good eyesight and hearing. Male bears in Massachusetts weigh up to 600 pounds and females can weigh up to 400 pounds. Despite their size and fierce reputation, bears are actually pretty timid. Most often bears will run away from people and will often disappear into the woods before they are even seen. Black bears that have become habituated to humans and their food can sometimes lead to unfortunate situations that often end with the bear being removed or destroyed.


Stef Olcen

While it can be exciting to see a bear in the wild, it is important to take simple measures to ensure that they remain "wild." Like other wildlife, bears are quick to take advantage of easy, reliable sources of food, even if the food is closely associated with people. The best approach to avoid potential conflicts is to not tempt bears with easy food. Bird feeders should be removed by April 1 and kept down until December each year. All pet food and unsecured garbage should be removed from yards each night. Landowners who keep bees should consider using electric fences (temporary or permanent) around the hives. Hives should be placed well away from trees, be mowed on all sides, and set back from wooded areas. Landowners with crops should also consider temporary electric fencing. Open and mowed areas should be maintained around the fields to cut down on bear pathways. Planting corn alternately with other crops may also reduce the amount of cover and food available to bears.

Visit MassWildlife's website at www.mass.gov/dfwele/dfw/wildlife/facts/mammals/bear/black_bear_home.htm for more information on bears in Massachusetts.

-Dan Clark

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During a car wash, dirty water containing soap and detergents, residues from wearing brake pads, grease, gasoline and motor oils washes off of the cars. If not directed properly, this water flows off the pavement and into nearby catch basins and storm drains. In the Wachusett Watershed, most of these storm drains flow into a surface water and then into the Wachusett Reservoir, a drinking water supply for 2.2 million Massachusetts residents.

What goes in here, ...

… comes out here.

To comply with federal, state and some local regulations, car wash wastewater should not be directed into the storm drain system or waterways!

ADDITIONAL TIPS

- Use detergents sparingly.
- Limit washing to the exterior of the vehicle and avoid washing the engines, transmissions or undercarriages.
- Avoid using metal brighteners, chemical degreasers, and hot water.
- Properly disperse any sudsy puddles that remain after the car wash is over. They contain toxic residues and can attract (and harm) thirsty animals.
- As an alternative to holding your own car wash, consider cooperating with a commercial carwash facility. Wastewater from these are treated before being released into the environment. Commercial facilities also use high pressure nozzles and pumps that minimize water usage. Some facilities have their own fundraising programs already in place.

WACHUSETT WATERSHED
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http://www.mass.gov/dcr/watersupply.htm

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Car Wash Fundraisers

Car washes are a great way to raise funds for sports teams, scout troops, schools, clubs, churches and other non-profit organizations. Unfortunately, they are also a great way for a large amount of pollution to be deposited in nearby rivers, streams, lakes, and wetlands.

We ask that you follow the simple recommendations in this brochure to protect our local water resources.

The following list of good housekeeping practices will help you have an environmentally successful fundraising event:

- Wash cars on grassed or gravel areas or in an area where water can be directed to grass areas to slowly filter into the ground and **not run into a storm drain.**

- Use only soaps, cleaners, or detergents labeled “non-toxic”, “phosphate free”, or “biodegradable”. Avoid the use of acid- based wheel cleaners.

- Think about a “waterless car wash”. A few environmentally friendly products have been created that do not require the use of water. (Internet search: waterless car wash fundraisers)

- Empty buckets of soapy water onto a grassed area and **not** into a parking lot, street, gutter or storm drains.

- Minimize water usage. Use a spray gun with flow restriction to minimize water volume and runoff.

Washing one car may not seem like a problem, but collectively car washing activity can add up to big problems for our local lakes, streams and wetlands. Pollution from car washing degrades water quality while also finding its way into sediments which impacts aquatic life.

Algae Bloom

Phosphates found in soap can cause excess weeds and algae to grow. Excess algae smell bad, look bad and harm water quality. As algae decay, the process uses up oxygen in the water. This can kill fish.

For Fundraiser Sponsors:

Washing vehicles is an example of a process water discharge of pollutants requiring a National Pollutant Discharge Elimination System (NPDES) permit if it reaches waters of the Unites States (this permit is issued through the Environmental Protection Agency).

The EPA recommends that companies or individuals take their vehicles to car washes. If a car wash is not available, NPDES permit requirements may be avoided and impacts on waters of the United States minimized if vehicles are washed in a vegetated or grassy area where the wash water will be absorbed into the ground instead of allowing it to run into the street and then into a storm drain.

Concerns About Medicine Disposal

- Medicines that are flushed down a toilet or sink contaminate water resources, resulting in reproductive and developmental problems in fish and other aquatic wildlife.
- Improperly discarded containers provide personal information that can be used illegally, including identity theft.
- There is the possibility of poisoning from accidental ingestions, particularly by small children and pets, if medicines are thrown "as is" in the trash or unneeded or expired medicines are kept in the house.

For More Information:

- MA Department of Environmental Protection: **www.mass.gov/dep/toxics/stypes/ppcpedc.htm**
- MA Water Resources Authority: **www.mwra.com/04water/html/pharmaceuticals.htm**
- SMAR$_x$T Disposal: **www.smarxtdisposal.net**
- US Environmental Protection Agency: **www.epa.gov/ppcp**
- White House Office of National Drug Control Policy: **www.whitehouse.gov/ondcp**

DIVISION OF WATER SUPPLY PROTECTION
Department of Conservation and Recreation
Office of Watershed Management
Wachusett/Sudbury Section
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www.mass.gov/dcr/watersupply.htm
January 2012

Unused & Expired Pharmaceuticals

Reduce water pollution and promote a healthy environment by properly disposing of unneeded or expired medications

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Medications Impact the Environment

Prescription and over-the-counter medications are a source of pollution when they are flushed down the toilet or drain. Waste-water facilities and septic systems are not currently designed to process pharmaceutical products. Compounds passing through these systems can impact surface waters, groundwater, and drinking water supplies. Pharmaceuticals can also be released into waterways via stormwater run-off from fields applied with manure or biosolids.

Modern technology can detect more substances, at lower levels, than ever before. Fortunately, tests done in the spring of 2008 detected no compounds in Boston's source drinking water that comes from the Wachusett and Quabbin Reservoirs. According to the American Water Works Association, research has not demonstrated an impact on human health from pharmaceuticals at the very low levels reported nationally in some drinking water supplies. Studies have shown, however, that medicines that reach streams, rivers, and lakes do affect wildlife, as fish and wildfowl face continuous exposure to the drugs. Medications thrown haphazardly in the trash can also be eaten by wildlife that frequent landfills.

DCR's Division of Water Supply Protection
The Massachusetts Department of Conservation and Recreation, Division of Water Supply Protection, Office of Watershed Management manages and protects the drinking water supply watersheds that provide water for approximately 2.2 million Massachusetts residents. Its legislatively mandated mission is to utilize and conserve water and other natural resources to protect, preserve and enhance the environment of the Commonwealth and to assure the availability of pure water for future generations.

Guidelines for Proper Disposal

These guidelines are taken from the White House Office of National Drug Control Policy, the Department of Health and Human Services, and the Environmental Protection Agency.

DO NOT DISPOSE OF MEDICATION DOWN THE TOILET!*
Take unused, unneeded, or expired prescription drugs to a "TAKE BACK DAY" if available in your community or follow these steps:

- **Take unused, unneeded, or expired prescription drugs out of their original containers.**
- **Remove ALL personal identification or prescription label from the container before placing in the trash.**
- **Mix the prescription drugs with an undesirable substance, like used coffee grounds or kitty litter, and put them in impermeable, non-descript containers, such as empty cans or sealable bags, further ensuring that the drugs are not diverted or accidentally ingested by children or pets.**
- **Throw these containers in the trash.**

*The Food and Drug Administration advises, however, that medications that have a high abuse potential be disposed of by flushing down the toilet rather than being placed in the trash. The following list is current as of January 2012, but the FDA continually evaluates medicines for safety risks and will update the list as needed. The list can be found online at: **www.fda.gov/Drugs/ResourcesForYou/Consumers/BuyingUsingMedicineSafely/EnsuringSafeUseofMedicine/SafeDisposalof Medicines/ucm186187.htm#MEDICINES**. These medicines include:

- **Abstral**, tablets (sublingual)
- **Actiq**, oral transmucosal lozenge
- **Avinza**, capsules (extended release)
- **Daytrana**, transdermal patch system
- **Demerol**, tablets
- **Demerol**, oral solution
- **Diastat/Diastat AcuDial**, rectal gel
- **Dilaudid**, tablets
- **Dilaudid**, oral liquid
- **Dolophine Hydrochloride**, tablets
- **Duragesic**, patch (extended release)
- **Embeda**, capsules (extended release)
- **Exalgo**, tablets (extended release)
- **Fentora**, tablets (buccal)
- **Kadian**, capsules (extended release)
- **Methadone Hydrochloride**, oral solution
- **Methadose**, tablets
- **Morphine Sulfate**, tablets (immediate release)
- **Morphine Sulfate**, oral solution
- **MS Contin**, tablets (extended release)
- **Nucynta ER**, tablets (extended release)
- **Onsolis**, soluble film (buccal)
- **Opana**, tablets (immediate release)
- **Opana ER**, tablets (extended release)
- **Oramorph SR**, tablets (sustained release)
- **Oxecta**, tablets (immediate release)
- **Oxycodone Hydrochloride**, capsules
- **Oxycodone Hydrochloride**, oral solution
- **Oxycontin**, tablets (extended release)
- **Percocet**, tablets
- **Percodan**, tablets
- **Xyrem**, oral solution

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The newsletter for owners of land protected by a Watershed Preservation Restriction (WPR) held by the Department of Conservation and Recreation (DCR), Division of Water Supply Protection.

Winter 2012

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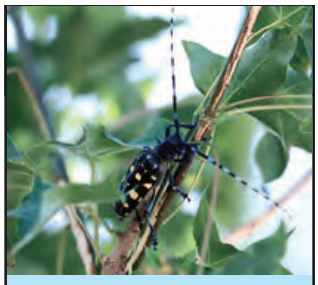


BEWARE of the Asian Longhorn Beetle. See p. 3

Watershed Currents

100 WPRs!

The DCR/DWSP WPR program records its 100th Watershed Preservation agreement

You always remember the first time. Back in the late 1980s, the state's real property directors voiced a willingness to consider a relatively new way to preserve land without actually buying the whole package (called a fee transaction).

Photo: DCR Staff

Protecting land in partnership with a landowner while that owner retains a limited bundle of rights to use the property for open space was cutting edge. Few such transactions had taken place in Massachusetts at that time. Today there are hundreds and hundreds of such conveyances throughout the state with all manner of municipalities, state agencies, and land trusts. These landowner/conservation organization agreements now protect watershed, farmland, wildlife habitat, vistas, historic sites, trail networks, and open space corridor connections in every corner of the Commonwealth. Thousands of privately held acres now enjoy this legally binding protection status. Whether called a Watershed Preservation Restriction (WPR), Agricultural Preservation Restriction (APR), or Conservation Restriction (CR), they all contribute to the natural resource heritage we hold dear, while often serving as an important estate planning strategy for landowning families.

The first WPRs were recorded on the June solstice of 1990 in the Quabbin towns of Barre and Petersham. Three separate ownerships had been carved from a single farm belonging, up to that time, to Mr. Arthur Walworth, an elderly absentee owner with a passion for the woods and fields that he had stewarded for years. I remember walking the land with him and being surprised by his youthful stamina. I was equally impressed by the thickest swarm of late spring mosquitoes I had ever had to endure. Mr. Walworth provided relief with his old bottle of "Old Woodsmen", an early effective repellent smelling like a tar and turpentine mix with a healthy dash of skunk. His Barre farm, until then, encompassed all three tracts now divided to accommodate the rural aspirations of three families: Jeff and Gail Mitchell who moved in to the farmhouse (claimed to be the oldest extant house in

- 100 WPRs, continued on Page 3

Meet the Staff

Jim French, Land Acquisition Coordinator

Now in his 30th year working for DCR (and formerly MDC), Jim began as the forester in charge of managing the woodlands surrounding the Wachusett and Sudbury Reservoirs. His UMass degree in Forestry (B.S. 1975) initially prepared him for employment in the logging and sawmill industry, followed by a period of private forestry consulting. His career took a turn when offered a position with the Commonwealth in 1983.

Shortly after starting with the state, his duties would also include working on land acquisition priorities for watershed protection. As more resources were allocated for this purpose, Jim's time was increasingly spent on land acquisition and less on land management. Soon this would be his full time job. During his stellar career, more than 500 landowners have agreed to sell land for water quality protection, adding more than 20,000 acres to the Quabbin, Ware River, and Wachusett watershed system. Jim has had a lot of fun over the years and enjoyed meeting so many wonderful landowners in the process.

When not on the job, Jim works his family's 100 year old apple orchard business in Sterling as the fourth generation caretaker. His two daughters are also a part of the effort. But given a free day, you'll find him in the woods, or on a river, or volunteering for the local land trust. Simply put, he is an impassioned land guy.

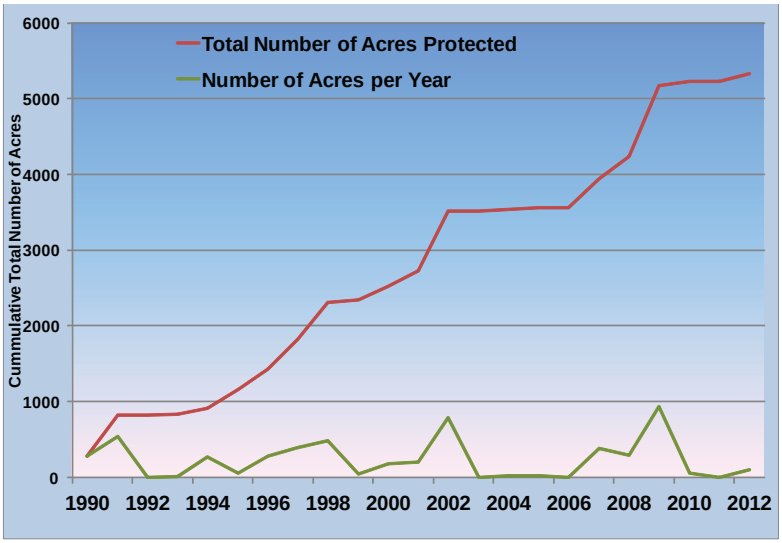
Jim gets acquainted with every potential WPR by walking the land as well as talking with the land owner.

Photo: Worcester Telegram and Gazette

100 WPRs

Facts and Figures

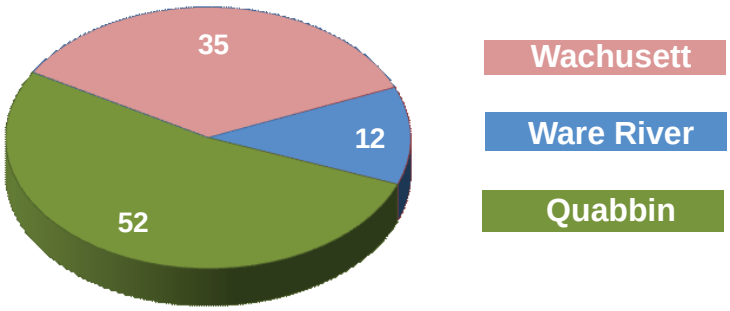
WPR acquisitions over time



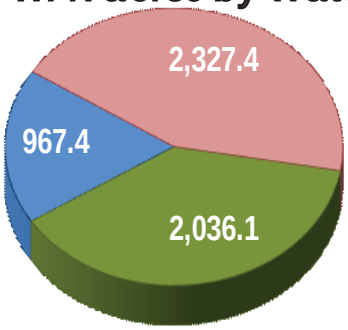
The table at left shows how the DCR Division of Water Supply Protection's WPR program has added over 5,300 acres to the total amount of protected land in the Quabbin Reservoir, Wachusett Reservoir, and Ware River Watersheds over the last 25 years. This acreage, in conjunction with outright fee purchased land, equals over 22,000 total acres of protected land.

The charts below show the proportion of protected land in all three watersheds by both number of WPRs in each watershed (below left) and totals number of protected acres in each watershed (below right).

Number of WPRs by Watershed



Protected WPR acres by Watershed



100 WPRs - From Page 1

Barre), on 12 acres; John and Ellen Ebersol on almost 9 acres; and Ted and Donna Williams on 72 acres. Ted is a well known freelance environmental writer with frequent articles in Fly Rod and Reel and Audubon magazine. Donna also has worked many years for Mass Audubon. On the same day, we recorded a WPR on 186 acres in Petersham belonging to Dr. William Foye, Professor of Pharmaceutical Sciences at the Mass College of Pharmacy, an Athol native, and author of *Trout Waters*, a book about fishing the upper Quabbin Watershed. Dr. Foye would go on to place conservation covenants on hundreds of additional acres he accrued throughout his long life.

What a treat to have the opportunity to work with such environmentally astute and caring folks as all of you. You are changing the landscape one deed at a time, and with each new property protected, we are closer to a greener and healthier world.

During the ensuing 20+ years, the WPR option has been taken up by you and so many others who are what we affectionately refer to as "engaged landowners." That is to say, landowners who know their acreage, appreciate it for its inherent open space values, and wish to continue to have a say in the future of the land you steward. You are also averse to seeing your land carved up by development, and take pride in taking steps to preserve the land you have under your care and control. You and DCR are partners in seeing a future landscape kept in a natural state for the benefit of generations to come. I have enjoyed working with all of you, and am honored to be a part of your land protection ethic.

As they say, the rest is history, for we have recently recorded our 100th WPR! The Huck family in Princeton holds the distinction of being the centennial WPR acquisition for DCR's Watershed Land Protection program. You, the 100, are fairly evenly dispersed within the three active watersheds: Quabbin Reservoir, Ware River, and Wachusett Reservoir, and represent a cumulative total of over 5,300 exemplary acres.

We are not done. It is our hope to continue working with watershed landowners in protecting their lands. Most funding for these acquisitions (some have been donated, and some have been acquired with federal dollars through the Forest Legacy program) comes from the Massachusetts Water Resources Authority. Their continued support for the watershed land protection program is the key to our long-term success. Lastly, word of mouth is our primary source of new referrals, so if you know of a landowner who may wish to be a part of the second hundred WPRs, tell them about your partnership with DCR.

To all of you who make up the first 100 WPRs, we raise a glass of crystal clear water in your honor.

-Jim French

Beware of the Asian Longhorn Beetle

Most of you, have heard plenty about the Asian Longhorn Beetle (ALB) in Massachusetts. Arriving from China in the 1980s, this invasive pest was first spotted in Worcester in 2008. With no natural predators, it poses a significant threat to our forests. Currently, state and federal agencies are working diligently to contain the outbreak. The shiny black beetle, with white spots, sometimes accented with blue or yellow, lives much of its life cycle burrowing inside the tree, causing structural weakness and providing a setting for opportunistic disease. Therefore, it is wise to be very cautious when considering bringing wood from distant locations onto your property. If you think you see signs of the beetle's presence on your land, immediately call the ALB Hotline at (617) 626-1779. For more information on the ALB go to http://massnrc.org/pests/alb/.

-Jim Taylor

Photos: USDA Forest Service

The male Asian Longhorn Beetle (at left) grows to 3/4' long, while the similar looking female can grow to 1.5" in length. This invasive pest should not be confused with the native Pine Sawyer Beetle, which, while similar, has no white spots and smooth rather than alternating colored segmented antennae. The pencil in the hole made by an ALB (shown above) demonstrates the potentially fatal damage the insect can cause.

Wildlife on Your Land

Is there a vernal pool on your protected land?

A vernal pool is a unique seasonal wetland that recurs each spring in the field or forest. It usually dries up completely by the end of summer. This set of conditions creates a distinctive little ecosystem with no predatory fish, which in turn provides the opportunity for some very peculiar creatures, such as Fairy Shrimp, Wood Frogs and Spotted Salamanders, to flourish.

As the snow melts and the days warm, adult Wood Frogs and Spotted Salamanders make their way to the pool to lay eggs. Typically, the first warm rainy night will signal a mass movement of Wood Frogs and Spotted Salamanders, which is known to some enthusiasts as "The Big Night."

As the pool dries, newly hatched frogs and salamanders race against time to mature and leave the pool. Fairy Shrimp never leave the pool, but they lay eggs that require a drying out phase before hatching again the next year. Some vernal pools depend on fall rains and winter snow; there are good and bad years. This past winter's minimal snow fall will likely mean shallower, less enduring pools that will make for a challenging year for all the critters.

While it is OK to peek at the progress of this little world, please do not disturb it. Always allow any branches or leaves nature has deposited there to remain. Also, be very careful not to disturb any egg masses, so that they will be an active part of nature's grand plan. *- Jim Taylor*

Photo: DCR Staff

For more information on vernal pools, go to www.vernalpool.org/vernal_1.htm.

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Massachusetts

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Watershed Currents is produced semi-annually for WPR/CR landowners in the DCR water supply watersheds.

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