



## TMDL Assessment Summary

# Arctic Brook (Valley Ave.)

### Watershed Description

This **TMDL** assessment summary applies to the 0.86-mile Arctic Brook located in the City of Bangor, Maine. The northern boundary of the Arctic Brook watershed is located near Pine Circle Drive and the eastern boundary runs parallel to Essex Street. Arctic Brook begins in the center of the watershed, just below School Street in the Broadway Shopping Center, a high intensity developed area. The stream flows south, crossing Route 15, and then flows southwest flowing parallel to Falvey Street. Arctic Brook then crosses Interstate 95 and empties into Kenduskeag Stream just below Valley Avenue. In 2010 DEP and Bangor City staff completed a Level 1 stream corridor survey for Arctic Brook finding several reaches in poor condition (DEP, 2010b). The Arctic Brook watershed covers 768 acres in the City of Bangor.

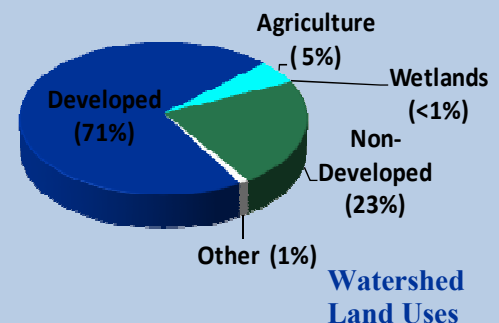
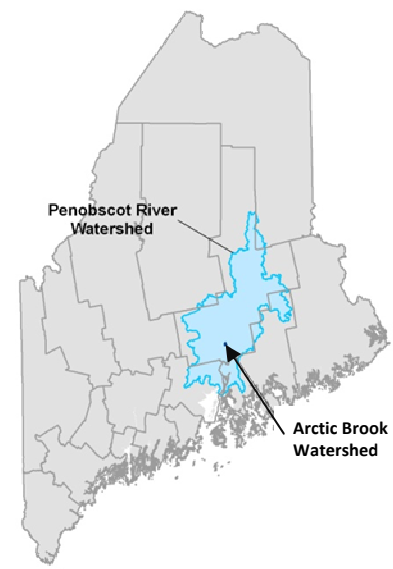
- Stormwater runoff from **impervious cover (IC)**, particularly in the developed area in the center of the watershed, is likely the largest source of pollution to Arctic Brook. Stormwater falling on roads, roofs and parking lots in developed areas flows quickly off impervious surfaces, carrying dirt, oils, metals, and other pollutants, and sending high volumes of flow to the nearest section of the stream.
- The Arctic Brook watershed is predominately developed (71%) and characterized by high intensity development and developed open space. The watershed is 23% impervious.
- The woodland areas in the watershed can absorb and filter stormwater pollutants, and help protect both water quality in the stream and stream channel stability.
- Arctic Brook is currently on to the list of Maine's Urban Impaired Streams (DEP, 2010a).

### Definitions

- **TMDL** is an acronym for **Total Maximum Daily Load**, representing the total amount of a pollutant that a water body can receive and still meet water quality standards.
- **Impervious cover** refers to landscape surfaces (e.g. roads, sidewalks, driveways, parking lots, and rooftops) that no longer absorb rain and may direct large volumes of stormwater runoff into the stream.

### Waterbody Facts

- **Segment ID:** ME0102000510\_224R06
- **City:** Bangor, ME
- **County:** Penobscot
- **Impaired Segment Length:** 0.86 miles
- **Classification:** Class B
- **Direct Watershed:** 1.2 mi<sup>2</sup> (768 acres)
- **Watershed Impervious Cover:** 23%
- **Major Drainage Basin:** Penobscot River Watershed



## Why is a TMDL Assessment Needed?

Arctic Brook, a Class B freshwater stream, has been assessed by DEP as not meeting water quality standards for aquatic life use and has been listed on the 303(d) list of impaired waters. The Clean Water Act requires that all 303(d)-listed waters undergo a TMDL assessment that describes the impairments and establishes a target to guide the measures needed to restore water quality. The goal is for all waterbodies to comply with state water quality standards.

A pilot impervious cover TMDL assessment was completed in 2005 for Arctic Brook, by ENSR (ENSR, 2005). However, data on the current percentage of impervious cover in the watershed has improved, warranting Arctic Brook's inclusion in this impervious cover TMDL. The impervious cover TMDL assessment for Arctic Brook addresses the water quality impairments to aquatic life use (benthic-macroinvertebrate and stream habitat assessments). These impairments are associated with a variety of pollutants in urban stormwater as well as erosion, habitat loss and unstable stream banks caused by excessive amounts of runoff.



*Sediment-laden water in Arctic Brook, resulting from construction activities upstream. Photo taken at the Grandview Ave. road crossing.  
(Photo: Alan Hunter)*

## Sampling Results & Pollutant Sources

Sampling Station	Sample Date	Statutory Class	Model Results
S-313	9/10/1997	B	NA

DEP makes aquatic life use determinations using a statistical model that incorporates 30 variables of data collected from rivers and streams, including the richness and abundance of streambed organisms, to determine the probability of a sample meeting Class A, B, or C conditions. Biologists use the model

results and supporting information to determine if samples comply with standards of the class assigned to the stream or river (Davies and Tsomides, 2002).

This impairment is based on data collected by DEP in 1997 at a sampling station located upstream of Valley Avenue, above the Kenduskeag Bridge (S-313). The most recent data collected at this station indicate Class B Arctic Brook is “non-attaining” (NA), meaning it does not meet Class A, B, or C conditions.

## Impervious Cover Analysis

Increasing the percentage of impervious cover (%IC) in a watershed is linked to decreasing stream health (CWP, 2003). Because Arctic Brook's impairment is not caused by a single pollutant, %IC is used for this TMDL to represent the mix of pollutants and other impacts associated with excessive stormwater runoff. The Arctic Brook watershed has an

impervious surface area of **23%** (Figure 1). DEP has found that in order to support Class B aquatic life use, the Arctic Brook watershed may require the characteristics of a watershed with **8%** impervious cover. This WLA & LA target is intended to guide the application of Best Management Practices (BMP) and

*8% IC represents an approximate **65% reduction** in stormwater runoff volume and associated pollutants when compared to existing pollutant loads.*

## Impervious Cover GIS Calculations

*The Impervious Cover Calculations are based on analysis of GIS coverage's presented in Figure 1. In Arctic Brook these maps were derived from a detailed field assessment conducted by DEP Staff, as described in the TMDL.*

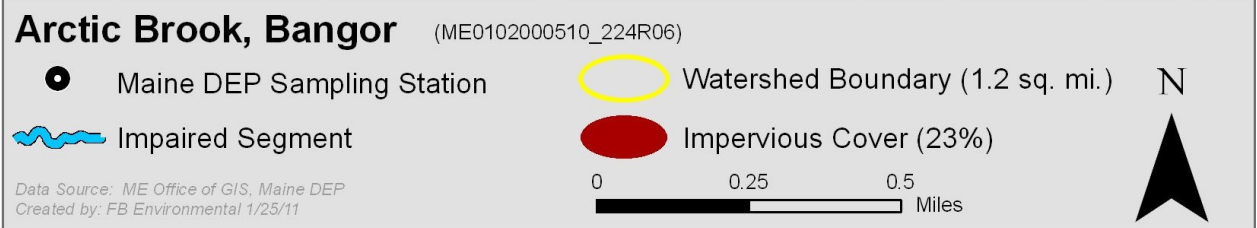
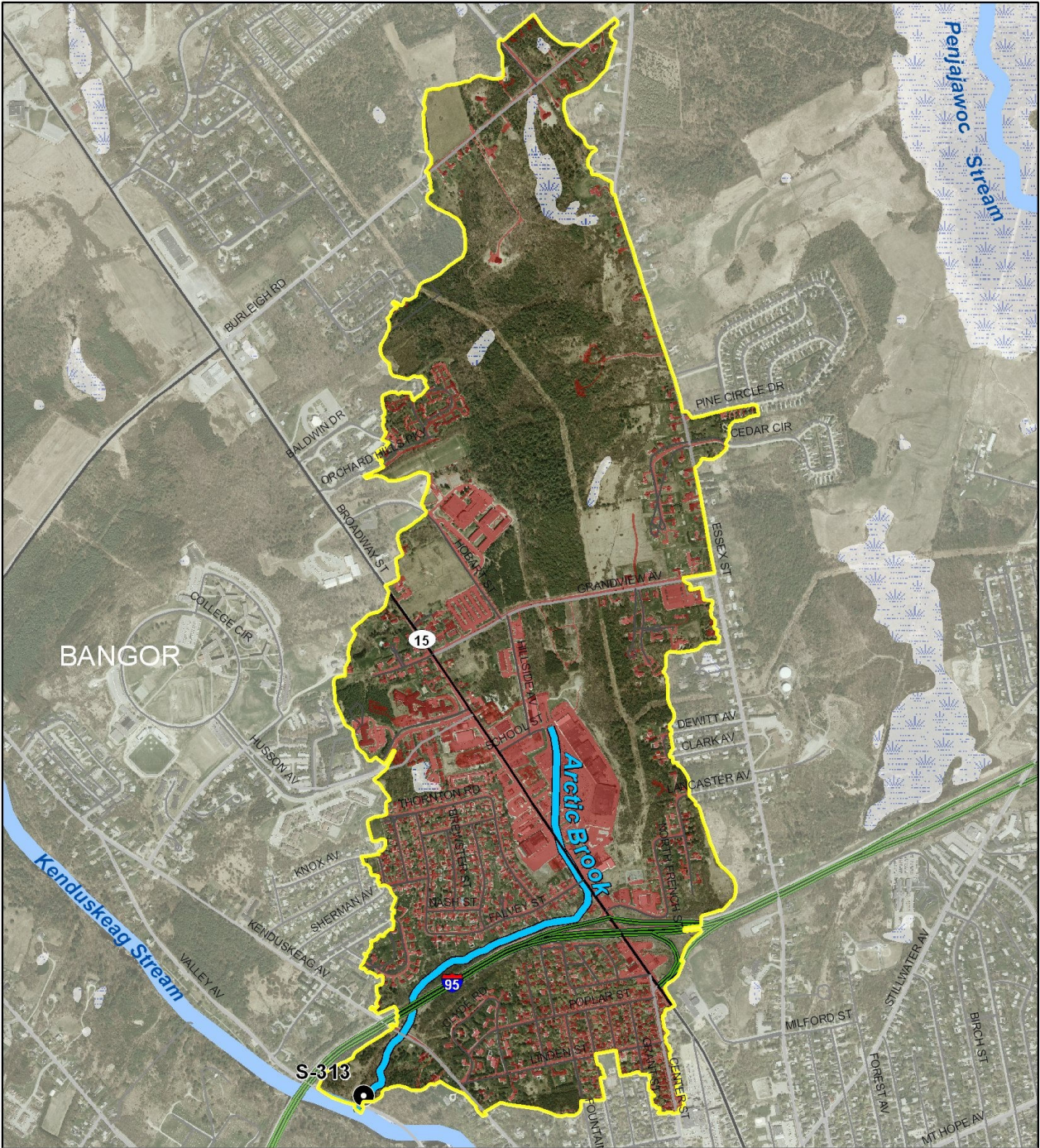
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Low Impact Development (LID) techniques to reduce the *impact* of impervious surfaces. Ultimate success of the TMDL will be Arctic Brook's compliance with Maine's water quality criteria for aquatic life.

### Next Steps

Because Arctic Brook is an impaired water, specific sources of stormwater runoff in the watershed should be considered during the development of a watershed management plan to:

- Encourage greater citizen involvement to ensure the long term protection of Arctic Brook;
- Address existing stormwater problems in the Arctic Brook watershed by installing structural and applying non-structural best management practices (BMPs); and
- Prevent future degradation of Arctic Brook through the development and/or strengthening of local stormwater control ordinances.



**Figure 1:** Map of Arctic Brook watershed impervious cover.

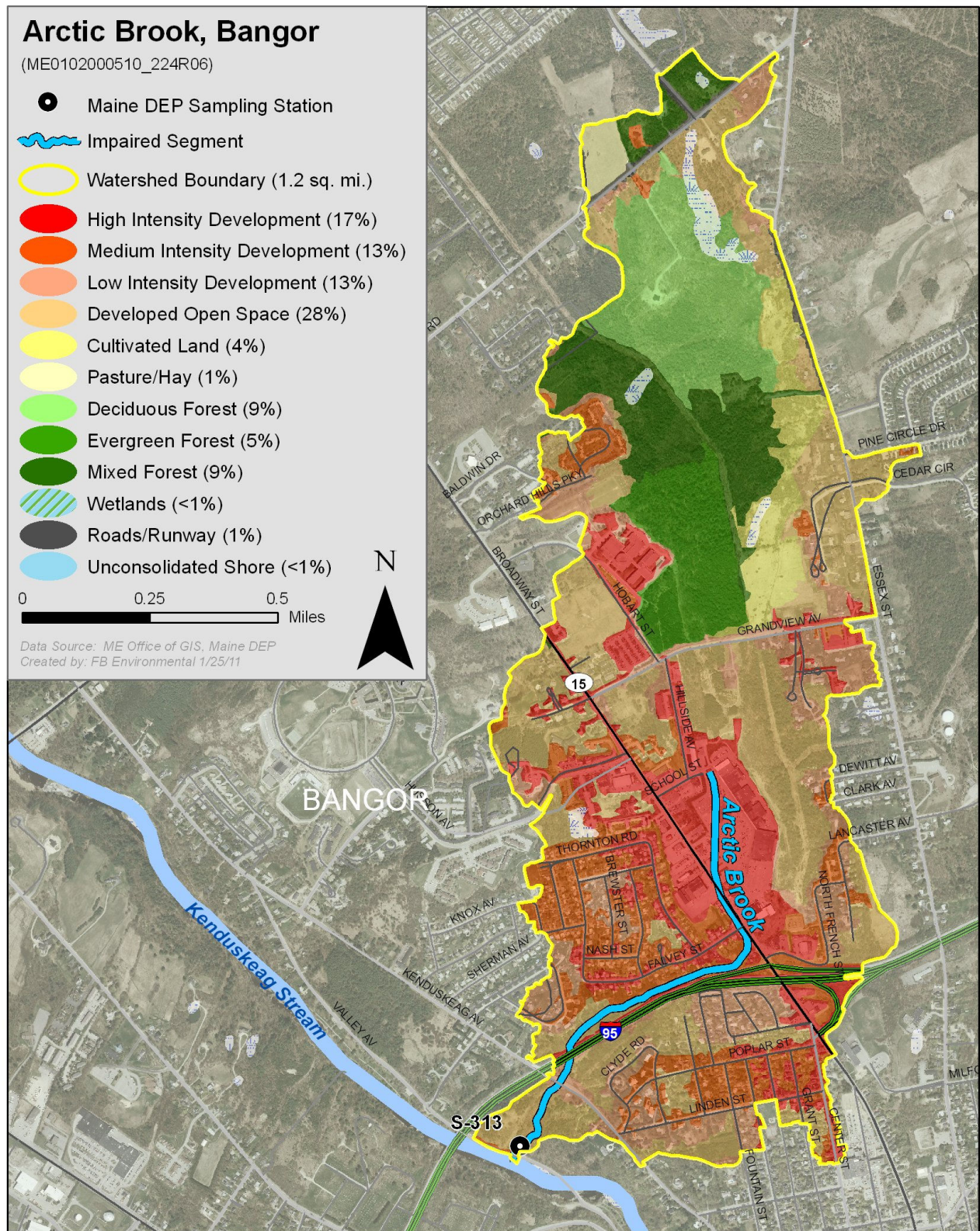


Figure 2: Map of Arctic Brook watershed land cover.

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## References

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- Davies, Susan P. and Leonidas Tsomides. 2002. Methods for Biological Sampling and Analysis of Maine's Rivers and Streams. Maine Department of Environmental Protection. Revised August, 2002. DEP LW0387-B2002.
- ENSR International. 2005. Pilot IC Method TMDL Analysis of Arctic Brook. Available online at: [www.epa.gov/ne/eco/tmdl/pdfs/ensr\\_pilot/Section4\\_6.pdf](http://www.epa.gov/ne/eco/tmdl/pdfs/ensr_pilot/Section4_6.pdf), accessed online on June 16, 2011.
- Maine Department of Environmental Protection (DEP). 2010a. Assessment Database Detail Report for Arctic Brook (Valley Avenue). Bureau of Land and Water Quality, Augusta, ME.
- Maine Department of Environmental Protection (DEP). 2010b. Arctic Brook, Birch Stream, Capehard Brook and Shaw Brook Watersheds (City of Bangor-Penobscot County) Stream Corridor Survey – Summary Report. Maine Stream Team Program, Augusta, ME.