NPDES PHASE II FINAL RULE

NOTICE OF INTENT

AND

STORMWATER MANAGEMENT PLAN

CITY OF CAMBRIDGE, MASSACHUSETTS

April 2006

Second DRAFT

CAMBRIDGE DEPARTMENT OF PUBLIC THE WORKS

TABLE OF CONTENTS

A. Introduction

This second draft to the NPDES Phase II Rule Notice of Intent (NOI) and Stormwater Management Plan (SWMP), dated April 2006, was developed to address comments received from EPA and written comments that EPA received during EPA's public comment process regarding Cambridge's NOI. EPA's comment letter is attached in Appendix G.

A.1 Objective

The objective of this stormwater management plan is to develop a program of stormwater mitigation for the City of Cambridge, Massachusetts based on the guidelines established under the Municipal Separate Storm Sewer System (MS4) stormwater management program by the U.S. Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Rule. The MS4 Phase II program was created with the intention of improving the quality of the nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into stormwater systems and discharges to surface water bodies. EPA requires that MS4 Phase II owners/operators reduce pollutants in stormwater to the maximum extent practicable (MEP) to protect water quality. The regulations specify that compliance with the MEP requirement can be attained by developing a stormwater management plan that addresses the following six minimum control measures:

- Public Education and Outreach
- Public Participation and Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Runoff Control
- Post-Construction Site Runoff Control
- Pollution Prevention and Good Housekeeping at Municipal Operations

EPA studies have demonstrated that stormwater pollution is one of the most significant sources of water pollution today. When it rains or snow melts the resulting stormwater picks up or dissolves pollutants and washes them into stormwater conveyance systems. Polluted stormwater runoff is often discharged into local rivers and streams without treatment. Common pollutants include oil, grease and metals from cars and roadways; pesticides and fertilizers from lawn maintenance activities; sediment from construction sites; and the

improper disposal of litter including cigarette butts, paper wrappers and plastic bottles. Stormwater can impair waterways, degrade animal habitat, pollute drinking water, increase flooding, cause erosion of streambeds or siltation of waterways, and decrease the amount of water recharged to aquifers.

A.2 Definitions[1]

Municipal Separate Storm Sewer System (MS4) *also referred to as a Municipal Separate Stormwater System:* "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States.

(ii) Designed or used for collecting or conveying storm water;

(iii) Which is not a combined sewer; and

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2."

Non Point Pollution means pollution that occurs when water runs over land or through the ground and picks up natural and human-made pollutants, and discharges them in surface waters or introduces them into groundwater.

Pollutants of Concern include biochemical oxygen demand (BOD), sediment or a parameter that addresses sediment (such as total suspended solids, turbidity or siltation), pathogens, oil and grease, and any pollutant that has been identified as a cause of impairment in any water body to which the MS4 discharges.

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[1] Source: U.S. Environmental Protection Agency Office of Water, *Storm Water Phase II Fact Sheet Series* (unless otherwise noted)

Point Source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.[2]

Pollutant mean any element or property of sewage, agricultural, industrial or commercial waste, runoff, leachate, heated effluent, or other matter in whatever form, and whether originating at a point or nonpoint source, that is or may be discharged, drained or otherwise introduced into any sewage system, treatment works or waters of the Commonwealth.[3]

Small SM4 means all separate storm sewers that are: (i) Owned or operated by the United States, a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States. (ii) Not defined as ''large'' or ''medium'' municipal separate storm sewer systems pursuant to paragraphs (b)(4) and (b)(7) of this section, or designated under paragraph (a)(1)(v) of this section….[4]

Stormwater means storm water runoff, snow melt runoff, and surface runoff and drainage.[5]

Small Construction Activities means Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the

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[2] Source: Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990. Page 48065 [40 CFR 122.26 (b) (8)]

[3] Source: 314CMR 4.02

[4] Source: 40 CFR § 122.26(B)(16)

[5] Source: Federal Register / Vol. 55, No. 222 / Friday, November 16, 1990. Page 48065 [40 CFR 122.26 (b) (8)]

larger common plan will ultimately disturb equal to or greater than one and less than five acres.[6]

Total Maximum Daily Load (TMDL)*:* "The sum of the individual [Wasteload Allocations (WLA)] for point sources and [Load Allocations (LA)] for nonpoint sources and natural background. If receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measures. If Best Management Practices (BMPs) or other nonpoint source pollution controls make more stringent load allocations practicable, then wasteload allocations can be made less stringent. Thus, the TMDL process provides for nonpoint source control tradeoffs." [7]

Urbanized Area: A land area comprising one or more places – central place(s) – and the adjacent densely settled surrounding area – urban fringe – that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile.

A.3 Background

In 1972, the Federal Water Pollution Control Act, also known as the Clean Water Act, was amended to make illegal the discharge of any pollutant as a point source to any water body in the United States without authorization by a NPDES permit. Pollution control measures were implemented first in industrial wastewater operations and municipal sewerage systems, however, it became apparent that more regulations were needed to include the identification of stormwater drainage systems as a point source. In 1987, the Clean Water Act was again amended to implement a two-phase approach to the reduction of stormwater discharges. The first phase was aimed at large and medium municipal separate stormwater systems (typically systems serving populations of 100,000 or more), industrial activities, and construction activities that disturbed five acres or more of land. The Phase I part of the program was implemented on November 5, 1990. The Phase I permitting process required

[6] Source: 40 CFR § 122.26(B)(15)(i)

[7] Source: 40 CFR - CHAPTER I - PART 130, § 130.2 Definitions.

these larger cities to develop and implement a stormwater management program, and to address stormwater management at specific municipal facilities at which "industrial" activity took place. It also required certain industries as well as any construction project greater than five acres to obtain NPDES permit coverage through the development and implementation of stormwater pollution prevention plans that would control erosion and sedimentation as well as pollutant discharges.

On December 8, 1999, the NPDES Phase II Stormwater Rule was published in the Federal Register by the United States Environmental Protection Agency. The NPDES Phase II Stormwater requirements focused on small MS4's (usually cities with populations of less than 100,000) and small construction activities (construction activity that disrupts one or more acres of land). The basis of this Phase II approach was to design a stormwater management program that focused on six minimum control measures outlined above.

The NPDES Phase II program requires the development of best management practices (BMPs) for each of the minimum control measures and the development of an implementation schedule and measurable goals throughout the five-year permitting period. The City of Cambridge is required to submit progress reports annually, and is subject to enforcement action as described in the Clean Water Act if it fails to implement the BMPs it has selected.

A.4 Project Approach

This Plan was developed based on a literature review, ongoing stormwater management efforts which includes participation in a Memorandum of Understanding with EPA to develop a stormwater program to prohibit dry weather discharges and to address wet weather discharges to the Charles River to the maximum extent practicable, and knowledge of our system and resources. The Plan builds upon knowledge gained from the extensive field investigations and hydraulic studies undertaken to identify illicit connections and for the design of sewer separation and stormwater management projects throughout Cambridge. The "Proposed Massachusetts Year 2002 Integrated List of Waters (303d list)", "Boston Harbor 1999 Water Quality Assessment Report", "Charles River Watershed 1997/1998 Water Quality Assessment Report", and City Ordinances, regulations, policies, plans, maps and other documents were reviewed. In addition, Meetings and discussions with various

City departments were held, and representatives of regional and state planning, environmental and other organizations were consulted. A bibliography is included as Appendix A.

A.5 Area Subject to the Plan

The NPDES Phase II program applies to separate municipal stormwater systems. Cambridge's collection system was built over 150 years ago as a combined sewer system. In the late 1930's separation of the combined system began. Separation of the City's combined system continues today although approximately 65 - 70% of the system is still combined or partially combined. The NPDES Phase II program applies only to those areas of the City that are separated and convey stormwater to waterways, representing approximately two square miles of the City.. Currently Cambridge's separate stormwater system discharges stormwater to the Charles River, Wellington Brook and Little River/Alewife Brook. Since the separated areas are spread throughout the City and the City is continuing to separate its combined sewer system many of the BMPs developed for this plan will be applied citywide, especially those pertaining to public education and outreach and public participation (refer to the map *Separated Catchment Areas and Municipal Stormwater Outfalls* in Appendix B).

A.6 Methodology

The objective of the NPDES Phase II program is to improve water quality. Stormwater pollution mitigation strategies in the stormwater management plan focus on the pollutants of concern that cause impairment of local waterways and waterbodies identified in the "Proposed Massachusetts Year 2002 Integrated List of Waters (303d list)," in Category 5 - "Waters Requiring a TMDL" (Total Maximum Daily Load). Data from the Integrated List, including the pollutants needing a TMDL, is provided in Section C.4.

BMPs for each of the six minimum control measures, the rationale for their selection, an implementation schedule, estimated costs, and the title of the person or the department responsible for implementation are described in the following sections.

B. Contact Information

This Notice of Intent (NOI) and Stormwater Management Plan have been completed for the City of Cambridge, Massachusetts, a political subdivision of the Commonwealth of Massachusetts, to satisfy the requirements of the NPDES Phase II Stormwater Program as defined under the Clean Water Act. The contact information for the person and department responsible for the implementation of this program is listed below.

Ms. Lisa Peterson, Commissioner
Department of Public Works
147 Hampshire Street
Cambridge, Massachusetts 02139

Phone: (617) 349-4802
Fax: (617) 349-4868
E-mail: lisap@ci.cambridge.ma.us

C. Municipal Separate Stormwater System

C.1 Location of Urbanized Area

This Notice of Intent and Stormwater Management Plan has been completed for the Municipal Separate Stormwater System located in the City of Cambridge, Middlesex County, Massachusetts. The approximate center of the City is located at the following coordinates:

Latitude: 42° - 22' – 01" N

Longitude: 71° - 06 – 21" W

C.2 Receiving Water Bodies

The City has identified the surface water bodies that receive discharges from the MS4. The following surface water bodies have been identified as receiving stormwater directly from outfalls or by receiving surface water from connecting brooks (refer to map *Water Bodies in Cambridge* in Appendix B).

- Charles River (including Lechmere and Broad Canals)
- Wellington Brook
- Little River/Alewife Brook
- Blair Pond (*via Wellington Brook*)
- Fresh Pond

C.3 "Proposed Massachusetts Year 2002 Integrated List of Waters" (formerly known as Clean Water Act §303(d) List of Impaired Waterways)

Section 305(b) of the federal Clean Water Act requires states to assess and report to EPA on water quality, and Section 303(d) requires that states publish a list of waters that are impaired. The purpose of developing the report and list is to assist water quality managers to prioritize remediation activities and implement appropriate protective measures. EPA recently modified its guidance on the preparation of the report and list. States are now required to submit an "Integrated Water Quality Monitoring and Assessment Report" that fulfills the requirements of both Section 305(b) and Section 303(d).

Under the new reporting structure, waters are assessed and assigned to one of five categories:

1. Attaining the water quality standard and no use is threatened.
2. Attaining some of the designated uses; no use is threatened; and insufficient or no data and information is available to determine if the remaining uses are attained or threatened.
3. Insufficient or no data and information to determine if any designated use is attained.
4. Impaired or threatened for one or more designated uses but does not require the development of a TMDL [Total Maximum Daily Load].
    a. TMDL has been completed.
    b. Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
    c. Impairment is not caused by a pollutant.
5. The water quality standard is not attained. The AU [Assessment Unit (waterbody)] is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL. This category constitutes the Section 303(d) list of waters impaired or threatened by a pollutant(s) for which one or more TMDL(s) are needed. An AU should be listed in this category if it is determined, in accordance with the state's or territory's assessment and listing methodology, that a pollutant has caused, is suspected of causing, or is projected to cause an impairment. Where more than one pollutant is associated with the impairment of a single AU, the AU will remain in Category 5 until TMDLs for all pollutants have been completed and approved by EPA.[8]

Pollutants may include pathogens, organic enrichment, low dissolved oxygen, metals, petroleum, noxious aquatic plants, and others. Non-pollutants may include exotic species, habitat alterations, and flow alterations, among others.

The western portion of the City lies within the Mystic River Watershed (approximately 30% of the City – refer to map *Cambridge Watersheds* in Appendix B). Waters within the City

[8] Source: EPA 2002 Integrated Water Quality Monitoring and Assessment Report Guidance, November 19, 2001

limits included in Category 5 include Blacks Nook and all of the Alewife Brook. Although not listed in the Section 303(d) list, Fresh Pond, Wellington Brook and Blair Pond are also important water bodies in the watershed. Wellington Brook and Blair Pond contribute flows to the Alewife Brook. The Cambridge MS4 directly discharges to Fresh Pond, Wellington Brook and Little River/Alewife Brook. The Cambridge MS4 does not discharge to the other water bodies in this watershed including: Blacks Nook, Perch Pond, Jerry's Pond and Yates Pond. Fresh Pond is considered under 314 CMR 4.04 to be an Outstanding Resource Water as it is part of the drinking water supply system for the City of Cambridge. According to 314 CMR 4.04 public water supplies constitute an outstanding resource as determined by their outstanding socio-economic, recreational, ecological and/or aesthetic values. The quality of these waters shall be protected and maintained. Discharges to Outstanding Resource waters are regulated under the Massachusetts Surface Water Quality Standards. In 2001 the City adopted the *Fresh Pond Reservation Master Plan* to protect Fresh Pond's water quality.

The eastern area of the City is within the Charles River watershed (approximately 70% of the City). Category 5 listed waters in this watershed within the City limits include the Charles River and the Millers River (from the headwaters to the Charles River). Lechmere Canal and Broad Canal are extensions of the Charles River. Cambridge MS4s discharge to the Charles River, Lechmere Canal and to the Broad Canal. The Millers River receives no discharges from the Cambridge MS4.

C.4 Category 5 Waters in Cambridge

Waterways in both the Mystic River (Boston Harbor) and Charles River watersheds are included in the Proposed List of Massachusetts Category 5 Waters "Waters Requiring a TMDL. However, no Total Maximum Daily Loads for any segments of Cambridge waterways have been established. The names of the waterway segments, segment ID, description, size, assessment date, and pollutant needing TMDL indicated in the list are tabulated below. The last column on the right contains comments.

Name	Segment ID	Description	Assess-ment Date	Pollutant Needing TMDL (*-non-Pollutant)	Comments
Mystic River Watershed					
Blacks Nook (71005)	MA71005_2002	Cambridge (2.5 acres)	Sep-96	-Nutrients -Noxious aquatic plants	No Cambridge MS4s discharge into this water body.
Alewife Brook (7138250)	MA71-04_2002	Outlet of Little Pond, Belmont to confluence with Mystic River, Arlington/Somerville. Miles 2.25-0.00	Jan-02	-Metals -Nutrients -Organic enrichment/ Low DO -Pathogens -Oil & Grease -Taste, odor and color -(objectionable deposits*)	This water body is presently subject to a DEP water quality Variance to allow Combined Sewer Overflows (CSO) and is the subject of a major long term CSO control program jointly funded by the MWRA and the City of Cambridge.
Charles River Watershed					
Unnamed Tributary (7239055)	MA72-31_2002	Also known as the "Millers River" – from the headwaters to the confluence with the Charles River, Cambridge. Miles 0.23-0.0	Dec-99	-Priority organics -Metals -(Other habitat alterations*) -Oil and grease -Taste, odor and color	No Cambridge MS4s discharge into this water body.
Charles River (7239050)	MA72-08_2002	(Charles Basin) Watertown Dam, Watertown to Science Museum, Boston. Miles 9.8-1.2	Dec-98	-Cause unknown -Unknown toxicity -Priority organics -Metals -Nutrients -Organic enrichment/ Low DO -Pathogens -Oil and grease --Taste, odor and color -Noxious aquatic plants -Turbidity	This water body is presently subject to a DEP water quality Variance to allow Combined Sewer Overflows (CSO) and is the subject of a major long term CSO control program funded by the MWRA.

The two water bodies listed as Category 5 waters that receive discharges from the Cambridge MS4 are the Charles River and Alewife Brook. Both of these waterbodies also receive discharges from Combined Sewer Overflows (CSO) during periods of heavy rain. There are seven (7) CSOs on the Charles River in Cambridge: two (2) are permitted to the

MWRA and five (5) are permitted to Cambridge. There are eight (8) CSOs on the Alewife Brook: one (1) is permitted to the MWRA, one (1) is permitted to the City of Somerville and six (6) are permitted to the City of Cambridge. Although these wastewater loads are a significant source of pollutants, according to the findings in the Massachusetts Water Resources Authority (MWRA) CSO Facilities Plans for both the Alewife Brook and Charles River (Metcalf and Eddy Consulting Engineers, 1997 and 2001) stormwater loads are the predominant source of pollution. Cambridge is working with the MWRA to reduce CSO discharges. The long term plans for CSO control will reduce the pollutants of concern associated with CSO discharges to both the Alewife Brook and the Charles River.

The Department of Environmental Protection (DEP) has issued a short term Variance for the CSO discharges to allow more time for additional information to be gathered on pollutant sources and loads before making a final determination on the final CSO control requirements. The Variance requires MWRA to conduct additional analysis on CSO and stormwater loads and their water quality impacts. DEP will make a final determination on the final CSO control requirements after it has reviewed water quality data from various sources.

BMPs for Minimum Control Measures to Address Pollutants of Concern

The pollutants of concern (POC) identified in C.4 above include nutrients (nitrogen and total phosphorus), metals, pathogens, oil and grease, objectionable deposits, priority organics, and turbidity as well as organic enrichment/low DO and taste, odor, and color concerns that can result from these pollutants. BMPs for each of the six minimum control measures that specifically address these pollutants of concern are discussed below. These BMPs, further detailed in Sections D.1 through D.6, will collectively control the discharge of pollutants of concern to impaired waterbodies of Cambridge that include Alewife Brook and Charles River.[9] The BMPs address pollution reduction largely through preventative measures to eliminate pollution from entering the stormwater drainage system and therefore not cause an exceedance of water quality standards.

1. Public Education and Outreach

[9]Both Blacks Nook and an unnamed tributary ("Millers River") are listed as Category 5 waters, but do not receive discharges from the City's MS4.

- BMP 1.a: The DPW has developed brochures posted on the City's web site that address pollutants of concern from the following activities:
  a. Vehicle Maintenance and Car Washing (oil and grease)
  b. Pet Waste (pathogens)
  c. Recycling and Trash (objectionable deposits, oil and grease)
  d. Automotive Runoff (oil and grease, metals)
  e. Food Waste and Grease (oil and grease)
  f. Keeping Cambridge Clean (objectionable deposits)
  g. Snow: Our Winter Challenge (sodium)
  h. Guide to Moving and Renovating (metals, oil and grease, nutrients)
  i. A lawn and grass maintenance brochure will be developed that addresses the impact fertilizers have on discharges to our receiving waters.

- BMP 1.e: The City's transportation program encourages the use of alternative forms of transportation in lieu of cars to reduce exhaust fumes and the wear and tear of breaks, tires and automotive parts that contain metals. (oil and grease, metals)

2. Public Involvement and Participation
   - BMP 2.b: The City works with volunteer organizations that monitor water quality for the Charles River and Alewife Brook. The City specifically provides litter pickup and removal and assistance with supplies for an annual clean-up effort that help to eliminate and reduce various pollutants of concern located in the Charles River and Alewife Brook. (objectionable deposits)

3. Illicit Discharge Detection and Elimination
   - BMP 3.b: The City's Illicit Detection and Elimination Program has identified and removed 244 illicit connections within the City. The City collects dry weather samples at thirteen (13) outfalls to the Charles River and eight (8) outfalls to the Alewife Brook. These samples are analyzed for pollutants of concern that include pathogens (fecal coliform, e. coli, enterococcus), nutrients, and biological oxygen demand (BOD). In addition, at least one sample of oil and grease is taken annually in the Mystic River and Charles River Watersheds. (oil and grease, nutrients, pathogens). In response to

EPA's concerns, the City will expand its outfall sampling to include all outfalls discharging to the Charles River and Little River/Alewife Brook, will prioritize further investigations in those drainage sub systems where existing sampling results continue to indicate potentially upstream illicit connections and will use the IDDE protocol to the extent appropriate in these areas. The city has recently purchased the metering equipment suggested by Pitt (2004) to assist in this effort.

4. Construction Site Stormwater Runoff Control
   - BMP 4.a: The Stormwater Management Permit shall require the submission of a Stormwater Management Plan, Erosion and Sediment Control Plan, and Operation and Maintenance (O&M) Plan. These plans will address contaminated runoff and pollutants of concern from exiting a construction site and entering the City's drainage system. The Erosion and Sediment Control Plan combined with the implementation of the O&M Plan and site inspections will reduce and eliminate sediment and construction waste in runoff that can contain pollutants of concern that adhere to sediment and waste. In addition, water quality policies, as part of the Stormwater Management Plan requirements will address pollutants of concern including pathogens, nutrients, and TSS. Currently, the City has a draft LID Document for Concord-Alewife that stipulates 80% TSS and 98% trash and floatable removal as part of the water quality criteria. (nutrients, pathogens, objectionable deposits, and turbidity)

5. Post Construction Runoff Control
   - BMP 5.a: The Stormwater Management Permit shall require the submission of a Stormwater Management Plan and Operation and Maintenance Plan for permanent BMPs that will address the pollutants of concern. Guidance to assist in meeting plan requirements will include BMP fact sheets that identify target pollutants and removal effectiveness if the BMP is implemented. The Operation and Maintenance Plan will ensure that BMPs are properly maintained to eliminate pollutants from being disposed downstream on a long-term basis. As previously mentioned, water quality policies, as part of

the Stormwater Management Plan requirements will address pollutants of concern including pathogens, nutrients, and TSS. (all pollutants of concern)

6. Pollution Prevention and Good Housekeeping
   - BMP 6.a: The good housekeeping manual includes BMP fact sheets for City facilities to use during day-to-day activities. This in conjunction with staff training and site inspections reduces pollutants. Specific parameters (including the pollutants of concern) that are reduced through BMP implementation are identified on each BMP fact sheet. (all pollutants of concern)
   - BMP 6.b: City operations that include street sweeping, catch basin cleaning, and stormwater drainage system maintenance help to reduce the amount of sediment and pollutants. (all pollutants of concern)

C.5 Eligibility Criteria

The City of Cambridge is located in the Commonwealth of Massachusetts and is defined as a small municipal storm sewer system (MS4) as defined in 40 CFR §122.26(b)(16). The City is located within an urbanized area as determined by the 2000 census data provided by the Bureau of Census. This Notice of Intent and Stormwater Management Plan are being provided to obtain coverage for stormwater discharges to waters of the United States. The following certifications are made as identified by the General Permit limitations on coverage.

Endangered or Threatened Species

The City of Cambridge lies within Middlesex County. The Bald Eagle (*Haliaeetus Leuocephalus*) and the Indiana Bat (*Myotis Sodalis*) are listed as endangered species within the County. However, the U.S. Fish and Wildlife Service has indicated “no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area.” The Cambridge MS4 is therefore eligible for coverage under the General Permit. A copy of the U.S. Fish and Wildlife determination is included as Appendix C

Historic Resources

Based upon review of sites in Cambridge shown on the MassGIS datalayer for National Register and State Register sites, analysis of those sites in relation to known outfall locations, consultation with the Cambridge Historic Commission, and the review of a Project Notification Form by the Massachusetts Historical Commission (MHC), no such historic sites are anticipated to be negatively impacted by stormwater. A copy of the Massachusetts Historical Commission determination is included as Appendix D. Cambridge will coordinate any additional review with MHC as necessary as we move forward with construction of various stormwater management projects.

D. Minimum Control Measures

The City of Cambridge has developed a Stormwater Management Plan for compliance with the NPDES Stormwater Phase II Rule. The review of the existing conditions and identification of stormwater needs has provided the framework for identifying best management practices under the six minimum control measures. The aim of this stormwater management plan is to reduce pollutant loads from stormwater systems to the maximum extent practicable, protect water quality, and meet the requirements under the Clean Water Act. The stormwater management plan was developed to manage the City of Cambridge's stormwater systems over the next five-year period. Best management practices are detailed in the following sections along with measurable goals.

D.1 Public Education and Outreach

The objective of the Public Education and Outreach minimum control measure is to inform the community of the impacts of stormwater runoff and what can be done to reduce stormwater pollution. This objective may be met through a variety of means, including the development and dissemination of educational material.

Required Elements:

- Develop and implement a public education program to distribute educational material to the community.
- Public education program will provide information concerning stormwater discharge impacts on water bodies.
- Public education program will address steps and/or activities that the public can take to reduce pollutants in stormwater runoff.

BMP 1.a – Develop Educational and Outreach Material for Residents and Businesses

Description: Cambridge is a densely urbanized and industrial City. Pollutants found in stormwater runoff during wet weather can originate from commercial, industrial, residential, and vehicular activities; leaking underground storage tanks; accidental spills;

construction sites; and, sewer infiltration. The primary pollutants found in heavily urban areas include pathogens, metals, oil and grease, nutrients, and organic enrichment.

Residents and businesses can play a major role in the reduction of stormwater impacts to surface water bodies. When residents and businesses are provided with the appropriate information they can better understand the effects of illegal discharges and the improper disposal of waste. The public education program creates expectations that greater awareness will influence behavior and habits that exacerbate the problems. An informed community can also be enlisted to aid in the identification of illicit discharges. In an effort to provide relevant information to the community, targeted educational and outreach materials will be developed for residents and businesses and/or existing materials developed by EPA and DEP will be used and modified as necessary. According to the 2000 U.S. Census many foreign languages are spoken as primary languages in Cambridge households. Efforts will be made to provide stormwater educational information in the major languages spoken at home.

At a minimum, educational information will annually be:

- Posted on the City's web page
- Made available to residents and businesses at locations within the City such as the City Hall and library and/or other municipal buildings
- Distributed at the Household Hazardous Waste Collection Days

Cambridge has developed several brochures that provide information on how to manage pet waste, residential vehicular maintenance and the importance and care of trees. These materials contain basic stormwater information about how these activities impact water quality. Additionally, specific commercial activities have been targeted such as restaurants and automobile service facilities. Brochures for these establishments were produced during Year 2.

Measurable Goals and Schedule: The effectiveness of this program is dependent on the City's ability to develop and provide information to the public.

Specific measurable goals and schedule include the following:

(i) develop three brochures or fact sheets that includes stormwater information for targeted businesses and residential uses during Year 1, in subsequent years additional information will be developed. Specifically, during Year 4 prepare a fact sheet on Healthy Household Habits and translate into the top 5 principal languages spoken in households in Cambridge according to the 2000 U.S. Census. Also in Year 4 develop a brochure/fact sheet on lawn maintenance and the impacts of fertilizers on water quality and receiving waters.
(ii) post stormwater information on the City's web site beginning in Year 1. Specifically, the brochures, fact sheets and web site will provide information concerning the identification of illicit discharges, the impact of stormwater discharges on water bodies, and will address steps and/or activities that the public can take to reduce the pollutants in stormwater runoff.
(iii) distribute materials through direct mail, door to door, through distribution to various service agencies that work with identified ethnic populations, and/or cable TV during Years 2 through 5. Specifically, during Years 4 and 5 distribute information on stormwater management measures and/or stormwater in general to every household actively receiving mail in Cambridge.
(iv) assess existing local/regional mass media marketing campaigns to determine if they fill a local educational need or goal during Year 4.

Responsible Person/Department: Commissioner/DPW

BMP 1.b – Develop Outreach Materials/Activities for Children

Description: The City of Cambridge currently manages an extensive sewer separation and stormwater management program. As part of this effort children are educated about the upcoming construction activity and the reasons for the project. The children usually help in creating construction murals that further educate the community about the benefits of clean water. It is also hoped that they bring this information home to share with their families.

Measurable Goals and Schedule: During the five (5) year permit term it is anticipated that the City will begin construction of stormwater management projects in the Cambridgeport and Alewife areas. Project outreach efforts will include the schools in or

near the construction area. By Year 4 one school outreach activity will begin in the Cambridgeport area and by Year 5 one school outreach activity will begin in the Alewife area. Activities can include a classroom presentation, mural project or other outreach as permitted by the school curricula.

Responsible Person/Department: Commissioner/DPW

BMP 1.c – Develop a Stormwater Web Page

Description: The DPW currently has a departmental web page. Information is posted on the department's stormwater projects and efforts. The DPW is currently reformatting its web site and will develop a page devoted to informing the community of ongoing stormwater management efforts and provide links to additional sources of information on stormwater management and resources.

Measurable Goals and Schedule: A stormwater web page will be developed by the end of Year 1. Updates to the web site will be made periodically for Years 2 – 5. Specifically, during Year 4 the Stormwater Web page will include copies of the NPDES MS4 Notice of Intent, Second Draft of the Stormwater Management Plan, and Annual Reports for yours 1 through 3. The Year 4 Annual Report will be added in Year 5.

Responsible Person/Department: Commissioner/DPW

BMP 1.d – Create a Catch Basin Curb Marker Program:

Description: A common misunderstanding many residents and businesses' employees have is that the catch basin is connected to the sanitary sewers system. DPW is experimenting with two types of catch basin curb markers/castings. One type is a 4" diameter plastic decal that is affixed to the curb with epoxy. The other is a casting that is set into the sidewalk when it is constructed. Each type of catch basin curb marker identifies the receiving water that the drainage catchment discharges to (Alewife Brook or Charles River).

Measurable Goals and Schedule: During Years 1 – 5 catch basin curb markers or plaques will be installed during sidewalk reconstruction projects.

Responsible Person/Department: Commissioner/DPW

BMP 1.e – Reduce Stormwater Pollution from Automobiles

Description: The wear and tear of automobile parts contribute to the deposition of metals on roadways that are flushed into waterways when it rains. The City's Community Development Department (CDD) has developed an extensive program to encourage the use of alternative forms of transportation, such as, walking, bicycling and using public transportation. The City requires large projects to provide a transportation plan as part of special permit applications. In addition, parking requirements limit the amount of parking businesses must provide in order to encourage the use of alternative means of transportation. Finally the City has a strong Vehicle Trip Reduction and Parking and Transportation Demand Management (PTDM) Ordinances to enforce trip reduction.

Measurable Goals and Schedule: During each year of the permit term the City of Cambridge will sponsor an event promoting the benefits of using alternative forms of transportation.

Responsible Person/Department: Assistant City Manager for Community Development/CDD

D.2 Public Participation and Involvement

The goal or objective of the second minimum control measure, Public Participation and Involvement is to get the public more involved in stormwater quality and pollution prevention issues. An involved public is more likely to understand the goals of the plan, to share that understanding with others, and to generate public support for the plan.

Required Elements:

- All public involvement activities must comply with state public notice requirements at MGL Chapter 39 Section 23B and local public notice requirements.

- The public shall have the opportunity to participate in the implementation and review of the Stormwater Management Program.

BMP 2.a – Participate in Public Meetings on Water Quality and Quantity

Description: The DPW is actively involved in a comprehensive field investigation program and stormwater management projects. Public meetings are held to discuss the problems found in the stormwater system and to discuss measures necessary to address them.

Measurable Goals and Schedule: The DPW will participate in or sponsor a public meeting annually to discuss water quality and/or quantity issues during the five-year permit period and/or to discuss the Stormwater Management Program activities. Meetings will be advertised using various methods, such as newspaper notices, flyers, web site postings, through e-mail list serves and local organizations' newsletters and will comply with public notice requirements.

Responsible Person/Department: Commissioner/DPW

BMP 2.b – Support Volunteer Efforts

Description: The local watersheds have various organizations involved in water quality monitoring, public education and clean up efforts. The City of Cambridge recognizes the importance of these organizations in reaching diverse groups of people. The DPW will work collaboratively with these groups and provide support to their efforts in the form of clean up assistance and supporting educational efforts.

Measurable Goals and Schedule: The DPW will provide assistance with clean-up efforts by helping to advertise, provide litter pick up/removal and/or assistance with supplies for one clean-up effort annually. DPW will also support educational efforts of these organizations by supporting grant applications or by participating in lectures/talks to improve our mutual understanding of water quality issues as opportunities arise throughout the permit term. During Year 1, DPW will seek permission from the Charles

River Watershed Association and the Mystic River Watershed Association to provide links to these associations' web sites from the updated DPW web site.

Responsible Person/Department: Commissioner/DPW

BMP 2.c – Sponsor Recycling of Hazardous and Solid Waste

Description: Keeping solid and hazardous materials out of landfills and incinerators contributes to water quality improvements and overall environmental benefits. During Year 1 the City of Cambridge held four Household Hazardous Waste Collection days where residents could bring their wastes. During Year 2 the City reduced the number of collection days to three annually. DPW has determined the reduction in the number of days has not had a negative impact on the amount of waste collected. The dates of the household hazardous waste events are posted on the City's website, in local papers and on various notice boards throughout the City.

In addition to residential curbside recycling Cambridge DPW staffs a recycling drop off center for residents, non-profits and small businesses. Items eligible for drop off include: paper, cardboard, glass, plastic & metal containers, mercury thermometers & thermostats, clothes, books, electronic media, motor oil, fluorescent lights, and hazardous batteries.

Measurable Goal and Schedule: The City of Cambridge will hold four hazardous waste collection days during Year 1 and three annually throughout the remaining permit period. DPW staff will accept recycling materials and motor oil at the drop off center on a regularly scheduled basis throughout the five-year permit period. Beginning in Year 2 information on illicit discharges identification and how to report an illicit discharge will be available to the community during these events.

Responsible Person/Department: Commissioner/DPW

BMP 2.d – Participate in Watershed Planning Efforts

Description: In January 2003 the City through its Community Development Department embarked upon a multidisciplinary planning study of the Concord-Alewife area in the western part of Cambridge. A Study Committee comprised of neighborhood residents, representatives of study area businesses, property owners and institutions, and City staff was appointed to guide this planning study. City staff and the Study Committee will work closely with a team of professional planning consultants, led by Goody, Clancy & Associates, to address a variety of planning issues. Key issues to be addressed by this study include the appropriate mix of land uses, including housing, industry, possible City uses, and open space; access and traffic; the character of future development; and needed zoning changes to accomplish study goals. Water quantity and quality issues will help inform the Study Committee in their decision making process. The planning effort in the Concord-Alewife area will be a 2-phase process.

In addition, since 2002 the City has been working with the towns of Arlington and Belmont to understand the causes of flooding and sewer surcharging in the Alewife Brook sub-watershed and has formed the *Tri-Community Working Group.* The *Tri-Community Working Group* developed an Environmental Joint Powers Agreement (EJPA), which would create the A-B-C Stormwater Flooding Board. The purpose of this Agreement is for the communities of Arlington, Belmont and Cambridge to work jointly and cooperatively to identify and implement cost effective solutions to reduce or eliminate any adverse effects of flooding and other hazards in the Alewife watershed pursuant to M.G.L. c.21A § 20. The *Tri-Community Working Group* will publish their study results in a *progress report*.

Measurable Goals and Schedule:

(i) Phase I of the Concord-Alewife study will include a study area inventory and analysis and will result in the development of preliminary concept alternatives and preliminary recommendations and should be completed by the end of Year 1.

(ii) Phase II of the Concord-Alewife study will focus on development of concept plans recommendations into a final plan, including zoning recommendation. If Phase II moves ahead it should begin by the end of Year 1 and be completed by the end of Year 3.

(iii) Forward study recommendations to the City Manager for consideration in Year 4.

(iv) Discuss proposed stormwater management strategies for the Concord-Alewife area in a public meeting during Year 4.
(v) Publish Low Impact Development (LID) guidelines for the Concord-Alewife area in Year 5.
(vi) Place the LID guidelines on the Stormwater web site in Year 5.
(vii) The *Tri-Community Working Group* will work with EOEA to advance the EJPA to a final document during Year 1 and execute the EJPA in Year 2.
(viii) The *Tri-Community Working Group* and/or A-B-C Flooding Board will meet four times annually during the five-year permit term as long as the Joint Powers Agreement remains in effect.
(ix) Finalize the Tri-Community Working Group's *Progress Report* in Year 3.
(x) Place the final Tri-Community Working Group's *Progress Report* on the Stormwater web page in Year 4.

Responsible Person/Department: Assistant City Manager for Community Development/CDD and/or Commissioner/DPW

D.3 Illicit Discharge Detection and Elimination

The objective of the illicit discharge detection and elimination minimum control measure is to eliminate point source discharges of pollutants to receiving waters. Illicit discharges have been defined in 40 CFR 122.26(b)(2) as "any discharge to a municipal separate storm sewer that is not composed entirely of stormwater…" with some exceptions. These exceptions include discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities. EPA studies have shown that pollutants levels from illicit discharges have been high enough to significantly degrade receiving water quality and threaten aquatic wildlife, and human health. Illicit discharges include, but are not limited to sanitary wastewater, car wash wastewaters, improper oil disposal, laundry wastewater, spills from roadway accidents, and improper disposal of auto and household toxics.

As part of the illicit discharge program, the City of Cambridge plans to continue to update the stormwater drain system information in the City's Geographic Information System (GIS), recommend changes to the existing Sewer Use Regulations, and develop an

educational program to inform residents, businesses and municipal employees in identification of illicit discharges. Cambridge currently has a successful illicit detection program and will continue to identify and remove illicit connections as they are identified

Required Elements:

- Develop, implement and enforce a program to detect and eliminate illicit discharges.
- Develop a stormwater drainage system map, including the location of all outfalls and the names of all waters that receive discharges from those outfalls.
- Must effectively prohibit, through an ordinance or other regulatory mechanism, non-stormwater discharges into the stormwater system and implement appropriate enforcement procedures and actions. If a regulatory mechanism does not exist, development and adoption of such a mechanism must be included as part of the stormwater management plan.
- Must inform public employees, businesses and the general public of hazards associated with illegal discharges and improper waste disposal.
- Non-stormwater discharges listed in Part 1.F of he EPA's General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems must be addressed if they are identified as being significant contributors of pollutants.

BMP 3.a – Update Stormwater Drainage System, Outfalls and Receiving Waters in GIS

Description: Mapping of sewer and stormwater drainage systems was completed in 1996 and revisions are on-going. In 1996, the original Geographic Information System (GIS) for sanitary and stormwater systems was developed from 100-scale paper maps and depicts the sewer and drainage systems. Numerous construction projects and investigation projects have been completed since that time. In many cases the updated information has not been used to update the GIS database due to difficulty and problems the City was having with the architecture of the GIS database and the software used to update it. As a result in January 2002 the Management Information Systems (MIS) department together with the DPW decided to move the DPW off of the existing Environment Systems Research Institute (ESRI) ArcInfo version 7.x based sewer and

stormwater system GIS data system to the ArcInfo 8.3 (ArcGIS) geodatabase format and editing environment. Working with a consultant, Camp Dress and McKee (CDM) the MIS department began the data customization for the Water Department in 2002 and began database customization for DPW in Fall 2003/Winter 2004. CDM conducted field investigations to ensure the accuracy of the GIS data. The GIS upgrade had many advantages including better control over editing, the ability to trace flow, the ability to do some modeling in the GIS system, and better integration with other City departments. Training of DPW employees on ArcGIS will be scheduled as database customization progresses. CDM's work was primarily completed in 2005 with the majority of system upgrades, including infrastructure projects from the past two decades. Future system upgrades will be provided directly by the DPW GIS project manager or other staff within Public Works or by consultants subsequent to the completion of our various large capital improvement projects.

During the first five-year permit term the City will continue to update pipe locations and sizes, locations of stormwater outfalls, and the location of catch basins and other public structural best management practices such as grit pits, flushing vaults, pump stations and detention facilities as a result of new projects and field investigations. Many if not all of the stormwater outfall locations are identified and mapped (refer to map *Separated Catchment Areas and Municipal Stormwater Outfalls* in Appendix B). There are two outfalls at Fresh Pond whose locations have not been field verified and mapped. These outfalls will be included in the outfall map. Stormwater catchment areas have been identified for the separated drainage systems and outfalls. Updated information from as-built/record drawings will be incorporated into the GIS system following migration of the existing system from the City's current Environment Systems Research Institute (ESRI) ArcInfo version 7.x based sewer and stormwater system GIS data into the ArcInfo 8.3 geodatabase format and editing environment. In addition to updating public stormwater drainage systems, the City will identify and track private structural stormwater controls in a separate database.

Measurable Goals and Schedule: During Year 1, the DPW will work with the MIS Department and their consultant on the migration to a new ESRI ArcInfo 8.3 geodatabase format and editing environment. Also in Year 1 the outfalls at Fresh Pond will be field verified and mapped, and beginning in Year 1, information on private

structural controls will be tracked through the review of site plans and logged into a separate database. During Year 2, record drawings will be catalogued to facilitate their subsequent scanning and linking to the new GIS database, and engineering staff will be trained on the new GIS software and geodatabase. During Years 3 through 5 existing record drawing information and field investigation information will begin to be inputted to update the GIS.

Responsible Person/Department: Commissioner/DPW

BMP 3.b - Detect and Eliminate Illicit Discharges

Description: The City has a successful, comprehensive and integrated approach to illicit discharge detection and elimination that was initiated in 1997. Since then we have identified and removed approximately 244 illicit connections throughout the City. Each year the number of illicit connection found and removed is decreasing significantly due to the success of our Illicit Discharge Detection and Elimination Program. The City currently performs water quality sampling during dry weather conditions to satisfy requirements of the Massachusetts Department of Environmental Protection (DEP) Administrative Consent Order ACOP-96-1004 (Common Manhole Separation) and DEP Notice of Non Compliance NON-NE-00-1004 (Alewife 308 Letter), and during the design process (field investigations) for major infrastructure projects.

An integrated approach

Initially, the City expected that through a typical dentritic analysis of its drainage system it could isolate those drainage branches where the probability was greatest for illicit connections, and had begun its analysis by moving in this direction. Concurrently, because of the serious impacts flooding was having through various areas in the City, it became apparent that a greater degree of knowledge was required both with regard to service areas throughout the City system and levels of service throughout the area. Thus the City began further field investigation programs to better understand flow patterns and the various sub catchment systems throughout the city.

It became obvious within a short period of time that the prevalence of common manholes throughout the system significantly compromised sewer levels of service, stormwater

quality and added a significant complexity to identifying and eliminating illicit connections. Given the significant number and nature of common manholes it seriously compromised analysis of the drainage systems to identify sources of illicit connections. It soon became apparent that a multi pronged approach was necessary so as to properly identify the various point sources of pollution within the system. System sampling as an indicator by itself was judged to be unreliable and inefficient.

Among the reasons for the lack of reliability is the flat nature of much of the pipe systems in those areas of the city that are separated. Not alone are the pipes virtually flat in these areas but given the artificially high nature of the Charles and the Alewife rivers standing water remains in these systems for up to a mile up system. The Endicott and Danforth drainage systems have weirs in place so as to prevent river water moving upstream. The flat nature of the drainage system gives rise to a propensity for solid settlement. Because of flat grades, sediment laden pipes and common manhole structures, the potential for significant bacterial growth within the sediment layer of the drainage system is high and contributes to elevated e.coli sample results. Furthermore, e.coli results exhibit significant variability though the source may remain constant.

It was thus decided that a more detailed and robust approach was in order while continuing with sampling for a broader range of indicator parameters within the systems. More detailed building inspections and dye testing were required and a more concerted sewer and drainage system TV inspection program was also necessary. The City determined to begin a more comprehensive field investigation effort to more fully understand the extent of the problems associated with its infrastructure.

Infrastructure Investigations

- Introduction

The City of Cambridge has been investigating its infrastructure since 1996 for the existence of illicit sewer system connections to storm drains in separated areas of the city. Approximately 2 square miles of the city is separated. This effort has resulted in 6,108 building inspections and dye tests, approximately 64 miles of drain and sewer lines being TV investigated and 244 illicit connections being removed. The city's procedure has evolved over that time to meet the demands of our infrastructure and to coincide with our programmatic approach to system improvements as well as illicit and

cross connections elimination. During that time we have moved from the use of traditional paper mapping systems, observations and outfall sampling and intersection investigations and sampling to the use of GIS systems, system wide building inspections and digital TV inspections for illicit connections and cross connections.

- EPA Administrative Consent Order (Charles River) 1996

In 1996 the DEP issued an Administrative Consent Order to Cambridge concerning dry weather discharges from stormwater drains to the Charles River. Cambridge collects dry weather samples at thirteen (13) outfalls to the Charles River and eight (8) outfalls to the Alewife Brook and reports the results to the DEP twice a year in September and March. These outfalls were selected due to historical high levels of fecal coliform counts. Samples collected are analyzed for fecal coliform, e. coli, enterococcus, nutrients, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). Sampling locations along the Charles include: Ames Street, Broad Canal, Main Street, Wadsworth Street, Danforth Street, Endicott Street, Flagg Street, John F. Kennedy Street East, John F. Kennedy Street West, University Road, Brewer Street, DeWolfe Street and Sparks Street. Sampling locations along the Alewife Brook include: St. Saveur Court, Huron Avenue, Blanchard Road at Wellington Brook, Normandy Terrace, Acorn Park, Fawcett Street, Wheeler Street and CambridgePark Drive. The sampling required under this Consent Order is expected to continue through the five (5) year term of this NPDES Phase II permit.

- MA DEP Administrative Consent Order 1997

In April 1997 MA DEP issued an Administrative Consent Order to the City to address common manhole structures, illicit connections and maintenance of its sewer system specific to oil and grease discharges. Subsequently, the City agreed to a work plan with MA DEP to address the elimination of common manholes in separated areas over a subsequent number of years. In May 1998 the City identified 431 common manholes throughout the city, identified the outfall associated with the manholes and provided a detailed report on the condition of the structures and the status of separation plates between the sewer and drainage system within the structures. To date 156 have been removed from separated areas and 115 remain to be separated.

- EPA Notice of Non-Compliance (Alewife Brook) 2000

In January 2000 the DEP issued a Notice of Non-Compliance to Cambridge concerning dry weather discharges from stormwater drains to the Alewife Brook. Cambridge collects dry weather samples at the eight (8) locations mentioned above on a quarterly basis and reports the results to DEP in March, June, September and December. Some samples collected are analyzed for fecal coliform, e. coli, enterococcus, nutrients, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). Sampling under this Notice of Non-Compliance is expected to continue through the five (5) year term of this NPDES Phase II permit.

- Pre-construction Investigations

When a design process is begun for major infrastructure projects such as sewer separation and stormwater management projects field investigations including cleaning, dye testing and televising are conducted to identify any existing illicit connections. Samples are collected and analyzed for the presence of fecal coliform. Extensive field investigations have been carried out throughout a majority of the City and illicit connections were removed. The Sparks Street and Lechmere Canal drainage areas have had the least amount of field investigations.

- Capital Improvement Program

The City has developed a capital improvement program over the past 5 years that extends for the next ten years, specific to sewer and drainage system maintenance, sewer separation and stormwater management. This program is integrated with MWRA infrastructure improvements for Combined Sewer Overflow (CSO) control and is inclusive of MWRA projected wholesale rate increases. Furthermore, priorities are established based on a wide variety of criteria, which include environmental concerns, public health issues, and legal obligations, and on our ability to continue to provide adequate funding toward infrastructure maintenance. Sewer separation and stormwater management projects are expected to continue in the City for the foreseeable future.

- Project Priorities

Previously, identification of priority areas was based upon stormwater drainage catchment areas. Several illicit connection removal contracts have already been implemented and completed. Existing illicit connections are being removed under the City's annual Remedial contracts. The above described water quality testing assures

that we are constantly monitoring our outfalls for illicit discharges, especially in the areas that have undergone extensive field investigations. Illicit detections are identified primarily through water quality sampling, but also include visual screening of outfalls, building inspections and dye testing, and TV inspections of pipes. Reports of suspicious discharges from outfalls are investigated immediately upon a notification of a suspected discharge or by routine observations. Control of other pollutants identified as "pollutants of concern" by DEP are addressed through the implementation of BMPs such as street sweeping, public education on good housekeeping practices and cleaning of the drainage system and catch basins.

- IDDE Program Changes

As described above, the City has completed an intensive field investigation program throughout a majority of the City, with the exception of the Sparks Street and Lechmere Canal drainage areas. In addition, the DPW routinely monitors through water quality sampling a majority of the stormwater outfalls in the City. The DPW will implement EPA's recommended Lower Charles IDDE Protocol for the Sparks Street and Lechmere Canal drainage areas. Additionally, DPW will expand its stormwater outfall monitoring program to include all of the known Cambridge stormwater outfalls in the Charles and Alewife Brook, thus ensuring continuous monitoring for new illicit discharges.

<u>Fresh Pond Watershed</u>

The outfall drainage systems that contribute to Fresh Pond are two isolated drainage areas. One for an area adjacent to Weir Meadow and another is near Lusitania Field. Drainage improvements for the Weir Meadow outfall have recently been completed and were designed and are maintained to meet DEP's Stormwater Performance Standards for new development. The BMPs include the removal of an asphalt path next to Fresh Pond and replacement with a stabilized aggregate path approximately 100' away, and the construction of a 200' linear wetland swale, which discharges to a sand and gravel infiltration berm prior to discharge to Fresh Pond.

According to a report prepared by Rizzo Associates the proposed improvements for the drainage area near Lusitania Field (Northeast Sector Project) include the creation of a wet meadow. This new meadow will modify existing drainage patterns, offer additional treatment of stormwater runoff and provide additional flood storage prior to their

discharge into Fresh Pond. These improvements are part of the Fresh Pond Reservation Master Plan adopted by the City of Cambridge in 2001. Currently this project is scheduled to start construction in FY05.

Water quality of Fresh Pond is closely monitored year round although no specific monitoring of the two stormwater outfalls are performed. The Fresh Pond Reservation Master Plan was developed to preserve the water quality within Fresh Pond Reservoir, which the surrounding reservation is intended to protect. The Fresh Pond Reservation Master Plan is overseen by the City's Watershed Manager for the City's water supply. As part of this Stormwater Management Program the City will undertake an annual water quality monitoring of one outfall.

Measurable Goal and Schedule: The City will perform routine water quality sampling on an annual basis during the five-year permit at the twenty-one locations (13 outfalls on the Charles and 8 outfalls on Alewife Brook) identified above during Years 1 through 3. During Years 4 and 5 sampling locations will be expanded to include: Lechmere Canal, South Massachusetts Avenue, Amesbury Street, Pearl Street and Pleasant Street outfalls on the Charles River, and Matignon Road on the Alewife Brook. Outfall monitoring testing parameters will include: fecal coliform, e. coli, enterococcus, nutrients, Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS). At least one sample for oil and grease will be done annually in each watershed. Where parameter values exceed acceptable levels DPW will complete further sampling and field investigations upstream to identify illicit discharges. In addition, the Sparks Street and Lechmere Canal drainage systems will be inspected for illicit connections following EPA's Lower Charles IDDE Protocol beginning in Year 4. Illicit discharges identified will be promptly removed from the system within three months of detection. In addition one water quality sample will be taken annually at an outfall to Fresh Pond. Common Manholes will be removed from separated areas.

Specific measurable goals and schedule to detect and eliminate illicit discharges shall include the following:

(i) Perform routine water quality sampling at stormwater outfalls annually.

(ii) Test one location in the Charles and Alewife watersheds for oil and grease.

(iii) Expand stormwater sampling locations to include Lechmere Canal, South Massachusetts Avenue, Amesbury Street, Pearl Street and Pleasant Street outfalls on the Charles River, and Matignon Road on the Alewife Brook in Year 4.

(iv) Identify and remove illicit connections.

(v) Perform water quality sampling at a Fresh Pond outfall annually.

(vi) Purchase sampling equipment as recommended by EPA's Lower Charles IDDE Protocol in Year 4.

(vii) Begin EPA's IDDE Protocol inspections of the Sparks Street drainage system in Year 4.

(viii) Begin EPA's IDDE Protocol inspections of the Lechmere Canal drainage system in Year 5.

(ix) Record the number of Common Manholes separated in separated areas beginning in Year 4.

Responsible Person/Department: Commissioner/DPW

BMP 3.c – Conduct Illicit Discharge Education Program

Description: Public employees, businesses, and the general public will be informed of hazards associated with illegal discharges and improper disposal of waste. This will be accomplished through the BMPs identified in Minimum Control Measures (MCMs) 1 and 2 above and 6 below. In addition, the City will advertise a hotline for reporting of illicit discharges and publicize the hotline on the DPW web site and in print media. The City maintains 24-hour operations via an Off Hours division.

Measurable Goals and Schedule: The hotline number and information about illicit discharges will be available on the DPW web site and in a press release and/or brochure by the end of Year 2. The goals are further articulated in MCMs 1, 2 and 6.

Responsible Person/Department: Commissioner/DPW

BMP 3.d – Develop Regulations Prohibiting Illegal Dumping of Non-Stormwater into the MS4

Description: The Cambridge Sewer Use Regulations are in the form of a City Ordinance. Currently the Regulations do not speak directly to stormwater discharges. The DPW is currently revising this set of regulations to address stormwater connections and to specifically prohibit the illegal dumping of non-stormwater into stormwater drains. The regulations will also implement appropriate enforcement procedures and actions.

Measurable Goals and Schedule: A working draft will be developed by the end of Year 1. Peer and legal review of the draft and a revised regulation/ordinance will be presented to the City Manager, City Council, and the community during Year 4. The draft will be amended as necessary and submitted to the City Council for their consideration for adoption during Year 5.

Responsible Person/Department: Commissioner/DPW

D.4 Construction Site Runoff Control

The goal of the Construction Site Runoff Control minimum control measure is to develop a program that allows for the review, implementation and enforcement of a program to reduce pollutants from stormwater runoff from construction activities that result in land disturbance of greater than or equal to one acre.

Currently, during the review period for large construction projects the DPW and Traffic and Parking Department review traffic management and construction management plans. During this review erosion and sediment control practices are reviewed. Currently these procedures are informal and do not cover all construction activities and enforcement provisions that are the target of this minimum control measure. DPW will work with the appropriate City agencies to draft and adopt a new ordinance and regulations that will formalize review, implementation and enforcement of a standardized procedure for construction site runoff control.

In addition, DPW is working to develop a set of Erosion & Sedimentation Control Guidelines that are included in all major public construction projects for DPW. These

guidelines will be incorporated with other stormwater management guidance materials detailed in BMP 4.a that will be standardized for use by all City departments for public infrastructure projects that disturb greater than or equal to one acre. In addition, all large private development projects and utility companies are required to have their contractors attend weekly construction/coordination meetings at the DPW. Topics discussed at these meetings include site cleanliness, traffic management, and erosion and sediment control maintenance/problems.

Required Elements:

The City must develop, implement, and enforce a program to reduce pollutants in any stormwater runoff to the separated stormwater drainage system from construction activities that result in the disturbance of greater than or equal to one acre. The program will have the following requirements:

- To the extent allowable under state or local law, an ordinance or other regulatory mechanism to require sediment and erosion control at construction sites.
- To the extent allowable under state or local law, develop sanctions to ensure compliance with the program.
- Require construction site operators to implement a sediment and erosion control program, which includes appropriate best management practices at the site.
- Require the control of wastes during construction operations.
- Develop procedures for site plan review including procedures, which incorporate consideration of potential water quality impacts.
- Develop procedures for the receipt and consideration of information from the public.
- Develop procedures for inspection and enforcement of control measures at construction sites.

BMP 4.a – Develop Program for Construction Site Runoff Control

Description: The DPW will review existing planning and construction permitting procedures and will draft a Program for Construction Site Runoff Control for implementation in the City. The Construction Site Runoff Control Program shall include development and adoption of an ordinance and separate regulations as the regulatory mechanisms to address construction activities. The ordinance sets the legal framework

for the City to require a Stormwater Management Permit to discharge stormwater from land disturbance activities that are (at a minimum) greater than or equal to one acre. The ordinance and regulations will provide the legal authority for construction site inspections and enforcement. It will include penalties and enforcement of the Stormwater Management Permit and required plans.

Currently the DPW reviews site plans for construction projects that are proposing a connection to the stormwater and/or sanitary sewer systems. As part of the proposed Program for Construction Site Runoff Control existing site plan review procedures for stormwater and sewer connections will formally be reviewed and modified to include review of erosion and sediment and waste control measures. A proposed Stormwater Management Permit that will require the submission of plans and details related to construction activities as follows:

- Stormwater Management Plan
- Erosion and Sediment Control Plan
- Operation and Maintenance Plan for temporary BMPs

The regulations will provide specific standards and requirements for these plans and outline the requirements for on site inspection requirements:

- The Stormwater Management Plan shall include water quality and quantity policies to address peak discharges, runoff volumes, and pollutants of concern; BMPs (including water quality and water quantity controls with standards and specifications to address pollutants of concern), low impact development strategies, and address stormwater hot spots. Guidance will be provided for preferred structural and non-structural BMPs that include pollutant removal effectiveness.
- The Erosion and Sediment Control Plan shall include site plan requirements and DPW review procedures, construction sequencing/scheduling, best management practices (including vegetative controls, temporary/permanent controls, waste control, and dewatering), and procedures for the receipt of public inquiries, concerns, and information. Specific requirements of this plan will be included in the regulations; guidance to meet the requirements will be included in stormwater management guidance information for developers/owners to use.

- The Operation and Maintenance Plan shall include procedures for the proper maintenance of temporary erosion and sediment control BMPs while construction activities are occurring.
- Procedures for inspections during construction will be implemented in the regulations.

The ordinance and regulations will be developed based on a peer review of cities and states with established regulatory and guidance standards and similar characteristics to the City.

Measurable Goals and Schedule: Review of existing planning and construction procedures will begin in Year 2 and be completed by Summer of Year 3. The regulatory mechanism for implementing this minimum control measure will be clarified by the Summer of Year 3. A draft of the appropriate regulatory mechanism (including ordinance, regulations, permit, and plan requirements) will be developed based on a peer review of model city and state ordinances/regulations and reviewed by the City's Law Department during Year 3 and Year 4. A final working draft will be amended, as appropriate, and submitted for adoption by the end of Year 5. Recordkeeping of ordinance and regulation requirements including permit and plan requirements and compliance by developers/owners will begin after Year 5 in the next permit period.

Specific measurable goals and schedule for the construction program shall include the following:

i. Review existing planning and construction procedures in Year 3. This includes the review of the City's draft Sewer and Stormwater Drainage Use Regulations and existing permit requirements related to construction activities.
ii. Clarify needed regulatory mechanism in Year 3.
iii. Develop draft regulatory mechanism, procedures and guidelines that includes an ordinance, regulations, and guidance information in Years 3 and 4. This includes recording the number of City inter-departmental meetings held that include, but are not limited to, the Law Department and DPW.
iv. Present draft ordinance (regulatory mechanism) to the City Manager, City Council, and the community for review in Years 4 and 5. The number of public meetings will be recorded.

v. Amend draft ordinance and submit for consideration for adoption, by the end of Year 5.
vi. Beginning after Year 5 in the next permit period, record the number of required Stormwater Management Permits submitted. These Permits include plans and BMPs to address construction site runoff and pollutants of concern.
vii. Provide stormwater management guidance materials or references that will include BMP suggestions for site development to target the pollutants of concern, developed by the end of Year 5.
viii. Adopt procedures for inspections during construction activities including erosion and sediment inspections and drainage system inspections, beginning in Year 5. The first milestone to meet this measurable goal is to conduct a peer review of inspection procedures in neighboring states in Year 4.
ix. Adopt procedures for enforcement and penalties for violations, by the end of Year 5. The first milestone to meet this measurable goal is to conduct a peer of review procedures for enforcement and penalties and review with the Law Department in Year 4.
x. Record the number of enforcement actions taken and reported, beginning after Year 5 in the next permit period.

Responsible Person/Department: Commissioner/DPW

BMP 4.b – Educate Contractors and Residents about the Construction Site Runoff Control Program

Description: As the Construction Site Runoff Control Program is developed material on erosion and sediment control practices will be developed and made available to residents and contractors in stormwater management guidance information.

Measurable Goals and Schedule: During permit Year 5 stormwater management guidance information will be developed with guidelines and checklists provided. Erosion and sediment control practices and problems will be discussed during 3 construction coordination meetings annually throughout the permit term.

Specific measurable goals and schedule for the stormwater management guidance information shall include the following:

i. Make materials on erosion and sediment control practices available through the City web site and/or other means in Year 4.
ii. Discuss erosion and sediment control practices and problems at 3 construction coordination meetings annually, beginning in Year 1.
iii. Record the number of guidance materials or references provided in Year 5. The first milestone to meet this measurable goal is to conduct a peer review of applicable BMPs and record the number of BMPs identified as needing guidance materials in Year 4.
iv. Create a list of resources, which provides BMP suggestions for the targeted pollutants of concern in Year 4. The first milestone to meet this measurable goal is to conduct a peer review on Best Available Technologies (BATs) in Year 4.
v. Record the number of workshop(s) or meeting(s) with City Departments to discuss implementation of plan requirements and review BMPs in Year 4.

Responsible Person/Department: Commissioner/DPW

D.5 Post Construction Runoff Control

The goal of the Post Construction Runoff Control minimum control measure is to encourage and require the implementation of post construction runoff controls for new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the City's MS4. These controls must prevent or minimize water quality impacts. The City's goal is to ensure that to the maximum extent practicable stormwater discharges from development and redevelopment projects comply with Massachusetts Surface Water Quality Standards and the DEP Stormwater Management Policy, and attenuate stormwater discharges to the municipal system.

Current measures adopted by the City that provide opportunities for control of stormwater discharges include the following:

- In February 2001 the City of Cambridge adopted a new Article 19.000, Project Review, of its zoning ordinance which establishes traffic and urban design standards for development projects likely to have significant impact on abutting properties and the surrounding urban environment. Site design indicators include the implementation of stormwater BMPs and other measures to minimize runoff and improve water quality. Projects that are required to follow the Large Project Review requirements are required to show that they are not overburdening the city's infrastructure system and requires a minimum of 15% of the total lot area to consist of green or permeable open space. At the time of the application to the Planning Board the proponent must detail in a report what the anticipated impacts are to the sanitary, stormwater and combined sewer infrastructure and certify that it has been submitted to DPW. This process allows the DPW to have input earlier on in the design process.

- In a separate piece of rezoning the City adopted in September 2001 a provision that created two Special Districts (4 and 4A) in the Alewife area. The new sections permit an appropriate level of development that is consistent with public interest in protecting regulated wetlands where they occur; maintaining flood storage capacity consistent with federal, state and local regulations; restoring areas currently developed to urban areas to their natural state in order to eliminate harmful impacts on sensitive wetlands environments; limiting the extent of land covered by impervious surfaces; and minimizing the amount of additional traffic passing through congested intersections on arterial neighborhood streets.

- Prior to the above two zoning changes the City adopted a new *Usable Open Space* (section 5.22 Cambridge Zoning Ordinance) provision in residential districts. This provision doubled open space provisions in residential districts and requires that half of this area is permeable open space.

- The DPW currently meets with project development proponents and reviews their site design to ensure that they are considering the reduction of runoff from their site. Developers have been using several types of BMPs to reduce runoff including: deep sump catch basins coupled with detention tanks and infiltration systems. Some developers have also chosen leaching fields or detention basins

to minimize flows or stop them completely and are using bio-remediation as a means of pretreatment.

Required Elements:

The City must develop, implement and enforce a program to address stormwater runoff from new development and redevelopment projects that disturb at least one acre and discharge in the municipal separated system. Projects less than one acre must be included in the program if the project is part of a large common plan of development that disturbs greater than one acre. The post construction program will have the following requirements:

- To the extent allowable under state or local law, an ordinance or other regulatory mechanism to address post construction runoff from new development and redevelopment.
- Procedures to ensure adequate long term operations and maintenance of best management practices.
- Procedures to ensure that any structural and non-structural BMPs that are put in place will prevent or minimize impacts to water quality.

BMP 5.a – Develop Program for Post Construction Site Runoff Control

Description: The DPW will review existing planning and permitting procedures and will draft a Post Construction Site Runoff Control Program for implementation in the City. The Post Construction Site Runoff Control Program shall include adoption of an ordinance and separate regulations as the regulatory mechanisms to address post construction activities. The ordinance sets the legal framework for the City to require a Stormwater Management Permit to discharge from a site after construction activities have commenced and the site is stabilized. The ordinance and regulations will provide the legal authority for post construction site inspections, documentation, and enforcement. The proposed Stormwater Management Permit will require the submission of plans as described above in BMP 4.a for construction and will also address the post construction requirements. In addition, an additional plan submittal will be required for long term operation and maintenance of BMPs. The ordinance and regulations shall include penalties and enforcement of the Stormwater Management Permit as well as requirements and procedures to ensure long term operation and maintenance of BMPs.

The City is considering options for annual compliance documentation. DPW will establish written regulatory and site plan review requirements for post construction runoff controls in tandem with the construction site runoff controls.

The regulations will provide specific standards and requirements for the required plans and outline the requirements for continued compliance and site inspection requirements:

- The Operation and Maintenance Plan will address maintenance for BMPs and requirements for property owners to demonstrate that the annual maintenance of BMPs is being implemented. Guidance references will be provided for developers/owners to use. The Operation and Maintenance Plan shall include procedures for the proper maintenance of permanent BMPs.
- Procedures for annual inspections as part of the owner's responsibility to ensure operation and maintenance of BMPs are performed.

Measurable Goals and Schedule: A working draft of the regulations will be completed by the end of Year 3 and a revised ordinance by the end of Year 4. A draft of the appropriate regulatory mechanism (including ordinance, regulations, permit, and plan requirements) will be developed based on a peer review of model city and state ordinances/regulations and reviewed by the City's Law Department during Year 3 and Year 4. A final working draft will be completed in Year 4, amended as appropriate and submitted for adoption in Year 5. Draft guidance materials and resources to address the Stormwater Management Plan and the Operation and Maintenance Plan including appropriate BMPs to address post construction site runoff and pollutants of concern will be developed during Year 4 and implemented in Year 5. Recordkeeping of ordinance and regulation requirements including permit and plan requirements and compliance by developers/owners will begin after Year 5 in the next permit period.

Specific measurable goals and schedule for the construction program shall include the following:

i. Complete a working draft of the regulatory mechanism that includes an ordinance, regulations, and permit requirements in Year 3 and 4.
ii. Undertake and complete peer review and legal review of draft ordinance/regulations in Years 3 and 4. It is envisioned that the ordinance will be split into two documents—an ordinance and applicable regulations.

iii. Develop draft guidelines on BMPs as part of stormwater management guidance in Year 4. The City is working toward a system that will allow for tracking of BMPs implemented in Year 5. The first milestone is to conduct a peer review to define parameters for tracking methods in Year 4.

iv. Discuss final draft ordinance and guidance with the City Manager, City Council, and community in Years 4 and 5.

v. Present final regulation, guidance and monitoring program for consideration and adoption, by the end of Year 5.

vi. Record the number of meetings held by the City for the regulatory process, beginning in Year 3.

vii. Administer stormwater management permit requirements that include implementing the Stormwater Management Plan and Operation and Maintenance Plan at the time that the ordinance and regulations are adopted, by the end of Year 5. The first milestone to meet this measurable goal is to identify permit requirements and conduct a workshop with staff to review implementation in Year 4.

viii. Administer procedures for enforcement and penalties for violations at the time that the ordinance and regulations are adopted, by the end of Year 5. The number of enforcement actions taken shall be recorded, after Year 5 in the next permit period. The first milestone to meet this measurable goal is to conduct law department review and meetings to discuss with staff in Year 4.

ix. Adopt procedures for post construction inspections, by the end of Year 5. The first milestone to meet this measurable goal is to conduct peer review on post construction inspection procedures in Year 4.

x. Discuss alternatives (requirements and procedures) to ensure adequate long-term operation and maintenance of BMPs that includes determining the process and requirements for owners to prove that annual maintenance has been performed in Year 4.

xi. Provide legal mechanism to require annual compliance for the operation and maintenance of BMPs in Year 4.

Responsible Person/Department: Commissioner/DPW

BMP 5.b – Undertake Tree Protection Activities

Description: In May 1999, the City Council voted to join Cities for Climate Protection (CCP), an international consortium of communities working to reduce the emission of greenhouse gases. Cambridge created a Climate Protection Task Force to develop a local action plan, which describes steps Cambridge can take to reduce greenhouse gas emissions. Included in this *Climate Protection Plan* is a strategy to "Optimize Use of Vegetation to Shade Buildings and Reduce the Urban Heat Island Effect".

According to the *Climate Protection Plan* the tree canopy reduces the urban heat island effect, sequesters carbon, reduces gasoline evaporation from parked motor vehicles, and makes the city more visually attractive. Preserving existing trees is the key to increasing the canopy since mature trees provide significantly more canopy than recently planted ones.

Other benefits from trees: "Forest Service research suggests that when the economic value of benefits trees produce (e.g., removal of air pollutants, heating energy savings, reduced stormwater runoff, increased property values, scenic beauty, and biological diversity) are assessed, total benefits can be two to three times greater than costs for tree planting and care . . .Furthermore, many of these benefits extend beyond the site where a tree grows, to influence quality of life in the local neighborhood, community, and region."[10]

In 2002, the Cambridge Community Development Department began a *Cambridge Urban Canopy Assessment Project* to measure the urban forest canopy cover in Cambridge and assess the environmental services provided. The study includes the sampling of 42 2-acre areas in the City and inputting the data on tree numbers, size and type into a special software program – City Green. The purpose of this study is to provide an enhanced understanding to municipal officials and the community of the scale and value of environmental services provided by the urban forest. The information gathered will be used to guide and support future plans and actions for tree education, planting and care on public properties and to inform regulatory policy and decisions regarding trees on private property.

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[10] McPherson & Simpson, Carbon Dioxide Reduction through Urban Forestry. USDA, 1999.

In addition, the City of Cambridge has developed a Draft *City Tree Protection Ordinance*. The proposed ordinance has been forwarded to the City Council Subcommittee on Health and Environment. The ordinance, if adopted, seeks to preserve existing trees and promotes new tree planting. The ordinance seeks to e*stablish and maintain maximum tree cover* and *prevent loss of highly valued, significant trees*. The urban forest serves a wide variety of functions that promote the health, safety and welfare of residents.

DPW tries to add and replace trees annually throughout the City and it also has several programs aimed at promoting new tree plantings and to accelerate the City's own tree-planting program. The Client Tree Program allows residents and businesses to have a tree planted in the sidewalk in front of their house or building for a nominal fee. The Commemorative Tree Program provides individuals, groups, clubs and organizations with the opportunity to have a tree planted to honor a person, event, idea, etc. for a nominal fee. The City Arborist provides public education and outreach materials to residents regarding the proper care, importance and maintenance of urban trees. Among other things outreach materials include brochures, door hangers and newspaper articles/press releases.

Measurable Goals and Schedule: One outreach and education activities will be carried out annually throughout the five-year permit term regarding the care, importance and protection of trees and their role in climate protection.

Responsible Person/Department: Commissioner/DPW

D.6 Pollution Prevention and Good Housekeeping

The goal of pollution prevention and good housekeeping minimum control measure is to examine municipal operations to ensure a reduction in the amount of pollution that discharges to receiving waters as a result of municipal actions and practices. The City of Cambridge will develop effective stormwater management programs for municipal facilities in separated catchment areas.

Required Elements:

- Develop and implement a program with a goal of preventing and/or reducing pollutant runoff contributed by or from municipal facilities and activities.
- Include an employee training component in the program.
- At a minimum maintenance activities for the following operations should be included: parks and open space; vehicle maintenance; building maintenance; new construction and land disturbance; and roadway and stormwater drainage system maintenance.
- Develop a schedule for municipal maintenance activities described above.
- Develop inspection procedures and schedules for long term structural controls.

BMP 6.a – Educate Municipal Employees about Pollution Prevention

Description: The DPW operates and maintains the City's sewer and stormwater drainage systems, maintains parks and roadways, manages a municipal cemetery, provides snow removal and maintains salt storage, undertakes and supervises public construction projects, manages solid waste and recycling programs, and maintains a fleet of municipal vehicles. In addition, the Fire, Human Services, Library, Police, School, Traffic and Parking, and Water Departments operate City-owned facilities with activities/operations that can potentially affect the quality of stormwater discharges to the City's drainage system. These include fire departments, a municipal golf course, parks, libraries, police maintenance garage, school facilities, parking garages and lots, and a water treatment plant and garage. Training will be developed and implemented to educate all pertinent Department employees on stormwater pollution prevention issues. Training will address general stormwater issues, specific pollutants of concern for receiving waters in Cambridge, methods for spotting and reporting stormwater runoff problems, and illicit discharges or suspicious stormwater drainage discharges.

The City's good housekeeping program will include the following:

- Inventory and map of all City owned facilities. Potential for impact on receiving waters will be reviewed and the facilities prioritized for inspection.
- Good housekeeping inspections at City facilities to assess facility activities and potential impacts on stormwater that enters the City's drainage system. Current

best management practices will be assessed and recommendation for improvements provided. This includes the development of schedules.

- Development of a good housekeeping manual that will include the following: stormwater pollutants and impacts on water quality including pollutants of concern for the City, City policies and protocols including requirements of leases and contracts for City properties, best management practice fact sheets that include targeted City operations, facilities, and pollutants of concern. Seventeen BMP fact sheets will be created for City-wide operations and facility activities that include, but are not limited to, catch basin cleaning, street sweeping, material management including solid waste, vehicle washing, vehicle maintenance, spill prevention and response, and lawn and grounds maintenance. Each BMP fact sheet will include suggested BMPs, inspection procedures, and maintenance procedures that are applicable to the City. The manual will also include a good housekeeping form that must be completed and submitted annually to the DPW Stormwater Project Manager, an activity schedule that includes facility activities and when they should be inspected, matrices for City-wide operations and facility maintenance activities that includes BMP deficiencies to address, facility drainage locus maps, and training contact information and workshop attendance sheets for future workshops held.
- A program for good housekeeping annual inspections, recordkeeping, and training for City employees will be developed.
- A list of responsible personnel with stormwater responsibilities will be developed. Personnel include facility managers and employees involved in the day-to-day operations. All individuals identified will be invited to a good housekeeping workshop.
- Good housekeeping workshops for City employees including facility managers and personnel will be conducted. Workshops will consist of reviewing regulatory requirements, how facility activities contribute pollutants of concern that enter nearby waterbodies, how to use the good housekeeping manuals, and review of BMPs applicable to their facilities and how these prevent pollutants of concerns from entering nearby stormwater outfalls. In addition, a program for annual inspections including recordkeeping and schedules for review will be provided. Training will include a mock good housekeeping inspection to train employees to perform good housekeeping inspections at their own facilities.

Measurable Goals and Schedule: A general stormwater training session will be held by the Department of Public Works on an annual basis beginning in Year 1. Work with managers during Years 2 and 3 to identify operations personnel with stormwater responsibilities will be completed. During Year 3 training protocols that include development of manuals and conducting workshops for facility employees involved in City and facility operations will be developed. Facility personnel will conduct inspections annually. The goal will be for 95% of employees with stormwater responsibilities to attend at least one session during the permit period.

Specific measurable goals and schedule include the following:

i. Provide stormwater training for municipal employees annually, beginning in Year 3. Number and type of training sessions conducted will be identified. For example, in Years 3 and 4 these may be formal workshops and in subsequent years it may be senior staff working with new employees or employees who have not received training.
ii. Work with managers to identify operations personnel with stormwater responsibilities, beginning in Year 3. This includes recording the number of pertinent staff who attend receive training (e.g., attend good housekeeping workshops and receive a good housekeeping manual). Pertinent staff are those with responsibilities and work tasks that can impact stormwater quality in the City.
iii. Develop and implement training protocols that are applicable to City operations in Year 3. This includes creation of good housekeeping reference manual(s) with BMP fact sheets to address maintenance activities to be placed on the City intranet site in Year 4.
iv. Record the number of facility personnel who complete inspections on an annual basis and submit an annual inspection report to the City's Stormwater Project Manager, beginning in Year 4.
v. Record the number of facilities that have initial good housekeeping inspections conducted, beginning in Year 3.
vi. Record the number of municipal facilities site plan updates including structural controls based upon initial site inspections in Year 4.

Responsible Person/Department: Commissioner/DPW

BMP 6.b - Maintain Strong Operations & Maintenance Program to Reduce Pollutants from Operations

Description: The focus of this effort will be to document operations and maintenance procedures for municipal facilities and Citywide operations within MS4 areas. The City has various municipal facilities throughout the City including a cemetery, salt storage facilities, municipal garage, public golf course, water treatment plant, etc.; some are within separated stormwater areas and others are not. The goal of this effort is to identify those facilities that may have operations with the potential to pollute, to develop measures to ensure appropriate actions are taken to prevent or reduce pollutant runoff from their operations, and to develop a schedule for maintenance activities. This applies to facilities within separated and combined areas.

The City has developed and implemented many operations and maintenance (O&M) programs to reduce pollutant runoff from entering the stormwater drainage system. These programs include:

- Infrastructure maintenance – there are over 4,000 catch basins in the City and approximately 80 miles of stormwater drains. We have a program to clean catch basins and drainage lines. Our current program provides cleaning of approximately 1,800 catch basins and 30,000 linear feet of stormwater drains annually. In addition Cambridge has approximately 115 common manholes remaining in separated areas and has developed a program to separate all common manholes in separated areas (approximately 156 common manholes have been removed to date).
- Park maintenance – the City's Parks Division cares for over 15,000 trees on public property and 99 parks. Pesticides and herbicides have not been used in parks since 2000. Approximately 300 new/replacement trees are planted annually. There are 15 athletic complexes and a municipal golf course (managed by the Recreation Department). Proper handling of any pesticides and fertilizers are implemented at the golf course.

- Street sweeping – the City has a very proactive street sweeping program. Over 11,000 street miles are cleaned/swept every year removing over 5,000 tons of debris before it gets into the drainage system. Residential streets and industrial areas are cleaned monthly from April to December (weather permitting) and the commercial squares are cleaned daily.
- Public construction – the City incorporates significant stormwater management elements into all of our capital projects. These can include catch basins with deep sumps and hoods, grit chambers, flushing vaults and stormwater retention tanks.
- Waste management and recycling – the City's waste management program has a comprehensive collection strategy including recycling and white goods pick up. Over 37,000 tons of wastes are collected annually of which 35% is recycled. The City also sponsors household hazardous waste collection days and maintains a residential drop off center for recyclable materials.
- Snow operations – the City's snow operations plan is reviewed annually. Sand has been significantly reduced from our salting operations since the winter of 2001/2002. The City's policy is to use only salt for road application except in the surface water supply protection zones that include the Fresh Pond Reservation area near the water treatment plant. This reduction in sand application reduces the amount of sand settling in catch basins and reduces street debris in the spring. All salter trucks are calibrated to minimize the amount of salt that is applied to the roadways.
- Cemetery operations – the cemetery division cares and maintains over 66 acres of land area.
- Vehicle maintenance – the DPW currently provides maintenance for approximately 300 municipal vehicles and trucks. Keeping the maintenance garage clean and the vehicles is good working order is a priority.
- Building operations – the DPW is ultimately responsible for maintenance of approximately 60 public buildings which includes police and fire stations, libraries, schools, water treatment facilities, parking garages, DPW facilities and administrative offices. The City is responsible for sweeping parking lots and cleaning catch basins at these facilities. As part of the good housekeeping workshops conducted in Year 3, facility personnel were informed of performing catch basin inspections, recommended sweeping and cleaning schedules,

recordkeeping, and the importance of coordination with the DPW to perform the necessary sweeping and cleaning operations.

In order to document operation and maintenance (O&M) of the City's drainage system, cleaning and repairs will be recorded in the Cambridge Request System (CRS). The CRS is a work order and asset management system that allows the City to keep track of the number and location of O&M activities.

Measurable Goals and Schedule: Beginning in Year 1 operations and maintenance programs will be reviewed with a priority on parks and open space, fleet maintenance, building maintenance, new construction and land disturbance, roadway drainage system maintenance, and stormwater system maintenance. During Years 2 municipal facilities within separated areas will be identified. Structural controls at these facilities will be identified beginning in Year 2. Beginning in Year 3 operations and maintenance procedures will be documented in a good housekeeping manual referenced in BMP 6.a, and inspection procedures and schedules for long term structural controls including the drainage system and components will begin to be developed in Year 3. During Year 3, updated facility mapping that includes additional drainage structures found during the initial inspection will be noted. Updates will be made in GIS and distributed in Year 4. Beginning in Year 4, the City will document the number of facilities that request sweeping and catch basin cleaning and will record the number of structures that are cleaned.

Specific measurable goals and schedule include the following:

i. Review operations and maintenance programs, beginning in Year 3. Record new activities at facilities noted in Year 3 (refer to BMP 6.a) and applicable BMPs implemented, beginning in Year 4.
ii. Identify municipal facilities in separated areas and identify structural controls including drainage manholes and catch basins at facilities in Year 3. Incorporate updated facility maps into City's GIS system, beginning in Years 4 and 5. This includes the number of hand mark-ups of municipal facility site maps to incorporate structural drain system components in Year 4.
iii. Document inspections procedures and maintenance schedules in a procedures manual, beginning in Year 3. This includes recording the number of City-owned

facilities that request and have street sweeping and catch basin cleaning completed, beginning in Year 4.

iv. Develop inspections procedures and maintenance schedules for long term structure controls in Year 3. This includes recording the number and type of operation and maintenance drainage system work orders completed, as recorded in the Cambridge Request System, beginning in Year 4.

v. Record the percentage of City catch basins cleaned, beginning in Year 4.

vi. Record tons of street sweepings collected on an annual basis, beginning in Year 4.

vii. Record tons of waste/recycling collected on an annual basis, beginning in Year 4.

viii. Record number of new trees planted annually, beginning in Year 4.

ix. Record the number of public structural controls constructed and repaired annually beginning in Year 4.

Responsible Person/Department: Commissioner/DPW

E. Implementation Schedule

Implementation of this stormwater management plan will be completed over a five-year permitting period, with the goal of reducing stormwater pollution to the maximum extent practicable. The following is the implementation schedule proposed by the City of Cambridge and the measurable goals that will be used to determine the effectiveness of the plan.

Cambridge Stormwater Management Program
Measurable Goals and Implementation Schedule

1. Public Education:

1.a
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Develop Educational and Outreach Material for Residents and Businesses	Commissioner/DPW	i. Develop 3 brochures or fact sheets ii. Post information on the web iii. Distribute materials iv. Assess existing local/regional mass media marketing campaigns

1.b
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Develop Outreach Materials/Activities for Children	Commissioner/DPW	i. Begin school outreach in Cambridgeport ii. Begin school outreach in Alewife

1.c
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Develop a Stormwater Web Page	Commissioner/DPW	i. Develop stormwater web page ii. Update stormwater web page

1.d
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Create a Catch Basin Curb Marker Program	Commissioner/DPW	i. Install catch basin curb marker/plaques

1.e
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Reduce Stormwater Pollution from Automobiles	Assistant City Manager for Community Development/CDD	i. Sponsor an event to promote alternative forms of transportation

2. Public Participation:

2.a
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Participate in Public Meetings on Water Quality and Quantity	Commissioner/DPW	i. Participate in/sponsor a public meeting on water quality/quantity and/or the stormwater management plan ii. Advertise meeting through various sources

2.b
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Support Volunteer Efforts	Commissioner/DPW	i. Provide clean-up assistance ii. Support educational efforts of local watershed groups iii. Seek permission to post links to local watershed groups' web sites

2.c
BMP ID #

Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal
Sponsor Recycling of Hazardous and Solid Waste	Commissioner/DPW	i. Hold Household Hazardous Waste collection days ii. Accept recycling materials at a drop off center iii. Provide information on illicit discharges and reporting

2.d
BMP ID #

Participate in Watershed and Planning Efforts Specify Best Management Practice	Assistant City Manager for Community Development/CDD and/or Commissioner/DPW Responsible Dept./Person Name	i. Complete Phase I of Concord-Alewife study ii. Complete Phase II if authorized iii. Forward study recommendation to City Manager for consideration iv. Discuss Concord-Alewife Stormwater Management strategies at a public meeting. v. Publish LID Guidelines vi. Post LID Guidelines on Stormwater Web site. vii. Execute the Environmental Joint Powers Agreement viii. ABC Flooding Board to meet 4 times annually ix. Finalize Tri-Community Working Group's Progress Report x. Post the final Progress Report on the Stormwater Web site. Specify Measurable Goal

3. Illicit Discharge Detection and Elimination:

3.a
BMP ID #

Update Stormwater Drainage System, Outfalls and Receiving Waters in GIS Specify Best Management Practice	Commissioner/DPW Responsible Dept./Person Name	i. Map Fresh Pond outfalls ii. Migrate existing GIS database to a new format iii. Track private structural controls in a database iv. Catalogue record drawings v. Train engineering staff on new GIS software vi. Begin updating GIS information with as- built/record drawings Specify Measurable Goal

3.b
BMP ID #

Detect and Eliminate Illicit Discharges Specify Best Management Practice	Commissioner/DPW Responsible Dept./Person Name	i. Perform routine water quality sampling ii. Test one location in each watershed for oil and grease iii. Expand Water Quality testing in the Charles River and Alewife Brook iv. Identify and remove illicit discharges v. Perform water quality sampling at a Fresh Pond outfall annually vi. Purchase sampling equipment as recommended by EPA's Lower Charles IDDE Protocol vii. Investigate Sparks Street drainage area viii. Investigate Lechmere Canal drainage area ix. Record number of CMHs separated Specify Measurable Goal

3.c
BMP ID #

Conduct Illicit Discharge Education Program Specify Best Management Practice	Commissioner/DPW Responsible Dept./Person Name	i. Advertise illicit discharge hotline number and information on illicit discharges Specify Measurable Goal

3.d
BMP ID #

Develop Regulations Prohibiting Illegal Dumping of Non-Stormwater into the MS4 Specify Best Management Practice	Commissioner/DPW Responsible Dept./Person Name	i. Develop a working draft ii. Provide opportunity for peer and legal review of draft iii. Revise draft as necessary iv. Present regulations/ordinance to City Council for consideration for adoption. Specify Measurable Goal

4. Construction Site Runoff Control:

4.a		
BMP ID #		
Develop Program for Construction Site Runoff Control	Commissioner/DPW	i. Review existing planning and construction procedures ii. Clarify needed regulatory mechanism iii. Develop draft regulatory mechanism, procedures and guidelines iv. Present draft to the community for review v. Amend draft as necessary and submit for consideration for adoption vi. Record number of required Stormwater Management Permits submitted vii. Provide stormwater management guidance materials or references viii. Adopt procedures for inspections during construction activities ix. Adopt procedures for enforcement and penalties for violations x. Record the number of enforcement actions taken and reported
Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal

4.b

BMP ID #

Educate Contractors and Residents about the Construction Site Runoff Control Program

Specify Best Management Practice

Commissioner/DPW

Responsible Dept./Person Name

i. Make materials available on erosion and sediment control practices available through the City web site and/or other means
ii. Discuss erosion and sediment control practices and problems at 3 construction coordination meetings annually
iii. Record the number of guidance materials or references provided.
iv. Create a list of resources, which provides BMP suggestions for the targeted pollutants of concern.
v. Record the number of workshops or meetings with City departments to discuss implementation of plan requirements

Specify Measurable Goal

5. Post Construction Runoff Control:

5.a
BMP ID #

Develop Program for Post Construction Site Runoff Control	Commissioner/DPW	i. Complete a working draft ii. Undertake and complete peer and legal review of draft iii. Develop draft guidelines on BMPs iv. Discuss final draft and guidance with the community v. Present final regulation, guidance and monitoring program for consideration and adoption vi. Record the number of meetings held by the City for the regulatory process vii. Administer stormwater management permit requirements viii. Administer procedures for enforcement and penalties for violations ix. Adopt procedures for post construction inspections x. Discuss alternatives to ensure adequate long-term operation and maintenance of BMPs xi. Provide legal mechanism to require annual compliance for the operation and maintenance of BMPs
Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal

5.b
BMP ID #

Undertake Tree Protection Activities	Commissioner/DPW	i. Provide community outreach and education activities on the care, importance and protection of trees and their role in climate protection
Specify Best Management Practice	Responsible Dept./Person Name	Specify Measurable Goal

6. Municipal Good Housekeeping:

6.a
BMP ID #

Educate Municipal Employees about Pollution Prevention Specify Best Management Practice	Commissioner/DPW Responsible Dept./Person Name	i. Provide stormwater training for municipal employees annually ii. Work with managers to identify operations personnel with stormwater responsibilities iii. Develop and implement training protocols that are applicable to operations iv. Record number of facility personnel who complete inspections on an annual basis v. Record number of facilities that have initial good housekeeping inspections conducted vi. Record the number of municipal facility site plans updated including structural controls based upon initial site visits/inspections Specify Measurable Goal

6.b
BMP ID #

Maintain Strong Operations & Maintenance Program to Reduce Pollutants from Operations Specify Best Management Practice	Commissioner/DPW Responsible Dept./Person Name	i. Review operations and maintenance programs ii. Identify municipal facilities in separated area and identify structural controls iii. Document operations and maintenance procedures in a procedures manual iv. Develop inspections procedures and maintenance schedules for long term structural controls v. Record percentage of City catch basins cleaned vi. Record tons of street sweepings collected vii. Record tons of waste/recycling collected viii. Record number of new trees planted ix. Record number of public structural controls constructed/repaired Specify Measurable Goal

F. Annual Status Reporting

As required by the permit, a status report will be completed on an annual basis and will be submitted as part of this NPDES General Permit. Information included in this status report shall include, but not be limited to the following:

- A self-assessment review of compliance with the permit conditions.
- An assessment of the appropriateness of the selected BMPs.
- An assessment of the progress towards achieving the measurable goals.
- A summary of results of any information that has been collected and analyzed. This includes any type of data.
- A discussion of activities for the next reporting cycle.
- A discussion of any changes in identified BMPs or measurable goals.
- Reference any reliance on another entity for achieving any measurable goal.

APPENDIX A BIBLIOGRAPHY

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APPENDIX B MAPS

SEPARATED CATCHMENT AREAS AND MUNICIPAL STORMWATER OUTFALLS

WATER BODIES IN CAMBRIDGE

CAMBRIDGE WATERSHEDS

APPENDIX C U.S. FISH & WILDLIFE DETERMINATION

(On file)

APPENDIX D MASSACHUSETTS HISTORICAL COMMISSION DETERMINATION

(On file)

APPENDIX E BRP WM 08A - NOTICE OF INTENT FOR DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4S)

(On file)

APPENDIX F TRANSMITTAL FORM FOR PERMIT APPLICATION AND PAYMENT

(On file)