



# Upper Blackstone

## Water Pollution Abatement District

### **Introduction**

*The Upper Blackstone Water Pollution Abatement District (the District) is two years away from completing the second of four phases of significant upgrades to its treatment facilities. A \$180 million capital program will improve the quality of the effluent that the District discharges to the Blackstone River. The District negotiated this permit with the U.S. Environmental Protection Agency (EPA) in 2001. EPA recently proposed a new discharge permit for the District with more stringent nutrient limits. These proposed standards for phosphorus and nitrogen are approaching the limits of current treatment technology. To meet them, the District estimates it would have to double its capital investment before completing current construction. District members believe that there is no evidence that proposed limits will improve water quality in the Blackstone River or Narragansett Bay, but they will present significant economic and environmental challenges to the city of Worcester and member communities.*

### **The Background**

The District facilities are located next to the historic Blackstone River. The river shows many of the signs of stress common to most urban waterways. There are 19 dams along the Blackstone River with impoundments — ponds — that have altered the river's flow patterns. Sediments in the river reflect the river's historic use: it was the first place where water power was used to fuel the Industrial Revolution and was once called America's hardest working river. There are other sources of this distress, such as point sources (seven dischargers in Massachusetts and more in Rhode Island), nonpoint discharges (stormwater), street and urban runoff and other uses.

Fortunately, there have been improvements in the Blackstone River's water quality. There is also great interest in finding ways to continue this progress. In addition to efforts underway in Massachusetts and

Rhode Island, the District is funding a new \$2 million model of the Blackstone River, slated for completion this year, which will provide more information about water quality in the Blackstone River, the sources of contaminants and their fate as they are transported to Narragansett Bay. The District also works and consults with other groups interested in improving the water quality of the Blackstone River and Narragansett Bay, including the Blackstone River Coalition, the Army Corps of Engineers and Mass Audubon Society.

### **The District's Commitments**

The District embarked on a Facilities Planning process in 1999 to evaluate its performance and develop a long-range plan to upgrade its existing facility and meet new technical challenges. Working with its consultant, CDM, the District developed a four-phase plan to upgrade the plant and add new treatment capacity. The work includes:

- ▶ Phase I – Completed in 2006 at a cost of \$56 million, it upgraded and expanded the preliminary and primary treatment facilities, included a high flow management system, provided new chlorination and dechlorination facilities, modified the multiple hearth furnaces and associated air pollution control facilities. The work also included an upgraded electrical system and provided a new SCADA system for process control.
- ▶ Phase II – To be completed in August 2009, this \$82 million set of improvements upgrades and expands the existing secondary treatment system to provide biological nutrient removal to meet the limits set by EPA.
- ▶ Phases III and IV – With \$42 million in new facilities, the District will upgrade the solids management facilities and address growth.

With these improvements in place, the District will achieve more stringent targets for controlling the nutrients of concern, phosphorus and nitrogen. The plant will meet the total phosphorus limit of 0.75 milligrams per liter (mg/L) and total nitrogen of 8 to

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10 mg/L, even though a total nitrogen limit was not established in the 2001 permit. The design is a sustainable one that depends on a biological removal process, with minimal addition of chemicals.

This commitment comes at a cost to the District's member communities. Because the City of Worcester contributes 90% of the flow, its residents and businesses are paying for most of the improvements. Upper Blackstone's assessment has gone up 600% since 2003, with sewer rates in Worcester more than doubling in the last four years. The District's assessment now represents 41% of Worcester's sewer bill, up from 19% in 2004.

## EPA's Proposal

Despite the progress the District has made, EPA is proposing much more stringent nutrient limits in a draft 2007 permit. The District has three concerns about these new standards:

1. The timing of the permit is poor and illogical
2. There is little scientific basis for reducing the nutrient limits at this time
3. The new limits present economic and environmental impacts that may outweigh the benefits

## Timing

EPA negotiated a five-year permit with Upper Blackstone in late 2001. In early 2002 a consent order was negotiated that established a time line for the District to achieve the permit limits in August 2009. The District believes it makes sense to complete construction first, operate the plant in its upgraded state for at least two full growing seasons, then assess the impact of the improved discharge before reducing the limits even further.

Other factors are connected with the timing of the permit. Facilities in Rhode Island that discharge into the Blackstone River or Narragansett Bay are being upgraded under similar time frames. The largest of these plants will not be completed until 2013 or later, making it impossible to separate the effects of changes upstream.

In addition, EPA is working from an old model of the river that dates from the mid to late 1990's. The District is working with the University of Massachusetts and CDM to develop a new model and to better define the impacts of the District's discharge downstream. The model will help the District and others to identify alternate solutions for achieving water quality goals. These may include managing impoundments in the

river, controlling non-point sources and plant upgrades. But it is premature to decide now – without more data – to undertake the most capital intensive of these possibilities: upgrading the plant.

## The Science

The science supporting the new limits has been challenged by the Massachusetts Department of Environmental Protection (MassDEP) and Rhode Island dischargers, including the Narragansett Bay Commission and the city of Woonsocket. There is an ongoing debate in the academic community regarding the validity of the science. As noted, the new model of the Blackstone River will provide more data about the sources of contaminants in the system and their impact on water quality. Dischargers in Rhode Island are also undertaking additional modeling and monitoring in Narragansett Bay to improve the basis for setting limits. When completed, these studies will better define the impacts of the District's discharge on downstream waters and will identify alternative solutions for achieving water quality goals.

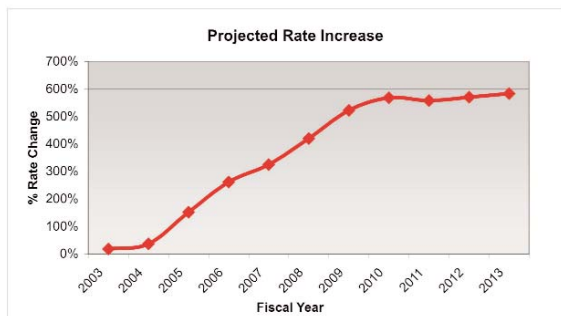
The total phosphorus limit proposed by EPA would be reduced from 0.75 mg/L to 0.1 mg/L in the summer and from no limit to 1.0 mg/L in the winter. Total nitrogen, previously unregulated, would be set at 5 mg/L. The Blackstone River Initiative, the study used to establish the 2001 limit, has supported a standard of 0.75 mg/L. No new information on the river system has been put forth to substantiate a lower limit.

In 2009, after the ongoing improvements are completed, the nitrogen and phosphorus load from Upper Blackstone will be less than the load from non-point sources, such as stormwater. In addition, there are many unsewered and partially sewerred communities along the Bay, which are contributing nitrogen to Narragansett Bay. The impact of these non-point sources on the water quality in the River and the Bay cannot be overlooked.

## The Cost/Benefit Issues

What would it cost to meet EPA's new permit standards? The District estimates that the cost could be \$100 to \$200 million, potentially doubling the cost rate payers are currently facing. But cost is not the only issue. To meet the standards, the District would have to pump the entire plant flow to a new treatment process and add a significant amount of chemicals to meet both the total phosphorus and total nitrogen targets. Adding the chemicals would produce more sludge that is more

## Current and Projected Change in Treatment Costs – Current Program



difficult to manage, which increases energy demands for dewatering and incineration. More ash would be generated, consuming landfill capacity at a faster rate. In total, the District would be enlarging its carbon footprint, increasing its use of resources without evidence that it would be improving river water quality.

### The District's Approach

EPA has a process for commenting on and negotiating a new permit. The drawback to the process is that it takes a long time, can be expensive and can distract the parties from their mutual goals: to improve the District's effluent and enhance the Blackstone River's water quality. Instead of going through a permit appeal or litigation process, the District suggests an alternative approach that would take the same period of time, depend on the new model results and cooperation in the region and might not require the construction of new capital facilities.

In this approach, the District would complete the new river model in 2007, finish Phase II construction in 2009 and complete Phase III for 2011/2012. Between 2009 and 2011, the District would optimize its operations, fine tuning the new facilities and monitoring the results. The model would be reviewed and revised in 2012, and EPA would set new standards in the 2012-2013 time period. If the new plant is not meeting standards, or the model shows that the more stringent limits will make a difference in water quality for a reasonable investment, the District would undertake Facilities Planning in 2012-2013. It would design and build the required facilities between 2013-2019.

Under the current approach, a permit appeal through the courts could take up to two years, being resolved in 2010. Facilities Planning would take two years and new facilities, if needed, would be designed and built between 2013 and 2019.

The District suggests that its alternate approach offers a number of benefits, including:

- ▶ Efficient application of sound science
- ▶ Cooperatively defined permit limits
- ▶ Managed progress toward the goal of improving the Blackstone River and Narragansett Bay
- ▶ Predictable costs

In the meantime, the District pledges to manage construction and operations and maintenance costs effectively. It will continue its support of the river modeling and work cooperatively with regional efforts to enhance the river and Narragansett Bay.

### Summary

The mission of the Upper Blackstone Water Pollution Abatement District is to provide environmentally responsible, high quality and cost-effective services to its customer owners in Central Massachusetts. In carrying out this mission, the District is committed to protecting the quality and uses of the historic Blackstone River. It will do so in a way that is in accord with good science, finishing its new facilities and ensuring that its customer communities are benefiting from well-reasoned and timely investments.

## WHY REGULATE NUTRIENTS?

Phosphorus and nitrogen are two of the major nutrients found in all rivers and estuaries, such as the Blackstone River and Narragansett Bay. They are essential to the growth of phytoplankton, a source of food for aquatic life, but in excess, they become harmful to rivers and estuaries. Algae blooms result and oxygen in the water is used up. As oxygen levels decline, the rivers and estuary can no longer support fish, shellfish and other aquatic life. This low-oxygen condition is called hypoxia.

Effluent from wastewater treatment plants is one source of nutrients, but phosphorus and nitrogen also come from failing septic systems, fertilizers, atmospheric deposition, and domestic animal waste. Phosphorus is typically the nutrient of concern in fresh water, while nitrogen is the limiting nutrient in saltwater bodies. Since the Upper Blackstone facility discharges to the Blackstone River – which ultimately flows to Narragansett Bay – both phosphorus and nitrogen are being regulated.

## The District

The Upper Blackstone Water Pollution Abatement District was formed in 1968 by an Act of the Massachusetts Legislature. District members include the communities of Auburn, Cherry Valley Sewer District in Leicester, Holden, Millbury, Rutland, West Boylston and Worcester. The District manages wastewater treatment from its member communities and provides septage treatment and solids management services to nonmember communities. More than 60 MA cities and towns count on the District for wastewater management services. The District's facilities are located on the Worcester/Millbury line adjacent to the Massachusetts Turnpike and Route 146. The secondary treatment plant was originally designed to handle an average wastewater flow of 56 million gallons per day and has treated peak flows in excess of 150 mgd. The treated wastewater is discharged to the Blackstone River.

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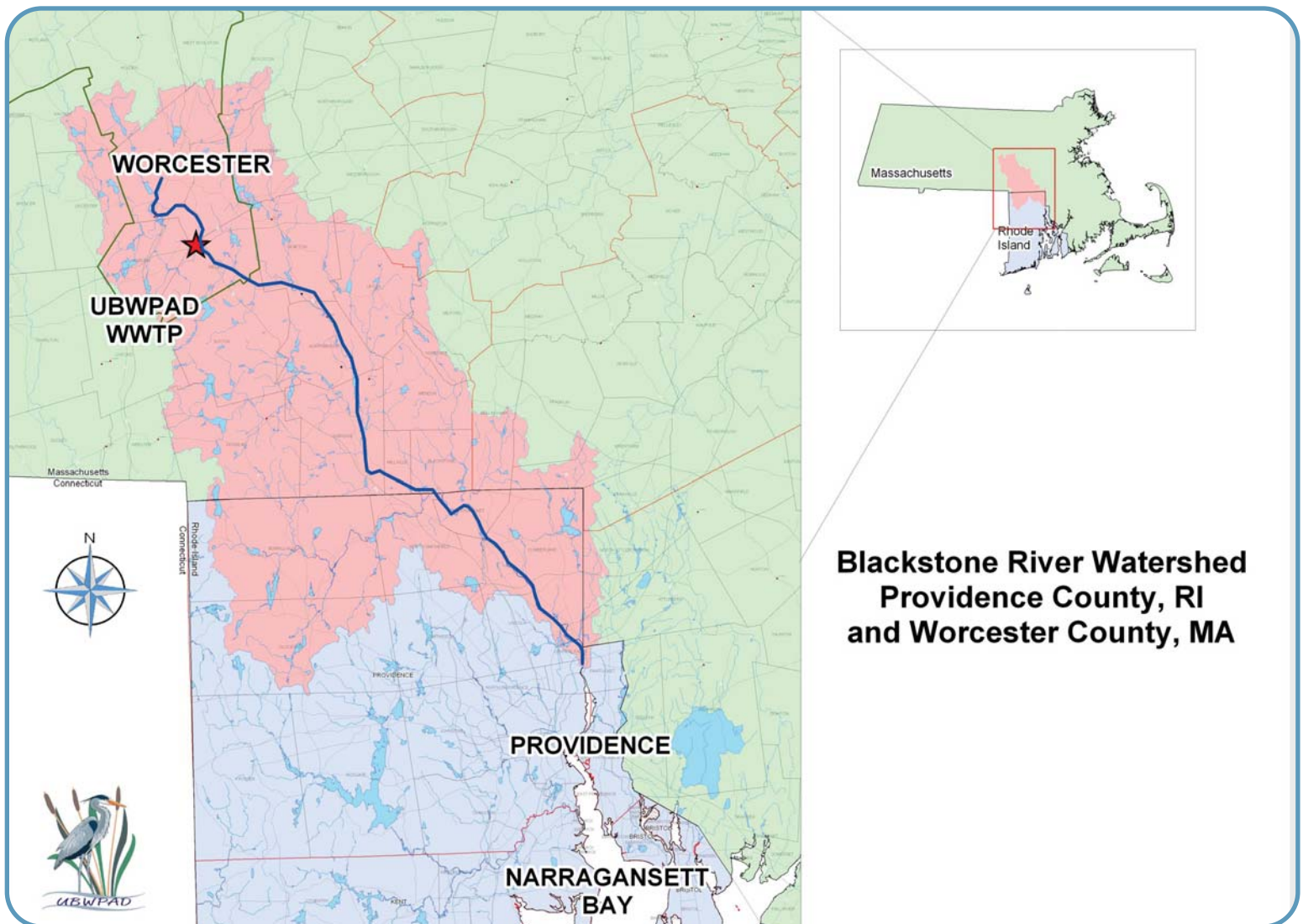
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**Blackstone River Watershed  
Providence County, RI  
and Worcester County, MA**