Hart Brook Watershed
ACTION PLAN

BACKGROUND

The City of Lewiston is Maine's second largest city and is located 30 minutes north of Portland and twenty minutes south of Augusta. The city is an urban mix of residential, retail, commercial, office, and agricultural land uses and currently has one of the most robust economic growth rates in the state. The Androscoggin River flows through Lewiston on its way to the Merrymeeting Bay, the Kennebec River confluence, and the Atlantic Ocean. The Androscoggin is an increasingly important component of downtown Lewiston revitalization.

Hart Brook is a small stream in an important developing area in the suburban growth area just east of the City's downtown area. The watershed contains some of the first suburban industrial development in the region and is home to important businesses such as Elmet Technologies, the Geiger Brothers, Allen-Edmonds and Whiterock Distilleries among others and is exhibiting increased development around the Maine Turnpike Exit 80 interchange. Active retail and commercial activity is located along Route 196-Lisbon Street which bisects the Hart Brook Watershed. Hart Brook drains to the Androscoggin River.

The 2100 acre Hart Brook Watershed has over 22% impervious surfaces (rooftops, parking areas, driveways and roadways) and has been identified by the MaineDEP as impaired due to stormwater runoff. Impaired waterbodies are under increased scrutiny by state and federal regulators and current state regulations require new development within an impaired watershed to implement additional stormwater management requirements. Ultimately, all public and private infrastructure within these watersheds may be regulated under federal Clean Water Act permit requirements.

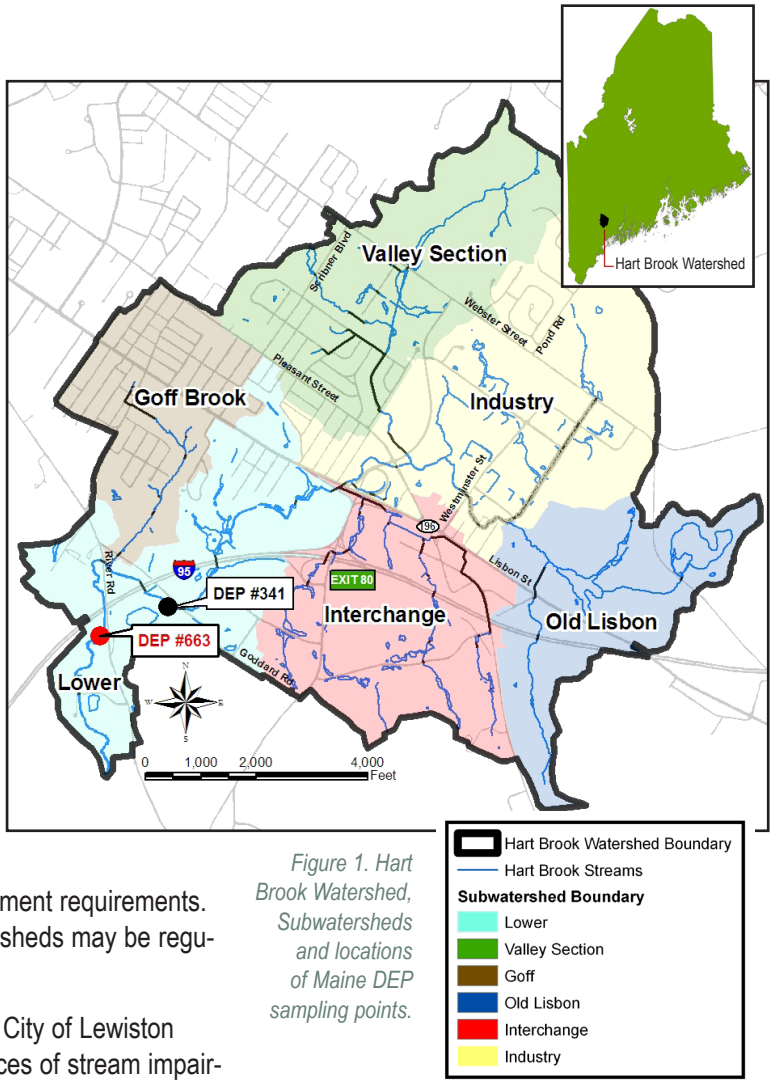


Figure 1. Hart Brook Watershed, Subwatersheds and locations of Maine DEP sampling points.

In order to proactively address polluted stormwater, in 2007, the City of Lewiston voluntarily began a watershed assessment to identify likely sources of stream impairment and viable opportunities for improvement. The watershed was divided into six subwatersheds comprised of similar land use. Each subwatershed was evaluated to determine potential stormwater pollutant loads and to identify specific structural and non-structural management strategies. These subwatersheds provide a more refined management framework for the implementation of the plan. The study subwatersheds are shown in Figure 1.

The watershed assessment results provided the basis for the Hart Brook Watershed Action Plan. The Action Plan is a plan proposed by the City that will help reduce stormwater pollutant loading to the stream, decrease stream temperature impacts and provide specific outreach to the landowners and users of the watershed. The goal of the plan is to restore the water quality of Hart Brook.

The Hart Brook Watershed Action Plan was developed cooperatively through a stakeholder-based planning effort and the specifics are listed herein, in order from the highest priority.

HART BOOK WATERSHED MANAGEMENT BASIS FOR ACTION PLAN

ACTION PLAN PRIORITIES

Develop a Watershed Working Group

In order to implement the Hart Brook Watershed Action Plan, there is a need for an established Watershed Working Group. The working group will provide assistance on the development of grant applications, provide program oversight, identify financial incentives for improved stormwater management and support other critical efforts in the successful implementation of the plan.

The watershed working group will be comprised of City staff representing: engineering, public works, city arborist, planning, code and economic development, key watershed stakeholders and members of civic organizations relevant to the tasks outlined in the Hart Brook Watershed Action Plan. The Watershed Working Group will meet on a scheduled basis to review and implement action plan priorities and will be facilitated through the Lewiston Public Services – Engineering Division.

Subwatershed Focus	All
Potential Funding Source	City NPDES MS4 Program Budget
Cost Estimate (Annual)	$2000
Funding Rationale	Staffing and printing.
Schedule:	First meeting Summer/Fall 2008 to review final plan.

Action items are listed in priority of action but, due to the complexity of watershed restoration, may be implemented in any order based on funding opportunities. The implementation of this plan will require the involvement of private citizens and landowners, city, and state agencies.

Summer Student Stormwater Program

The City of Lewiston currently employs interns each summer to assist in the implementation of various public works activities. The Hart Brook Watershed Action Plan, NPDES MS4 permit compliance and other stormwater-related activities will require an increasing level of effort from City staff for implementation.

Summer interns could provide valuable support for the implementation of the Hart Brook Watershed Action Plan. Specifically, interns could implement storm-drain stenciling, yardscaping outreach, shade tree planting, and stormwater BMP inspections among others. The Watershed Working Group will explore opportunities for partnerships with the University of Southern Maine-Lewiston/Auburn and Central Maine Community College as a source of summer interns and possible cost-sharing initiatives.

Subwatershed Focus	All
Potential Funding Source	City NPDES MS4 Program Budget and/or grants including the Davis Conservation Foundation and John Sage Foundation, among others.
Cost Estimate:	$115,055 over 5 years $31,011 in Year 1 and $21,011 each subsequent year
Funding Rationale	Staff administration and oversight, intern salary, initial grant writing effort, trainings and grant reporting.
Schedule:	Program development Fall 2008. First interns 2009

Summer interns can help implement the Action Plan.

Private Commercial Facility Owner Outreach Program

Commercial and industrial landowners are an important component of the local economy and future development and redevelopment by these landowners should not be jeopardized by unbalanced regulatory standards or increasingly more stringent stormwater requirements.

The Hart Brook Watershed assessment identified large impervious commercial and industrial facilities as likely sources of stormwater pollutants. Parking areas and rooftops occupy approximately 12% of the watershed land area and a large percentage of this is in commercial or industrial ownership. There are approximately 825 properties within the industrial and commercially-zoned portions of the watershed.

The Lewiston Industrial Park off of Westminster Street.

In order to continue to develop and redevelop within this watershed it will be critical for the Watershed Working Group to provide information on the best management of stormwater runoff from private facilities and to identify grant opportunities and incentives for the structural retrofitting of infrastructure for water quality improvements.

The outreach to commercial and industrial landowners in the watershed will be led by the Watershed Working Group and include the following activities.

A) Compile mailing lists for commercial and industrial landowners within the watershed. Obtain contact information for facility managers.
B) Identify local contractors that provide “stormwater-friendly” landscape and pavement management services and those that specialize in retrofitting stormwater management systems.
C) Work with Lewiston-Auburn Economic Growth Council to develop an initial mailing providing specific information on the Hart Brook Watershed and the economic importance of actions to reduce pollutant loads and thermal pollution of the brook. The initial mailing will provide specific information on non-structural facility management such as; vacuum pavement sweeping, alternative deicers, low or no fertilizer and toxics landscape management, appropriate pavement sealants, and snow removal and storage strategies and a list of local contractors providing these services.
D) Initiate site walks on properties identified with structural retrofit potential to discuss opportunities for including stormwater management retrofits through capital improvements. Opportunities for financial incentives and grant writing support will be outlined for landowners.
E) Work with interested landowners to develop financing and technical strategies for implementation of non-structural and structural stormwater best management practices.
F) Maintain contact with facility owners through regular email updates concerning trainings/workshops, grant opportunities and “stormwater friendly” landscape and pavement management contractors.

Subwatershed Focus	All
Potential Funding Source	City NPDES MS4 Program Budget and grant funding. The possibility of incentives through the Stormwater Utility Fee Credit System will also be explored.
Cost Estimate	$13,900
Funding Rationale	Staff administration for development and production of mailings, postage, mailing costs, site walks (assume 16 properties), consultant fee for technical support, development of specific financing strategies for interested landowners and periodic email updates.
Schedule	Initial mailing Winter 2008. Site visits scheduled for 2009.

Yardscaping Outreach and Education

Residential, commercial and industrial landowners manage over 428 acres of lawn within the Hart Brook Watershed (22% of the watershed area). The potential for fertilizer, pesticide and herbicide migration from these managed surfaces into Hart Brook is high, particularly in the Valley Section, Industry and Goff Brook subwatersheds, where lawn makes up a significant portion of the subwatershed areas. The Maine Bureau of Pesticide Control distribution and use reports show a sharp rise in the use of pesticides in Maine from 800,000 pounds in 1995 to 3,000,000 pounds in 2004. Most of this material was a combination of fertilizers and pesticides (weed & feed products) applied to residential and commercial lawns.

Large setback lawn areas along Webster Boulevard should be managed to minimize fertilizer export.

In an effort to reduce the potential for nutrient and toxics to flow into Hart Brook it will be important to reduce or eliminate the use of fertilizers, pesticides, and herbicides on watershed lawns, reduce the potential for erosion from these surfaces, improve soil condition within lawn areas to maximize rainfall infiltration and evapotranspiration and create opportunities for shallow storage and evaporation of small rainfall events in constructed raingardens within lawn areas. Yardscaping programs are being successfully implemented at a state-level through the Maine Board of Pesticide Control and locally through the University of Maine Extension and the Androscoggin Valley Soil and Water Conservation District (AVSWCD).

The Yardscaping Outreach and Education effort will be led by the Watershed Working Group and consist of the following activities.

A) Initiate a subwatershed-based evaluation of lawn surfaces to identify potential target areas for outreach. The evaluation will follow guidance from the Center for Watershed Protection's Unified Subwatershed and Site Reconnaissance manual (www.cwp.org).
B) Identify local contractors that provide landscape management services. Identify local hardware, garden/landscape supply, and commercial outlets that sell fertilizer, herbicides and pesticides. Obtain contact information of relevant owners and managers.

C) Work with contractors and commercial supply stores to provide "stormwater-friendly" services and supplies.
D) Initiate neighborhood workshops on yardscaping practices.
E) Implement yardscaping and raingarden demonstration projects on residential and commercial properties within priority target areas within the watershed.
F) Maintain contact with landscape contractors and commercial suppliers through regular updates concerning trainings/workshops, grant opportunities and "stormwater friendly" landscape research.

Subwatershed Focus	All
Potential Funding Source	NPDES MS4 Program Budget and Maine DEP 319 Grant Funding
Cost Estimate	$119,775 over 5 years
Funding Rationale	Administration oversight and cooperation with AVSWCD for implementation of yardscaping outreach and education program (based on successful program in Cumberland County) and program material development including brochures, website, lawn flags, mailings and yardscaping kits.
Schedule	Initial subwatershed evaluation in summer 2008.

City of Lewiston Efforts

The following action items include a variety of structural and non-structural activities to be initiated by the City of Lewiston as funding is made available or obtained through grants.

Sanitary Sewer Assessment

Existence of cracks in the sanitary sewer lines were documented by Edwards and Kelcey, consultants to the City, in 2006 and verified during stream surveys conducted by Field Geology Services in 2007. It is not clear if these cracks contribute to sanitary sewage leaks, but the Hart Brook Watershed contains over 56,000 linear feet of sanitary sewer that is over 25 years old. As sanitary infrastructure ages, the likelihood of pipe failures, open joints and leaks increase and the potential exists for migration of sanitary sewage to the stream. Over 19,000 linear feet of sanitary sewer is within 75' of the mainstem of Hart Brook. Additionally, numerous stream crossings by sanitary sewer may increase the likelihood of sewer leaks due to stream erosion and undermining of concrete abutments and sewer supports. Large daily fluctuations of dissolved oxygen within Hart Brook indicate that there is a concentrated source of nutrients, which among other things, may be indicative of sanitary sewage contamination, in the watershed above the MaineDEP sampling locations.

Sanitary sewer lines run along much of the Hart Book.

The specific action under this item is a Tier 1 evaluation of sanitary sewer pipe within the Hart Brook Watershed. A Tier 1 evaluation would include a preflushing and televising of the sanitary sewer pipe to determine location, size and severity of existing cracks and leaks. The primary focus of the evaluation should be the 11,745' of 18" to 24" sewers and 6243' of 24"+ diameter

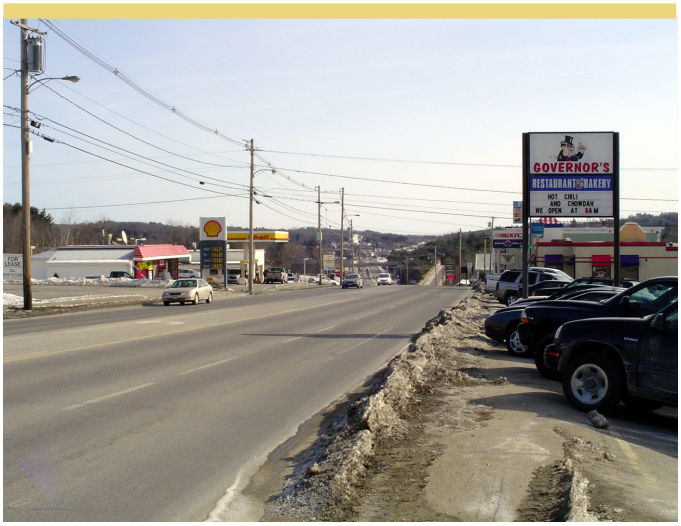
primary interceptor. This would include much of the "streamside" sanitary sewer line.

Subwatershed Focus	All
Potential Funding Source	City Capital Improvements Plan (CIP) Budget.
Cost Estimate	$78,195 for Tier 1 Evaluation.
Funding Rationale	Estimates based on conversations with local sewer line inspection contractor regarding cost per linear foot for various pipe sizes (2007).
Schedule	2010, dependent on approval of CIP.

Roadway Pavement Management

The Hart Brook Watershed contains over 36 miles of roadway. This includes 21 miles of city-owned roadway and 15 miles of state or state-aid roadways of which 5 miles is operated and maintained by the Maine Turnpike Authority. Roadway impervious surfaces cover 7% of the watershed area. Roadways have been shown to generate some of the highest stormwater generated pollutant loads in national research but opportunities for installing structural stormwater management practices are often limited due to narrow right of way, adjacent sidewalks and other utility constraints.

In an effort to reduce the potential for pollutant loading from roadways, enhanced management is necessary and should include targeted pavement sweeping and catchbasin cleaning. Pavement sweeping is considered to be 10 times less expensive than catchbasin cleaning and is therefore a value added activity. Pavement sweeping for stormwater pollutant reductions must be accomplished by using the best available vacuum or regenerative air technologies. The conventional method utilizing mechanical broom sweepers can provide removal of heavy particles, operate in wet conditions and reduce catch basin cleaning but do very little for stormwater pollutant loads which are primarily attached to fine particles. Research in the upper mid-west portions of the United States, has documented that with the appropriate street sweeping equipment, total suspended sediment (TSS) can be reduced by approximately 20% in a watershed through a targeted pavement sweeping program from spring through fall.



Pavement maintenance will be an important part of the Action Plan.

Currently, the Hart Brook Watershed is swept primarily in the spring. A targeted street sweeping program, utilizing the City's new vacuum sweeper, could be developed in the Hart Brook Watershed for stormwater pollutant reductions. A targeted sweeping program should include the following:

A) Sweeping of winter sand as soon as possible in the spring after snowmelt. Hart Brook Watershed roads would be a primary focus area. Sweeping for winter sand should include a single pass with a mechanical broom for heavy particles and a second pass with a vacuum sweeper.
B) Early summer sweeping of all area roadways after spring tree seed and flower drops.
C) Late summer sweeping after extended dry periods on targeted roadways that are directly connected impervious areas and carry large volumes of traffic,

including but not limited to Route 196, Industrial Park roadways and Pleasant Street.

D) Fall sweeping after leaf drop.

Pavement best management practices should also continue to include catch basin cleaning which is currently an annual activity by the City of Lewiston.

Subwatershed Focus	All
Potential Funding Source	Stormwater Utility Fee
Cost Estimate	$20,000 Annually
Funding Rationale	Additional spring, summer and fall sweeping would require additional staffing and equipment use by Highway Department. Estimate is based on miles of highway within watershed and sweeper use miles of roadway per day (6-8 miles per day). Cost estimate is based on city staff and annual maintenance on vacuum sweeper.
Schedule	Ongoing

Town Roadway Erosion Reduction

Numerous roadways within the Hart Brook Watershed were noted during field evaluation as having excessive shoulder erosion. In order to reduce sediment transport to the stream and to improve area aesthetics, the City will actively pursue opportunities to address shoulder erosion through maintenance. Specific areas of concern were noted along Goddard Road, Webster Blvd. at the Hart Brook crossing (Valley Section) and along the roadways within the Industrial Park.

Road shoulder and ditch stabilization should follow guidance from the MaineDOT Best Management Practices manual and would include grading, turnouts, crushed stone stabilization and/or shoulder paving if necessary. Potential integration with identified road-edge stormwater retrofits may be possible in many locations and would be preferred if new pavement and curbing are implemented as a part of shoulder improvements.

Subwatershed Focus	All
Potential Funding Source	City Highway Department maintenance budget and MaineDOT Surface Water Quality Protection Program.
Cost Estimate	Undetermined
Schedule	TBD

Shade Tree Planting

Upper Hart Brook, within the Industry subwatershed, flows through a concrete-lined canal for over 3/4 mile before returning to a “natural” floodplain. The concrete channel contributes to temperature increases, as documented in the Hart Brook Watershed assessment, and likely reductions in Dissolved Oxygen that may contribute to overall stream impairment.

In an effort to maintain temperatures of stream water through the concrete-lined portion of the stream, planting of shade trees along the channel is being investigated. A

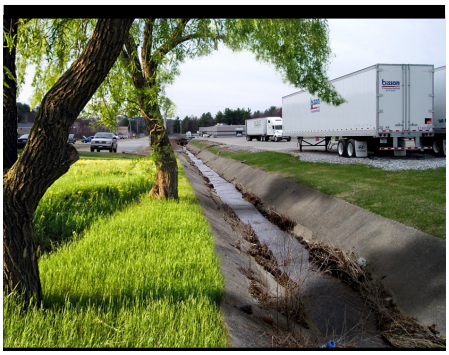


Photo simulation of tree planting along concrete channel.

shade tree planting program will need thorough planning so that it can be executed without compromising the integrity of the concrete channel. Fast growing trees such as poplar or birch will be considered for the planting plan. The planting plan should be provided for review to landowners and adjacent property owners. Lewiston is a Tree City with established tree planting policies and it is assumed that the City arborist would oversee this action item. A landscape plan and shade tree planting also has the added benefit of improving aesthetics in the Industrial Park.

Subwatershed Focus	Industry
Potential Funding Source	Compensation Fee Utilization Plan or Project Canopy Grant program.
Cost Estimate:	$60,000
Funding Rationale:	Development of landscape planting plan, public meetings, purchase of trees, planting along concrete channel and first year maintenance.
Schedule:	2008-2009

Industrial Park Roadway Enhancement

Forrestall Street, Saratoga Street, Westminster Street, and Lexington Street offer access to the industrial/commercial facilities of the Lewiston Industrial Park. The paved travelway is 36' wide and has no curbing. These roads and their storm sewer/drainage infrastructure are directly connected to Hart Brook. Lack of curbing and heavy truck traffic contributes to erosion on the shoulders which drain to the storm sewer. Failing shoulders in some locations appear to be chronic maintenance problems. During warm months the streets become walking areas for Industrial Park employees and seasonal food vendors set up stands in various locations throughout the park.

Lewiston's Adopt-A-Spot could be integrated with stormwater BMPs for Industrial Park roadway enhancement.

In order to reduce shoulder erosion and promote aesthetic improvements for Industrial Park employees this action proposes a stormwater improvement and roadway enhancement project as a demonstration along select portions of these roadways. Shoulder stabilization could be accomplished through "mountable" curbing with periodic curb breaks to route gutter stormwater flow to road right-of-way raingardens and/or stormwater filters prior to reaching a catch basin inlet. In some areas, roadside tree planting and sidewalks may be appropriate. This action item could be integrated with the Shade Tree Planting Action Item as an overall enhancement of the aesthetics for Saratoga St. Partners for this project could include local garden clubs, Lewiston-Auburn Economic Growth Council, Lewiston Adopt-a-Spot organizations, and local businesses for road edge raingarden maintenance. The link to "lunch-hour" wellness and fitness programs may broaden grant funding opportunities.

Subwatershed Focus	Industry
Potential Funding Source	City Capital Improvement Plan (for infrastructure upgrades), MaineDOT Transportation Enhancement Program, MaineDOT Surface Water Quality Protection Program and other grants.
Cost Estimate:	$60,448 (this cost only includes design and construction of specific demonstration raingarden locations) plus all costs for curbing, esplanade and sidewalks dependent on the location and scale of the project.

Funding Rationale:	Engineer's estimate for 8 stormwater retrofits managing 0.86 acres of developed area and 0.68 acres of impervious area.
Schedule:	2010 - Dependent on approval of CIP or grant availability.

Stormwater BMP Inspection and Maintenance Ordinance

The maintenance of stormwater structural systems constructed as a part of redevelopment or new development projects is critical to long-term functionality. Final inspections after installation and annual inspection over the life of the system is a current requirement of municipal permitting in many states.

In order to ensure the long-term operation of stormwater structural management systems, the City of Lewiston intends to adopt an inspection and maintenance ordinance for installed stormwater structural systems. The Maine Municipal Association has developed a draft ordinance that will be considered and modified for local use. As one option to improve the management of these ordinance requirements (including annual inspection submissions), the City of Lewiston will be considering the development of a web-based, Geographic Information System (GIS) enabled tracking and management system for stormwater BMPs. This system could be developed to provide automatic reminders to facility owners under formal maintenance agreements and would reduce staff burden. Proprietary software or custom applications could be acquired or developed for City use.

Subwatershed Focus	All
Potential Funding Source	City NPDES MS4 Permit Program and grants for development of automated tracking system.
Cost Estimate	$25,000 (Initial investment for development of automated tracking system)
Funding Rationale	Software testing, acquisition and implementation. Staff time for implementation and management of ordinance would vary depending on language in ordinance.
Schedule	2009

Watershed Monitoring Program

Currently there is limited water quality and quantity data for Hart Brook. The MaineDEP provides infrequent testing in single locations for compliance with state water classification requirements. In order to more fully understand the watershed, sources of pollutants and the benefits of particular actions, the City plans to establish a watershed monitoring program.

The watershed monitoring program should consist of periodic water quality sampling under base flow conditions (3 sampling events) and storm flow conditions (3 sampling events) in predetermined locations within the watershed (at least 4) on an annual basis. The sampling program should be developed in cooperation with the MaineDEP and include a Quality Assurance Project Plan (QAPP). Water quality sampling would include Total Suspended Solids, Nutrients, Metals, Bacteria, and Total Petroleum Hydrocarbons. Additionally, a watershed monitoring program could include the development of a staff gage at an easily accessible location within the water-

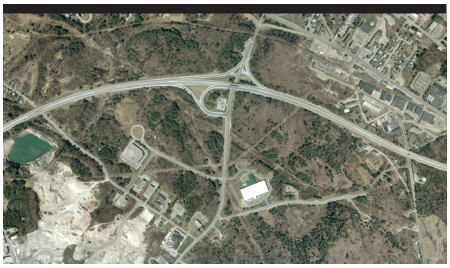
Intensive watershed monitoring will improve understanding of the watershed.

shed. The staff gage would allow for the establishment of a stage-discharge curve in order to monitor stream flow rate. An improved understanding of the stream's response to rainfall would allow for refined future modeling efforts. The Watershed Working Group may consider the development of a Stream Team Program that would provide volunteer labor for the monitoring and sampling of the watershed. Stream Team activities could include stream macroinvertebrate sampling in order to improve understanding of the watershed's aquatic community. The City of Lewiston will investigate options for working with the Lewiston Auburn Water Pollution Control Authority to use their laboratory facilities for water quality testing and reference other successful volunteer-based monitoring programs in Maine.

Subwatershed Focus	All
Potential Funding Source	City NPDES MS4 Permit Program Budget and grants.
Cost Estimate	$135,350 for annual testing over five years.
Funding Rationale	Sampling contractor personnel, equipment, and laboratory testing. Development of staff gage, stage discharge curve and Stream Team Program.
Schedule	2009

Exit 80 Access Master Planning

Maine Turnpike Exit 80, located within the Hart Brook Watershed is becoming a focal point for new development within the city. Currently zoned industrial and commercial areas within the underdeveloped portion to the south of Exit 80 are being promoted for new development.



Undeveloped land in vicinity of Exit 80.

This action item proposes to integrate stormwater master planning into the traffic movement and engineering evaluations when reviewing future roadway reconstruction and new access corridors within this developing area. A subcommittee of the Watershed Working Group comprised of economic development, planning and engineering staff along with key stakeholders (or other existing zoning committee) could be formed to identify improvements which would be incorporated into the future development of this area related to access, roadways and stormwater management. The Watershed Working Group or relevant subcommittee will cooperate with City staff and the Androscoggin Transportation Resource Center on this Action Item.

Subwatershed Focus	Interchange and Lower
Potential Funding Source	City NPDES MS4 Permit Program Budget and grants.
Cost Estimate	N/A – No additional cost to plan. Integrate stormwater management costs during access permitting.
Schedule	2009

Private Commercial Actions

The following action items include structural and non-structural activities to be initiated by the private commercial sector with City support as funding is made available or obtained through grants.

Demonstration Stormwater Disconnection Projects

Cooperation with private commercial facility owners will be critical to the successful improvement of the Hart Brook Watershed. The Industry subwatershed is espe-

cially challenged with extensive private development, a concrete-lined channel and direct discharges of stormwater from roadways and private facilities. While heavily developed, zoning set-back requirements within the industrial zone have allowed for significant areas of undeveloped lawn and landscaped areas on individual parcels. These undeveloped set-backs provide potential locations for demonstration stormwater retrofits without significant limitations on future build-out opportunities.

The structural retrofit assessment inventory identified thirteen properties within the Industry subwatershed as viable potential locations for stormwater structural retrofits, based on the prioritization process of structural opportunities. The City proposes to initiate a dialogue with facility owners of these parcels regarding the possibility of voluntary stormwater retrofitting on their facilities. Stormwater retrofits on these parcels would likely require pavement re-grading, disconnections of roof drains, and the installation of engineered stormwater management systems. The dialogue with facility owners would include a review of future parcel expansions and/or facility upgrades and investigation of the feasibility of retrofits that could be included as a part of these improvements. It is planned that discussions with private owners will be initiated through the Lewiston-Auburn Economic Growth Council and City economic development staff.

Subwatershed Focus	Industry
Potential Funding Source	Compensation Fee Utilization Plan and grant funding. Private funding with the possibility of incentives through the Stormwater Utility Fee Credit System will also be explored.
Cost Estimate	$458,550
Funding Rationale	Engineer's estimate managing 9.76 acres of developed area including 8.22 acres of directly connected impervious area.
Schedule	Begin discussions in 2010.

Demonstration Stormwater Disconnection Projects

Cooperation with private commercial facility owners will be critical to the successful improvement of the Hart Brook Watershed. The Interchange subwatershed is an older zone of development with an extensive area of directly connected impervious area including Commercial Street, Ferry Road and adjacent facilities. Small setbacks in this area limit opportunities for stormwater retrofit management but two locations within this developed area made the Top 65 retrofit list.

The City proposes to initiate a dialogue with facility owners of these parcels regarding the possibility of voluntary stormwater retrofitting on their facilities. Stormwater retrofits on these parcels would likely require pavement regrading, disconnections of roof drains, and the installation of engineered stormwater management systems. The dialogue with facility owners would include a review of future parcel expansions and/or facility upgrades and investigation of the feasibility of retrofits that could be included as a part of facility improvements. It is planned that these discussions with private owners will be initiated through the Lewiston-Auburn Economic Growth Council and City economic development staff.

Grant funding for private facility retrofits will create incentive for demonstration projects.

Subwatershed Focus	Interchange
Potential Funding Source	Compensation Fee Utilization Plan. Private funding with the possibility of incentives through the Stormwater Utility Fee Credit System will also be explored.
Cost Estimate	$32,409
Funding Rationale	Engineer's estimate managing 0.21 acres of developed area including 0.17 acres of directly connected impervious area.
Schedule	Begin discussions in 2010.

Riparian Enhancement Below Overhead Utility Lines

Streamside shading along Hart Brook will reduce stream temperature and protect the stream from excessive algal growth and associated reductions in stream dissolved oxygen.

Central Maine Power (CMP) manages a utility corridor in the Lower subwatershed that crosses Hart Brook. CMP currently provides managed, vegetated buffers between utility corridors and state highways. The City will initiate a discussion with CMP regarding an expansion of the program to include perennial streamside zones at the utility crossing of Hart Brook. The action item would include the development of a planting plan within the utility corridor that would provide long-term shading for that section of stream. Cooperative planting with the City of Lewiston and/or watershed volunteers will be investigated as a means of executing this action item.

Subwatershed Focus	Lower
Potential Funding Source	MaineDEP 319 grant funding for plants and labor. CMP Partnership Funding.
Cost	$10,200
Funding Rationale	275 linear feet of stream within the utility corridor and 40' streamside planting width.
Schedule	Begin discussions in 2009.

State Actions

There are 6 miles of State-aid highway, 4 miles of state highway and 5 miles of Maine Turnpike within the watershed. Overall roadway impervious surfaces occupy 7% of the watershed area. Roadways have been shown to generate some of the highest stormwater pollutant loads in national research but opportunities for structural stormwater management practices are often limited due to narrow right of way and adjacent sidewalks and other utilities.

The following action items includes structural and non-structural activities to be initiated by the City and implemented by the state as funding is made available or obtained through grants.

Necessary winter maintenance poses a challenge for stormwater best management.

Maine Turnpike Deicer Management Strategy

The winter maintenance of roadways is critical to public safety. Unfortunately, the use of sand and salt for winter ice and snow control can have deleterious effects on stream water quality and aquatic communities. The Maine Turnpike crosses the Hart

Brook three times and chloride discharges from the roadway in these areas may have impacts on the receiving stream.

The City proposes a discussion between the Maine Turnpike and the Watershed Working Group to investigate opportunities for a reduction or alternative to traditional highway deicing. This action item would include the identification and mapping of the Turnpike drainage system and a determination of whether discharges from the Turnpike contain high levels of chlorides which are likely to reach the brook. The Watershed Working Group would engage in discussions with the Maine Turnpike Authority to develop an appropriate method for reduction of chlorides in stormwater runoff. A consideration of salt alternatives may also be considered for use in these areas. Extensive research on the use of potassium acetate, sodium acetate, sodium formate, calcium magnesium acetate, magnesium chloride and others are being conducted across the country and should be considered in cost-benefit scenarios.

Subwatershed Focus	Lower
Potential Funding Source	Grant research funding.
Cost Estimate	Unknown depending on level of effort.
Schedule	Begin discussion in 2009.

State Roadway Stormwater Disconnection Demonstrations

Route 196 and adjacent private facilities within the Hart Brook Watershed are directly connected impervious areas. Many of the adjacent driveway access, parking areas and rooftops are connected to the Route 196 storm sewer infrastructure through closed drainage or surface drainage. Stormwater from this infrastructure enters the Hart Brook at three primary locations.

The City will utilize the stormwater retrofit inventory results to identify opportunities for the mitigation of stormwater runoff from Route 196 in road setback areas and begin discussions with the MaineDOT regarding funding programs. Good structural retrofit opportunities exist in the cloverleaf area at the Alfred Plourde Parkway-Route 196 interchange and along Route 196 east of Elmet Technologies.

Route 196 setbacks offer good opportunities for stormwater retrofits.

Subwatershed Focus	Old Lisbon and Lower
Potential Funding Source	MaineDOT Surface Water Quality Protection Program
Cost Estimate:	$120,000
Funding Rationale	Engineer's estimate for segment of Route 196 east of Elmet Technologies. Estimate based on identified stormwater retrofit opportunity areas and the costs of retrofit systems within the project area.
Schedule	2009 - 2010 upon implementation by MDOT.

Residential Actions

The Valley Section and specifically the Pond Road neighborhoods within the Industry subwatershed contain significant residential areas. Much of the runoff from these areas is directed into the City's storm sewer system with untreated discharges directly to Hart Brook. Pollutant loads from residential areas can be very high in nutrients and bacteria and roadway and driveway runoff contributes to thermal pollution.

Road edge raingardens will enhance aesthetics and provide water quality treatment for neighborhoods.

In an effort to address stormwater runoff in these areas, the City will consider a program to develop neighborhood raingardens both along city roadways and on private property. This program will likely require public outreach and community meetings, the identification of property owners willing to have raingardens on their properties and the design and implementation of the stormwater management systems. Partnership opportunities include local gardening clubs, AVSWCD, Maine Cooperative Extension and local landscaping contractors and supply companies.

Subwatershed Focus	Industry and Valley Section
Potential Funding Source	MaineDEP 319 grant program, MaineDOT Transportation Enhancement Program and other community improvement grants programs including CDBG.
Cost Estimate	$49,900 Valley Section Neighborhoods $84,400 Pond Road Neighborhoods
Funding Rationale	Engineer's estimate based on identified stormwater retrofit opportunity areas within the Top 65 stormwater retrofits. These costs could vary depending on private raingarden development subsidies and the likely inclusion of non-Top 65 retrofits in the vicinity of priority project sites.
Schedule	Phased program starting 2010 based on receipt of grant funding.