STORMWATER MANAGEMENT PROGRAM
FINAL REPORT

Submitted to:
UNIVERSITY OF MASSACHUSETTS LOWELL

Submitted by:

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1.0 INTRODUCTION

AMEC was retained by the University of Massachusetts Lowell (University) to assist the University in assessing the existing University's stormwater procedures and developing a Stormwater Management Program (SWMP) to meet the needs of the National Pollutant Discharge Elimination System (NPDES) Stormwater Phase II Final Rule (Phase II). United States Environmental Protection Agency (EPA) Region 1 authorizes the NPDES Phase II general permits for the Commonwealth of Massachusetts.

The intent of this project is to assess the University's ability to meet EPA's requirements for a Municipal Small Separated Stormwater System (MS4) and to develop a Stormwater Management Program to include all four campuses (North, South, East, and West). In order to accomplish this, AMEC performed a good housekeeping audit of all four campuses, met with appropriate Facilities and Environmental Health & Safety personnel, and reviewed available documents.

EPA considers a MS4 to include all man-made drainage features (roads with drainage systems, gutters, and ditches). A regulated MS4 is one that exists within the boundaries of an urbanized area as defined by the U.S. Census Bureau. Drainage systems that are solely part of a combined sewer system are not covered by NPDES Phase II. The City of Lowell's recent combined sewer separation project in Riverside Street and Sparks Street caused the University to become part of a separate stormwater sewer system.

Authorization received by EPA will only be for discharges that occur after permit coverage is granted. The permitting authority reserves the right to take appropriate enforcement actions for any un-permitted discharges. As a MS4, the University must meet the six minimum control measures of NDPES Phase II. The regulatory intent is that small MS4 owners/operators must reduce pollutants in stormwater to the maximum extent practicable to protect water quality. The term maximum extent practicable (MEP) allows the owner/operator's program to focus on methods that will have the greatest impact within their MS4, while the structure for the program is loose; the EPA's six minimum control measures (MCM) are as follows:

- MCM 1: Public education and outreach
- MCM 2: Public participation and involvement
- MCM 3: Illicit discharge detection and elimination
- MCM 4: Construction site runoff control
- MCM 5: Post-construction runoff control
- MCM 6: Pollution prevention and good housekeeping

One key element of the development and implementation of a SWMP is the requirement to identify and eliminate non-stormwater discharges to the stormwater drainage system and receiving waters. This requirement is fulfilled by assessing the occurrence of non-stormwater discharges, determining whether or not the discharge is allowable, and if not allowable, either eliminating the discharge or controlling the discharge through the use of best management practices (BMPs). Allowable discharges are defined in federal, state,

and local regulations and include such non-stormwater discharges as footing drain discharges, sump pump discharges, irrigation runoff, fire fighting discharges, and other discharges as specifically allowed by the regulatory agencies. Proper BMP recommendation and implementation is another key element to a functioning SWMP. Appropriately selected BMPs can significantly reduce the amount of pollution coming from non-point sources at industrial facilities.

This report summarizes the results of the assessment and concludes with a discussion about establishing the measurable goals and record keeping necessary for compliance with the intent of the NPDES Phase II regulations. The SWMP will be used in the development of a Notice of Intent (NOI) to be submitted to the EPA Region 1 with a copy to Massachusetts' Department of Environmental Protection (DEP).

LIMITATIONS AND EXCLUSIONS

The stormwater audits included observation of accessible areas, review of available documents, and interviews with available facility contacts.

If the University undertakes construction (or other land-disturbing activities) that disturbs greater than one acre of land, the University must develop and implement a Stormwater Pollution Prevention Plan (SWPPP) and obtain a Construction General Permit from the EPA. Furthermore, NPDES Phase II requires the filing of a MSGP for specific categories of industrial activities, including steam electric generating and land transportation. The 2008 MSGP became effective September 29, 2008. The MSGP NOI submittal deadline is January 5, 2009.

2.0 SITE DESCRIPTION

2.1 North Campus

The North Campus is bounded by the VFW Highway to the southeast, Plymouth Street and Standish Street to the southwest, Riverside Street to the northwest, and Sparks Street to the northeast. The location of this site is shown in Figure 1. There are twelve classroom and administrative buildings, one gymnasium, soccer field, football field/track, library, two large parking lots, several small parking lots, maintenance garage facility, and a power plant located within the campus.

The maintenance garage facility is operated by the University. The building is adjacent to a power plant. A steep slope leading towards the VFW Highway is located in the back of the building. An overpass connects the Maintenance Garage with Kitson Hall. The entrance to the Maintenance Garage is through an access road along the Engineering Building from Riverside Street. Most of the land around the building is paved. The building is connected to a municipal sewer system.

The overpass is used as a shelter for a variety of items. These items include mowing equipment, electrical carts, and salt/sand mix for winter road maintenance. The dumpsters are stored outside of the sheltered area in front of the Engineering Building. The vehicle service and wash-down activities are performed at an offsite commercial carwash.

2.2 East Campus

The East Campus is bounded by the Northern Canal to the south and southeast, and by the Merrimack River to the north. Several buildings located within the campus are not owned by the University. The location of the site is shown in Figure 2. The buildings located within the campus include several residence halls, campus recreation center, parking lots, a parking garage, and research centers.

There are no industrial-type activities on the East Campus. Aramark operates a food service in Fox Hall. Grease and used oil from the food operations are stored in 55-gallon drums in the rear of the building. Some of the drums are located on a concrete pad with a metal overhead cover. The dumpsters are located at several locations throughout the campus.

2.3 South Campus

The South Campus is located on the southern bank of the Merrimack River. The campus is bounded by Pawtucket Street to the north and northwest, Wilder Street to the east, and a railroad to the south. Broadway Street intersects the campus from the west to the east. The location of the site is shown in Figure 3. The larger part of the campus is located north of Broadway Street; it consists of administrative buildings, classrooms, residence halls, library, dining hall, softball field, and a parking lot. Two midsize parking

lots are located across Wilder Street. Additional classrooms and administrative building are located south of Broadway Street, as well as a power plant, salt shed, and one large and two small parking lots.

The salt shed is operated by the University and is used for storage of salt/sand mix for winter road maintenance. The salt shed is fenced off and the gate is locked during off business hours.

2.4 West Campus

The West Campus is not currently used by the university and all buildings are secured with the exception of Bigelow Building, which was leased to a Department of Corrections (DOC) juvenile facility. The campus is bounded by Princeton Street to the north, Augusta Way to the west, St. Andrews Way to the south, and Brouilette Street to the east. The location of the site is shown in Figure 4. There are several parking lots adjacent to the buildings. A large portion of the campus is undeveloped and vegetated.

3.0 EXISTING DRAINAGE

All campuses are located within the Merrimack River Watershed; all stormwater runoff from the University contributes to the Merrimack River. AMEC reviewed existing drawings provided by the University for stormwater data; however, field investigation would be required to accurately verify all stormwater outfalls.

3.1 North Campus

Stormwater runoff generated throughout the impervious areas of the North Campus flows over roof and pavement and is collected by internal roof leaders or catch basins, and conveyed to a stormwater drain or to a combined sewer. The University has recently completed separation of the combined sewer discharging into the City of Lowell sewer system on Riverside Street and VFW Highway. As a result, stormwater runoff from the southern part of the campus (Cumnock Hall, Southwick Hall, Falmouth Hall, Kitson Hall, Pasteur Hall, Ball Hall, Engineering Building, and surrounding parking areas) does not discharge into the combined sewer. A portion of the runoff directly infiltrates through three leaching basins installed under the Cumnock Hall parking lot. The overflow is connected to the municipal sewer on Riverside Street. The remaining stormwater runoff is conveyed through the stormwater drain and discharges into the Merrimack River at two locations. Both of these outfalls have been identified and are shown in Figure 1. Additionally, the City of Lowell has separated the Sparks Street combined sewer, and the Riverside Parking Lot was tied to the municipal stormwater drain. According to the drawings provided by the University, stormwater runoff from the library and adjacent buildings is collected via internal roof leaders and conveyed to a combined sewer on VFW Highway. Runoff from the parking lot on Standish Street is collected by catch basins located along the southern edge of the parking lot and conveyed through the stormwater drain, which ties into the municipal stormwater drain discharging into the Merrimack River through an outfall. Additional catch basins located on VFW Highway

are also tied to the municipal stormwater drain. Approximate location of the outfall has been identified on Figure 1.

3.2 East Campus

Stormwater runoff generated throughout the East Campus is collected via internal roof leaders or catch basins, and conveyed to a stormwater drain or combined sewer. Runoff from the northwestern area of the campus, bordered by Institute for Plastics Innovation to the east, Northern Canal to the south and Merrimack River, discharges to a 42-inch combined sewer on Pawtucket Street. According to the drawings provided by the University, a small portion of the Leitch Hall Roof discharges directly to the Merrimack River through an outfall. One outfall is identified and is shown in Figure 2.

3.3 South Campus

Stormwater runoff from the South Campus is collected in several different networks. One network collects runoff from the Dining Hall, Weed Hall, O'Leary Library, and the surrounding areas. This storm drain ties into a 27-inch municipal storm drain on Wilder Street. Stormwater runoff from the area north of O'Leary Library is collected via catch basins and conveyed to the 27-inch municipal storm drain on Wilder Street. Another network collects runoff from Sheehy Hall, Concordia Hall, and an adjacent parking lot. An 18-inch storm drain leaves the University property. This drain either discharges directly into the Merrimack River or municipal storm drain on Pawtucket Street. Stormwater runoff from Durgin Hall and the area north of the building is conveyed through a 12-inch pipe; according to a records review, the 12-inch pipe is connected to the municipal storm sewer located on Pawtucket Street. Dugan Hall and the surrounding areas are tied to a combined sewer connected to the municipal sewer on Broadway Street. Riverview Parking Lot has a separate storm drain system, which discharges directly into the Merrimack River through an outfall. Stormwater runoff from Coburn Hall and the Power Plant is conveyed to the combined sewer on Wilder Street. One outfall is identified and is shown in Figure 3.

3.4 West Campus

Stormwater runoff from the southern portion of the site appears to be collected via catch basins and conveyed to a stormwater drain. According to the drawings provided by the University, the stormwater drain connects to the municipal storm drain on Princeton Street. Additional catch basins located on the paved roadway, between Bigelow Building and Richardson Hall, appear to be isolated and not connected to any drainage system. Stormwater runoff from the roofs is collected via downspouts and infiltrated into the ground. West Campus is represented on Figure 4.

4.0 RECEIVING WATER BODIES AND IMPAIRED WATERS

Some of the UML's MS4 outfalls discharge stormwater directly to the Merrimack River. Other UML outfalls tie to the municipal storm drain or combined sewer. According to the City of Lowell's Stormwater Compliance Plan, Lowell's MS4 discharges stormwater to several water bodies and man-made channels, which are tributaries of the Merrimack River.

The Merrimack River is included on the Massachusetts 303(d) list of impaired water bodies. The river segment from the state line at Hudson, NH, to the Pawtucket Dam in Lowell, MA, is listed for metals and pathogens; and the river segment from the Pawtucket Dam in Lowell to Duck Island in Lowell is listed for nutrients, metals, pathogens, and flow alterations.

Currently, only a draft version of Pathogen TMDL has been developed for the Merrimack River watershed. According to the draft TMDL, combined sewer overflows (CSO) and stormwater runoff represent the major sources of pathogens to the Merrimack River watershed. The draft TMDL recommends monitoring storm drain outfalls during dry weather to detect illicit discharges. It also suggests intensive application of non-structural BMPs is needed throughout the watershed. One non-structural BMP is to improve natural filtering provided by vegetative cover, which could be achieved by low impact development BMPs. A basin-wide implementation is recommended, which includes a mandatory program for implementing stormwater BMPs and eliminating illicit sources.

5.0 ENDANGERED SPECIES AND HISTORIC PLACES

In order to meet the permit eligibility criteria the University must show that discharges or discharge related activities will not adversely affect any species that are listed as endangered or threatened under the Endangered Species Act (ESA) or result in the adverse modification or destruction of habitat that is designed as critical under the ESA.

5.1 Endangered Species Act

According to Addendum A of the General Permit, U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) have identified two species of concern in the Merrimack River:

- Short nosed sturgeon
- Dwarf wedge mussel

Any small MS4 discharging into the Merrimack River must consult with the FWS and NMFS to determine that discharges are not likely to adversely affect listed species. The University will send letters to the FWS and NMFS (see Appendix B) describing the stormwater discharges from the MS4 to the Merrimack River. However, the University does not anticipate that their discharges impact the two listed species of concern.

5.2 Massachusetts Endangered Species Act (MESA)

Under MESA, rare species and their habitats are protected by prohibiting the "Take" of any plant or animal species listed as Endangered, Threatened, or of Special Concern by the MA Division of Fisheries & Wildlife (MA DFW). If the project falls within Priority Habitat of Rare Species and does not meet the MESA filing exemptions, proponents must file with the Natural Heritage and Endangered Species Program (NHESP). Priority Habitat is defined as "the geographic extent of Habitat for state-listed species" as delineated by the Division pursuant to 321 CMR 10.12. According to the MA DFW, the following state-listed species are found in Lowell:

- Peregrine Falcon (Bird)
- Melsheimer's Sack Bearer (Butterly/Moth) - historic
- Cobra Clubtail (Dragonfly/Damselfly)
- Umber Shadowdragon (Dragonfly/Damselfly)
- Arrow Clubtail (Dragonfly/Damselfly)
- Blanding's Turtle (Reptile)
- Tufted Hairgrass (Plant) - historic
- Hairy Wild Rye (Plant) - historic
- New England Blazing Star (Plant) - historic

While the Merrimack River is designated as "NHESP 2008 Priority Habitat of Rare Species and also Estimated Habitat of Rare Wildlife" (see Figure 5), the filing requirement applies to projects that will result in construction activity or disturbance. Certain construction projects may be exempt from the filing. There is no buffer zone associated with the designated area. A project is either in or outside the designated area. Therefore, if the University decides to construct within the designated area, consultation and coordination with the MA DFW is strongly recommended.

5.3 Historic Places

According to Addendum B of the general permit, applicants must determine whether their MS4's stormwater discharges, allowable non-storm water discharges, or construction of best management practices (BMPs) to control such discharges, has the potential to affect a property that is either listed or eligible for listing on the National Register of Historic Places.

There are three scenarios for how applicants meet eligibility criteria for protection of historic places:

1. Historic properties are not in the path of a MS4 stormwater discharge or no BMP construction is planned at those properties.
2. Historic properties are identified but they will not be affected by the discharges or construction of BMPs.
3. If historic places can be affected by the discharges or construction of BMPs, then the appropriate State Historic Preservation officer shall outline measures the applicant will follow to mitigate or prevent the adverse affects. The applicant has to comply with those measures.

The properties listed in the "National Register of Historic Places" are included in Table 1. Lowell Locks and Canals Historic District appear to be the only historic places affected by the discharges. The locks and canals were designed as waterworks and historically receive stormwater discharges from the City of Lowell. Therefore, the second eligibility criterion has been met. Future University construction projects will be reviewed for this eligibility criterion.

6.0 STORMWATER AUDIT

On September 19, 2008 and September 24, 2008, AMEC performed a stormwater inspection of all campuses at UML. This inspection was limited to visible and accessible areas and included the following:

1. Verify the presence of drains, catch basins, and stormwater system
2. Verify stockpiling and storage of road salt, catch basin cleanings, street sweepings, etc. Confirm presence or non-presence of shed(s), cover(s) and/or other stormwater containment and/or treatment measures
3. Determine any apparent illicit discharges to MS4
4. Determine vehicle wash-down procedures and locations
5. Determine vehicle service procedures and locations
6. Determine existing general spill containment measures (if discharges may enter the drainage system)
7. Determine the frequency of cleaning drain(s) and catch basin(s) and/or other maintenance activities

Available UML plans were reviewed to assess the known data on the campus stormwater drainage system. In many areas of the North, South, and East campuses, the stormwater drainage system connects to the sanitary sewer, or stormwater is conveyed directly to a combined sewer. However, all campuses appear to have at least one stormwater outfall to either the Merrimack River or the municipal storm drain. Therefore, the University must comply with the general permit.

AMEC interviewed Hector Valdes, Facilities Project Manager, Richard Lemoine, Director of Environmental Health & Safety, and Glenn MacDonald, Safety Specialist, to determine existing operations, procedures and control measures. In addition, facility inspections of the power plants on the North and South Campuses were performed to assess the facilities' impact on stormwater. This audit was conducted during dry weather. A copy of the Facility Audit Checklist completed during the inspection is included in Appendix A.

7.0 CURRENT PRACTICES

7.1 Illicit Discharge Elimination

The University recently completed a combined sewer separation project on the North Campus. The University cooperated in a separation project on Riverside and Sparks streets with the City of Lowell, as well as executed two separation projects on the North Campus. The Stormwater Management Master Plan (SWMMP) dated September 26, 2006, identified two areas that the University prioritized for disconnection; these included a cross connection in a catch basin located within the VFW Highway layout and a direct connection from a bathroom facility in Falmouth Hall.

The VFW Highway catch basin was installed on top of a combined sewer pipe, which did not have sufficient capacity to handle the flow during heavy storms and would overflow to the Merrimack River. In addition, one of the bathrooms located in Falmouth Hall was connected to the storm drain. This scenario created a combined sewer, which discharged directly to the Merrimack River. Following the SWMMP recommendation, the University disconnected Pasteur Hall roof drains from the combined sewer and rehabilitated the catch basin and the combined sewer line, thus eliminating the cross connection. In addition, the bathroom was connected to the sanitary sewer.

7.2 Best Management Practices

The general permit requires the permittee to evaluate physical conditions, site design, and best management practices to promote groundwater recharge and infiltration. The University has completed a project at the North Campus promoting groundwater recharge. Stormwater runoff from Cumnock Hall and the surrounding areas was disconnected from the combined sewer and rerouted to three leaching basins installed under the parking lot.

Pollution prevention and good housekeeping (MCM 6) requires the permittee to develop and implement a program with a goal of preventing and/or reducing pollutant runoff. The following measures are currently being implemented by the University and can be used as part of the program:

1. Parking Lot Sweeping – parking lots are swept annually
2. Catch Basin Cleaning – catch basins are cleaned annually, unless more frequent cleaning is needed.
3. Stormceptor Cleaning – employees were trained by the manufacturer on proper maintenance of water quality structures.
4. Snow Disposal – snow is generally piled on open grass areas to promote groundwater recharge and infiltration.
5. Salt Storage – a portion of salt/sand mix for winter road maintenance is stored in a salt shed at the South Campus.
6. Spill Prevention and Response – the University has established a spill response team that consists of six people. Team members are trained during the 40-hr HAZMAT program on how to respond to a spill.

8.0 MINIMUM CONTROL MEASURES (MCM)

Proper BMP recommendation and implementation is a key element to a functioning SWMP. Appropriately selected and implemented BMPs can significantly reduce the amount of pollution coming from non-point sources. The University must meet the six MCM of NDPES Phase II.

Each of the six regulated MCM are outlined below with accompanying BMP. The layout is as follows: MCM description, department responsible for implementation and maintenance, BMP description, measurable/reportable goal, timeline to employ BMP, and the estimated cost to employ BMP,

8.1 MCM 1: Public Education and Outreach

The University must implement an educational program providing information about the impacts of stormwater discharges on water bodies. The program should address steps and activities that the students, faculty, and staff can take to reduce the pollutants in stormwater runoff.

Responsible Department: Facilities Department

8.1.1 BMP #1-1: Development of Stormwater Section on UML Webpage

Description: The UML Environmental Health and Safety Office (EHS) will develop a stormwater management information page on the campus website to educate staff and students with tips on stormwater pollution prevention and University management solutions. The page will be accessible to students, staff, and general public. Links to the EPA and Massachusetts DEP websites, as well as other resources will be included on the website.

Measurable Goal: Development of a webpage with links.

Timeline: By the end of Year 2009.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower.

8.1.2 BMP #1-2: Letters to Contractors

Description: UML distributes letters to UML-employed contractors providing services on campus. The purpose of the letters is to advise them of potential impacts to stormwater on campus and to describe precautions that they are expected to take.

Measurable Goal: Letter provided at start of contractor work.

Timeline: As appropriate, per contract or purchase order.

Estimated Cost: No additional cost anticipated; the BMP has been implemented.

8.2 MCM 2: Public Involvement and Participation

Public involvement activities are designed to provide opportunity for the students, faculty, and staff to participate in the implementation and review of the SWMP. The University's audience consists of staff and students. The SWMP will be available for review during regular business hours in the EHS Office or available on the EHS webpage.

Responsible Department: EHS Office

8.2.1 BMP #2-1: Catch Basin Stenciling Program

Description: The University will stencil a message next to catch basins or install plaques reminding people not to dump anything down the storm drain. The University will attempt to recruit volunteers among staff and students to help with the program.

Measurable Goal: Stencil up to 20 catch basins per year.

Timeline: Complete stenciling of all catch basins by the end of permit term.

Estimated Cost: Approximately $100 for paint and stencils/plaques for 20 catch basins. If volunteers are recruited, minimal additional manpower costs anticipated.

8.3 MCM 3: Illicit Discharge Detection and Elimination

This control measure requires the development, implementation and enforcement of a program to detect and eliminate illicit discharges. An illicit discharge is defined as any discharge to a storm drain that is not entirely stormwater (illegal sanitary sewer connections, non-permitted industrial discharges, and accidental or intentional dumping into the stormwater system). The permit requires the University to develop a storm sewer map, showing at a minimum the locations of outfalls and the names of all waters that receive discharges from those outfalls. The map may include other elements, such as catch basins, manholes etc.

Responsible Department: Facilities Department

8.3.1 BMP #3-1: Development of a Storm Sewer Map

Description: The University will use their current maps to develop a storm sewer map showing the location of outfalls and the names of receiving waters. Visual field surveys will be used to verify conflicting information or to identify outfalls that are currently unknown.

Measurable Goal: Development of a storm sewer map, with emphasis on location of outfalls.

Timeline: By the end of Year 2009.

Estimated Cost: Based on 2 weeks of work, including field surveys, the cost for an outside consultant at approximately $10,000.

8.3.2 BMP #3-2: Illicit Discharge Detection Plan

Description: Develop and implement a plan to detect and address illicit discharges. Identify a point person and procedures for University personnel and students to notify point person of potential illicit discharges. Establish follow up procedures to determine source of the discharge of concern. Define areas of concern to prioritize outfalls found in BMP #3-3.

Measurable Goal: Development of an Illicit Discharge Detection Plan.

Timeline: By the end of Year 2009.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower.

8.3.3 BMP #3-3: Dry Weather Outfall Observations

Description: The University will make observations during a dry weather period to determine if outfalls receive flow. The presence of flow during a dry weather period could indicate an illicit discharge connection.

Measurable Goal: Make observations at all outfalls at least once. Document and store the records with the Illicit Discharge Detection Plan.

Timeline: Conduct during low groundwater period. Compete by the end of Year 2012.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower. If Consultant performs outfall observations, estimate cost per four outfalls is $2,200.

8.4 MCM 4: Construction Site Stormwater Runoff Control

This measure includes the development, implementation and enforcement of a program to reduce pollutants in stormwater runoff from construction activities with land disturbance greater than one acre.

Responsible Department: Facilities Department

8.4.1 BMP #4-1: Develop Construction Site Runoff Control Procedures

Description: The University will continue to follow current EPA and Massachusetts DEP regulations for construction projects disturbing more than one acre of land, and for all projects within vegetated wetland buffer zone. The University will develop standards to ensure construction site operators meet Phase II stormwater regulations, including preconstruction site plan review, construction and project closeout inspections.

Measurable Goal: Develop procedures.

Timeline: By the end of Year 2009.

Estimated Cost: If University staff write procedures, administrative and manpower cost only. Policy could be developed by a Consultant for an estimated cost of $15,000-$25,000.

8.4.2 BMP #4-2: Construction Runoff Training

Description: The University will train appropriate Facilities Department and Environmental Health & Safety staff in erosion and sediment control for construction stormwater management.

Measurable Goal: Two staff members to attend an erosion and sediment control stormwater management workshop or training program.

Timeline: By the end of Year 2009.

Estimated Cost: Staff time and the cost of the workshop or training – approximately $600 for a one-day workshop for two employees. Alternatively, EPA website offers several archived webcasts that can be downloaded free of charge.

8.4.3 BMP #4-3: Inspect Construction Runoff Controls

Description: Assign construction inspection responsibility to up to two staff members. Inspect BMPs prior to breaking ground and throughout construction.

Measurable Goal: Inspect, record findings, and document outcome of any necessary actions.

Timeline: Throughout the permit term.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower. Estimated to require 2 manhours per inspection. Number of inspections dependent on duration of construction, site and weather conditions and proximity to sensitive receptors. If Consultant to perform inspections and provide letter report, estimate cost per inspection at $840.

8.4.4 BMP #4-4: Enforcement Strategy

Description: The University will develop an enforcement strategy for proper employment of construction stormwater management controls. Objective: Facilities Department will have the power to stop work if stormwater controls are not in place or not being used properly.

Measurable Goal: Two staff members to attend a construction runoff control workshop or training program.

Timeline: By the end of Year 2009.

Estimated Cost: Staff time and the cost of the workshop or training – approximately $600 for a one-day workshop for two employees. Alternatively, EPA website offers several archived webcasts that can be downloaded free of charge.

8.5 MCM 5: Post-construction Stormwater Management

This control measure includes the development, implementation and enforcement of a program to address stormwater runoff from projects that disturb greater than one acre. Stormwater controls to be inspected include hydrodynamic separators, filter systems, detention basins, and infiltration pits.

Responsible Department: Facilities Department

8.5.1 BMP #5-1: Develop Policy for Post-Construction Stormwater Management

Description: The University will develop standards to ensure stormwater management BMPs are operated in good condition.

Measurable Goal: Develop a policy to include inspection protocols and maintenance procedures.

Timeline: By the end of Year 2009.

Estimated Cost: If University staff write procedures, administrative and manpower cost only. Policy could be developed by a Consultant for an estimated cost of $15,000-$25,000.

8.5.2 BMP #5-2: Post-Construction Runoff Training

Description: The University will train appropriate Facilities Department and Environmental Health & Safety staff in best management practices for post-construction stormwater management.

Measurable Goal: Two staff members to attend a post-construction stormwater management workshop or training program.

Timeline: By the end of Year 2009.

Estimated Cost: Staff time and the cost of the workshop or training – approximately $600 for a one-day workshop for two employees. Alternatively, EPA website offers several archived webcasts that can be downloaded free of charge.

8.5.3 BMP #5-3: Inspect Post-Construction Management BMPs

Description: Assign post-construction inspection responsibility to up to two staff members. Inspect BMPs from new construction prior to project closeout. Additionally, inspect the BMPs three months after installation then add to the annual inspections performed by the University.

Measurable Goal: Inspect, record findings, and document outcome of any necessary actions.

Timeline: Throughout the permit term.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower. Estimated to require 2 manhours per inspection. If consultant to perform inspections and provide letter report, estimate cost per inspection at $840.

8.6 MCM 6: Pollution Prevention and Good Housekeeping

This measure includes the development, implementation and enforcement of a program to prevent or reduce pollutant runoff from facilities operations into the storm sewer system.

Responsible Department: Facilities Department

8.6.1 BMP #6-1: Catch Basin Cleaning

Description: The University currently cleans catch basins on as needed basis. The cleaning occurs on average every year.

Measurable Goal: Clean catch basins annually.

Timeline: Throughout the permit term.

Estimated Cost: The University already implements this BMP, so no additional cost anticipated.

8.6.2 BMP #6-2: Stormceptor Cleaning

Description: The University staff was trained on maintenance of the Stormceptor units. The units are currently cleaned on as needed basis.

Measurable Goal: Clean Stormceptor units annually.

Timeline: Throughout the permit term.

Estimated Cost: The University already implements this BMP, so no additional cost anticipated.

8.6.3 BMP #6-3: Parking Lot Sweeping

Description: The practice of street sweeping parking lots and access roads can reduce the pollutant load *(s*ediment, debris, trash, deicing product, and trace metals) conveyed by runoff*.*

Measurable Goal: Parking lots will be swept at a minimum annually, preferably in the spring.

Timeline: Throughout the permit term.

Estimated Cost: The University already implements this BMP, so no additional cost anticipated.

8.6.4 BMP #6-4: Road Salt Storage

Description: The University currently stores salt in a salt shed at the South Campus and under an overpass at the North Campus. However, the salt pile at the North Campus is located next to a catch basin and salt gets washed into the storm drain. The salt from the North Campus will be relocated to the salt shed at the South Campus. This constitutes a procedural change that will require educating the staff about the location change.

Measurable Goal: Salt pile will be relocated to the South Campus.

Timeline: Relocation of the salt pile by the end of Year 2008.

Estimated Cost: Procedural change only, no additional capital costs are anticipated. Capital costs will be assessed following the investigation.

8.6.5 BMP #6-5: Landscape Maintenance

Description: The University employs green practices with applications of organic fertilizers. The University will develop a written policy and educate its contractors and employees about the use of fertilizers and other chemicals. The policy will consider sustainable approaches to applying fertilizers, pesticides, herbicides, and other chemicals.

Measurable Goal: Develop a written policy and educate appropriate contractors and staff.

Timeline: Throughout the permit term.

Estimated Cost: If University staff write procedures, administrative and manpower cost only. Policy could be developed by a Consultant for an estimated cost of $15,000-$25,000.

8.6.6 BMP #6-6: Oil and Grease Management

Description: The University subcontracts food services. At the time of this report, the services are contracted to ARAMARK. At the time of the stormwater audit, buckets with used oil were observed opened. The University will require used oil and grease to be stored properly.

Measurable Goal: Send a letter to the ARAMARK food service director. The University will require future food service contracts to ensure proper stormwater management controls for oil and grease management.

Timeline: By the end of Year 2008.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower.

8.6.7 BMP #6-7: Closing of Dumpsters

Description: Dumpsters throughout the University are equipped with covers. However, the covers are often not used, which results in accumulation of water during rain events. During the process of dumping much of the accumulated water will dump on the ground along with trash leachate. The University will educate its employees about covering the dumpsters. Information will be added to the stormwater section on the University website.

Measurable Goal: Train cleaning and maintenance personnel to close dumpster lids.

Timeline: By the end of Year 2009.

Estimated Cost: Anticipated to be performed by staff. BMP requires additional administrative and staff manpower.

9.0 CONCLUSIONS

The 2003 MS4 general permit has expired, and the EPA is still in the process of issuing a new permit. According to the EPA website, the final permits should be available in early 2009. To obtain coverage, the permitees will be required to submit a new Notice of Intent (NOI). It is anticipated that NOIs will be due 90 days after the effective date of the final permits.

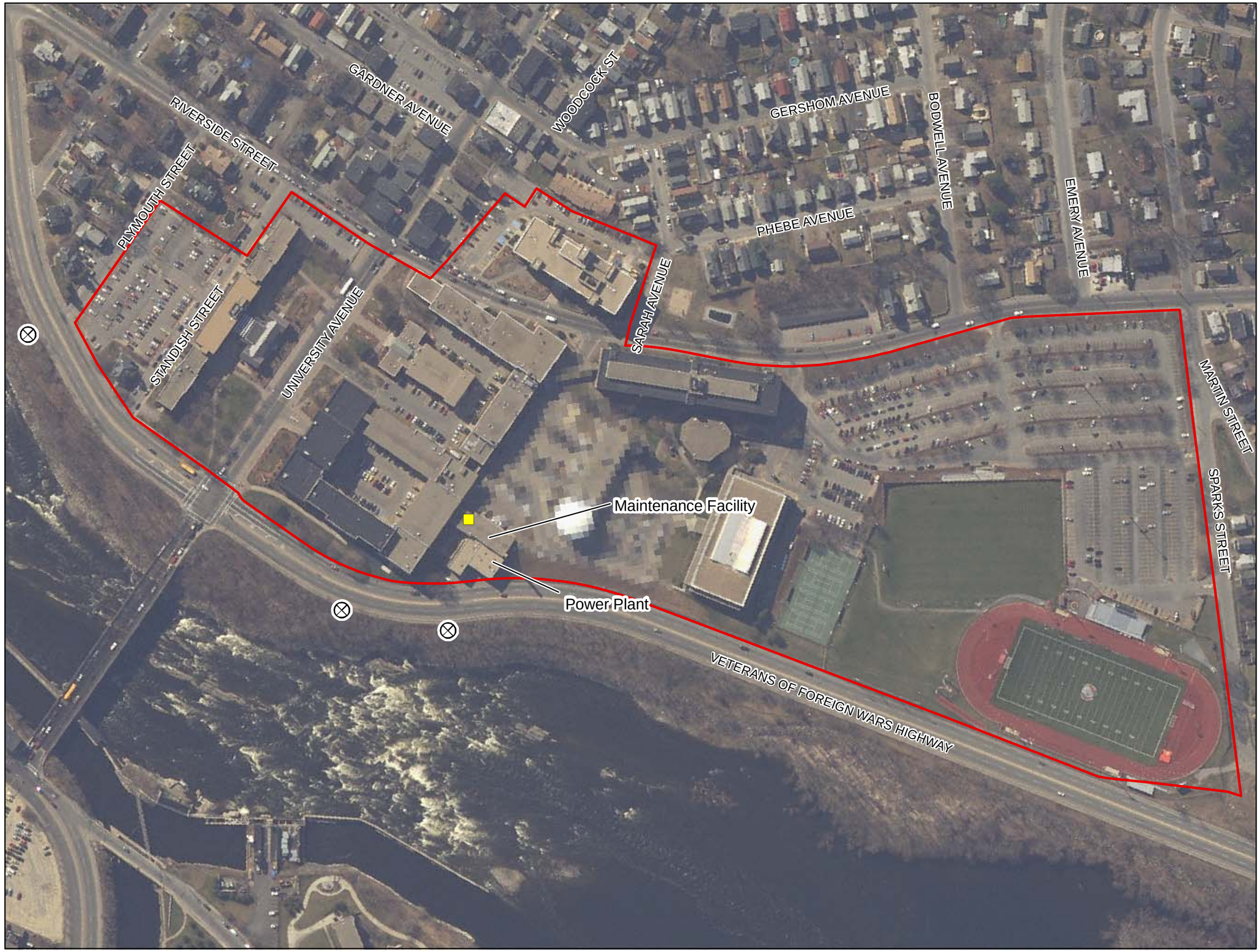
Since it is not appropriate to submit a NOI on an expired permit, EPA requests that MS4s develop a stormwater management program to reduce discharge of pollutants from the MS4 to the maximum extent practicable and protect water quality. A MS4 is considered to be in compliance when it satisfactorily implements its program.

When the University does submit a NOI, the University must evaluate the SWMP annually and submit an annual report on the effective date of the permit. The University must keep all records/supporting documents for five years. All documentation must be made available to the public during normal business hours. Future permit requirements are expected to be more significant in the level of effort required by the MS4. EPA anticipates the new permit to include:

- Enhanced illicit detection discharge and elimination (IDDE): identify, isolate, and remove wastes from separate stormwater system
- Water quality monitoring of stormwater discharges
- Encouraging the use of low impact development and green infrastructure techniques
- Requirements designed to implement approved total maximum daily load (TMDL) waste load allocations (WLAs)

Given that the draft TMDL recommends a basin-wide mandatory program for implementing stormwater BMPs and eliminating illicit sources, it is prudent for the University to take a proactive approach in the detection and elimination of illicit discharges.

FIGURES



North Campus

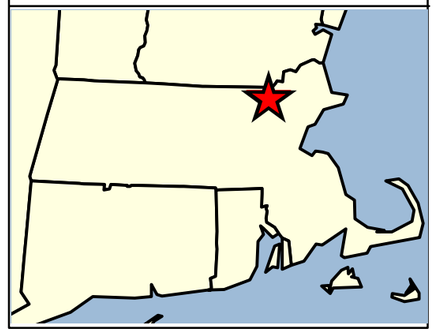
University of Massachusetts
at Lowell

Lowell, MA

Legend

- Outfall
- Salt Pile
- Approximate Campus Area Boundary

Location of Site



Notes and Sources

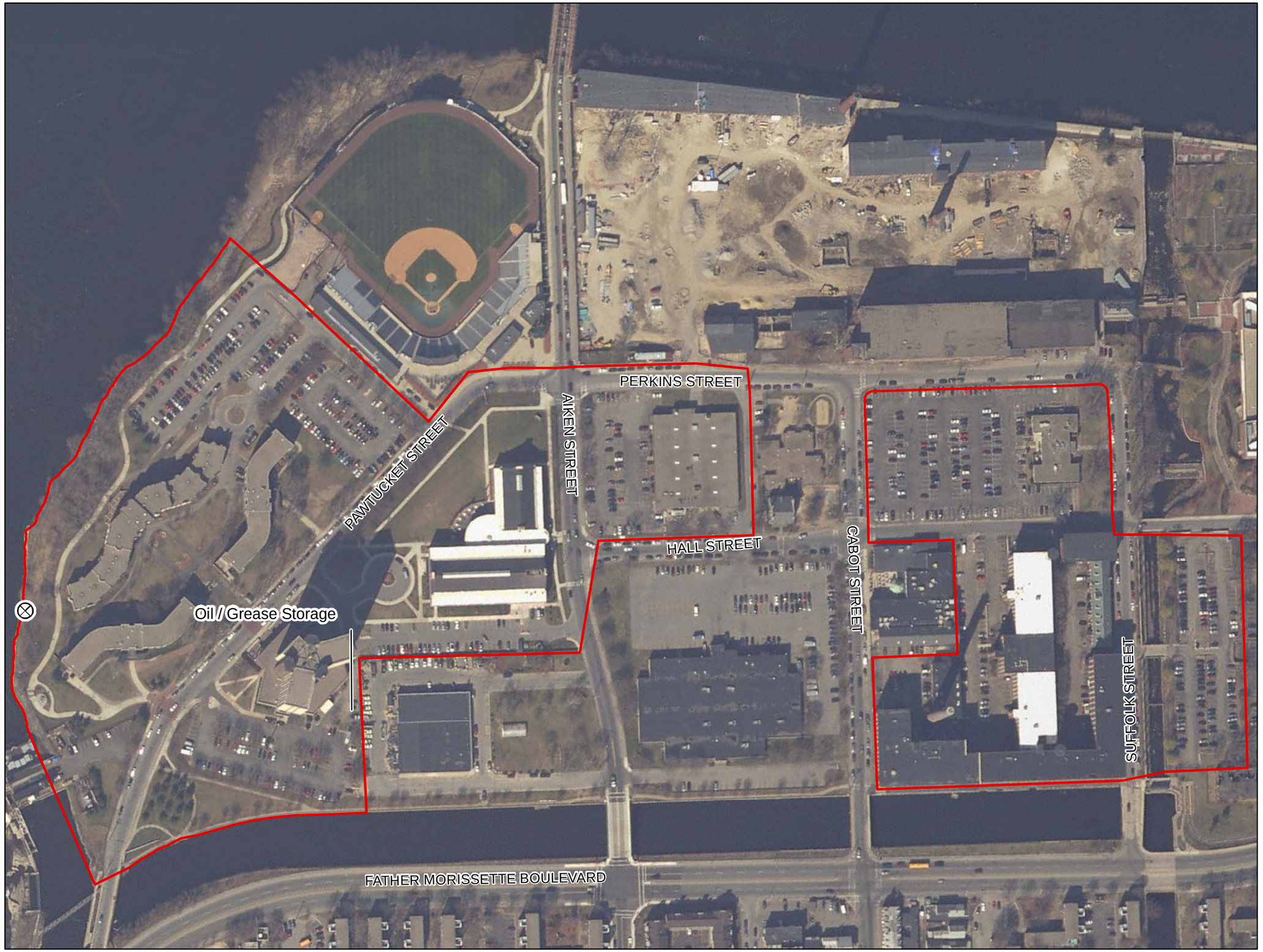
FIGURE 1

Aerial Photo: MassGIS 2005.

0 90 180 Feet

AMEC Earth & Environmental, Inc.
2 Robbins Road
Westford, MA 01886
(978) 692-9090

H:\UMASS\Lowell_MA\Task1\MXD\NorthCampus.mxd H:\UMASS\Lowell_MA\Task1\Export\NorthCampus.pdf February 10, 2009 DWN: KMP CHKD: DJK



East Campus

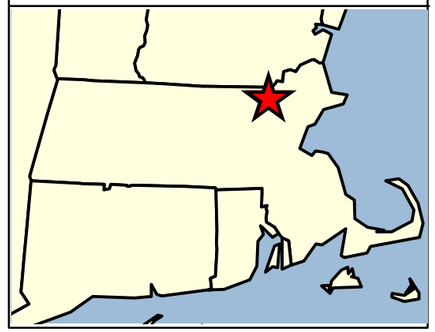
University of Massachusetts at Lowell

Lowell, MA

Legend

- Outfall
- Approximate Campus Area Boundary

Location of Site



Notes and Sources

FIGURE 2

Aerial Photo: MassGIS 2005.

0 90 180 Feet

AMEC Earth & Environmental, Inc.
2 Robbins Road
Westford, MA 01886
(978) 692-9090

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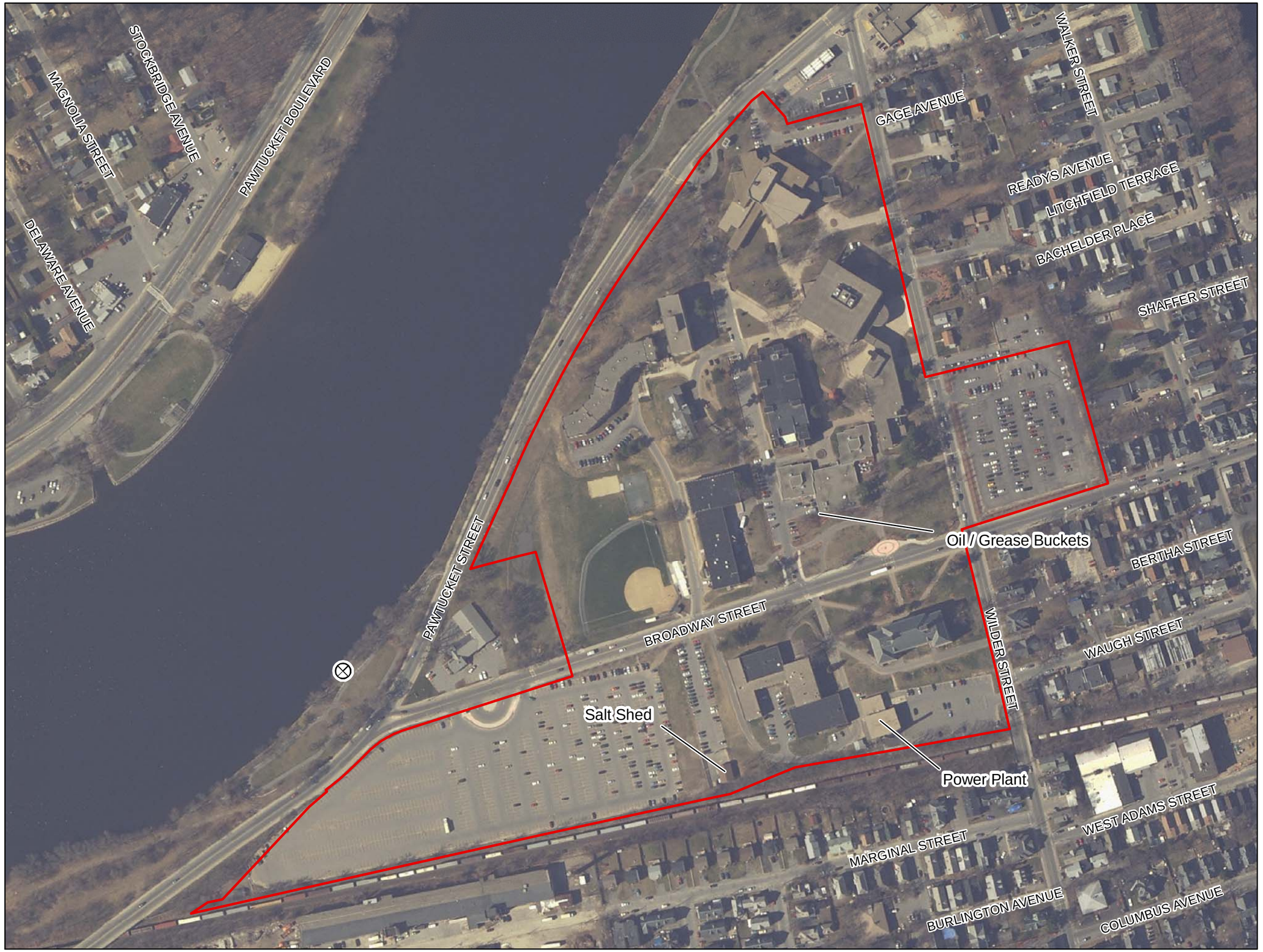


South Campus

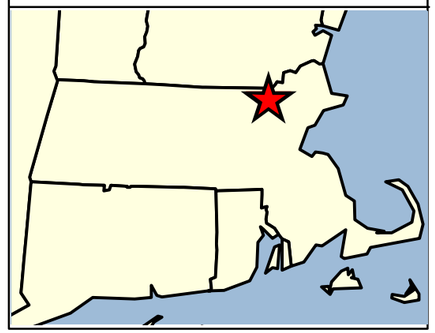
University of Massachusetts
at Lowell

Lowell, MA

Legend

- Outfall
- Approximate Campus Area Boundary

Location of Site



Notes and Sources

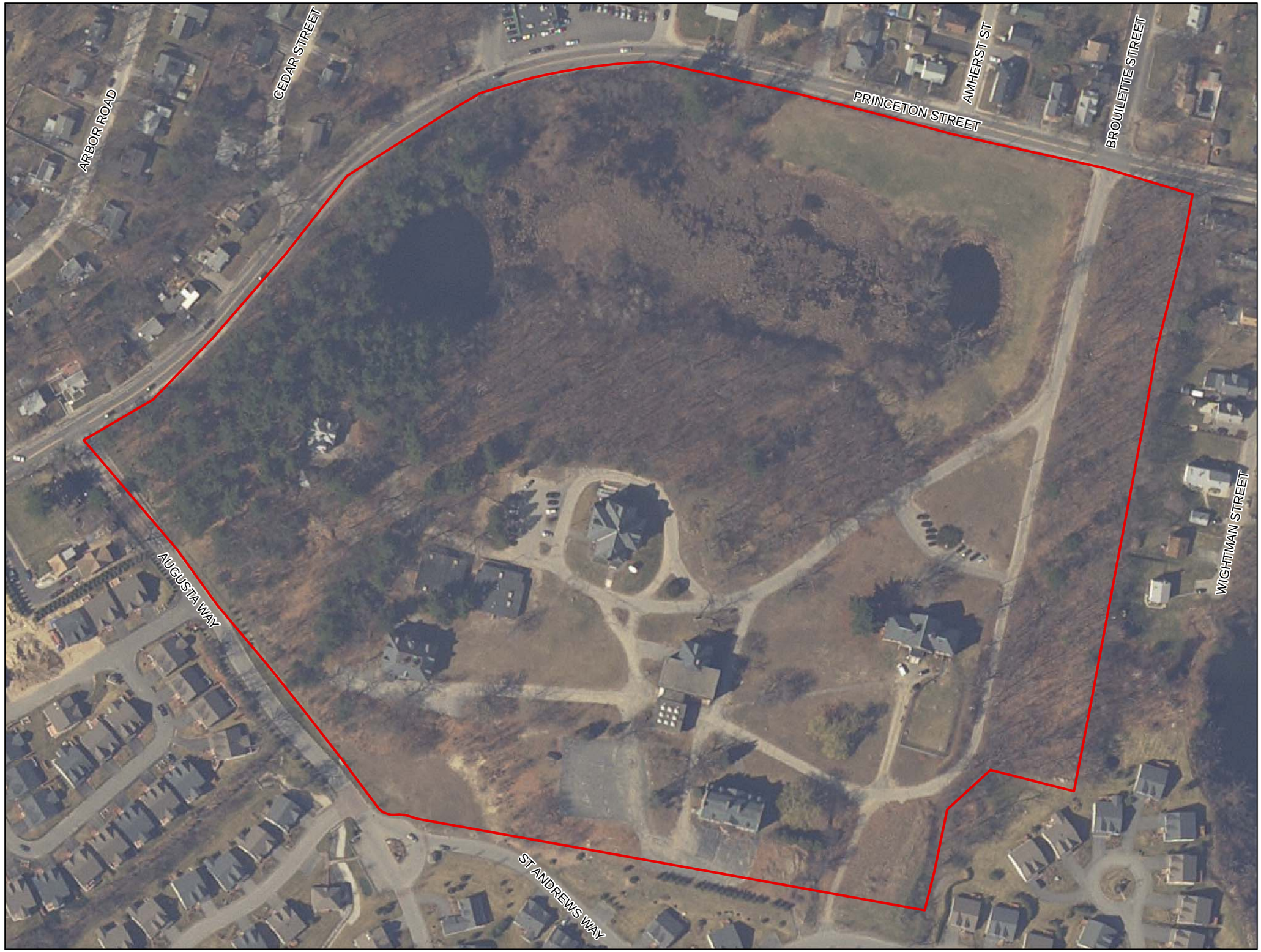
FIGURE 3

Aerial Photo: MassGIS 2005.

0 110 220 Feet

AMEC Earth & Environmental, Inc.
2 Robbins Road
Westford, MA 01886
(978) 692-9090

H:\UMASS\Lowell_MA\Task1\MXD\SouthCampus.mxd H:\UMASS\Lowell_MA\Task1\Export\SouthCampus.pdf January 22, 2009 DWN: KMP DJK CHKD: KMP



West Campus

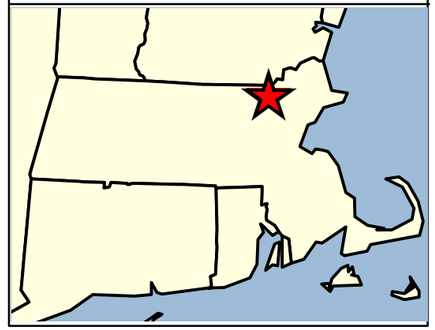
University of Massachusetts
at Lowell

Lowell, MA

Legend

Approximate Campus Area Boundary

Location of Site



Notes and Sources

FIGURE 4

Aerial Photo: MassGIS 2005,

0 70 140 Feet

AMEC Earth & Environmental, Inc.
2 Robbins Road
Westford, MA 01886
(978) 692-9090

Priority Habitat and Estimated Habitat Natural Heritage and Endangered Species Program

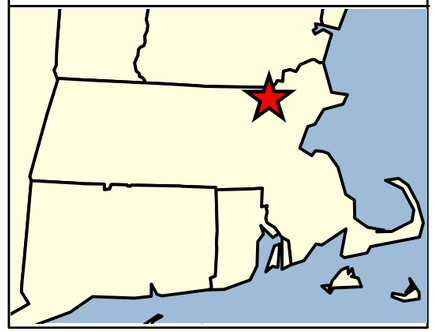
University of Massachusetts
at Lowell

Lowell, MA

Legend

- Approximate Campus Area Boundary
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Priority Habitats of Rare Species
- Surface Water Outline
- Highway

Location of Site



Notes and Sources

FIGURE 5

Aerial Photo: MassGIS 2005.
Habitat Data: MassGIS 2008.
Surface Water Data: MassGIS

0 500 1,000 Feet

AMEC Earth & Environmental, Inc.
2 Robbins Road
Westford, MA 01886
(978) 692-9090

H:\UMASS\Lowell_MA\Task1\MXD\Habitat.mxd H:\UMASS\Lowell_MA\Task1\Export\Habitat.pdf January 22, 2009 DWN: DJK CHKD: KMP

TABLES

Table 1 - Properties listed in "National Register of Historic Places"

RESOURCE NAME	ADDRESS	CITY	LISTED
Allen House	57 Rolfe St.	Lowell	8/11/1982
Andover Street Historic District	245--834 Andover St., 569, 579 E. Merrimack St.	Lowell	6/2/2000
Belvidere Hill Historic District	Fairview, Talbot and Summit Sts. and parts of Nesmith, Mansur and Fairmount Sts. and Belmont Ave.	Lowell	5/26/1995
Bowers, Jerathmell, House	150 Wood St.	Lowell	1/28/1994
Bowers, Jonathan, House	58 Wannalancit St.	Lowell	6/18/1976
Brown--Maynard House	84 Tenth St.	Lowell	7/2/1986
Butler School	812 Gorham St.	Lowell	2/2/1995
Chelmsford Glass Works' Long House	139-141 Baldwin St.	Lowell	1/25/1973
City Hall Historic District	Roughly area between Broadway and French Sts., Colburn St. and both sides of Kirk St.	Lowell	4/21/1975
City Hall Historic District (Boundary Increase)	165 Market St.	Lowell	10/13/1988
Colburn School	136 Lawrence St.	Lowell	5/19/1995
Flagg--Coburn House	722 E. Merrimack St.	Lowell	5/15/1986
Fox, Warren, Building	190--196 Middlesex St.	Lowell	10/12/1989
Holy Trinity Greek Orthodox Church	Lewis St.	Lowell	4/13/1977
Howe Building	208 Middlesex St.	Lowell	10/12/1989
Hoyt-Shedd Estate	386-396 Andover St., 569-579 E. Merrimack St.	Lowell	5/17/1984
Lowell Cemetery	984 Lawrence St.	Lowell	5/20/1998
Lowell Historic Preservation District	Lowell area around Merrimack River	Lowell	1/19/2001
Lowell Locks and Canals Historic District	Between Middlesex St. and the Merrimack River	Lowell	8/13/1976
Lowell National Historical Park	Merrimack St.	Lowell	6/5/1978
Lowell Post Office	89 Appleton St.	Lowell	10/4/2002
Merrimack--Middle Streets Historic District (Boundary Increase)	Merrimack, Middle, Prescott, Central and Market Sts.	Lowell	7/15/1988
Middlesex Canal	Running SE between towns of Lowell and Woburn	Lowell	8/21/1972
Monarch Diner	246 Appleton St.	Lowell	11/28/2003
Musketaquid Mills	131 Davidson St.	Lowell	12/9/1999
Pawtucket Congregational Church	15 Mammoth Rd.	Lowell	3/21/2007
Rogers Fort Hill Park Historic District	Roughly bounded by High St., Mansur St., Concord R., and Lowell Cemetery	Lowell	5/27/1999
South Common Historic District	Roughly bounded by Summer, Gorham, Horndike, and Highland Sts.	Lowell	8/10/1982
St. Joseph's Convent and School	517 Moody St.	Lowell	7/19/2002
St. Patrick's Church	284 Suffolk St.	Lowell	1/3/1985
Tyler Park Historic District	Roughly bounded by Princeton, Foster, and Pine Sts.	Lowell	8/17/1989
US Post Office	50 Kearny Sq.	Lowell	3/10/1986
Varnum Building	401--405 Bridge St.	Lowell	12/19/1988
Varnum School	103 Sixth St.	Lowell	1/24/1995
Wamesit Canal-Whipple Mill Industrial Complex	576 Lawrence St.	Lowell	8/11/1982
Wannalancit Street Historic District	14-71 Wannalancit St., and 390, 406 Pawtucket St.	Lowell	5/20/1998
Washington Square Historic District	Roughly bounded by Merrimack, Park, Andover, Oak, Harrison, and Willow Sts.	Lowell	8/11/1982
Washington Square Historic District (Boundary Increase)	140--160 Andover St.	Lowell	11/12/1999
Wilder Street Historic District	284--360 Wilder St.	Lowell	5/26/1995
Worcester House	658 Andover St.	Lowell	12/22/1983

APPENDIX A

Facility Audit Checklist

Questions			
		YES	**NO**
1.	Does the facility have a septic system? If YES, has the system received a septic system inspection within the past five years?	☐	☒
	Does the facility have any records regarding system pumping and inspection?	☐	☐
2.	Does the facility have any permits for the discharge of wastewater and related pollutants to groundwater or surface water?	☐	☒
3.	Does the facility operate an underground injection well?	☐	☒
4.	Does the facility have floor drains? If YES, identify what the drain(s) are connected to: *Municipal sewer system* If not connected to tight tank or municipal sewer system, identify outfall or receiving water:	☒	☐
5.	Does the facility perform any water sampling/monitoring activities?	☐	☒
6.	Does the facility conduct any motor vehicle washing/maintenance activities? If YES, are there service & washdown procedures established? *The University uses Dazzle Car Wash water base alkaline detergent. However, washing activities occur rarely.* If YES, identify the locations for vehicle service & washdown? *No specific location used for washing activities.*	☒ ☐	☐ ☒

		YES	NO
7.	Are there any catch basins on or bordering the property? If YES, how frequently are they cleaned? *CBs are cleaned on as needed basis, on average annually.*	☒	☐
8.	Does the facility have covered stockpiling and storage areas for all street sweepings, salt, catch basin cleanings, etc.? *North Campus – salt pile adjacent to the Power Plant (located under the overpass)* *South Campus – proper salt shed*	☒	☐
9.	Are there any drums, barrels, tanks or similar containers or platforms (e.g., pallets) located outside or near storm drains? *Oil and grease drums outside of Fox Hall* Are any open, deteriorated, or leaking? Are there suitable containment measures in place?	☒ ☐ ☐	☐ ☒ ☒
10.	Are there trash/refuse containers on-site? Are they covered? *Most containers have covers; however, they are not closed frequently.* Are there drain holes where liquid may leak out?	☒ ☐ ☒	☐ ☒ ☐
11.	Is snow disposed on-site? If YES, are there measures to control pollutants (salt, sand) from entering the storm drain system? *Snow is generally piled on open grass areas. If too much snow has piled up it may be disposed of off-site.*	☒ ☒	☐ ☐
12.	Are stormwater conveyance channels and outlets stabilized? *North Campus only – other outlets have not been located.*	☒	☐
13.	Are there any areas of soil disturbance on the site? If YES, what stabilization measures have been or will be taken? *North Campus – adjacent to the Engineering Building; disturbed slope. Retaining wall will be installed and slope regraded. Riprap will be used instead of seed.*	☒	☐

		YES	NO
14.	Does the facility use fertilizer in landscaping activities? If YES, what type of fertilizer, and are there procedures in place?	☒	☐
15.	Does the facility have non-stormwater discharges (i.e. Air conditioner condensate, industrial activities)? *Air conditioner condensate*	☒	☐
16.	Is there an employee training program covering spill prevention and response, good housekeeping, and material management practices? *40 Hr HAZMAT Program; Stromceptor manufacturer training – how to clean O/W separators* Is there a Pollution Prevention Team established? *Spill Response Team – part of the ICP (consists of 6 people)*	☒ ☒	☐ ☐

NOTES:

Prepared By: Petr Masopust Date: March 5, 2009

APPENDIX B

Agency Correspondence

[Date]

U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Re: Federally Listed Threatened and Endangered Species Review
Small Municipal Separate Storm Sewer System General Permit
University of Massachusetts Lowell

Dear Sir or Madam:

University of Massachusetts Lowell (UML) is conducting a review of potential environmental impacts resulting from the operation of a small municipal separate storm sewer system (MS4), required by the National Pollutant Discharge Elimination System Small MS4 General Permit. According to the general permit, two species of concern, the short nosed sturgeon and the dwarf wedge mussel, are found in the Merrimack River. Therefore, any operators discharging to the Merrimack River are required to consult with the U.S. Fish and Wildlife Service (USFWS).

UML currently operates a small MS4 at four of its campuses located in Lowell, MA. Portions of the drainage system discharge directly to the Merrimack River. UML has identified the following outfalls discharging directly to the Merrimack River: three at the North Campus, one at the East Campus, and one at the South Campus (Figures 1-3). The remaining outfalls discharge to the City of Lowell's municipal storm drain or combined sewer.

UML implements numerous Best Management Practices (BMPs) as described in the Stormwater Management Plan limiting pollutants from entering the storm drain system and therefore, UML does not anticipate that the discharges would adversely affect the protected species or their habitat. Please confirm that further consultation with the USFWS is not necessary.

If you have any questions or require any additional information, please do not hesitate to contact me at [phone number and email]. Thank you for your assistance.

Sincerely,

[Name and title]