

2017



REPORT CARD FOR  
**NEW HAMPSHIRE'S**  
INFRASTRUCTURE



New Hampshire Section of the American Society of Civil Engineers  
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## EXECUTIVE SUMMARY

Infrastructure is the backbone of our community. While we don't always acknowledge it, the condition of our infrastructure has a very real impact on our lives. We all depend on roads and bridges to get us where we are going, water infrastructure that delivers clean on-demand water, electricity to light our home and office, and schools that will facilitate a learning environment. Historically, our country's large infrastructure investments have been reactionary measures to the national and world economic and current events, and generally between these major events our investment are inadequate to meet our needs. Many of our infrastructure systems are struggling to stay in adequate condition, and as these systems continue to surpass their intended lifecycles, New Hampshire residents and policymakers must decide if we value the personal and economic advantages that come from a robust infrastructure network, and if we do, to make it a priority moving forward.

This document was created to help New Hampshire understand the state of our infrastructure. As civil engineers, our job is to plan, design, construct, and maintain our infrastructure networks, and the ASCE-NH 2017 Report Card provides an opportunity to share that information with the public. This document is a snapshot for residents and policymakers to engage in conversation about where we are and where we want to be. We hope that this information provides the insight needed to start that conversation.

## ABOUT THE INFRASTRUCTURE REPORT CARD

### GRADING CRITERIA

ASCE-NH's 2017 Report Card Committee is a group of dedicated civil and environmental engineers from New Hampshire, who volunteer their time to collect and analyze data, prepare, review, and revise each section, and develop the final Report Card. The committee worked with the ASCE's Committee on America's Infrastructure and ASCE Infrastructure Initiative staff to provide New Hampshire with a snapshot of the state of our infrastructure, as it relates to us at home, and on a national basis.

The Report Card Sections are analyzed based on the following eight criteria:

**CAPACITY** Does the infrastructure's capacity meet current and future demands?

**CONDITION** What is the infrastructure's existing and near-future physical condition?

**FUNDING** What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

**FUTURE NEED** What is the cost to improve the infrastructure? Will future funding prospects address the need?

**OPERATION AND MAINTENANCE** What is the owners' ability to operate and maintain the

infrastructure properly? Is the infrastructure in compliance with government regulations?

**PUBLIC SAFETY** To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

**RESILIENCE** What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

**INNOVATION** What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?



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# SOLUTIONS TO RAISE THE GRADE

If New Hampshire is ready to improve our infrastructure, ASCE-NH has some suggestions to start raising the grade.

## BE INFORMED AND VOCAL

Learn about your community's infrastructure needs. Go to town halls or legislative events, and get to [know your elected officials](#) and discuss your concerns with them.

## SUPPORT CONSISTENT POLICIES AND FUNDING SOURCES

ASCE-NH recognizes that comprehensive planning and long-term funding are keys to sound decision making. Inconsistent policy and unsustainable funding sources undermine the ability to plan for the future. Funding needs to incorporate the cost of a project over its entire lifespan – including designing, building, operating, and maintaining the infrastructure.

## LOCALLY SOURCED FUNDING

While NH depends heavily on federal funding and federal financing to supplement our state budget, we need to start thinking about how we can help ourselves and put policies in place to incorporate long-term, sustainable funding on a state and local level, that will address our needs.

## KNOW WHAT YOU DON'T KNOW

NH has a reputation of creating policy based on data. This is good news, but we want to recognize that acquisition of data is a continuous effort and an important one to shape appropriate policies. Furthermore, while there is a need to act, an emphasis on proper planning and design is essential for the best return on investment.

Specifically related to this solution, ASCE-NH attempted to, but was not able to incorporate our schools section into the report card this year because of the lack of recent condition data. We recommend immediate and sustained collection of such data on a statewide basis, which improves our ability to assess the challenges facing our school infrastructure and allows us to strategically invest in our facilities for future generations.

## GRADING SCALE

### A EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and resilient to withstand most disasters and severe weather events.

### B GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.

### C MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.

### D POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.

### F FAILING/CRITICAL: UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.

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G.P.A.



# 2017 REPORT CARD FOR NEW HAMPSHIRE'S INFRASTRUCTURE



AVIATION



PORTS



BRIDGES



RAIL



DAMS



ROADS



DRINKING  
WATER



SOLID  
WASTE



ENERGY



STORM  
WATER



HAZARDOUS  
WASTE



WASTEWATER





# AVIATION

## SUMMARY

The New Hampshire airport system has undergone notable safety improvements over the last 5 years however funding for future airport infrastructure improvements remains too low and uncertain. There are currently a total of 107 registered airports, heliports, and seaplane bases in New Hampshire, of which 25 are open to the public and 12 are “system airports” that are eligible for federal funding on an annual basis. New Hampshire’s airports serve varying purposes, and experience varied levels of activity. Future improvements are planned with an emphasis on continued safety improvements, improved flying facilities and airport accessibility, and a focus on economic return on investment.

## CONDITION AND CAPACITY

Slow growth in annual aircraft operations is predicted for the future, as the 2015 New Hampshire Airport Systems Plan (NHASP) update predicts an increase from 436,564 in 2013 to 446,874 annual operations in 2033. This growth pattern matches New England Region trends, and most other regional and national trends. Although overall growth is slow, the 2015 New Hampshire Airport Systems Plan (NHASP) recommended some airport capacity improvements based on factors including anticipated growth or change in aviation activity, a need for enhanced service to employers and economic centers, and enhanced service to geographic areas. Four airports were identified as candidates for upgraded roles and appropriate measures are planned to begin to accommodate this.

New Hampshire Department of Transportation (NHDOT) 2015 Balanced Scorecard shows the average Airport Runway Surface Conditions increased from a 4.21 to 4.31, a measure of surface friction, where an upward trend is good. Additionally, the NHDOT completed a Pavement Condition Index survey in 2012 and will update this survey in 2018. This is a process that provides the state with a comprehensive inventory of pavement condition with predicted pavement deterioration rates, and is used to guide the State’s investment in airport pavement upgrades.

The current private and public use of Unmanned Aerial System (UAS) within the State of New Hampshire is a prime example of future innovation that directly affects airspace navigation and commerce. Title 14 of the Code of Federal Regulation (14 CFR) Part 107 addresses the commercial use regulations for UAS operations, and provides users with a comprehensive list of what can and cannot be done. The NHDOT Bureau of Aeronautics studies, and helps administer the current federal guidance and laws established, with a goal of safely incorporating UAS into the state airport system. Other future innovation activities may include longer lasting pavement designs, improved navigational aids and approach procedures, improved access for pilots to weather information, energy efficient airfield lighting, solar array collection systems on airports, and aircraft fuel technology improvements.

## INVESTMENT AND FUNDING

Airports in New Hampshire receive the majority of their funding for capital improvements from the Federal Airport and Airway Trust Fund, and these funds are distributed through the Airport Improvement Program, which is managed by the Federal Aviation Administration, (FAA). The Airport Improvement Program is typically authorized on a multi-year basis through acts of legislation by the U.S. Congress. In the 2011 New Hampshire Report Card, it was noted that the Airport Improvement Program bill had run out, and the program was being administered via recurring Continuing Resolutions approved by Congress. On February 14, 2012 a new bill was approved and provided level funding via the FAA Modernization and Reform Act of 2012. This provided for funding for three years, through 2015. In July of 2016, Congress passed a 14- month extension extending funding and aviation tax authority through September 30, 2017. This is a



continuance of concerns expressed in 2011, and in essence the month-to-month extensions put New Hampshire airports in a position of funding uncertainty.

The major sources of funding for airport infrastructure improvements include the aforementioned Airport Improvements Program (Federal); State of New Hampshire Transportation Aeronautics Grants-Non Federal budget; State of New Hampshire Aircraft Operating Fee, which collects revenues from activities such as aircraft registration, and fuel tax; State-Local Airport Grant program, commonly referred to as an 80/20 program (has remained unfunded since 2008); Airport Property Tax Reimbursement Program (also currently unfunded); and locally funded projects within each airport's community. The Bureau of Aeronautics also manages a bi-annual state operating budget, which derives revenue from state aircraft registrations, and state aircraft operating fees that assist our airports. These revenues vary on an annual basis and can be approximated at \$1M per year.

An airport's ability to utilize private investment funds to initiate infrastructure improvements is limited by local economic development oversight and input, public input and coordination, and adherence to FAA at state requirements for maintaining the facility for the flying public. An airport is well suited to accept private investment provided the investor understands the existing Airport grant assurances, and the basic responsibilities that the municipality has to maintaining the airport in a manner that is consistent with aeronautical purposes.

In the 2015 NHASP Update, an overall funding need summary was developed for the next 20 years. This need was broken into three categories (Airside and Landside Infrastructure, Pavement Maintenance, Planning Environmental and Specialty Studies) and totaled \$509.20 million for the next 20 years. The FAA issues approximately \$15-20M per year in federal grants to 12 New Hampshire airports. With an approximate \$500M need over 20 years compared to the available funds, there is a projected shortfall of \$100-\$200 million in the twenty-year planning period.

Of the \$509.2 million of planned infrastructure improvements, pavement and navigational upgrades will improve New Hampshire Airport's reliability and accessibility for the future. Twenty of the state's airports have navigational aid improvement projects planned, such as airfield approach lighting, rotating hazard beacons, instrument landing systems, global positioning system approaches, and obstruction lighting. In addition, The Bureau of Aeronautics has identified a need for approximately \$51,500,000 in pavement maintenance for the state's airports over the next twenty years.

### RECOMMENDATIONS TO RAISE THE GRADE

The 25 public airports generate annually \$1.16 billion of economic output, provide over 9,200 jobs, and generate \$27.9M in tax revenues. Infrastructure capital investment needs for the next twenty years exceed the available funding by \$100 million to \$200 million. To raise the aviation grade for New Hampshire the 80/20 State Grant Program should be refunded, Congress should pass a long-term authorization of the Federal Aviation Administration Airport Improvement Program bill, New Hampshire airports should implement sustainable environmental technology to reduce operating costs and improve environmental stewardship, and the State should preserve or increase the current staff level at Bureau of Aeronautics.

### SOURCES

Information provided by NHDOT Bureau of Aeronautics, July 2015, February, 2016

Information provided by Manchester Boston Regional Airport, June 2015

Information provided by Berlin Municipal Airport, October, 2015

New Hampshire State Airport Systems Plan, Bureau of Aeronautics, February 2015

Information provided by the Airport Consultants Council (ACC), LN 16-09 July 14, 2016 Legislative Update

# BRIDGES

## SUMMARY

There are 3,848 bridges in the New Hampshire Department of Transportation (NHDOT) bridge inventory with an approximate replacement value of \$8 billion. Nearly 80% of all state-owned bridges were constructed prior to 1980, over 650 of those bridges are over 75 years of age, and between 2010 and 2015 the average age of state-owned bridges increased from 52 to 56 years. A typical bridge design life is 50 years, and therefore, the average bridge in New Hampshire now has reached or exceeded its planned functional life. As of December 2015, 12.8% of the bridges in state were considered structurally deficient, corresponding to 9.2% of the total bridge deck area. Due to the average increasing age of state-owned bridge structures, it is anticipated there will be an upward trend in number of state-owned “Red List” bridges. “Red List” bridges require more frequent inspections due to poor condition, weight restrictions or construction type, and also require more funds to maintain.

## CONDITION AND CAPACITY

Bridges are an important component of the transportation network, however, the conditions of New Hampshire’s bridges continue to decline as the average age of the bridges increase. The total number of bridges in New Hampshire has grown from 3,795 to 3,848 statewide since the 2011 state infrastructure report card was published. As the bridge inventory continues to grow, funding for maintenance, preservation, rehabilitation and replacement of structures is required to be stretched further and further.

All bridges on public ways in New Hampshire are inspected at least bi-annually through NHDOT, with more frequent inspections of bridges determined to be deficient. The inspection interval for bridges on the Red List is cut in half to six months for state-owned bridges and annually for non-state-owned structures. In general, bridges that are included on the NHDOT Red List are deemed “structurally-deficient”.

The Moving Ahead for Progress in the 21st Century Act (MAP-21) instituted a nationwide asset management metric to inventory the percentage of structurally-deficient bridge deck area on the National Highway System (NHS) rather than merely the number of structurally-deficient bridges, as the size of a deficient structure can have a large influence on funding and maintenance requirements. All bridges are not equal, for example, a large interstate river crossing bridge, which is structurally-deficient has a larger effect on bridge maintenance and funding than a small structurally-deficient culvert-type structure. Between 2006 and 2015, there was a net decrease of 9 bridges from the Red List, however, the progress was made solely on the municipal bridges as there was a net increase in state-owned Red List bridges of 12. An interesting statistic is that the number of Red List state-owned bridges increased, but the Red List deck area decreased, while the complete opposite was true of municipally-owned Red List bridges. Twenty-five municipally-owned structures and 16 state-owned bridges were eliminated from the Red List. It is estimated by NHDOT that the cost in 2015 dollars to rehabilitate or replace all of the state-owned Red List bridges is approximately \$562 million. The following tables summarize the conditions of New Hampshire’s state and municipal bridges as of December 2015:

Summary of Bridge Condition by Number of Bridges			
Bridge Condition	State-Owned Bridges	Non State-Owned Bridges	Totals
Red List (Structurally Deficient/Poor)	154 (7.1%)	338 (20.0%)	492 (12.8%)
Totals	2,160	1,688	3,848





Summary of Bridge Condition by Bridge Deck Area (SF)			
Bridge Condition	State-Owned Bridges	Non State-Owned Bridges	Totals
Red List (Structurally Deficient/Poor)	742,000 (7.4%)	423,000 (16.6%)	1,165,000 (9.2%)
Totals	10,059,000	2,544,000	12,603,000

NHDOT administers a state-funded State-Aid Bridge (SAB) program and a federally-funded Municipal Off-System Rehabilitation and Replacement (MOBRR) program to assist municipalities with addressing non-state-owned deficient or Red Listed bridge structures. Generally, the cost sharing in these programs is 80% state and/or federal and 20% municipal. Between an annual state appropriation of \$6.804 million and a federal appropriation of \$4.0 million combined with a municipal match of \$2.16 million, the funding levels in these programs allow for approximately 25 to 30 municipal bridges to be removed from the Red List each year, however, approximately 15 to 20 bridges are also added to the list each year. NHDOT is currently programming municipal bridge projects in these programs for State FY 2026, essentially equating to a ten-year waiting period for municipalities to receive construction funding for municipal Red List bridges. It is estimated by NHDOT that the cost in 2015 dollars to rehabilitate or replace all of the municipally-owned Red List bridges is approximately \$280 million.

### INVESTMENT AND FUNDING

While New Hampshire has made considerable investments into the state and municipal bridges system since the last Report Card, it is clear that significant funding commitments are needed for New Hampshire to sustain a sufficient surface infrastructure system. Effective July 1, 2014, New Hampshire Senate Bill 367 became a law and increased the state road toll (gas tax) by \$0.042 per gallon. This was the first increase in the state road toll since 1991 and is anticipated to generate approximately \$33 million in additional revenue per year, for exclusive use by the NHDOT to address infrastructure projects. Per the new law, the additional revenue is allocated on a priority basis, first to bond debt service for larger on-going projects (I-93 widening, Sarah Mildred Long Replacement) and to highway block grants for municipalities, and then the remainder is directed to betterment projects and the municipal bridge aid program. The increase in the road toll sunsets when the bonds are paid off, or in 20 years, whichever is sooner, meaning it is not a long-term funding solution. The municipal bridge aid portion of the revenue is \$6.8 million, however, there was no effective increase in the funding amount to this program as the new revenue offset funding that had been allocated from another source, effectively keeping the funding level stagnant. Politically, any increase in funding for infrastructure appears to be met with a large amount of resistance, so the funding outlook in the near-term is not optimistic. Without additional revenue from new sources, either federal or state, New Hampshire’s funding levels for transportation will remain essentially the same as they are today meaning that infrastructure needs will continue to outpace the available investment funding.

### RECOMMENDATIONS TO RAISE THE GRADE

NHDOT has made progress in reducing the number of bridges that are structurally-deficient or contained on the Red List. There is still a long road ahead, and as the average age of bridges in the NHDOT inventory increases, it can be expected that the number of bridges added to the Red List each year will increase, therefore, current funding levels will likely not accomplish as much looking forward as they do currently. With the recent completion of Memorial Bridge Replacement and the imminent completion of the Sarah Mildred Long Bridge Replacement, upcoming work will be largely focused on preservation rather than mega-projects.

- With more than half of the state-owned bridges planned to be either repaired by NHDOT Bridge Maintenance or programmed in the 2017-2026 Ten Year Transportation Improvement Plan, more progress should be made in the near future.





- Mega projects have been time-consuming for NHDOT personnel, and changing gears towards bridge preservation will allow for a renewed focus on reducing the number of Red List bridges.
- Further increase or, at a minimum, indexing the state portion of the road toll would generate additional revenue which could be directed towards bridge infrastructure preservation, however, with a continued increase in fuel efficiency of vehicles and alternative power vehicles (electric and hybrid), the road toll alone does not appear to be a long-term solution to addressing the increasing funding gap.

### SOURCES

NHDOT 2015 State Bridge Red List Summary, dated September 15, 2015.

NHDOT State Owned Red List Bridges, dated March 31, 2016.

NHDOT Municipal Owned Red List Bridges, dated March 31, 2016.

NHDOT Annual Report Fiscal Year 2015.

Ten Year Transportation Improvement Plan 2017-2026.

Discussions with NHDOT Bridge Design Bureau personnel October 2016.



# DAMS

## SUMMARY

Dams are an important feature of the New Hampshire environment, creating some of the best water-based recreational areas in the state, providing water supply and hydropower, and, in a few cases, flood control. However, dams that are not maintained in good operational order can fail and cause loss of life and economic damage. A number of the dams in the state, particularly those on the large lakes, were constructed in the mid-1800s to provide waterpower to fuel the great Industrial Revolution-era mills of New Hampshire and Massachusetts. In New Hampshire, the risks associated with many dams are increasing because of: 1) the increasing age of the inventory of dams in the state (the average age of the dams in New Hampshire is 87 years; 2) the number that were built before dam safety engineering standards were developed (over 60% of the dams were built before 1960); 3) businesses and homes that have been built downstream from dams in areas that would be flooded if the dams were to fail; 4) the increasingly frequent occurrence of extreme rainfall events due to climate change; and 5) the lack of needed/required maintenance on many privately owned and some publicly owned dams.

New Hampshire has 146 High Hazard Dams, 158 Significant Hazard Dams, and 532 Low Hazard Dams. 138 of the 146 High Hazard Dams have Emergency Action Plans (EAPs), which show the area that would be inundated if the dam were to fail, and provide a notification flow chart and procedures to be followed by the dam owner during an incident which could threaten life and property downstream. The remaining High Hazard dams have been recently upgraded and the EAPs are in progress. Based on the most recent inspections of the High Hazard Dams, 44 are rated as in Satisfactory Condition, 36 are rated as Fair, 37 are rated as Poor, 2 are rated as Unsatisfactory, and 27 have not yet been rated.

## CONDITION AND CAPACITY

There are currently 2,624 dams in New Hampshire. Of these, 836 of these dams are classified as hazardous dams because the flooding produced by their failure would result in loss of life or property damage downstream. The “hazardous” classification of a dam is based solely on the extent of development downstream within the potentially inundated area, and not related to the condition of the dam.

Of these 836 hazardous dams, 146 are classified as High Hazard Dams because their failure would inundate houses or other occupied structures downstream and likely cause loss of life. One hundred and fifty-eight dams are classified as Significant Hazard Dams because their failure would cause major property damage downstream, and 532 are classified as Low Hazard Dams because their failure would cause minor property damage downstream, such as damage to a town or city road. The remaining 1,788 dams are classified as Non-Hazardous Dams. Because of the small size of these dams and the lack of development downstream, the failure or misoperation of these dams would not cause loss of life or property damage downstream.

Under state law, all Significant and High Hazard Dams in New Hampshire are required to have an Emergency Action Plan, which identifies the areas downstream that would be inundated if the dam were to fail, and includes a notification plan and a response plan. Emergency Action Plans are in place or are being prepared for the 304 Significant and High Hazard Dams in the State. Based on an examination of the inundation maps included in these plans, NHDES has determined that there are more than 26,000 homes, 560 state road crossings and more than 2,500 town road crossings that would be destroyed or damaged if these hazardous dams were to fail.

The major flood events that occurred in the state over the past decade have raised awareness of the significance of New Hampshire’s dams and the need to ensure their structural and operational integrity to protect public safety and property.



To meet this goal, the NHDES Dam Bureau inspects Low, Significant and High Hazard dams at a frequency of 6, 4 and 2 years, respectively. NHDES's inspection schedule requires that NHDES inspect 202 dams per year. This workload is accomplished by three Dam Safety Engineers and the Supervisor of the Dam Bureau's Dam Safety and Inspection Section. Currently, a fourth Dam Safety Engineer position is vacant because of a funding shortfall.

### INVESTMENT AND FUNDING

Governmental Organizations or utilities own about one-quarter of the dams in the state. The majority of the dams are owned by private organizations or individuals. Operation, maintenance, and rehabilitation of dams can range in cost from the low thousands to millions, and owners are responsible for these expenses. Many owners, especially the private dam owners who do not have a source of revenue associated with their dams, cannot afford these costs.

#### *State-Owned Dams*

In addition to its responsibility for regulating the safety of the 2,624 dams in the State, the NHDES Dam Bureau is responsible for performing all the repairs and reconstruction required on all the 276 state-owned dams. NHDES dam operators perform daily operations and maintenance on the 111 dams owned by NHDES, as well as the 100 dams owned by the New Hampshire Fish and Game Department. With an average expected design life of 50 years, NHDES must perform 5 to 6 major reconstruction projects per year to keep up with the work required on the inventory of 276 state-owned dams. Currently, 48 of the 276 state-owned dams (or approximately 17%) have been identified as having deficiencies that require major reconstruction or repair. The total cost of these repairs, using state resources for the design and reconstruction, is estimated to be approximately \$33 million.

The cost for the repair and reconstruction of state-owned dams is funded from the State Dam Maintenance Fund established under RSA 482:55 supplemented with general funds for the operation and maintenance of the dams. In addition, as part of the last several biennial budgets, the legislature has provided Capital Appropriations of approximately \$3 million per biennium to fund major reconstruction projects at state-owned dams.

#### *Municipally-Owned Dams*

There are a total of 363 municipally-owned dams in New Hampshire. Assuming that this inventory is in similar condition to the inventory of state-owned dams, then approximately 17% or 62 dams could be expected to be in need of significant reconstruction or repair. Assuming a conservative per project cost estimate of \$500,000 per project, the total estimate of the investment needs for municipally-owned dams is \$31 million.

#### *Privately-Owned Dams*

There are a total of 1,962 privately-owned dams in New Hampshire. Assuming that this inventory is in similar condition to the inventory of state-owned dams, then approximately 17% or 333 dams could be expected to be in need of significant reconstruction or repair. Assuming a per project cost estimate of \$500,000 per project, the total estimate of the investment needs for privately-owned dams is approximately \$166 million.

To provide a potential funding source for private dam owners, the New Hampshire Legislature established the Dam Maintenance Revolving Loan Fund with enactment of Chapter 272:5 of the Laws of 2008. The primary purpose of that law was to establish a per diem fine on dam owners and operators for failure to comply with New Hampshire's Dam Safety statutes and regulations or failure to perform required maintenance work on their dams. During the debate on the bill, the legislature determined that any fines collected under this new authority should be dedicated to a revolving fund which could provide low-interest loans to dam owners to help fund the necessary repairs, and it modified the bill accordingly. The statute was amended in 2009 with the enactment of Chapter 110 of the Laws of 2009 to authorize the Dam Maintenance Revolving Loan Fund to accept revenue from other sources including the general fund, principal and interest





from the repayment of loans, grants and awards from the federal government, interest earned from the investment of fund balances, and private gifts. The statute was amended further in 2013 with the enactment of Chapter 45 of the Laws of 2013 to allow municipalities, in addition to private dam owners, access to the Dam Maintenance Loan Fund, and allow the fund to be used for removal or improvement to the dams, instead of only repair.

The current balance of the Dam Maintenance Revolving Fund from fines collected to date is approximately \$76,000, which is much less than the costs of a typical repair, improvement or removal project. Currently funding is not available from any of the other revenue sources identified in the statute. However, if funding from these sources were ever to become available, the Dam Maintenance Revolving Fund provides a framework to help municipal and private dam owners improve the safety of their dams.

### RECOMMENDATIONS TO RAISE THE GRADE

New Hampshire's dams provide a wide range of benefits, from flood control, electricity generation, and water supply, to providing the basis for our state's scenic image and our recreational opportunities. We have, however, allowed our dams to age without providing proper care. In addition, development in the state continues, which means the population growing up around dams is increasing, putting more people at potential risk should there be a dam failure. The NHDES Dam Bureau is understaffed and operates with limited funding, thereby reducing the frequency of inspections and slowing the regulatory actions needed to maintain the safety of our dams. The number of dams that need repair and rehabilitation continues to grow while costs for the necessary work outpace the available funding. Recent legislation has improved the mechanisms for funding dam improvements by providing municipal and private dam owners with better access to the state's dam maintenance revolving loan fund; however, the financial needs for dam safety, maintenance, and repair far outstrips the state funds currently available. ASCE-NH makes the following recommendations:

- Unfunded dam inspector positions should be funded and filled; staffing levels should be consistent with current state of practice.
- Prepare Emergency Action Plans for all the significant and high hazard dams by 2018.
- NHDES should develop a long-range capital program that addresses the financial needs for properly repairing, rehabilitating, and operating the state-owned dams.
- The New Hampshire General Court should appropriate the funding necessary to ensure the dam maintenance revolving loan fund can better service the needs of deficient private and municipal dams.

### SOURCES

New Hampshire State Department of Environmental Services.

New Hampshire Lives on Water; New Hampshire Water Sustainability Commission Final Report; December 2012

SB60, Chapter 245:1, Laws of 2009, Commission to Study Water Infrastructure Sustainability Funding Final Report, November 2013



# DRINKING WATER

## SUMMARY

The public drinking water infrastructure has served NH communities and businesses well over the past several decades. However, much of the current infrastructure has exceeded its design life, is operating at its capacity, or is out of compliance with new regulatory standards and requires upgrading or replacement. In many cases, the actual condition of the infrastructure is unknown because it is buried underground. Accurate records and locations of the infrastructure are also sometimes unknown due to the age of the infrastructure.

## CONDITION AND CAPACITY

It is anticipated that New Hampshire's population will continue to grow through 2035, especially in higher density cities where public drinking water infrastructure is utilized the most. Failure to invest can result in water disruptions, impediments to emergency response, and damage to other types of infrastructure. The cost (per foot) to repair a pipe increases significantly for an unscheduled repair, compared to the cost to maintain and replace infrastructure prior to a break. Emergency repairs may also cause disruptions to transportation and commerce.

In 2016, drinking water infrastructure was stressed due to drought conditions that were observed throughout New Hampshire, but most notably in the southern communities. As a result of the drought, hundreds of public and private wells failed, homeowners had to wait weeks to deepen or replace wells because of the high demand, and public water supply has been limited. As of November 10, 2016, 166 community systems reported implementing a water restriction or ban, and 15 municipalities implemented voluntary or mandatory outdoor use bans within their political boundaries. Additionally, there is limited financial resources available to private well owners to repair or replace their existing wells.

Emerging contaminants are also starting to play a role in the importance of drinking water infrastructure. In 2016, the New Hampshire Department of Environmental Services (NHDES) worked with communities around New Hampshire that were affected by emerging contaminants in their private drinking water wells. For many homeowners, it was possible to connect to the public water supply by extending existing public water lines (pipes). However, there is currently no financial mechanism to fund water line extensions that are needed due to the discovery of emerging contaminants in drinking water.

It is imperative that citizens and leaders in New Hampshire understand the critical need for reliable drinking water and advocate for sustainable funding sources to deliver adequate drinking water infrastructure to our citizens.

## INVESTMENT AND FUNDING

A joint legislative study was funded and a committee was formed in 2009 to study water infrastructure sustainability funding and in November 2013 the final report was released. The study predicted the infrastructure investment needs for the next 10 years, identified the need for an additional revenue source (other than rate-payers), and made recommendations on revenue sources.

A 10-year infrastructure investment of approximately \$857 million for drinking water infrastructure is needed to update the current infrastructure to ensure reliability, meet demand growth, and achieve regulatory compliance objectives. While the creation of the report provides a great building block to initiate intelligent discussions on infrastructure investment, there has been no legislative action to date to ensure funding for public drinking water infrastructure.



### RECOMMENDATIONS TO RAISE THE GRADE:

New Hampshire's public drinking water infrastructure is aging and has surpassed design life. Severe weather conditions in recent years have highlighted some of the vulnerabilities of the current drinking water infrastructure. Emerging contaminants are starting to play a role in the need for reliable infrastructure throughout the state. The State general fund appropriations are not a sustainable, reliable funding source for drinking water infrastructure investment.

ASCE supports the following recommends:

- Reinvigorate the State Revolving Loan Fund (SRF) program under the Safe Drinking Water Act through permanent reauthorization and tripling the amount of annual appropriations.
- Fully fund the Water Infrastructure Finance and Innovation Act (WIFIA) at its authorized level.
- Determine new state revenue source(s), such as the "beverage container charge" recommended in the SB60 Report, to create a dedicated Water Trust Fund;
- Citizens and leaders advocate for the infrastructure and for sustainable funding;
- Legislatures compromise on a revenue source and commit on the investment.

### SOURCES

New Hampshire Lives on Water: <https://nhlivesonwater.org/>

SB60, Chapter 245:1, Laws of 2009, Final Report, Dated November 2013

State of New Hampshire, Office of Energy and Planning Regional Planning Commissions County Population Projections, 2013 <https://www.nh.gov/oep/data-center/documents/2013-projections-state-counties.pdf>

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# ENERGY

## SUMMARY

Significant investments have been made to improve the reliability of New Hampshire's electrical transmission and distribution systems and upgrade existing gas distribution infrastructure. However, retirements of power generators in the region are expected to result in demand outstripping the supply of electricity by 2018 unless new generators are added or efficiency reduces demand. Currently, nuclear and natural gas generation make up 80% of New Hampshire's generation capacity with the remaining 20% made up of coal, hydroelectric and renewables. The reliability of supply, lack of diversity, and age of energy infrastructure increases our state's and customers' risk for future increased energy costs. In 2016, the average price of electricity in the state increased over 2015 prices, and electricity rates are higher in New England than anywhere else in the contiguous US, however, the average bill of a commercial entity in New England is significantly lower than the average commercial bill in the US.

## CAPACITY AND CONDITION

Energy infrastructure in New Hampshire includes power generators, power lines, pipelines, and supporting infrastructure such as substations and regulator stations.

### *Electric Infrastructure*

Significant investments have been made to improve the reliability and reduce congestion on the electric transmission system in response to a 2012 ISO-NE system study that assessed the ability of the transmission system to meet projected needs in the New Hampshire/Vermont area by 2020. In addition, Eversource Energy, the largest electric utility in NH, is upgrading the distribution system. This includes constructing and upgrading substations and distribution lines to increase reliability and meet load demands.

### *Gas Infrastructure*

New Hampshire has no natural gas production and relies on domestic and foreign imports to supply gas via four interstate transmission pipelines or three utility liquefied natural gas storage facilities. Proposed pipeline expansion projects have been stalled by regulatory and financial factors. The increased reliance on natural gas for power generation has contributed to supply constraints during peak winter periods, which drives up the price for consumers. There are two natural gas local distribution companies in NH that have limited growth potential due to the lack of supply. However, the condition of the existing distribution pipeline infrastructure is good. According to the US DOT Pipeline and Hazardous Materials Safety Administration, there are approximately 3,400 miles of distribution pipeline in NH that provides gas service to customers. The majority of the existing gas distribution infrastructure has been upgraded to plastic or cathodically protected coated steel. Only 5% of steel main lines and 26% of service lines (~112 miles) need to be upgraded to cathodically protected coated steel.

### *Power Plant Infrastructure*

According to ISO-NE 2015 Regional System Plan, approximately 2,500 Megawatts (MW) of power generation retired from 2010 through 2016 with another 1,550 MW that will retire by summer 2018. The retirements of power plants in the regions are due to the age of existing power plant infrastructure and economic and political factors; including the price of fuel and political commitment to reduce carbon emissions. According to Eversource, no significant infrastructure investments are needed to maintain operation of their three power plants and nine hydroelectric power plants located throughout NH that produce a total of 1,059.5 MW of electricity. Merrimack Station in Bow is a coal fired plant that meets or exceeds existing environmental regulations due to the installation of a scrubber that removes pollutants. NextEra



Energy's Seabrook Station nuclear power plant that generates 1,244 MW of electricity is seeking a license extension to the year 2050. The most prominent concern for the plant's license renewal process is how to address concrete degradation found in several of the plant's structures in 2010. At this point, it is uncertain if and how much infrastructure investment is needed to address the problem.

New Hampshire's renewable infrastructure is growing. In 2015, New Hampshire installed 16 MW of solar electric capacity bringing the total number of installed MW up to 35. The state has 185 MW of installed wind power. Over the next five years, New Hampshire is expected to install 241 MW of solar electric capacity. New Hampshire will increase the Renewable Portfolio Standard (RPS) from 8.3% to 24.8% in 2025. In 2016, the net metering cap was raised from 50 MW to 100 MW; however, there is an open docket at the NH Public Utilities Commission (PUC) which may result in a change in customer-generator compensation or new tariffs.

### Supply

It is expected that power plant retirements will outpace additions by approximately 500 MW by 2018. Eversource, in order to comply with deregulation of the energy market in NH, will sell its twelve power generators making the fate of those facilities and the impact on capacity uncertain. In addition, retirements result in less diversification of large scale generation within the region and an increased dependency on natural gas generation. Increased dependency on natural gas, is a problem and large risk for the state, if natural gas supply is insufficient to meet the demand of end users. According to Vamsi Chadalavada, Executive Vice President and Chief Operating Officer of ISO New England Inc., "Winter has become a challenging time for New England grid operations. Especially during the coldest weeks of the year, the natural gas infrastructure in New England is inadequate to meet the demand for gas for both heating and power generation. In fact, we've identified over 4,000 MW of natural-gas-fired generating capacity at risk of not getting sufficient fuel on any given day." In addition, according to Unitil, the expansion of distribution pipeline infrastructure to new customers is limited by the lack of natural gas capacity at the appropriate pressure to provide expanded services within the state.

Recently proposed natural gas transmission line projects that would increase capacity in the system have been thwarted by the lack of a funding mechanism or power purchase agreements. One wind project was recently approved that would generate 28.8 megawatts of power. Another possible solution is to increase transmission of energy into New Hampshire via the Northern Pass Project. Northern Pass is a 192-mile transmission line project that will bring 1,090 MW of clean, affordable energy from Hydro-Québec's hydroelectric plants in Canada to New Hampshire and to the rest of New England. Northern Pass is currently awaiting regulatory approval. Also, there is significant potential for energy efficiency to continue to reduce overall demand in the State and region.

### INVESTMENT AND FUNDING

The intent of deregulation was to allow market forces to operate and ultimately reduce the risk and cost borne by consumers via electric rates. The unintended consequence is a system that is largely dependent on natural gas supply, which can become constrained. In 2014, the six New England governors proposed funding a new pipeline by adding a charge to electricity bills, on the premise that the new pipeline capacity would eventually reduce the cost of electricity since most New England power plants run on natural gas. In 2016, the PUC ruled that utilities cannot sign up for space on a natural gas pipeline and pass the costs along to ratepayers. Private developer, Kinder Morgan, withdrew its project for a proposed natural gas pipeline after failing to get commitments from big customers. A viable funding mechanism to increase natural gas capacity in the unregulated environment has yet to present itself.

In addition, public policy surrounding renewable generation is mixed. There is a dedicated Renewable Energy Fund used to provide grant monies to support renewable energy projects, as well as Renewable Energy Certificate sales. However,



\$720,000 of the REF fund was diverted to the Division of Homeland Security in Fiscal Year 2016. In addition, the rate to be paid to generators who participate in net metering is being evaluated by the PUC. Uncertainty in available funding and rate of return on investments discourages private investment in the renewable market.

#### RECOMMENDATIONS TO RAISE THE GRADE:

Electric and gas infrastructure is currently in adequate condition and does not require significant investments within the next five years to maintain the current level of operation. However, electric and natural gas demand is projected to surpass supply within the next five years resulting in risk to the system and increased electric and heating costs for consumers. ASCE supports the following recommendations:

- Improve funding for energy efficiency programs;
- Support policies that provide reasonable certainty for cleantech demand incentivize cleantech-based businesses to make investments in capital equipment and employees;
- Utilize competition and market-driven mechanisms that support cleantech and economic growth;
- Implement an Energy Efficiency Resource Standard (EERS);
- Encourage distributed generation by expanding use and scope of renewable property tax exemptions, raising or lifting net metering cap, and attracting private financing;
- Diversify NH's fuel portfolio and increase the use of in-state resources.

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# HAZARDOUS WASTE

## SUMMARY

New Hampshire, like many of the states in the northeast, has a wide range of environmental legacy concerns due to the industrial and manufacturing past of the state. There are currently over 1,649 sites that must address petroleum and/or hazardous waste contamination according to inventories maintained by the New Hampshire Department of Environmental Services (NHDES). In addition, there are 20 Superfund sites and 600+ Brownfields in New Hampshire. Although progress has been made with many sites and the Methyl-tertiary-Butyl Ether (MtBE) Remediation Bureau was formed during 2014 to specifically address state-wide MtBE contamination, overall revenues for contaminated site cleanups have been declining. In March 2016, the Southern New Hampshire perfluorooctanoic acid (PFOA) investigation was launched to identify sources of perfluorochemicals (PFCs) in southern New Hampshire drinking water supplies. This investigation was expanded and, to date, PFCs have been found in several locations within New Hampshire; the investigation is ongoing. The emergence of these new contaminants has further stretched the efforts of the already overloaded NHDES both in terms of department responsiveness and funding for cleanup efforts.

## CONDITION AND CAPACITY

The primary missions of NHDES are to ensure the health and safety of the public and to protect the quality of New Hampshire's environment. Among the NHDES's Waste Management Division are many programs including the Hazardous Waste Management and Remediation Bureaus, the Petroleum Remediation Section, and the recently formed MtBE Remediation Bureau. These programs are responsible for tracking generators of hazardous waste and for the remediation of sites where hazardous substances or hazardous wastes have been released to the soil and groundwater of the State.

### *Superfund*

In 1980, the U.S. Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as Superfund, to clean up contaminated sites created through uncontrolled disposal of hazardous substances. New Hampshire has 20 identified Superfund Sites with each undergoing cleanup through the Superfund program. Fourteen of the sites are in the remedial monitoring phase (post-construction monitoring of the effectiveness of the cleanup), one site is in the remedial design phase, three sites are in the remedial action phase, and two sites are in remedial investigation phase. One additional site (the Mohawk Tannery Site in Nashua) has been proposed as an addition to the National Priority List (NPL), and one site (Town Garage) has been delisted from the NPL.

### *Brownfields*

The federal Brownfields program was established in 1994 and is administered within CERCLA. NH's Brownfields Program became effective July 1, 1996. The program encourages cleanup and redevelopment of industrial or commercial properties known as "Brownfields" that are abandoned or underutilized because of known or suspected environmental contamination. The NH Brownfields Program provides incentives to remediate and redevelop these properties by parties who are not responsible for the contamination while being protected from liability under state law (through a Covenant Not to Sue). NHDES estimates there are 600+ Brownfields in NH. Of those, approximately 215 sites have benefitted from NHDES and/or EPA Brownfields funding. NHDES also reports that 56 sites have been accepted into the State's Brownfields Program and are eligible for Covenants Not to Sue.

### *State Hazardous Waste Sites*

In addition to the contaminated sites in the Superfund and Brownfields programs, there are approximately 1,278 other known hazardous waste sites in New Hampshire according to NHDES inventories. Of this total, approximately 492 of the



sites are under active oversight and management by NHDES. Financial support for their oversight of the State sites is received from the State's Hazardous Waste Cleanup Fund and the State's General Fund, but revenues from these sources have been declining. The initiation of the 2016 investigation into the presence of PFCs in New Hampshire has further stretched NHDES resources. At this time, the scope, scale and duration of this investigation is unknown. As new data become available and/or new emerging contaminants are identified, the likelihood of future investigations in New Hampshire increases.

### **State Petroleum Release Sites**

New Hampshire currently has approximately 1,157 known petroleum release/remediation sites that are under active remediation or other controls. Available data indicates a decline in the number of active leaking underground and on-premise heating oil tank sites (the two largest categories). The number of new leaking underground tank sites has declined and the number of on-premise tank sites has roughly leveled off. More than 10,000 petroleum release sites of all types have been closed as clean since the early 1990s. During 2016, New Hampshire regulated 1,491 underground storage facilities (3,410 individual tanks) and 1,120 above ground storage facilities (4,841 individual tanks). These facilities were used to store a total of 44.1 million and 151.6 million gallons of products, chiefly petroleum, respectively.

### **INVESTMENT AND FUNDING**

The NHDES's Superfund Program has received approximately \$18,252,216 over the past 5½ years, including the required 10% state match. Additional funds would allow for more expedited cleanups and, potentially, more cost-effective restorations and returns to potential future use of the state's Superfund sites. NHDES has also received approximately \$857,000 to \$994,000 annually between 2012 and 2016 for its Brownfields Program with the trend in funding generally decreasing. The Brownfields Program also includes a Revolving Loan Fund (RLF) that provides low-interest loans for cleaning up Brownfields. NHDES was awarded its current RLF grant in 2005 and received supplemental funds in 2007, 2008 and 2013. The RLF Fund balance is currently less than \$475,000. Lack of funds in this account will hamper efforts to identify and remediate Brownfields properties.

Funding for petroleum release sites is received from the petroleum cleanup funds (petroleum products imported into New Hampshire are taxed at \$0.015 per gallon to provide money for clean ups). The Oil Fund Disbursement Board administers this funding for petroleum site cleanups. Funding from the Board was \$16,197,168 in 2014 and \$16,888,922 in 2015. These totals were supplemented, in 2015, by \$1.2 million from the federal Leaking Underground Storage Tank Fund (LUST). State general funds are not used in this program. In addition to the petroleum cleanup funds, petroleum release sites that contain MtBE or water supplies impacted by such sites can be funded under the court-ordered settlements for remediation of MtBE contamination. The settlement funds total \$81,630,000; approximately \$10 M has been expended to date.

### **RECOMMENDATIONS TO RAISE THE GRADE**

Funding for the petroleum and hazardous waste cleanup programs is a primary concern of the NHDES to continue to ensure the health and safety of the public and to protect the quality of New Hampshire's environment. ASCE supports the following recommendations:

- Dependable, dedicated, long-term sources of funding are needed to ensure that remediation of contaminated sites continues.
- Legislative initiatives that would allow diversion of funds from New Hampshire's Petroleum Reimbursement Funds to other State programs should be prevented, and an increase in the New Hampshire petroleum import fee to raise revenue for the petroleum reimbursement funds should be considered.



- To continue Brownfields redevelopment, funding for federal and state programs that support remediation and redevelopment of Brownfields should be supported.
- For Superfund, another federal funding mechanism should be pursued to remove the cost of cleanups from the federal general fund. Resources for Superfund sites should focus on implementing remedial actions that will achieve the greatest reduction in risk to human health and the environment, with consideration given to future uses of sites. Additional research support and coordination should be provided at sites where the contaminant releases continue to pose long-term threats and remediation difficulties.

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# PORTS

## SUMMARY

With only 17 miles of coastline, New Hampshire has a limited number of commercial ports. However, these facilities play a vital role in the economy and recreational activities of the seacoast region. Years of inattention, lack of planning, and deferred maintenance have resulted in substandard conditions that limit the potential of New Hampshire's ports.

## CONDITION AND CAPACITY

The majority of port commerce occurs on the Piscataqua River separating Portsmouth, New Hampshire and Kittery, Maine. The Piscataqua River area includes seven industrial terminal facilities, the New Hampshire State Pier (Market Street Terminal), a commercial fish pier, and several smaller facilities. The Portsmouth Naval Shipyard is located on the Maine side of the river in Kittery. The Piscataqua River is a tremendous resource for New Hampshire with an 800 foot diameter upper turning basin, 1000 foot diameter lower basin, and 35 foot channel depth. The river's natural and navigational features allow for a maximum 750-foot Panamax vessel and cruise ships.

The eight acre Market Street Marine Terminal is under the jurisdiction of the Pease Development Authority (PDA) Division of Ports and Harbors and is the only publicly owned, deep water general cargo terminal on the Piscataqua River. In addition, this terminal is a designated Foreign Trade Zone. A Master Plan was completed for the terminal in 2000 concluded that the terminal was underutilized at that time. The Market Street pier constructed storm water improvements completed in 2013, and the south bridge access was replaced in 2014. Security upgrades to the pier in 2006 included a CCTV system, offices relocated outside of the secured area, and a small boat dock for the City of Portsmouth Fire Department, Harbormaster, and emergency responder boats. At present, the facility has an inefficient layout to accommodate multiple bulk landings and the pier requires upgrading to accommodate larger vessels. The terminal is in desperate need of rehabilitation upgrades. In particular, there are neither plans to make the Terminal more resilient to extreme weather and sea level rise, nor plans to mitigate damage to critical infrastructure elements such as communications or power.

Smaller harbors and marinas are found throughout the state, and Hampton-Seabrook and Rye Harbors include state owned facilities supporting smaller fleets. Hampton-Seabrook Harbor is accessed by vessels through a common entrance channel under Route 1A shared by the towns of Hampton and Seabrook. Hampton Harbor facilities consist of a state-owned commercial fishing pier and public boat launch in Hampton; and a public pier and launch ramp in Seabrook. These facilities support a small commercial fishing fleet, a charter fleet, and many recreation boaters. Rye Harbor consists of a man-made harbor used by recreational boaters, charter boats, and a small commercial fishing fleet. The facility has a state-owned, commercial fishing pier (re-constructed in 2009), boat ramp and moorings. Rye Harbor was last dredged in 1986-1987 and is starting to show signs of the need for maintenance dredging.

## INVESTMENT AND FUNDING

In 2011, 3.1 million tons of cargo worth \$1.7 billion was loaded or discharged at terminals along the Piscataqua River. This was an increase of 2% compared with 2010. A significant portion of the region's energy comes in through the port with fossil fuels (oil, propane, and coal) accounting for \$0.9 billion in cargo value. The amount of fuels brought in through the port provides the equivalent of 20% of NH's total energy use.

The PDA and USACE have proposed widening the current Upper Turning Basin from 800 feet to over 1,000 feet in order to accommodate longer vessels that call on the State's ports. The feasibility study and dredge disposal options are currently under review. The project cost is estimated at \$14.3 Million with a 65% federal, 35% state cost sharing. Funding



is in place from USACE and the offshore disposal site is permitted. In addition to the upper terminal basin, other area terminals are looking to possibly dredge their facilities at the same time. The current upper basin width is an impediment to vessel access to area facilities, and dredging is planned for 2016-2017.

The PDA Division of Ports and Harbors is self-funded and receives no additional funding from other PDA or the State of New Hampshire. The generated revenue from State Pier operations is insufficient to provide bonding capability for proposed construction projects. As a result, the Authority applies to various governmental funding sources (TIGER, FEMA, etc.) for necessary upgrades. The State Pier previously had long term leases for salt and scrap metal businesses. In 2015 the scrap metal lease was not renewed. Staging for the Sara Long bridge construction has taken its place, however a new customer needs to be secured by 2018 or there will be a significant drop in the State Pier's revenue stream.

The greatest needs of this navigable waters system appear to be regular maintenance dredging, in order to maintain depth clearance within the State's navigable waters; rehabilitation and realignment of the Market Street Marine Terminal, miscellaneous repairs to piers, wharfs, docks, and jetties; and a long-range capital maintenance and improvement plan. The state legislature continues to pass bills that authorize the Pease Development Authority, Division of Ports and Harbors to enter into project partnership agreements for dredging with the Department of the Army. USACE has estimated that approximately 2.8 million cubic yards of sediment will require dredging from New Hampshire's navigable waters between 1994 and 2044. Furthermore, New Hampshire currently does not have suitable onshore or offshore disposal sites for dredge spoils. The long-term offshore disposal site off Cape Arundel, Maine was closed in 2010 without a new offshore site approved. A "Regional Sediment Management Plan" has been proposed by the PDA Division of Ports and Harbors and currently requires funding.

#### RECOMMENDATIONS TO RAISE THE GRADE:

Overall, the state's ports funding is inadequate to accommodate future growth and generate economic benefit for our state. Our ports need a long term guaranteed funding source, maintenance plan and dredging disposal site, and master plans to promote growth and sustainability of these revenue sources. ASCE-NH supports the following recommendations:

- A master plan for the PDA Division of Ports and Harbors should be discussed and developed with an implementation schedule and financial plan;
- The Regional Sediment Management Plan should conclude the search and identification of sediment disposal, including long term, sustainable solutions. Attendant to this, the sediment management plan funding must be finalized. As dredging is an ongoing necessity for NH ports and harbors, long term, sustainable funding mechanisms should be developed and enacted;
- Long term funding for rehabilitation, realignment, and maintenance of the Market Street Marine Terminal is necessary to maintain the viability of the State's only publicly owned deep water pier;
- There is an ever increasing need to develop a plan to address the susceptibility and damage to critical port infrastructure from sea level rise.



# RAIL

## SUMMARY

New Hampshire has a total of 443 route miles of rail trackage as reported in the 2012 State Rail Plan. The state's rail trackage is used primarily for transporting freight, but the network also includes tourist railroads and Amtrak passenger service operating on selected routes. The State of New Hampshire owns approximately 201 miles of active track (45% of the total in-state trackage) that are leased and operated by private carriers. Approximately 242 route miles are owned and operated by private railroads, with one regional railroad (Pan Am Railways) operating 121 miles of the total trackage.

## CONDITION AND CAPACITY

### Freight Traffic

There are nine active freight railroads operating in New Hampshire. Most of the freight carried on New Hampshire's tracks (approximately 5,600,000 tons in 2012) is "bridge traffic" that passes through the state. New Hampshire's railroad system is an important importer and exporter of resources for local businesses. The railroads exported approximately 321,000 tons of New Hampshire products and goods, mostly aggregate (95%), from the state during 2012. Since the state is a net importer of rail freight, an additional 780,000 tons of freight, primarily coal, petroleum, lumber and wood products, cement, and chemicals, terminated at facilities in the state in 2012. Over half of the total tracks are Federal Railroad Administration (FRA) Class 1 (maximum allowable speed of 10 mph for freight traffic) or slower. As of 2012, only about 40 percent of the state's tracks were FRA Class 3 or 4 (maximum speeds of 40 to 60 mph for freight traffic and 60 to 80 mph for passenger traffic). This high percentage of slow-speed track illustrates the lack of maintenance and the track limitations that currently will not allow time-sensitive cargoes to be carried over most of the track in the state. As identified in the State Rail Plan, freight tonnage has declined over the past decade.

The freight rail industry is changing standards to increase freight cars to a 286,000-lb load capacity (over the older 263,000-lb loadings). This results in additional inadequacies of the rail network. As of 2012, only approximately 104 miles (24% of the total state trackage) are capable of handling the heavier 286,000-lb carloads. Shipping freight in double-stacked intermodal containers on flatcars has allowed the freight-rail industry to improve efficiency. Double-stacks require higher clearances than earlier railroad standards. As of 2012, only 17% (76 miles) of NH's tracks have adequate clearance, with the most common obstruction being bridges which preclude double-stacked shipping.

### Passenger Travel

New Hampshire has two intercity Amtrak passenger rail routes that pass through the state:

- "The Vermonter" (one daily round trip), between St. Albans, Vermont and Washington, D.C. has a stop in Claremont, New Hampshire. Annual ridership from the five stations that serve New Hampshire and nearby Vermont (one station in New Hampshire, four stations in nearby parts of Vermont) is over 35,000 riders. This route is FRA Class 4 track (maximum speed 80 mph).
- "The Downeaster" (five daily round trips between Boston and Portland, Maine has three stops in New Hampshire). Since 2011, annual ridership has been over 500,000 passengers with approximately 200,000 riders per year from New Hampshire. This route is FRA Class 4 track (maximum speed 80 mph).

## INVESTMENT AND FUNDING

### Freight Operations

There is little state funding available to assist railroads in improving the rail network. The state has a Special Railroad Fund dedicated to maintenance and repair of state-owned lines (approximately \$250,000 annually). The state established a



revolving loan fund for improvements on privately owned lines. Originally, \$4 million was set aside and this had been loaned out by 2010. The current balance in the fund is \$700,000. There have not been large-scale, private-only investments to improve the condition of the freight rail system in many years.

### ***Passenger Operations***

Continued population growth in southern NH has increased the congestion on the local highway system: traffic on Interstate I-93 routinely experiences delay and daily commuter traffic on the Everett Turnpike continues to grow. Efforts to improve the state's rail network are currently focused on reducing air pollution emissions and highway congestion through development of passenger rail service for commuters to and from the Greater Boston area.

Potential expansion of passenger services that has been evaluated is the "Capitol Corridor." This project would extend the commuter rail service from Lowell, MA to Nashua, Manchester, and Concord, NH along an existing rail. NHDOT completed the feasibility study "New Hampshire Capitol Corridor Rail & Transit Alternatives Analysis" (December 2014), which evaluated the feasibility of extending passenger rail service and other transit alternatives. The study concluded that substantial economic benefits would be generated by the proposed passenger rail service, mostly through new jobs and real estate development. The potential economic development, when coupled with the new passenger service, was a key finding of the study. The next phase will require \$4 million for completing a detailed financial plan, final engineering/environmental evaluations, and federal funding applications. The Governor has opposed undertaking this next phase of the project. Additionally, the legislature voted to remove the next phase from the 10-Year Transportation Plan. The Capitol Corridor project has become a contentious political subject.

### **CONCLUSIONS**

The physical condition of the New Hampshire trackage is adequate for the current levels of freight and the typical freight being hauled and for the current levels and speeds on the passenger routes. The service levels (freight delivery schedules and frequency of passenger service) are generally adequate for shippers and passengers, but future increases in either freight or passenger service will be limited without additional investments. Safety incidents have been rare. There have been a handful of minor railroad incidents in the state over the last few years including the derailment of single wheels or cars, but nothing that raises safety to the level of a public concern.

The state rail system has a low resilience due to lack of redundancy in routes. The railroads in New Hampshire generally operate and maintain their infrastructure adequately and in compliance with state and federal regulations.

Incorporating commuter rail into the mix of transportation modes will be a challenge. Recent appropriations have paid for the initial evaluations for commuter rail service on the New Hampshire Capital Corridor. The design and implementation phases will require additional funding, which the General Court has been very reluctant to approve.

### **RECOMMENDATIONS TO RAISE THE GRADE:**

A healthy rail network still remains an important component of the state's infrastructure. The railroad infrastructure in New Hampshire could be improved by the following:

- Develop a program of dedicated funding to allow use of state funds for maintaining and upgrading the state's freight-rail infrastructure;
- Encourage upgrading the state's mainlines and primary branch lines to accommodate 286,000-lb freight cars and double-stack container intermodal traffic;
- Cooperate with surrounding New England states to resolve regional rail issues and to promote cooperation and efficiency within the rail network;





- Develop policies to promote increased and improved intermodal freight transportation (consistent with ASCE Policy Statement 149).

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# ROADS

## SUMMARY

New Hampshire has seen an increase in vehicle miles traveled (VMT) on the state's roads since 2011, when the last Report Card was released. Based on the 2015 assessment, approximately 47% of the road network is in good condition, 24% in fair condition, 22% in poor condition and 7% in very poor condition. This includes large investments in the Interstate I-93 corridor and Spaulding Turnpike. New Hampshire passed a 4.2-cent/gallon gas tax increase in 2014, which helps to offset some of the costs from 20 years of deferred investment, however there are still unmet needs. The effectiveness of a gas tax continues to decline as vehicle mileage per gallon and alternative fuel vehicles continue to erode the revenue generated.

## CONDITION AND CAPACITY

After 2015, the NHDOT revised the methodologies for evaluating the road system and the strategy for maintenance of their infrastructure. NHDOT categorized roads in tiers; in general, the Tier 1 roadways represent the Interstate and Turnpike system, Tier 2 the non-Interstate National Highway System (NHS) and other high traffic volume corridors, Tier 3 the regional corridors, and Tier 4 the lower traffic volume unnumbered roadways. The International Roughness Index (IRI) is used to determine thresholds for good, fair, poor, and very poor condition roads.

### Highway Conditions:

Tier	Good Condition (%)	Fair Condition (%)	Poor Condition (%)	Very Poor Condition (%)
1	96.5	3.3	0.2	0.0
2	60.1	25.5	13.0	1.5
3	29.5	33.9	30.5	6.1
4	8.4	22.7	45.6	23.3

Note: Highway road condition (including Turnpikes) based on 2015 data

The Bureau of Turnpikes maintains approximately 620 lane miles of roadways including Interstate I-95, the Spaulding Turnpike, and the F.E. Everett Turnpike from the Massachusetts border to the junction of Interstate I-93 and Interstate I-393 in Concord. While the Turnpike system is predominately comprised of Tier 1 roadways, there are also some Tier 2, 3 and 4 roadways. The Bureau of Turnpikes has set the following overall condition targets for their roadway network: Good: 90% min.; Fair: 5-10%; Poor: 5% max.

### Turnpikes Conditions:

Tier	Good Condition (%)	Fair Condition (%)	Poor Condition (%)	Very Poor Condition (%)
1	91	8	1	0

Note: Turnpike road condition based on 2015 International Roughness Index data

According to TRIP, a national transportation research group, driving on roads in need of repair costs each New Hampshire motorists about \$317 each year.

New Hampshire utilizes a wide variety of pavement treatments (see definitions page) depending on the condition of the roadway and the desired service life:



- **Reconstruction Strategy:** Limited to NHDOT's Ten Year Plan capital improvement projects like I-93 Salem-Manchester and NH 125 Plaistow-Kingston.
- **Rehabilitation Strategy:** Only utilized on Tier 1 roadways and is considered on a case-by-case basis on other Tiers. The goal of rehabilitation is to restore a pavement to good condition whereby the preservation strategy can then be applied to maintain it in good condition.
- **Preservation Strategy:** Applies to constructed roadways that are in good condition in order to maintain them in good condition. The desired paving cycle for this strategy is 10 years.
- **The light capital paving (LCP) Strategy:** The most commonly used and is applied to roadways while they are in fair to poor condition in order to maintain serviceability and to keep them from reaching very poor condition. The desired paving cycle is 7 years.
- **Roughness Paving Strategy:** Created to address the roadways that are in very poor condition with the goal of eliminating this strategy over time. Since very poor condition roadways are deemed unacceptable, the NHDOT has set a goal of eliminating the very poor condition Tier 2 roadways by the end of 2018, Tier 3 roadways by 2020, and Tier 4 roadways by 2022. The goal of the roughness paving strategy is to restore a pavement to fair condition whereby a LCP strategy can then be applied to maintain it in acceptable condition.

Based on the paving cycles described above, NHDOT developed a three-year paving program (2016, 2017, and 2018). The three-year paving program will be updated at the end of each construction season, so the current three-year program now includes 2017 thru 2019. The following table provides a comparison of the target vs. proposed paving miles:

Tier	Target Miles	Proposed 2016 <sup>1</sup>	Proposed 2017	Proposed 2018	Proposed 2019
1	54	27	75	28	32
2	191	149	156	149	161
3	215	227	215	208	229
4	127	158	145	54	127
<b>TOTAL<sup>2</sup></b>	<b>587</b>	<b>561</b>	<b>591</b>	<b>439</b>	<b>549</b>

Notes:

1. Proposed miles. As built has not been completed
2. Does not include Turnpikes or crack sealing.

New Hampshire continues to improve capacity with the widening of Interstate I-93 from the Massachusetts border to Manchester under construction, the Spaulding Turnpike improvements between Newington and Dover, and a series of upgrades to electronic tolling throughout the Turnpike system. Roadway capacity is good compared to other regions of the country with future capacity improvements once the Interstate I-93 widening is complete, likely to be focused on the Turnpike system.

### Safety

Traffic fatalities in the first six months of 2016 are up substantially over the same period in 2014 and 2015. Car crashes continue to be one of the leading causes of death in New Hampshire.

Year	2011	2012	2013	2014	2015**
<b>Fatalities</b>	90	108	135	95	114
<b>F/MVM*</b>	0.71	0.84	1.05	0.73	0.87

\* Fatalities/Million Vehicle Miles Traveled

\*\* 2016 statistics not available, but available data suggests a significant increase over 2015.



## INVESTMENT

### *Highways:*

Based on the current NHDOT Ten Year Plan, the NHDOT plans to invest \$75M annually. This is expected to increase somewhat due to additional funding becoming available through Federal redistribution, de-obligations as projects become delayed or are closed out, and as the actual revenues generated from the 2014 gas tax increase (Senate Bill 367, SB 367) are calculated. The NHDOT exceeded the goal for 2017 based on additional funding becoming available from the before-mentioned sources. However, if no additional funding were available, there would be an estimated annual shortfall of \$16M. This shortfall is reflected in the proposed 2018 paving program but not the 2019 paving program. The 2019 paving program was developed assuming a fully funded program (\$67M). If the expected \$16M becomes available in 2018, sections would be advanced from the 2019 program to achieve the target miles.

The target miles and associated required annual investment is a function of the current pavement condition and treatment costs, both of which are updated annually, so the mileage targets are expected to fluctuate slightly. The desired paving cycle is also an important factor when setting the annual target miles. As the NHDOT continues to collect pavement condition data and develops the Pavement Management System, the desired paving cycle will become more refined and with a more robust System the NHDOT will be able to establish condition targets rather than mileage targets.

### *Maintenance, Operations, and Equipment:*

Winter maintenance is currently being budgeted for \$3.2 million below the three-year average. This could ultimately risk investment in road rehabilitation projects. Currently it costs \$8 million per year to maintain the fleet in its present condition. It has been estimated that \$37 million would be needed to restore the fleet to its appropriate service level. The NHDOT currently requires over \$18.5 million in federal funds to subsidize its operational budget. With operations fully funded in the State budget, this funding could be restored to the construction program.

### *Turnpikes:*

To achieve the condition targets described above, Turnpikes advertises two resurfacing contracts annually as part of their Turnpike Replacement and Renewal (R&R) Program with a goal of paving approximately 8-10% of the network that is not being addressed as part of their Capital improvement program (typically about 45 to 65 lane miles). The paving projects typically constitute 60%-70% of the R&R program funding with each contract ranging from \$3M to \$4M depending upon the treatments. Treatments are typically preservation (overlays) or rehabilitation (inlay and overlay) in nature.

## FUNDING

Significant funding commitments are needed for New Hampshire to sustain a sufficient surface infrastructure system. On December 4, 2015, Fixing America's Surface Transportation Act or "FAST Act" was signed into law resulting in long term authorization of federal transportation funding and an increase in federal funds available to the State. However, because Congress has not appropriated funds for fiscal year 2017, the additional funding provided through the FAST Act is not available to the states.

In the latest update of the NHDOT Ten Year Plan, over \$1 billion in road and bridge repairs were identified primarily focused on maintenance and preservation projects along with a short list of larger capital projects including I-93. The NHDOT has secured Transportation Infrastructure Finance and Innovation Act (TIFIA) loans including \$173 Million to finance the I-93 widening and \$181 Million pledged to the rehabilitation of roads and bridges. A significant percentage being dedicated to rehabilitation and maintenance of tier 3 and 4 roads and bridges. As these notes mature more of the money that is now available for lower tier investments will need to be redirected to paying for the principal of these loans.





The main sources of State funding are the gas tax and vehicle registration fees. Toll revenues provide funding to the Turnpike system, but these revenues must also be used to pay off debt service on bonds first, which limits the use of those funds for transportation projects. In July of 2014, the State enacted its first gas tax increase since 1991. The increase of 4.2 cents per gallon (to 22.2 cents per gallon total) has increased funding for roads and bridges, I-93 debt service, and municipal projects. Although this has been a benefit, there are still unmet needs. The effectiveness of a gas tax continues to decline as vehicle mileage per gallon and alternative fuel vehicles continue to erode the revenue generated.

New Hampshire needs to continue to assess the gas tax rate to reflect a reasonable percentage of the price per gallon paid, to maintain the infrastructure while also considering alternative revenue sources that would replace the gas tax. Aside from the gas tax, vehicle registration fees were temporarily raised in 2009 with the surcharge targeted to funding the Betterment program; however, the surcharge expired in June 2011 resulting in a reduction of \$40 million annual revenue.

Turnpikes are funded by toll revenue. Toll rates for a passenger vehicle range from \$0.50 to \$2.00 and were last increased in July 2009.

#### RECOMMENDATIONS TO RAISE THE GRADE

ASCE-NH supports the following recommendations:

- Identify a sustainable source of revenue to meet investment targets after TIFIA notes mature.
- NHDOT's system of tiers and strategies is relatively new. Life Cycle and Return of Investment analysis of this system is needed to verify the effectiveness.
- Expansion of asset management to vehicle fleet to analyze balance between new purchases and maintenance of older vehicles.
- Address operational shortfalls through state funding allowing federal dollars to return to the capital projects.
- Assess toll increase to assist with financing of major Turnpike capacity projects.
- Increase Federal and State funding for the completion of important ongoing and planned maintenance, operations, equipment and 10-year plan expenditures.
- Study alternative methods of revenue that assesses tax according to the vehicle's use of the highway system.
- Ensure that highway funding and revenues are used for highway and bridge projects and not diverted into programs that don't relate to the highway infrastructure.
- Encourage municipalities to establish capital reserve funds to help pay for State cost sharing on municipal projects.

#### SOURCES

Transportation Department Of. Ten Year Transportation Improvement Plan, 2017 – 2026.

NHDOT 2015 Annual Report

NHDOT 2016 Annual Report-At-A-Glance AMPS

Discussions with NHDOT Personnel, January, 2017

TRIP Key Facts about New Hampshire's Surface Transportation System and Federal Funding August 2016

Concord Monitor Article "N.H. traffic fatalities rising higher than national average" August 27, 2016

National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS) March 2017 inquiry

# SOLID WASTE

## SUMMARY

Most New Hampshire citizens do not pause to consider what happens to solid waste (trash) once it's picked up or dropped off at the town transfer station. Yet, the proper planning and management of solid waste disposal is essential to the smooth operation of a clean, modern society. Solid waste in New Hampshire is disposed in two privately owned commercial landfills, four publicly owned landfills and one waste to energy facility. The facilities are generally well constructed and properly operated. Landfill operations are challenged to preclude discernable off-site odors. Adequate capacity is available at existing sites to expand the larger current landfills to provide about 20 years of statewide capacity needs. Permitting of the next landfill construction phases at these existing sites needs to proceed over the next several years to assure future capacity. New Hampshire's recycling rate is 35% compared to a statewide goal of 40%. Single stream recyclables are hauled to neighboring states due to the lack of a single stream processing facility in New Hampshire. Restaurants and some towns in New Hampshire are beginning to segregate food wastes for composting. New Hampshire should consider adopting regulations to encourage the segregation and processing of food wastes and to facilitate the permitting of appropriate processing facilities.

## CONDITION AND CAPACITY

The solid waste generated in New Hampshire can be categorized into three general sources: residential, commercial/industrial, and construction and demolition (C&D). The total tonnage of waste generated in 2007 was 1.70 million tons or 5.4 lb. per person per day. Residential waste accounted for 37%, commercial/industrial accounted for 42%, and C&D waste accounted for 21%. The EPA categorizes our solid waste and its major components as: 34% paper, 13% yard trimmings, 12% food scraps, 12% plastics and 8% metal. The disposition of New Hampshire's residential and commercial waste in 2014 can be broken down as follows: 33% was placed in a landfill, 35% was recycled, 27% was processed at a waste to energy facility, and a limited quantity was composted. C&D waste was both landfilled and recycled in nearly equal percentages.

### *Solid Waste Disposal*

For decades, solid waste has been buried in landfills. Since the late 1980s landfills have been required to be lined to prevent seepage into the soil and water table. Currently, the majority of New Hampshire's solid waste is trucked and disposed of in three large landfills in Berlin, Bethlehem, and Rochester. Smaller landfills exist in Nashua, Lebanon, and Conway. Today, many communities have transfer stations that were established when old unlined landfills were closed. Transfer stations handle resident-delivered solid waste, and some handle curbside collected materials in packers. There are also several commercially operated transfer stations in New Hampshire.

Managing solid waste landfill operations to preclude any off-site, discernable fugitive gas emissions is an on-going challenge for some landfill facilities.

There is one operating waste-to-energy facility in Concord that accepts 575 tons per day of waste from the local cooperative and other municipalities in southern New Hampshire. This facility has a rate order for the sale of its generated electricity that expires in 2019. A 200 ton per day waste to energy facility in Claremont closed in 2013.

Since landfills are central in any waste management program, New Hampshire will need to assure that adequate landfill capacity is available. Currently, sufficient assured state-wide capacity is permitted for approximately 6 years at commercial landfills and for a greater period at some public landfills with limited service areas. The quality of existing solid waste infrastructure, which includes landfills and other disposal facilities, recycling facilities, and transfer stations in New



Hampshire is generally satisfactory. Assured capacity in the future, however, is limited. The three major landfills in New Hampshire, in Berlin (Success), Bethlehem and Rochester, each have recently announced plans to expand, and each has substantial expansion capability at the existing site.

Now is the time to secure and permit new landfills. New landfill sites in New Hampshire are very difficult to locate and acquire and securing all necessary local and State permits will continue to be particularly challenging for new private landfill facilities in the future. In the next forty to fifty years, new landfill sites will be needed in New Hampshire.

### **Recycling**

In 1990 the New Hampshire Legislature set a goal for the diversion (recycling) rate at 40% by the year 2000. As of 2014, the diversion rate was approximately 35%, and increase from 30% estimated in 2010. Currently more than 46 New Hampshire towns have Pay As You Throw (PAYT) programs where trash must be disposed of in town-specific bags purchased at local retailers, but recyclables are picked up free of charge. The system has proven effective in increasing recycling rates, thereby decreasing solid waste disposal costs for the municipality.

Both private and public entities have made significant efforts in New Hampshire to site a single stream recycling facility. Private initiatives have failed due to local opposition to facility siting, mainly due to traffic impacts. Public initiatives have failed due to the inability to attract a sufficient critical mass of recyclables tonnages committed long term. As a result, single stream recyclables are delivered for processing to facilities in Maine, Massachusetts and Vermont. The additional transportation costs negatively impact single stream recycling economics for some New Hampshire municipalities.

Composting is another form of recycling. Since many municipalities will not accept yard waste, many citizens and municipalities already compost it. On the other hand, food waste is rarely composted even though much of it is compostable. There is a growing demand for composting of food waste in New Hampshire as restaurants and some municipalities have begun to segregate food wastes for composting. Neighboring states have adopted regulations to encourage and/or require separate collection and composting and processing of food wastes.

### **INVESTMENT AND FUNDING**

Under the New Hampshire State Solid Waste Management Act, RSA 149-M:3, in 1990 the New Hampshire Legislature recommended the following preferences for waste management:

- Source Reduction
- Recycling & Reuse
- Composting
- Waste-to-Energy
- Incineration without energy production
- Landfilling

The capital and operation, maintenance and closure costs of solid waste disposal facilities are funded entirely through per ton tipping fees, both at public and privately owned facilities. Unlike other infrastructure needs, state and Federal funding for the capital costs of solid waste disposal facilities is not necessary. Self-funding and competition reasonably assure economically efficient facilities.



#### RECOMMENDATIONS TO RAISE THE GRADE:

- New permitted landfill capacity for state-wide access is needed in the next five years as current landfills are predicted to reach their permitted capacities. The three commercial landfills in New Hampshire have sufficient expansion capacity at existing sites to satisfy this need for about a twenty year period.
- Continued statewide public education programs to encourage recycling are needed. Larger municipalities with curbside collection should consider single stream recycling to make it easier for the public to recycle.
- Public/private partnerships should be encouraged to develop a single stream recyclables processing facility in New Hampshire.
- New Hampshire should consider state regulations to encourage food waste composting and the permitting of food waste composting/processing facilities should be facilitated.

#### SOURCES

Statistics, observations, and comments provided by the NH Department of Environmental Services on the NHDES website.

Observations from practicing solid waste engineering in New Hampshire.



# STORM WATER

## SUMMARY

The demands on municipal stormwater management continue to increase with aging stormwater infrastructure handling greater flows than they were originally designed for. Stormwater is water from rainfall or snowmelt that flows over the land surface and does not soak into the ground. Stormwater is recognized by the U.S. EPA and New Hampshire environmental agencies as one of the leading causes of water pollution. Increasingly stringent regulations have also placed additional burdens on cities to improve water quality. Investment strategies to implement modern stormwater management are needed at the local level. While the monetary cost of managing stormwater is high, the potential cost of inaction is even higher. Without significantly changing our approach to managing stormwater, the State will likely experience even more extensive flooding and degradation of water resources that will impact drinking water quality, aquatic habitat, recreational opportunities, and tourism.

## CONDITION AND CAPACITY

In 2010 the New Hampshire Stormwater Commission (HB1295) released their final report which identified that stormwater contributes to over 80% of the surface water quality impairments. Impervious surfaces (e.g., roads, rooftops, parking lots, lawns in the shoreland zone) and other land use development cause most stormwater runoff, which contributes to increased frequency and magnitude of flooding. The Commission recommended:

1. A watershed-based strategy that distributes the responsibility and cost of stormwater management to restore and protect the State's water resources, drinking water supplies, aquatic habitat, and recreational opportunities; and
2. The adoption of low impact development (LID) stormwater management, an approach focused on controlling stormwater through better site planning and the use of small, decentralized stormwater treatment practices such as rain gardens, and porous pavement to treat stormwater close to the source.

Of additional concern, is that much of the municipal stormwater infrastructure in New Hampshire was designed to handle the 10-year storm with the goal of conveying runoff quickly from the built environment. In much of the state, changing climate has led to a greater than 20% increase in design storm sizes and the common observations that flooding is occurring more frequently. Past designs are often unable to handle the increased frequency and volume of flows and the increased size of the design storm as intended. The majority of stormwater infrastructure in the state was constructed in conjunction with large land developments. Beginning in the 1980s, land development activities in large cities have required developers to obtain NPDES permits, but water quality was not an objective until recently.

Along with new stringent stormwater regulations, many smaller municipalities will now be included in the new 2017 New Hampshire Small Municipal Separate Storm Sewer System General Permit (NH Small MS4) which becomes effective in 2018. Significant new elements of the permit include a focus on illicit discharge detection and elimination and nutrient management all of which will be linked to requirements for measurable water quality improvements. The 2010 Census published new urbanized areas, which triggers an MS4 permit, and will now include many new communities.

## INVESTMENT AND FUNDING

While wastewater and drinking water infrastructure is partially funded by a fee-based structure that water customers pay for when they use the services, there is not currently a similar funding model for stormwater. Many municipalities are unsure how to fund pending regulations and drainage infrastructure needs.



The Stormwater Commission recommended the formation of a statewide utility to provide a consistent and dedicated revenue stream for a stormwater program to be viable and self-supporting. This program could include the option to either create a municipal stormwater utility, to join an inter-municipal stormwater utility district, or join a state-administered watershed utility. Recommended fees included a range of \$2-\$6 per month for residential properties and \$25-\$75 per month per acre of impervious area for commercial properties.

At the State level, recent efforts have been underway to secure Clean Water State Revolving Fund (CWSRF) monies for Clean Water SRF Non-Point Source and Stormwater Projects for 2015. However, out of the total required to complete each project, only about \$713,200 of 20% principal loan forgiveness funds are available for that purpose. The total qualified project amounts come to about \$3.5 million, with many more necessary projects not eligible for the Project Priority List Funding.

A Water Sustainability Commission was established to study how to sustainably fund water infrastructure (known as SB 60, Chapter 245:1, Laws of 2009). The General Court of New Hampshire published the SB60 commission final report November 2013 and estimated an investment of \$272 million is necessary for maintenance and improvements to municipal stormwater systems over the next decade. The estimated investment does not include requirements of the draft 2015 Small MS4 permit pending its anticipated reissuance. Based on the current funding levels, it will take nearly three decades to meet the \$272 million need, during which time existing infrastructure will continue to age.

#### **RECOMMENDATIONS TO RAISE THE GRADE:**

NH-ASCE supports the establishment of a federal water infrastructure trust fund to provide a reliable source of federal assistance for construction and repair of the stormwater infrastructure. In the interim NH-ASCE supports the following:

- Annual appropriations of \$1.5 Billion from the federal general fund for the State Revolving Loan Fund program;
- Establish a federal capital budget to create a mechanism to help reduce the constant conflict between short-term and long-term needs. The current federal budget process does not differentiate between expenditures for consumption and long-term investment. This causes major inefficiencies in the planning, design, and construction for long-term investments. A capital budget system would help to increase public awareness of the problems and needs facing our country's physical infrastructure, and would help Congress focus on programs devoted to long-term growth and productivity;
- A statewide stormwater utility program to provide a consistent and dedicated revenue stream for a stormwater program based on the HB1295 recommendations;
- The adoption of low impact development (LID) stormwater management and watershed-based solutions based on the HB1295 recommendations;
- Funding research in stormwater management and treatment technology to reduce capital expenditures.

#### **SOURCES**

HB1295 Final Report, New Hampshire House Bill 1295, Chapter 71 Laws of 2008, Stormwater Study Commission, November 2010.

SB60 Final Report, Chapter 245:1, Laws of 2009. The General Court of New Hampshire. November 2013.

NHDES ARF Funding Information: <http://des.nh.gov/organization/divisions/water/web/documents/nps-ppl.pdf>



# WASTEWATER

## SUMMARY

Water is the cornerstone of New Hampshire's beauty and prosperity. Our beautiful lakes, rivers, and seacoast bring hundreds of thousands of visitors to the state every year. The wise management and protection of our water resources is critical to New Hampshire's economy, public health, and environment.

The majority of New Hampshire wastewater, about 65%, is treated by private on-site disposal systems generally consisting of a septic tank with a leach field. Approximately 35% of the state's population is served by 91 public and 30 private wastewater collection/treatment systems. Most of these systems, 71, discharge their treated wastewater to surface waters and the remaining 27 discharge to groundwater. The majority of these systems, 74%, are small by industry standards conveying and treating less than 1.0 million gallons per day.

## CONDITION AND CAPACITY

New Hampshire's wastewater collection systems date back to the 1870s. The early collection systems were "combined" conveying both sanitary and stormwater flows via gravity discharging them to local waterways. The state's collection systems grew as communities developed and populations increased. Wastewater collection system materials, construction methods, and operations evolved as technology and regulations evolved. Over the industry's first 100 years, gravity pipe construction material evolved from brick, vitrified clay (VC), and tar/fiber to reinforced concrete, polyvinyl chloride (PVC), and high density polyethylene (HDPE). Manholes evolved from brick to reinforced concrete.

The majority of the state's wastewater treatment infrastructure and pump stations was constructed after passage of the Clean Water Act (CWA) in 1972. The CWA established water quality standards and provided federal and state funding to achieve compliance. A significant CWA regulation was the requirement for secondary treatment. To achieve compliance with this regulation most eligible New Hampshire communities upgraded existing wastewater treatment plants (WWTPs) or constructed new ones. Mechanical pump stations were introduced in the 1950s to convey wastewater flows that could not be conveyed via gravity systems. The majority of the state's pump stations were constructed after the CWA as communities expanded their collection systems and consolidated treatment facilities.

New Hampshire's wastewater industry today faces four challenges that stress already fragile systems. The most critical challenge facing the state's wastewater industry is aging and failing infrastructure. Wastewater collection systems constructed in the late 1800s have reached the end of their useful life and requires rehabilitation or replacement. Collection systems with VC and tar-paper pipes experience frequent failures because these pipes have exceeded their useful life. The majority of the mechanical equipment installed at the treatment facilities and pump stations constructed under the CWA in the mid-1970s to mid-1980s have reached the end of their useful life and require replacement.

The second critical challenge facing the industry is increased regulatory requirements. As scientific detection methods have become more sophisticated, new regulations have been implemented. Many treatment plants now must treat for nutrients and metals, processes that they were not originally designed for in the 1970 and 1980s. Due to EPA's Total Maximum Daily Load regulatory requirements, seacoast treatment plants now have to treat for nitrogen, treatment plants along the Merrimack River now have to treat for phosphorous, and some plants have to treat for both. This recent EPA regulatory requirement will cost New Hampshire seacoast WWTPs over \$200 million and cost inland treatment plants over \$50 million, collectively between 2010 and 2030 to comply. Furthermore, several treatment plants now have to treat for a variety of metals including copper, lead, and aluminum.



The third critical challenge is a lack of sustainable funding. Through the CWA, communities depended on federal and state funding to construct new wastewater infrastructure. Because new facilities did not require any capital investment and initially little operational investment, most NH communities kept sewer rates artificially low. Over years this problem was compounded resulting in most wastewater utilities not charging sufficient rates to fully fund operations and properly maintain and replace their assets. As a result, assets are not replaced at the end of their lifespan increasing costs and the probability of failure. Communities attempting to upgrade these facilities now have limited options for funding.

The fourth and final critical challenge facing the state's wastewater industry is climate change. The state's combined sewer infrastructure dating back 100 years were not designed for the current population, amount of impervious area, and increased storm intensities being experienced. The increased storm intensities cause system surcharging that backs into resident's basements, creating health concerns and cleanup costs. Lastly, the power outages associated with increased storm intensity disable pump stations and treatment facilities.

### INVESTMENT AND FUNDING

New Hampshire generally has sufficient wastewater capacity to meet the state's future (20-year) needs. However, sustaining its existing wastewater assets is the state's biggest challenge. New Hampshire's sewer bills in 2015 averaged less than \$600 annually. For most utilities, these rates are inadequate to sustain its assets, meet new regulatory requirements, and maintain adequate financial reserves for emergencies. One of the reasons sewer rates are artificially low is because the majority of the state's wastewater infrastructure was constructed after the CWA and was funded by its Construction Grant Program which began in 1972 and ended in the mid-1980s. This program paid up to 95% in a combination of federal and state grants for community wastewater construction. This program was replaced by the State Aid Grant (SAG) and State Revolving Fund (SRF) low interest loan. The SAG reimbursed communities up to 30% of the eligible project cost. Unfortunately, the SAG program was suspended in 2008 due to state budget issues.

Grants from the U.S. Department of Agriculture-Rural Development Agency and the U.S. Department of Housing and Urban Development are still available to small communities meeting specific program requirements. This leaves low interest SRF loans as the only funding source for wastewater infrastructure projects. In an economic climate where public safety, education, and roadways are in the forefront, the wastewater industry is poorly supported financially and often loans are not approved at town meetings. Senate Bill 60 Report concluded in 2013 that New Hampshire's ten-year wastewater need is \$1.7 billion dollars. There are currently no funding options that can fulfill our state's \$1.7 billion need.

The state also needs to invest in the wastewater industry's aging workforce. Institutional knowledge is being lost at a much faster pace than it is being replenished. The industry is having problems attracting its next generation of workers. Due to the negative perception of the industry, it being a relatively low paying engineering discipline, and a general lack of awareness of the industry has created a technical void that will impact the state for generations to come.

### RECOMMENDATIONS TO RAISE THE GRADE

New Hampshire must address the artificially low sewer rates most utilities charge. Sewer rates should be based on the sustainability of the utilities' assets, the ability to meet new regulatory requirements, and maintenance of adequate reserves to pay for emergency work. To supplement communities until sustainable rates are achieved, NH-ASCE supports the establishment of a water trust fund to provide a reliable source of federal assistance for construction and repair of the wastewater infrastructure.

ASCE supports the following recommendations:





- Reinvigorate the State Revolving Loan Fund (SRF) under the Clean Water Act by reauthorizing the minimum federal funding of \$20 billion over five years.
- Fully fund the Water Infrastructure Finance and Innovation Act (WIFIA) at its authorized level.
- Establish a federal Water Infrastructure Trust Fund to finance the national shortfall in funding of infrastructure systems under the Clean Water Act.
- Preserve the status of tax-exempt bonds. These bonds have funded more than \$1.9 trillion in infrastructure construction in the last decade alone.
- Raise awareness of the true cost of wastewater treatment.
- Achieve Clean Water Act compliance in a way that minimizes the impact on lower-income residents and on economic competitiveness through bill payment assistance; revisiting EPA affordability guidelines; renewed or enhanced federal and state aid; and redirecting other aid sources to sewer-mandate compliance.
- Support green infrastructure, which provides co-benefits such as water and air quality improvement, aesthetic value to communities, and cost competitiveness.
- Fund research in wastewater treatment technology to reduce capital expenditures, as well as operation and maintenance costs.

#### SOURCES

SB60, Chapter 245:1, Laws of 2009, Final Report – November 2013

New Hampshire Town and Country, New Hampshire Water Assets Under Pressure: Municipal Wastewater Systems – May 2012

Failure to Act: The Economic Impact of Current Investment Trends in Water and Wastewater Treatment Infrastructure, America Society of Civil Engineers - 2011

New Hampshire Water Resources Primer, Department of Environmental Services - December 2008

2017

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