LYNN
400 Parkland Avenue • Lynn, Massachusetts 01905-1138 • (781) 596-2400 • Fax (781) 595-1420
WATER & SEWER
COMMISSION

June 26, 2006

United States Environmental Protection Agency
Water Technical Unit
P.O. Box 8127
Boston MA 02114

MADEP
Division of Watershed Management
627 Main Street
Worcester, MA

Dear Sir or Madam:

Enclosed please find the Annual Report for the Lynn Water and Sewer Commission's NPDES Phase II Storm Water Management Program. The report has been prepared in accordance with the Commission's NPDES Permit # MAR0410044, and covers the Reporting Year for the period of May 1, 2004 through April 30, 2005,

Should you have any question or require additional information please do not hesitate to contact me at (781) 596-2400 x241.

Sincerely:

Neal Johnson

Neal Johnson
Engineer

cc: Anthony J. Marino, P.E.
LWSC file.

LYNN
WATER & SEWER
COMMISSION

400 Parkland Avenue • Lynn, Massachusetts 01905-1138 • (781) 596-2400 • Fax (781) 595-1420

April 24, 2006

MADEP
Division of Watershed Management
627 Main Street
Worcester MA 01608

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NPDES PHASE II
STORM WATER GENERAL PERMIT
NO. MAR041044

ANNUAL REPORT
May 1, 2005 – April 30, 2006

Lynn Water & Sewer Commission
400 Parkland Avenue
Lynn MA 01905

A. Self Assessment Review of Compliance with Permit Conditions

For the period of May 1, 2005 through April 30, 2006 the Lynn Water & Sewer Commission (Commission) has complied with the General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems # MAR041044 to the best extent practicable by:

1. Continuing to comply with MADEP Regulations and NPDES Permit # MA 0100552 effective July 31, 2000 through July 30, 2005.
   (The Commission is currently operating under above mentioned NPDES permit. The Commission applied to USEPA for a new NPDES permit in January of 2005. The new permit is still pending.)
2. Continuing to comply with the Second Modified Consent Decree effective September 26, 1997 for the control of combined sewer overflows, and private inflow and infiltration, to the receiving water bodies of the City of Lynn.
3. Continuing to maintain and enforce an effective Industrial Pretreatment Program governing industrial users of the Lynn Water & Sewer Commission sanitary sewer and stormwater systems.
4. Continuing to maintain and enforce current Lynn Water & Sewer Commission rules regulations governing construction site runoff in conjunction with the City of Lynn Planning Board and Conservation Committee.
5. Continuing to review and comment on all new construction or new subdivision site plans while enforcing Lynn Water & Sewer Commission rules and regulations regarding stormwater regulations.
6. Continuing to maintain an effective catch basin cleaning and repair programs.
7. Continuing to maintain and implement effective brook and drain conduit cleaning and repair programs

8. Continuing to require street sweeping on all Lynn Water & Sewer Commission construction projects.
9. Continuing to work with the City of Lynn Department of Public Works to provide a city wide street sweeping program.

B. Self Assessment of Appropriateness of Best Management Practices

The Best Management Practices (BMP's) adopted for the NPDES Phase II Storm Water General Permit with few exceptions are current practices and policies of the Lynn Water & Sewer Commission. New BMP's were instituted primarily for the "Public Education", and "Public Participation" minimum control measures.

The Lynn Water & Sewer Commission enforces current rules and regulations on a daily basis, and continues to implement BMP's regarding Public Outreach and Public Participation through mailings, newspaper advertisement, and public access cable television to publicize construction schedules, volunteer clean-up activities, special events, etc.

The Lynn Water & Sewer Commission is satisfied that the continued application of current rules and regulations and selected additional BMP's regarding Storm Water are appropriate at this time.

C. Assessment of Progress Towards Achieving Measurable Goals.

The Commission continues to make progress towards achieving its measurable goals. Under a "Second Modified Consent Decree" agreed to by the Commission and USEPA, MADEP, and other government agencies in early 2001 the Commission is required to eliminate combined sewer overflows (CSO's) at four(4) of it's NPDES permitted outfall locations. Compliance with the decree, the elimination of CSO's, remains the Commission's primary goal. In October of 2004 the Commission submitted to a USEPA and MADEP a fifteen (15) year with a scheduled completion date of December 2020 Supplemental Facilities Plan, which includes the design and construction of new sewer and storm water sewer systems, storage conduits, flow control structures, as well as private and public inflow removal programs. As of April 2006 the Commission is awaiting USEPA and MADEP approval of the submitted Supplemental Facilities Plan.

Below is a detailed assessment of the Lynn Water & Sewer Commission's measurable goals for each Control Measure.

1. Public Education and
2. Public Participation:

Public Education and Outreach and Public Participation efforts as set forth in the Lynn Water & Sewer Commission's Notice of Intent have not been met at this time. Work pertaining but not limited to compliance with an MADEP Administrative Consent Order(ACO) issued August 2006, the drafting of I&I removal contracts, water and sewer system improvement projects, metering of unaccounted for water, as well as acceptance of the Commission's Supplemental Facilities Plan by USEPA MADEP for the control of Combined Sewer Overflows (CSO's) at receiving water outfalls to ensure compliance with the Second Modified Consent Decree has taken precedence over the development of Public Education and Public Participation policies for storm water.

3. Illicit Discharge Detection and Elimination

Illicit Discharge Detection and Elimination continues to make steady progress since May 1. 2005.

The Lynn Water & Sewer Commission currently contracts with National Water Main Cleaning Co. for video inspection and cleaning services of the Commission's sanitary sewer and storm water systems on an as needed basis. These services are available to the Commission for infiltration inspection, and suspected illicit discharge inspection.

The Lynn Water & Sewer Commission continues to enforce it's rules and regulations prohibiting illicit discharge. Penalties and fines for illegal, regulated pollutants, and or hazardous discharges are published periodically in the Lynn Daily Item and the Lynn Journal, local newspapers.

A copy is attached as Appendix A.

4. Construction Site Runoff Control

Measurable Goals for Construction Site Runoff Control are met by continuing current practices regarding construction activities and construction sites. The Lynn Water & Sewer Commission in conjunction with the City of Lynn Planning Board, and the Lynn Conservation Commission require strict compliance with individual MADEP Order of Conditions for all construction projects, as well as the City of Lynn General Conditions.

A copy is attached as Appendix B.

5. Post Construction Runoff Control

Measurable goals for Post Construction Runoff Control are being met by continuing current practices regarding construction sites after completion of projects.

The Lynn Water & Sewer Commission continues to require:

- Separate storm water and sanitary sewer systems.
- Biannual street sweeping.
- Annual catch basin cleaning.
- Developers to maintain pre-development runoff conditions.
- Developers must submit drainage plans providing control measures for sub division drainage such as detention ponds, swales, vegetation planting, grass plots etc.
- Maintenance of drainage structures to conform to Lynn Water & Sewer Commission standards.

A copy of the Lynn Water & Sewer Commission Storm Water Operation and Maintenances Requirements for Water Quality Structures and Detention Basins is attached as Appendix C.

6. Municipal Good Housekeeping

Measurable goals for Municipal Good Housekeeping are being met by continuing current practices regarding good housekeeping. The Lynn Water & Sewer Commission continues to require and implement:

- A three (3) times per year street sweeping schedule coordinated by the City of Lynn Department of Public Works
- Annual catch basin cleaning coordinated by the Lynn Water & Sewer Commission Sewer Department
- Regular repair of damaged or degraded catch basins coordinated by the Lynn Water & Sewer Commission Sewer Department
- Regular maintenance of all brooks and drain conduits in the City coordinated by the Lynn Water & Sewer Commission Sewer Department
- Proper disposal of brook and catch basin cleaning debris coordinated by the Lynn Water & Sewer Commission Sewer Department
- High pressure water jetting, snaking, and root control of sanitary sewer and storm water piping on an as needed basis coordinated by the Lynn Water & Sewer Commission Sewer Department.
- Proper maintenance of parks, playgrounds, and open spaces coordinated by the City of Lynn Department of Public Works.

D. Discussion of Activities for Next Reporting Cycle

The Lynn Water & Sewer Commission as previously mentioned is currently designing, building and installing new sanitary sewer and storm water drainage systems to comply with the Second Modified Consent Decree agreed to by the Commission and regulatory agencies on June 29, 2001. Pending USEPA and MADEP approval of the Commission's "Supplemental Facilities Plan" the Commission will begin installation activities and continue through December 31, 2020. Moreover removal of private inflow and infiltration will continue through the same time period.

In the coming year the Lynn Water & Sewer Commission will attempt to meet measurable goals for the Public Education and Public Participation control measures. Many of the stated goals in the Lynn Water & Sewer Commission's Notice of Intent require formal consideration by the Commission Board. In the coming year attempts will be made to set as agenda items storm water initiatives such as:

- Volunteer Stenciling of catch basins.
- Feasibility of a Storm Water Management Panel.
- Public / Municipal Watershed Committees.
- Financing for Storm Water programs.

Efforts will be made to institute employee training programs regarding Storm Water Management.

Efforts will be made to provide Public Information Packets regarding Storm Water Impact on receiving waters.

Efforts will be made to provide the public with good management technique regarding storm water runoff in regards to vehicle washing, waste oils, paint, stain, and strippers, pet wastes, etc.

E. Changes in Identified Best Management Practices or Measurable Goals.

At this time the Lynn Water & Sewer Commission has not changed any Best Management Practices or measurable goals.

F. Reliance on Other Entities for Achieving Measurable Goals

The Lynn Water & Sewer Commission continues to work towards achieving measurable goals with the City of Lynn Department Of Public Works, City of Lynn Health Department, MassHighway, and surrounding communities including Lynnfield, Peabody Revere, Salem, Swampscott, and Saugus.

APPENDIX A

10¢
or all your beer and soda bottles and cans
and our double coupons on cigarettes
Open 7 days a week, 6 AM til 10 PM
780 Washington St., Lynn
OPEN X-MAS DAY

"Doing
106 SYLVAN
Open: 8:30-9:00 M-F 8:30-5:00

LYNN WATER AND SEWER COMMISSION

NOTICE

Subject: PROPOSED PENALTIES AND FINES FOR VIOLATION OF INDUSTRIAL PRETREATMENT RULES AND REGULATIONS: (per violation per day, each such day constitutes a separate violation)

	PENALTY CHARGES
pH: 0.0-2.0 HAZARDOUS WASTE	$5,000.00
2.1-3.0	$4,000.00
3.1-4.0	$2,500.00
4.1-5.0	$1,000.00
5.1-5.4	$ 100.00
5.5-10.0 COMPLIANCE	
10.1-10.4	$ 100.00
10.5-11.4	$1,000.00
11.5-12.4	$2,500.00
12.5-14.0 HAZARDOUS WASTE	$5,000.00
REGULATED POLLUTANT METALS INCLUDING CYANIDE: (EXCEEDING PERMIT LIMIT)	$ 500.00
EXPLOSIVES (gasoline discharges, volatile organics, etc.) SEE R. & R.'S ARTICLE V SECTION 2 a.:	$5,000.00
OIL & GREASE: (NON PETROLEUM BASED) FOOD SERVICE ESTABLISHMENTS	
1st OFFENSE	WARNING
2nd OFFENSE	$ 200.00
3rd OFFENSE	$ 300.00
4th OFFENSE	$ 400.00
(etc. etc. OFFENSE X $100.00)	
FLOW OBSTRUCTION,* SEE R. & R'S ARTICLE V SECTION 2 b.:	$1,000.00 MIN.
	$5,000.00 MAX.
UNTIMELY AND INCOMPLETE REPORTING (B.M.R., C.M.R., etc.):	$ 100.00
DISCHARGES CAUSING INTERFERENCE, PASSTHROUGH OR RESULTING IN A VIOLATION OF THE COMMISSION N.P.D.E.S. PERMIT:	$5,000.00

THE ABOVE PENALTIES ARE IN ADDITION TO COSTS FOR DAMAGES TO THE SEWERAGE TREATMENT WORKS (collection system, pumping stations, sewer treatment plant, etc.) CAUSED BY THE VIOLATOR.

*Discharges of the following materials to the sewer or drainage system INCLUDING CATCH BASINS shall be punishable by a fine of NOT LESS THAN $1,000.00 or more than $5,000.00 per violation; garbage with particles greater than one-half inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, sinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent hops, waste paper, wood, plastics, gas, tar, asphalt residues, residues from refining or processing of fuel or lubricating oil, mud, or glass grinding or polishing wastes.

APPENDIX B

GENERAL CONDITIONS

1. Failure to comply with all conditions stated herein and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.

2. This Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.

3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable Federal, State, or local statutes, ordinances, by-laws, or regulations.

4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:

   (a) the work is a maintenance dredging project as provided for in the Act; or

   (b) the time for completion has been extended to a specified date more than three years, but less than five years from the date of issuance and both that date and the special circumstances warranting the extended time period are set forth in this Order.

5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.

6. Any fill used in connection with this project shall be clean fill, containing no trash, refuse, rubbish or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.

7. No work shall be undertaken until all administrative appeal period from this Order have elapsed or, if such an appeal has been filed, until all proceedings before the Department has been completed.

8. No work shall be undertaken until the Final Order has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In

the case of registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is to be done. The recording information shall be submitted to the Lynn Conservation Commission prior to commencement of the work.

9. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words, "Massachusetts Department of Environmental Protection and the File Number".

10. Where the Department of Environmental Protection is requested to make a determination and to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before the Department.

11. Upon completion of the work described herein, the applicant shall forthwith request in writing that a Certificate of Compliance be issued stating that the work has been satisfactorily completed.

12. The work shall conform to the following plans and special conditions:

Plans:

Title	Dated	Signed and Stamped by	On File with:

13. The Order of Conditions must be registered in the Registry of Deeds, Essex County, within four (4) weeks or prior to commencement of work and prior to obtaining a building permit, if necessary, whichever comes first. The recording information shall be submitted to the Lynn Conservation Commission. Failure to comply shall be deemed cause to revoke this Order of Conditions.

14. All work shall conform to the Notice of Intent and above- referenced plans and supporting documents unless otherwise specified in this Order. In case of a conflict, the conditions of this Order shall prevail.

15. If necessary, in advance of any work on this project, the applicant shall notify the LCC and at the request of the LCC, shall arrange an on-site conference among the LCC, the contractor, the engineer, and the applicant to ensure that all of the conditions of this order are understood. This Order shall be included in all construction contracts and shall supersede any conflicting contract requirements.

16. The LCC shall be notified at least forty-eight (48) hours in advance of the date upon which construction activities on the site are to proceed. All site mitigation measures must be in place prior to initiation of construction.

17. Prior to construction, the applicant shall inform the LCC in writing of the name(s), address(es), and business and home telephone numbers of the project supervisor(s) who will be responsible for insuring performance of all sedimentation and erosion control measures, wetlands alteration, and replication aspects of the project.

18. A copy of this Order of Conditions, including all referenced documents and plans, and all other subsequent approvals and directives issued by the LCC, shall be available on-site for inspection or reference while activities regulated by the Order are being performed. Copies of said documents shall be provided to all contractors and subcontractors who shall also be held responsible for compliance with this Order.

19. Issuance of these Conditions does not in any way imply or certify that the site or down-stream areas will not be subject to flooding, storm damage or any other form of damage due to wetness.

20. This Order of Conditions does not relieve the permittee or any other person of the necessity of complying with all other applicable Federal, State, or Local statutes ordinances, By- Laws, or regulations.

21. The applicant assumes all liability arising from his/her construction activities and project performance.

22. The LCC shall be notified in writing prior to start, at mid- point, and completion of work.

23. Prior to the start of work, the edge of bordering vegetated wetland (or the top of bank in areas where there is no BVW) shall be clearly marked in the field by stakes or flags placed at no greater than twenty-five (25) foot intervals. These markers shall be maintained in place throughout construction.

24. A continuous limit of construction barrier shall be established between all construction areas, including proposed replication areas and wetland resource areas. Said barrier shall consist of a staked hay bale dike, siltation fence, and/or orange construction fence.

25. Prior to the start of work, filter fabric fencing (or a double row of staked hay bales), shall be installed up gradient of all resource areas along the limit of activity between areas to be disturbed and down gradient streams and wetlands. The location of this barrier shall be shown on the approved plan. This barrier shall define the limit of disturbance and shall be maintained in good repair until all disturbed areas have been stabilized with vegetation or other means. This barrier shall be inspected and approved by the LCC or its agent prior to start of work and be maintained until the LCC or its agent determines that control measures are no longer necessary.

26. Prior to start of work, filter fabric shall be placed under the grate of all catch basins within the 100 foot buffer to prevent sediments from entering the wetland (or stream, river, marsh, etc.). All newly constructed catch basins also shall be covered with filter fabric. Basins shall be maintained in this manner until parking areas and roadways have been permanently stabilized.

27. The applicant shall have on hand at the start of soil disturbance removal or stockpiling, a minimum of hay bales and sufficient stakes for staking these bales. Said bales shall be used only for the control of emergency erosion problems and shall not be used for the normal control of erosion, as described in the Erosion Control Plan submitted with the Notice of Intent or the hay bale barrier described.

28. During all phases of construction, all disturbed or exposed soil surfaces shall be brought to final finished grade and stabilized bare ground that cannot be permanently stabilized within thirty (30) days shall be stabilized with mulch or any other protective covering and/or method approved by the USDA Soil Conservation Service and the LCC. Areas to be seeded shall be loamed with not less than four (4) inches of good quality loam. Before seeding, ground limestone shall be applied at a rate sufficient to bring the soil test to pH 6.5. In addition, 10-6-4 fertilizer, or its equivalent, shall be applied at a rate of fifteen (15) pounds per one thousand (1,000) square feet, in accordance with Soil Conservation Service guidelines.

29. No earthen embankment in the buffer zone shall have a slope steeper than 3:1.

30. All erosion control devices shall be maintained to ensure their effectiveness. At no time shall any sediment be deposited in any resource area. The Applicant shall immediately control any erosion problems that occur on-site and also shall immediately notify the LCC. Any debris which falls into a wetland or waterway shall be removed immediately by hand, and the area restored to the satisfaction of the LCC. The LCC reserves the right to require additional erosion and/or damage prevention controls it may deem necessary.

31. Stripping of vegetation, clearing and grubbing of trees, grading or other solid disturbance shall be done in a manner that will minimize soil erosion. To the extent practical, limited portions of the area should be cleared at one time to allow construction to proceed and the area to stabilize.

32. All debris or excavated material shall be disposed of in a legal manner. No fill, construction materials, or brush shall be stockpiled on-site once construction is completed.

33. All retaining walls (concrete, rip-rap, etc.) over ten (10) feet in height shall be designed by a structural engineer and a letter from the structural engineer stating the wall has been built according to the designed plan shall be presented to the LCC before a Certificate of Compliance is issued.

34. Slope stabilization and sequencing of excavation and fill shall follow the specifications set forth in the above- referenced plans.

35. Whether from on-site or off-site sources, any fill used in connection with this project shall be clean fill as described below:

> Clean Acceptable Fill: Must be earthen, permeable material; exclusive of peat; clay; tight till; hardpan; metals; boulders larger than twelve (12) inches in diameter; wood; tree branches; potential leachable hazardous materials (petroleum by-product); or construction debris. These materials must be compactable to 65% of original profile.

36. Hay bales shall be placed down-gradient of work to be performed.

37. Pruning shall be performed only as necessary and slash shall be removed off-site.

38. Trees and debris left from previous work over the years shall be cleaned up in the areas covered under this Order.

39. Where stone or rock fill has been used in areas that are to be seeded, minimum coverage of this fill shall be twelve (12) inches of compacted clear borrow, gravel, or soil, and it shall be topped after grading with not less than four (4) inches of good quality loam.

40. There shall be no stockpiling of soil or other materials within twenty-five (25) feet of any resource area.

41. All demolition debris will be disposed off-site.

42. The applicant, owner, successor, or assignee(s) shall be responsible for maintaining all on-site drainage structures and outfalls, assuring the lasting integrity of vegetative cover on the site and the site activities so as to prevent erosion, sedimentation, chemical contamination or other detrimental impact to the on-site wetland and/or off site resource areas.

43. All underground utilities, etc. that are located within a resource area shall have a clay barrier every one hundred (100) feet so as to prevent the resource area from being artificially drained. A plan showing the locations of the clay barriers shall be submitted to the LCC prior to commencement of any work.

44. Pavement must be sloped as necessary to collect run-off water into catch basins.

45. A stone rip-rap apron shall be installed at the outfalls of all discharge pipes immediately after installation of the pipe. Velocity breakers, as approved by the LCC, shall be used in all places where directed run-off enters the brook, compensatory area or grassed areas. Rip-rap and dissipaters shall not be placed within the wetland or waterway.

46. All headwalls with pipes ten (10) inches in diameter and larger are to be fitted with trash racks and/or child-proof grates of a type approved by the LCC. The applicant and/or owner shall be responsible for removing trash or other obstructions from the trash racks or grate on a regular basis. This Condition shall remain in perpetuity and be recorded as such in the Certificate of Compliance.

47. All temporary and/or permanent waterways and water holding areas must be in place and substantially protected from erosion before any road, parking area, or roof water can be discharged into these areas. Approval of the LCC also must be obtained before discharging water into the above areas.

48. During and upon completion of this project, there shall be no increase in the rate of surface water run-off from this project for the ten (10) and/or one hundred (100) year storms.

49. Any work below the one hundred (100) year flood plain requires full one hundred (100) percent compensation for any lost flood storage.

50. Oil\gasoline traps shall be installed in all catch basins. The owner shall be responsible for ensuring that the catch basins and the traps are cleaned at least two times per year. Records of this maintenance shall be made available to the

59. Members and agents of the LCC shall have the right to enter and inspect the premises to evaluate compliance with the Order of Conditions and the LCC may require submittal of any data deemed necessary by the LCC for that evaluation.

60. Prior to issuance of a Certificate of Compliance, the applicant shall submit a letter to the LCC from a registered professional engineer certifying that the work is in compliance with the plans referenced, and all of the Conditions herein. Said letter will certified, but not be limited to, the following:

A. "As-Built" elevations of all drainage ways constructed within one-hundred (100) feet of any wetland resource area.

B. "AS-Built" elevations and grades of all filled or altered and resource areas.

C. Distances to all structures and alterations within one-hundred feet (100) of any wetland resource areas.

Nine (9) "As-Built" topographic plans of all areas within jurisdiction of the Wetlands Protection Act and By-Law shall be submitted when a Certificate of Compliance is requested.

61. The provisions of this Order shall apply to and be binding upon the applicant, its employees, and all successors and assigns in interest or control

62. Pruning and clearing: The protection of vegetation is important to slow percolation of rain water into the ground and to reduce erosion.

APPENDIX C

LYNN WATER AND SEWER COMMISSION

STORMWATER OPERATION AND MAINTENANCE REQUIREMENTS

FOR

WATER QUALITY STRUCTURES AND DETENTION BASINS

MANUAL

LYNN WATER AND SEWER
COMMISSION
400 PARKLAND AVENUE
LYNN, MASSACHUSETTS 01905

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1.0 INTRODUCTION

This manual provides guidelines for the design, operation, and maintenance of Water Quality Structures and Detention Basins to meet stormwater management requirements for the Lynn Water and Sewer Commission and various regulatory programs. The intent of this manual is to provide the City of Lynn and it's residents with designs that prevent untreated discharges to wetlands and waters, preserve hydrologic conditions that meet or improve pre-development conditions, reduce or prevent flooding by managing the peak discharge and volumes of runoff, minimize erosion and sedimentation, reduce suspended solids and other pollutants to improve water quality, provide increased protection of sensitive natural resources, allow for routine maintenance and provide for public safety.

These requirements are in addition to any other Local, State, or Federal regulations. Nothing in these requirements shall be construed to exempt any activity from any other Local, State, or Federal regulation.

This manual may be rescinded, modified, or added to, by the Commission, the Executive Director or Chief Engineer of the Commission, at any time when, in their judgment, such action is in the best interest of the Commission.

2.0 PERSONNEL

The Lynn Water & Sewer Commission, as the owner and operator of the City of Lynn's drainage system, will provide the necessary personnel and will be responsible for the inspection, maintenance and repair as needed to maintain the integrity of the system. The following personnel will be responsible for assessing the drainage systems conditions and authorizing construction and repairs:

Lynn Water & Sewer Commission: Five-member board appointed by the Mayor of Lynn and the Lynn City Council. Authorizes all activities conducted by the Lynn Water & Sewer Commission.

Executive Director: Oversees all Lynn Water & Sewer Commission operations and reports directly to the Commission.

Chief Engineer: Oversees engineering department and daily operations of the water, sewer and drain systems. Reports to the Executive Director and the Commission.

Treasurer: Acts as Chief Procurement Officer. Authorizes all purchasing of equipment and supplies as needed for routine and emergency operation and maintenance. Reports to the Executive Director and the Commission.

Staff Engineer: Oversees the design and construction of water quality structures and detention basins. Reports to the Chief Engineer.

Sewer Superintendent: Oversees all drainage operations including maintenance, repair and construction. Reports to the Chief Engineer.

Sewer Foreman: Oversees all drainage maintenance, repair and construction. Reports to the Chief Engineer and the Sewer Superintendent.

3.0 DEFINITIONS

ANTI-SEEP COLLAR: A plate that is attached to the barrel running through an embankment of a pond that prevents water seepage around the pipe.

Armored: Protective covering.

Barrel: A concrete or corrugated metal pipe that passes runoff from the riser, through the embankment, and to the pond outfall.

Base flow: The portion of stream flow that is supported by groundwater seepage into a channel, rather than by stormwater runoff.

Basin: See *Watershed*

Bedrock: Solid rock, commonly called "ledge", that forms the earth's crust. It is locally exposed at the surface but more commonly is buried beneath a few inches to more than 300 feet of soil and other material.

Catch Basin: A conventional structure for the capture of stormwater utilized in streets and parking areas. It includes an inlet, sump, and outlet and provides minimal removal of suspended solids. A hood is used to separate floatables, oil and grease from stormwater.

Channel: In hydrology, the bed of a river or stream through which water is moved or directed.. Channels may be either natural or man-made (e.g.,a concrete lined box channel).

Detention time: The amount of time that a unit volume of stormwater actually remains in a BMP (Best Management Practices) facility or structure. Greater detention times will provide increased removal of suspended solids.

Discharge: Water or effluent released to a receiving water body.

Drainage area: Land area from which water flows into a stream or lake.

Dry pond: An area surrounded by an embankment, or an excavated pit, designed with out a permanent pool of water.
Detention of the runoff in the pond allows for settling of solids and reduces local and downstream flooding.

Emergency spillway: An outlet for surplus water.

Erosion: Weathering of soil by running water, wind, or ice.

Extended detention basin: An area surrounded by an embankment, or an excavated pit, designed to temporarily hold stormwater long enough to allow settling of solids and reduce local and downstream flooding.

Energy dissipator: A structure (riprap or concrete apron) that prevents Scouring and slows the flow of water.

Freeboard: The space between the top of an embankment and the highest water elevation expected for the largest design storm stored. The space is required as a safety margin in a pond or basin.

Groundwater: The water contained in interconnection pores located below the water table in an unconfined aquifer or located in a confined aquifer.

Oil and grease separator: Also known as a Water Quality Inlet (WQI).

100-year storm: Precipitation from a storm that occurs with a predicted statistical frequency of once every 100 years over a 24-hour period. This storm has a 1% chance of happening in any one given year. Because this is a statistical storm, it could occur twice in the same year.

Particulates: Sand, silt, or clay soil particles and organic matter found in stormwater.

Pond/wetland system: A two-cell stormwater wetland design with a wet pond in combination with a shallow marsh.

Riprap: A combination of boulders, large stones, and cobbles used to line channels, stabilize banks, filter out sediments, or reduce runoff velocities.

Riser: A vertical pipe extending from the bottom of a pond that is used to control the discharge rate for a specific design storm.

Scouring: The cleaning and digging action of flowing water, especially the downward erosion caused by stream water in sweeping away mud and silt from the streambed and outside bank of a curved channel.

Sediment: Eroded soil and rock material and plant debris, transported and deposited by runoff.

Sediment forebay: Component of a stormwater runoff BMP that uses a small settling basin, which allows sediments to settle out prior to flowing to a subsequent BMP. They are often used in tandem with infiltration devices, wet ponds, or marshes. Also known as a sediment trap.

Sump: The bottom of a catch basin, which collects solids and water.

Watershed: An area of land that contributes runoff to one specific delivery point. Large watersheds may be composed of several smaller "sub-watersheds" each of which contributes runoff to different locations that ultimately combine at a common delivery point.

Wet pond: An area surrounded by an embankment, or an excavated pit, designed with a permanent pool of water. Runoff entering the wet pond displaces the water already present in the pool and remains there until displaced by next storm event. Detention of the runoff in the pool allows for settling of solids and reduces local and downstream flooding.

4.0 DRY EXTENDED DETENTION BASINS

4.1 Site Criteria

- For each acre-foot of storage in a detention basin, four acres of drainage area are recommended.
- Soils, depth to bedrock and depth to water table at the proposed location of the detention basin must be investigated. Site conditions must be suited to the sitting of the detention basin: Poorly drained soils may result in standing water. Bedrock close to surface may prevent excavation.
- Access to detention basins must be provided for personnel and vehicles to clean and maintain basins.
- A minimum 10-foot setback is required from the street line or property line of land not owned by applicant to the top of bank.

4.2 Design Criteria

- Design of the detention basin shall provide a 24-hour average detention time for the entire spectrum of storm events in each year. The longest detention time for the maximum runoff volume shall be set at 40 hours. The average detention time for very small storms shall be no less than 6 hours. Volume of the detention basin shall be based on a 100-year storm.

- The design of the detention basin shall account for gradual accumulation of sediment. On-site disposal areas capable of receiving sediment from a minimum of two cleaning cycles should be reserved. Extra storage (such as sumps) shall be provided near the pond inlet or the lower stage to trap incoming sediments.

- Distance between inlets and outlets should be as great as possible to lengthen the flow path and increase detention time. Inlet baffles should be constructed where necessary to prevent short-circuiting.

- Detention basins should be wedge-shaped, if possible, narrowest at the inlet and widest at the outlet. A minimum length to width ratio of 3:1 should be used to maximize storm water contact and detention time.

- Inflow points shall be designed with energy dissipators to reduce inflow velocity.

- Any stream channel immediately below the pond outlet shall be lined with large stone rip-rap and graded to a slope of approximately 0.5% to prevent scouring during large storm events. A layer of filter cloth shall be laid down that conforms to the natural dimensions of the channel, and then anchored with 18-30 inch stone rip-rap. Smaller sized riprap 9-12 inches shall be used if the diameter of the pipe outfall is less than 24 inches.

- The inlet shall be designed with a forebay or settling zone to trap coarse sediments.

- Catch basins that discharge directly to the detention pond shall be provided with a 4-foot deep sump, a hooded outlet and a water quality inlet structure.

- Detention basin side slopes shall be no steeper than 3:1 (h: v) and no flatter than 20:1 (h: v). Detention basin slopes shall be stabilized with low lying ground cover type plantings, geotextile fabric, or other methods before pavement is placed on the roadway.

- Detention basin bottoms shall be graded level and sloped to the outlet and provided with a low maintenance low lying ground cover type vegetation free of standing trees, shrubs or saplings and suitable for periodic flooding.

- The outlet structure shall be designed to facilitate maintenance. Structures should be accessible to maintenance personnel and equipment during normal and emergency conditions.

- The outlet structure shall contain a drain-down valve, which will allow complete draining of the detention basin within 24 hours for emergency purposes or routine maintenance where possible.

- Embankments and spillways should be designed in conformance with the state dam safety regulations and criteria. All detention basins must have emergency spillway capable of by-passing runoff from large storms (100 year) without damaging the impounding structure.

- An access for maintenance, minimum width of 10 feet and a maximum slope of 12%, must be provided by easement or public or private right-of-way. This access should never cross the emergency spillway, unless the spillway has been designed for that purpose. This access shall be deeded over to the Commission. Access roads shall be constructed with a minimum of 8 inches of crushed stone covered by 6 inches of loam. No structures are to be located within access easements or right-of-way.

- Detention basins shall have a minimum of 1-foot freeboard above maximum high water level for adequate public safety.

- To prevent scour at the inlet and outlet an energy dissipator shall be installed to absorb the impact of the flow, and reduce the velocity to a level that will not erode the channel or area.

- Embankments, or dams, created to store more than 15 acre-feet, or that are more than 6 feet in height, are under the jurisdiction of the State Office of Dam Safety and are also subject to their regulations as well.

- Detention basins shall be sloped so that no standing water remains in the basin 24 hours after a storm event to prevent causing a breeding ground for mosquitoes.

- If necessary for access, top of berms on the detention basin shall be a minimum of 10 feet wide for vehicles to maintain basin and shall be free of trees and shrubs.

- Trash racks shall have vertical bars with a maximum 6-inch opening to prevent access into pipes by large animals and children. Minimum opening shall be 3 inches. Trash racks shall be aluminum or stainless steel and be securely anchored.

- All detention basins should have armored emergency spillways capable of safely conveying the 100-year storm event directed to that basin.

- Fencing shall be provided as needed for security. Gates with locking devices shall be provided on chain link or timber rail and post fence. Chain link fences shall be 6 gauge a minimum of 4 feet high. Wood rail fences when used shall be 3 feet high. All wood posts shall be 6 inches by 8 inches No. 2 Stress Rated Southern Pine. The wood rail shall be 9 inch by 12 inch No. 2 Southern Pine. Where ponds are adjacent to public roadways steel or timber guardrails shall be provided.

- The detention pond access berm and a 10 foot wide buffer easement shall be deeded over to the Commission.

- Drainage system that discharges directly to the detention pond shall be provided with a water quality inlet structure.

- Reinforced concrete or pipes, barrels and risers shall be utilized for their greater longevity.

- To prevent clogging, trash racks or hoods should be installed on the riser. To facilitate access for maintenance, the riser should be installed within the embankment. Anti-seep collars should be installed on the outlet barrel to prevent seeping losses and pipe failure. The embankment shall be properly compacted. The embankment shall have at least one-foot freeboard above emergency spillway.

- Landscaping abutting a detention basin shall consist of non-leafy, low maintenance type vegetation.

- Houses abutting a detention basin shall have the first floor elevation a minimum of two (2) feet above the pond maximum high water elevation.

5.0 WET RETENTION PONDS

5.1 Site Criteria

- Base flow and/or large contributing drainage areas are necessary to support pool elevations in wet ponds.

- The contributing drainage area to any individual wet pond should be at least 10 acres and the pond surface area at least 1/4 acre. Wet ponds should not be utilized for sites with drainage areas of less than 10 acres unless adequate ground water flow is present.

- For each acre-foot of storage in a wet pond, four acres of drainage area are recommended.

- At a minimum, the volume of the permanent pool should be at least 2.5 times greater than the runoff volume generated by the mean storm.

- Soils, depth to bedrock and depth to water table at the proposed location of the wet pond must be investigated. Site conditions must be suited to the siting of the wet pond: Well drained soils will not support surface water, sites with these soil types will require the use of natural or synthetic lining material. Bedrock close to surface may prevent excavation.

- Access to detention basins must be provided for personnel and vehicles to clean and maintain basins.

- A minimum 10-foot setback is required from the street line or property line of land not owned by applicant to the top of bank.

5.2 Design Criteria

- Wet ponds should not be designed or utilized to treat runoff generated during site disturbance or construction.

- The ratio of wet pond pool volume to runoff volume should be as close to 4 as possible, for pollutant removal rates.

- The average wet pond pool depth shall be 3 to 6 feet deep to achieve optimum settling of particulates. Water depths should be shallow near the inlet and deeper at the riser of outlet.

- A minimum pool surface area of 0.25 acres is recommended based on the typical drainage area size required to sustain a permanent pool during summer months.

- The original design volume of the wet pond should take into account gradual sediment accumulation. On-site disposal areas capable of receiving sediment from at least two clean-out cycles should be reserved in adjacent open space. Extra storage, in the form of a sediment forebay, should be provided near the inlet to trap incoming sediments.

- The additional storage provided shall be based on a 24-hour 100-year storm.

- The pond should be wedge-shaped, narrowest at the inlet and widest at the embankment. Inlets should be as far removed from outlet structures as possible to lengthen the flow path and increase detention time. A minimum length to width ratio of 3:1 should be used to maximize storm water contact and detention time in the pool. Inlet baffles should be constructed where necessary to prevent short-circuiting.

- Reverse slope pipes should be set to discharge stormwater approximately one foot below the normal surface elevation of the permanent pool.

- Inflow points should be designed with energy dissipators to reduce inflow velocity.

- Six to eighteen inches of water are needed for optimum wetland vegetation growth.

- Wet pond side slopes shall be no steeper than 3:1 (h: v) and no flatter than 20:1 (h: v). Wet pond slopes shall be stabilized with low lying ground cover type plantings, geotextile fabric, or other methods before pavement is placed on the roadway.

- To prevent clogging, trash racks or hoods should be installed on the riser. To facilitate access for maintenance, the riser should be installed within the embankment. Anti-seep collars should be installed on the outlet barrel to prevent seeping losses and pipe failure. The embankment shall be properly compacted. The embankment shall have at least one-foot freeboard above emergency spillway.

- The outlet structure shall be designed to facilitate maintenance. The vital parts of the structures shall be accessible to maintenance personnel and equipment during normal and emergency conditions.

- A bottom drain pipe with a valve and an inverted elbow shall be installed to prevent sedimentation and be sized to completely drain the pond in less than 24 hours.

- Reinforced concrete pipes, barrels and risers shall be utilized for their greater longevity.

- To prevent scour at the outlet the channel, immediately below the pond shall be modified to conform to natural dimensions, and lined with large riprap placed over filter cloth.

- Embankments, or dams, created to store more than 15 acre-feet, or that are more than 6 feet in height, are under the jurisdiction of the state Office of Dam Safety and are also subject to their regulations. Embankments and spillways should be designed in conformance with the state dam safety regulations and criteria. All wet ponds must have emergency spillway capable of bypassing runoff from large storms without damaging the impounding structure.

- An access for maintenance, minimum width of 10 feet and a maximum slope of 12%, must be provided by easement or public or private right-of-way. This access should never cross the emergency spillway, unless the spillway has been designed for that purpose. This access shall be deeded over to the Commission. Access roads shall be constructed with a minimum of 4 inches of crushed stone covered by 6 inches of loam. No structures are to be located within access easements or right-of-way.

- Detention pond shall have a minimum of 1-foot freeboard above maximum high water level for adequate public safety.

- Vegetative buffers around the perimeter of the wet pond are recommended for erosion control, additional sediment and nutrient removal.

- If necessary for access, top of berms on the wet ponds shall be a minimum of 8 feet wide for vehicles to maintain pond and shall be free of trees and shrubs.

- Trash racks shall have vertical bars with a maximum 6-inch opening to prevent access into pipes by large animals and children. Minimum opening shall be 3 inches. Trash racks shall be aluminum or stainless steel and be securely anchored.

- All detention basins should have armored emergency spillways capable of safely conveying the 100-year storm event directed to that basin.

- Catch basins that discharge directly to the detention pond shall be provided with a 4-foot deep sump, a hooded outlet and a water quality inlet structure.

- Drainage system that discharges directly to the detention pond shall be provided with a water quality inlet structure.

- The detention pond access berm and a 10 foot wide buffer area shall be deeded over to the Commission.

- Landscaping abutting a detention basin shall consist of non-leafy, low maintenance type vegetation.

- Houses abutting a detention basin shall have the first floor elevation a minimum of two (2) feet above the pond maximum high water elevation.

- Fencing shall be provided as needed for security. Gates with locking devices shall be provided on chain link or timber rail and post fence. Chain link fences shall be 6 gauge and a minimum of 4 feet high. Wood rail fences when used shall be 3 feet high. All wood posts shall be 6 inches by 8 inches No. 2 Stress Rated Southern Pine. The wood rail shall be 9 inch by 12 inch No. 2 Southern Pine. Where ponds are adjacent to public roadways steel or timber guardrails shall be provided.

- Any stream channel immediately below the pond outlet shall be lined with large stone rip-rap and graded to a slope of approximately 0.5% to prevent scouring during large storm events. A layer of filter cloth shall be laid down that conforms to the natural dimensions of the channel, and then anchored with 18-30 inch stone riprap. Smaller sized rip-rap 9-12 inches shall be used if the diameter of the pipe outfall is less than 24 inches.