

**Status of Current FHWA Water Quality Research**  
<https://www.fhwa.dot.gov/environment/index.cfm>  
 01/02/2018

**FHWA Office of Planning, Environment and Realty**

The research program area has a national focus on strengthening transportation planning and environmental decision-making. HEP's research is coordinated through all programs including Center for Environmental Excellence, by AASHTO and FHWA, the National Cooperative Highway Runoff Research Program (NCHRP), and the Turner Fairbank Highway Research Center.

Transportation Research Board's Research in Progress (RIP) Database contains information on current or recently completed transportation research projects, including those underway in HEP.

The Transportation and Environmental Research (TERI) database, maintained by CEE, is a central storehouse for tracking and sharing new transportation and environmental research ideas.

Current Stormwater NCHRP projects:

**Project: Using Vegetated Compost Blankets to Achieve Highway Runoff Volume and Pollutant Reduction**  
 NCHRP 14-39

Status: Active \$499,999, 4/27/2017 – 4/26/2021

Contract: University of Maryland

Research is underway.

**Project: Enhancing the International Stormwater BMP Database to Serve as a Highway Specific BMP Database**  
 NCHRP 25/25 Task 112

Status: Active \$105,000, 12 months

Contract: Geosyntec

Proposal reviewed in Fall 2017.

**Project: Field Testing of BMPs Using Granulated Ferric Oxide Media to Remove Dissolved Metals in Roadway Stormwater Runoff**

NCHRP 25-54

Status: Active \$400,000, 9/16/2016 – 9/15/2018

Contract: Barr Engineering

Research in underway.

**Project: Center for Environmental Excellence**

[https://environment.transportation.org/center/products\\_programs/communities\\_of\\_practice.aspx#Stor](https://environment.transportation.org/center/products_programs/communities_of_practice.aspx#Stor)

Initiating a **communities of practice for stormwater** practitioners and providing state of the practice reports on current topics

Status: Ongoing.

**Project: International Stormwater BMP Database with the Water Research Foundation**

Contractor: Wright Water Engineers, Inc, and GeoSyntec Consultants

Purpose of Work: WERF, ASCE-EWRI, USEPA, FHWA, and APWA have formed a coalition of organizations to fund and manage the International Stormwater Best Management Practices (BMP) Database. The work will consist of entering currently available and newly developed data sets, keeping the web site and database up to date, providing data analysis and developing protocols for integrating low impact development techniques into the database. Webinars and fact

sheets on utilizing the database were produced.

[http://www.werf.org/c/KnowledgeAreas/SIWM/Products/SIWM13T16\\_Fact\\_Sheets.aspx](http://www.werf.org/c/KnowledgeAreas/SIWM/Products/SIWM13T16_Fact_Sheets.aspx)

Status: The work is ongoing and the database is currently accessible through the website at

<http://www.bmpdatabase.org>.

Products: 2016 BMP Performance Summaries <http://www.bmpdatabase.org/Docs/03-SW-1COh%20BMP%20Database%202016%20Summary%20Stats.pdf>

Urban Stormwater BMP Performance Monitoring Manual

<http://www.bmpdatabase.org/Docs/2009%20Stormwater%20BMP%20Monitoring%20Manual.pdf>

**Project: Evaluation and Update of FHWA Pollutant Loadings Model for Highway Stormwater Runoff**

Contractor: U.S. Geological Survey

Purpose of Work: The Federal Highway Administration and the U.S. Geological Survey are cooperating on a national project to evaluate the existing highway stormwater runoff model and update the model using new information and software. This work will incorporate the existing model in a new software platform, provide information on the probability distributions of: precipitation characteristics, highway-runoff-volumes, highway-runoff concentrations, upstream flow, upstream receiving-water concentrations, and structural best management practice performance. This information is used to estimate the probability of concentration and loads in receiving waters downstream of the highway outfall and it will estimate the probability of the outfall exceeding water quality standards.

Status: Model Published. Information on this project can be found at: <https://doi.org/10.5066/F7BG2M33>, along with the 1990 FHWA Pollutant Loadings Model for Highway Stormwater Runoff. Available online. Looking for Spring 2018 Training locations.

**Project: An Update to the Federal Highway Administration (FHWA) Highway-Runoff Database (HRDB) and Technical Support and Training for the HRDB and the FHWA Stochastic Empirical Loading and Dilution Model (SELDM)**

Contractor: USGS

Status: Ongoing

<https://doi.org/10.5066/F74Q7T5X>

**Project: Low Impact Development (LID) for Linear Transportation Projects**

Contractor: USGS

Status: Ongoing

Purpose of Work: This project will provide information and statistics that can be used to calculate potential benefits of LID and conventional BMPs.

#### **Available reports and publications:**

**Project: National Synthesis on Potential Sources, Fate and Transport, and Potential Effects of Chloride in Surface and Ground Water Resources of the Conterminous United States**

Contractor: USGS

Purpose of Work: The objective of this research is to provide water-resource managers and decision makers with information to evaluate the potential Chloride sources. This information will be used to identify and evaluate the magnitude of potential sources to ultimately evaluate ways to reduce these sources so that water quality standards are not exceeded.

Status: Published.

Products:

Granato, G.E., DeSimone, L.A., Barbaro, J.R., and Jeznach, L.C., 2015, **Methods for evaluating potential sources of chloride in surface waters and groundwaters of the conterminous United States**: U.S. Geological Survey Open-File Report 2015-1080, 89 p., <http://dx.doi.org/10.3133/ofr20151080>.

Granato, G.E., Kostick, D.S., and Cazenias, P.A., 2004, **Overview of chloride in the environment, Rising salt concentrations in tributaries of the Hudson River Estuary Proceedings**, December 6, 2004, Altamont, NY: Hudson River Environmental Society, 42 p. Report On-Line <http://www2.marist.edu/~en04/RSLABS.pdf>

**Project: Estimating Basin Lag Time and Hydrograph-Timing Indexes Used to Characterize Stormflows for Runoff-Quality Analysis**

Contractor: USGS

Purpose of Work: This project will provide information and statistics that can be used to calculate potential benefits of LID and conventional BMPs. This project will also provide a BMP estimator tool to calculate statistics necessary for use with SELDM.

Status: Ongoing, report expected 2013.

**Project: Remotely Monitoring Water Quality Near Highways: A Sustainable Solution. (Exploratory Advanced Research).** Nov 2015. <https://www.fhwa.dot.gov/advancedresearch/pubs/16018/index.cfm>

**Project: Great Lakes Restoration Initiative**

Purpose of work: FHWA solicited proposals from State DOTs and Eastern Federal Lands Highway Division for efforts within the Great Lakes States of Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York, and Wisconsin to implement on-the-ground projects within the Great Lakes Basin utilizing \$2.5 million in funding from the U.S. Environmental Protection Agency to support field level projects for the new "*Great Lakes Restoration Initiative Implementation - DOT/FHWA.*" The FHWA funding for the GLRI can be utilized as 100 percent Federal funds.

Status: Wisconsin and NY projects completed. Illinois project expected completion Winter 2018.

The funding supports 4 projects within 3 states (Michigan, New York, and Wisconsin). The lead for the Wisconsin project is Wisconsin Department of Transportation (WisDOT) in coordination with the Wisconsin Division. The lead for the two New York projects is U.S. Fish and Wildlife Service in coordination with the Eastern Federal Lands Highway Division (EFLHD). The lead for the Michigan project is the U.S. Forest Service in coordination with the EFLHD.

**Determining the State of the Practice in Data Collection and Performance Measurement of Stormwater Best Management Practices 2014** - The objective of this research project is to assess the state of practice of data collection and performance measurement in stormwater management programs at state Departments of Transportation (DOTs).

Specifically, this study evaluates if it is feasible to develop performance measures for stormwater that state DOTs can use in performance-based planning and programming. The study focused on both construction-phase as well post-construction application of BMPs to protect water quality.

**Project: Evaluation of Best Management Practices for Highway Runoff Control**, 2006 - This report focuses on improving the scientific and technical knowledge base for the selection of best management practices (BMPs) through a better understanding of BMP performance and application. This report documents an extensive program of research on the characterization of BMPs and stormwater, and the influence of factors such as land use practice, hydraulic characteristics, regional factors, and performance evaluation. The report includes a CD containing a spreadsheet model and three additional volumes: User's Guide for BMP/LID Selection, Appendices to the User's Guide, and Low Impact Development Design Manual for Highway Runoff Control. NCHRP Report 565. <http://www.trb.org/Main/Public/Blurbs/158397.aspx>

**Project: Bridge Runoff Treatment Analysis and Treatment Options**, NCHRP 25-42

Status: Published. Mar 2014. \$300,000, RBF Consulting  
<http://www.trb.org/Main/Blurbs/170652.aspx>

**Project: Guidance for Achieving Volume Reduction of Highway Runoff in Urban Areas, NCHRP 25-41**

Status: Published. Sept 2014

Contract: Geosyntec

<http://www.trb.org/Main/Blurbs/172415.aspx>

**Project: Long-Term Performance and Life-Cycle Costs of Stormwater Best Management Practices, NCHRP 25-40**

Status: Published. \$550,000, June 2014.

<http://www.trb.org/main/blurbs/171471.aspx>

**Project: A Watershed Approach to Mitigating Stormwater Impacts, NCHRP 25-37** Status: Published. \$600,000, April 2016

<http://www.trb.org/main/blurbs/175861.aspx>

**Project: Pollutant Load Reductions for Total Maximum Daily Loads for Highways, NCHRP Synthesis 444**

Status: Completed June 2013

<http://www.trb.org/Publications/Blurbs/169006.aspx>

**Project: Measuring and Removing Dissolved Metals from Stormwater in Highly Urbanized Areas, NCHRP 25-32**

Contractor: RBF Consulting, University of Texas

Status: Published. \$300,000. Sep 2013.

<http://www.trb.org/Publications/Blurbs/170715.aspx>

**Project: Pollutant Load Reductions and Total Maximum Daily Load (TMDL) Compliance for Highways, NCHRP 25-05/Topic 43-06**

Status: Published. \$40,000. Mar 2013.

<http://www.trb.org/Publications/Blurbs/168619.aspx>

**Project: Reducing the Effects of Roadway Deicers on the Natural Environment, NCHRP 20-05/Topic 43-12**

Status: Published. \$40,000. Montana State University.

<http://www.trb.org/Main/Blurbs/169520.aspx>

**Project: Meeting the New EPA Effluent Limitations Guideline for Construction Site Discharge Turbidity: Effectiveness of Different Turbidity Control Systems and Monitoring Methods, NCHRP 25-25/Task 74**

Status: \$300,000, 12 months

Final report submitted to AASHTO July 2012.

**Project: Guidelines for Evaluating and Selecting Modifications to Existing Roadway Drainage Infrastructure to Improve Water Quality in Ultra-Urban Areas, NCHRP 25-31**

Contractor: GeoSyntec Consultants, \$300,000

Purpose of Work: The objective of this research is to develop guidelines for evaluating and selecting hydraulic modifications to existing drainage infrastructure in order to reduce pollutant loads and concentrations in ultra-urban areas.

Status: Published. May 2012

<http://www.trb.org/Main/Blurbs/168015.aspx>

### **Guidelines for Vegetation Management**

This handbook provides guidance of current agency practices, recent literature findings, and research on roadside vegetation management. The guidelines are designed to assist roadside vegetation managers in integrated roadside

vegetation management decision-making processes into highway project planning, design, construction, and maintenance. The report is available for purchase through AASHTO at:

[https://bookstore.transportation.org/Item\\_details.aspx?id=1752](https://bookstore.transportation.org/Item_details.aspx?id=1752)

#### **Invasive Species Cover and Wildlife Use at Compensatory Mitigation Sites**

This work evaluated compliance with invasive species performance standards at State Department of Transportation (DOT) wetland mitigation sites. Many State DOTs have had such performance standards applied to their projects by local US Army Corps of Engineers districts or state permitting agencies. This report surveyed States and looked at the difficulty of complying with these invasive species performance standards (e.g. 10% or less of areal cover thresholds) and what type of further research is needed in this area.

<http://www.environment.fhwa.dot.gov/ecosystems/invasive/index.asp>

#### **AASHTO Stormwater Practitioner's Handbook #13- Developing and Implementing a Stormwater Management Program in a Transportation Agency**

This handbook provides recommendations for developing and implementing an effective stormwater management program to comply with National Pollutant Discharge Elimination System (NPDES) regulations. The report can be found at: [http://environment.transportation.org/center/products\\_programs/practitioners\\_handbooks.aspx#11](http://environment.transportation.org/center/products_programs/practitioners_handbooks.aspx#11)

#### **Best Practices in Addressing NPDES and other Water Quality Issues in Highway System Management, NCHRP 20-68A, Scan 08-03**

The domestic scan for Best Practices in Addressing NPDES and Other Water Quality Issues in Highway System Management is to look at existing practices and consider innovative practices used by high-performing transportation agencies that could be beneficially adopted by other agencies. The scan tour and report will provide opportunities for technology transfer on an economical basis with the potential for significant benefits on a national scale.

Status: Scan tour conducted July 12-24, 2009 and included New York, Maryland, District of Columbia, North Carolina, Texas and Florida. The report can be found at:

[http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A\\_08-03.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_08-03.pdf)

#### **NCHRP 25-25, Task 53: Stormwater Treatment with Vegetated Buffers**

The use of vegetated buffers, filter strips, and grass swales as primary water quality treatments for stormwater runoff is gaining momentum; however, to date, these vegetative stormwater treatments have not yet achieved the same level of acceptance by some state regulatory agencies as other post-construction water quality best management practices (BMP). This is due in part to a general misconception or lack of understanding of the performance capabilities of these applications. The focus of this project is to provide data demonstrating the proven performance capabilities of vegetated buffers, filter strips, and grass swales as post-construction, primary stormwater treatments. This research was done to help facilitate gaining acceptance of or credit for their use from regulatory agencies. Final report September 2009

[http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25\(53\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25(53)_FR.pdf)

#### **NCHRP 25-25, Task 56: Cost and Benefit of Transportation Specific MS4 and Construction Permitting**

The NPDES general permits associated with the Municipal Separate Storm Sewer System (MS4) program and stormwater discharges associated with construction activities are written in broad terms to cover all regulated entities in a "one size fits all" approach. These general permits do not recognize the linear nature of highway projects and the administrative organization of state departments of transportation (DOTs). For example, state DOT's do not have the power to pass ordinances and levy taxes to fund special stormwater requirements. These measures must typically be funded by appropriations from the state's transportation budget. In addition, rights-of-way are limited in area, which constrains the DOT's ability to comply with permit requirements. This research will look at these issues related to stormwater permitting, and see if the development of specific MS4 and construction permits for highways would be more cost effective in both meeting the water quality goals of the states and reducing the permitting conflicts that are currently encountered in many of the one-size-fits-all permits. This report can be found at:

[http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25\(56\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP25-25(56)_FR.pdf)

#### **Water Quality Analyses for NEPA Documents: Selecting Appropriate Methodologies, NCHRP 25-25(35)**

The National Environmental Protection Act (NEPA) requires that sponsors of transportation projects consider the impacts of those projects on water quality and water resources. There are numerous methodologies available to perform these analyses; however, there is little or no guidance on selecting the most effective analytical tool for the particular information being presented for NEPA documentation. Some methods developed by the EPA and FHWA may be more suited for detailed project level analysis and some better suited for planning level studies and watershed-based analyses. The objective of this study is to identify those water quality analysis methodologies that are best suited for detailed project-level impact assessment for NEPA documents.

Status: The report can be found at: <http://www.trb.org/TRBNet/ProjectDisplay.asp?ProjectID=1307>

#### **State Transportation Agency Strategies to Address NPDES Phase II Requirements, 2007, NCHRP 25-25(16)**

The report focuses on determining how state transportation agencies have addressed compliance with NPDES Phase II requirements. Research was directed toward determining staffing and organizational structure throughout the entire agency to address NPDES Phase II compliance for construction activities as well as the stormwater management program as a regulated MS4. This project was conducted at the request of the AASHTO Standing Committee on the Environment. The report can be found at: [http://www.trb.org/NotesDocs/25-25\(16\)\\_FR.pdf](http://www.trb.org/NotesDocs/25-25(16)_FR.pdf)

#### **Determining Components of Infrastructure to Stormwater Runoff**

This report by US Geological Survey was done using existing land use, land cover, and impervious surface data, to determine the individual contribution of the various components to impervious surfaces, to the overall storm water runoff issue. The results of this report are based on 6 case studies in Washington, Virginia, Nebraska, Iowa and Florida shows that the percentage of impervious cover contributions from road surfaces in these studies varied between 20 – 35%. Generally roads were at 28%, buildings at 29% and parking lots at 25% for total impervious areas in a watershed. As the watershed becomes more developed and the impervious surfaces increase, the contribution from the road surfaces decreases. The final report is available online at: <http://pubs.usgs.gov/of/2007/1008/> Information about the research can be found at: <http://mac.usgs.gov/tilley/>

#### **Guidelines for the Selection of Snow and Ice Control Materials to Mitigate Environmental Impacts, 2007, NCHRP Report 577**

Every year considerable quantities of snow and ice control products are applied to highways, there is a balancing act of maintaining safety and applying what is needed without causing environmental impacts. This report looks at ways to define the selection of winter maintenance materials based on their environmental impact. It looks at the most common chemical alternatives such as sodium chloride, magnesium chloride, calcium chloride, calcium magnesium acetate, potassium acetate, etc. The report develops guidelines for selection of snow and ice control chemicals and abrasives, based on their constituents, performance, environmental impacts, cost and site-specific conditions. It looks at the environmental impacts of the effects on human health, aquatic life, flora and fauna, surface-water and groundwater quality, air quality, vehicles, and physical infrastructure including bridges, pavements, railway electronic signaling systems and power distribution lines. This report will not only focus on their performance and cost under various weather conditions but will also evaluate their relative impacts on the environment. The final report #577 can be found at: [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_577.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_577.pdf)

#### **Evaluation of Best Management Practices for Highway Runoff Control, 2006, NCHRP Report 565**

This report focuses on improving the scientific and technical knowledge base for the selection of BMPs through a better understanding of BMP performance and application. This report documents an extensive program of research on the characterization of BMPs and stormwater, and the influence of factors such as land use practice, hydraulic characteristics, regional factors, and performance evaluation. In addition to the report, a CD is affixed to the back cover containing three additional volumes and a spreadsheet model. The additional volumes are: User's Guide for BMP/LID Selection, Appendices to the User's Guide, and Low Impact Development Design Manual for Highway Runoff Control. The final report #565 can be found at: [http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp\\_rpt\\_565.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_565.pdf)

**Environmental Stewardship Practices, Policies, and Procedures for Road Construction and Maintenance (2005)** - This report developed a compendium of environmental stewardship practices, policies, and procedures in areas of

construction and maintenance. This manual can be downloaded at:

[http://www4.trb.org/trb/crp.nsf/reference/boilerplate/Attachments/\\$file/25-25\(4\) FR.pdf](http://www4.trb.org/trb/crp.nsf/reference/boilerplate/Attachments/$file/25-25(4) FR.pdf)

**The National Highway Runoff Data and Methodology Synthesis -2003**

**Volume I:** Technical Issues for Monitoring Highway Runoff and Urban Stormwater

**Volume II :** Project Documentation with CD based bibliographic database of reports

**Volume III –** Availability and Documentation of Published Information for Synthesis of Regional or National Highway Runoff Quality Data

This report evaluates the existing highway runoff quality data to determine if the quality and processes contributing to water quality constituents in highway runoff can be adequately characterized on a nationwide basis to fulfill the information needs of highway practitioners. Results are also available through the internet at: <http://ma.water.usgs.gov/FHWA/>

**Aquatic Ecology and Stream Restoration Video – Fall 2003** This video showcases six stream restoration case studies from across the nation and promotes the importance of restoring our streams after road construction. This project documents examples of a nationwide effort on stream restoration showing the appropriate designs and techniques for stream relocation, fish and wildlife habitat preservation and methods to improve the water quality while providing safe efficient roadways. The series of videos has been developed by North Carolina Department of Transportation for Federal Highway Administration and is now available.

**Assessing the Impacts of Bridge Deck Runoff Contaminants in Receiving Waters- 2002, NCHRP Report 474, Volume 1: Final Report, Volume 2: Practitioner's Handbook**

This report presents guidance for assessing and if necessary mitigating the impacts of bridge deck runoff. The final report includes findings of the literature review and a survey of highway agency practices, consultation and testing of sites. The second volume or practitioner's handbook presents the assessment process as a result of the final report.

**Management of Runoff from Surface Transportation Facilities--Synthesis and Research Plan, 2001, NCHRP Web Document 37** The final report has been posted as [NCHRP Web Document 37](#)

The objectives of this research, on the management of the quality and quantity of runoff waters from surface transportation facilities, was to (1) synthesize existing knowledge and practice into a form usable by practitioners; (2) develop a strategic research plan to address gaps in existing knowledge; and (3) recommend a system for continued exchange of information between practitioners and others interested in water-quality and runoff issues.

**Guidance Manual for Monitoring Highway Runoff Water Quality – June 2001** The Federal Highway Administration contracted with URS Group, Inc. to conduct an evaluation of water quality monitoring equipment for measuring the constituents of highway stormwater runoff. Testing was done on the methodologies and use of these various monitoring and sampling equipment in the highway environment. The results are presented in this report. This manual will assist States and help local governments prepare highway stormwater monitoring programs based on monitoring goals. Guidance is provided to assist the user in not only selecting equipment, but also with highway stormwater runoff monitoring designs for a comprehensive plan. Recommendations and field evaluations are given for specific equipment and monitoring methods. The report provides recommendations on adaptations necessary for using available off-the-shelf equipment to improve the evaluation of stormwater runoff in the highway setting.

**Environmental Impact of Construction and Repair Materials on Surface and Ground Waters – NCHRP 25-9 – June 2000**

The CD-ROM based report presents a validated methodology for assessing the environmental impact of highway construction and repair materials on surface and ground water under six general highway reference environments. This methodology includes: (1) a set of comprehensive bioassay protocols that directly measure the toxicity of leachates from highway construction and repair materials on two target organisms, the water flea, *Daphnia magna*, and the freshwater algae, *Selenastrum capricornutum*, and (2) the IMPACT model that can estimate the fate and transport of such leachates in typical highway environments. The IMPACT model is based on an extensive database of

bioassay toxicity results for materials ranging from common construction and repair products to waste and recycled materials proposed for use in highway construction.

**Stormwater Management Practices in an Ultra-Urban Setting: Selection and Monitoring - May 2000** This report focuses on design criteria, and monitoring studies on stormwater best management practices (BMPs) implemented in and ultra-urban settings. The report provides and planning level review of the applicability and use of new and some of the more traditional BMPs in ultra-urban areas. The report provides specific guidance for selecting and siting stormwater management technologies. Case studies are used to highlight various examples throughout the country that address ultra-urban considerations.

**Guidance Manual for Monitoring Highway Runoff Water Quality – June 2001**

This report provides guidance for selecting and using stormwater runoff monitoring equipment for monitoring of highway runoff. (Available via request)

**Evaluation and Management of Highway Runoff Water Quality - June 1996**

This manual synthesizes the results of past documentation and research on highway stormwater runoff into a single-volume users manual on water quality impact assessment and mitigation. It presents available and appropriate impact prediction and mitigation tools for use during highway project planning and development activities.

**Training and Courses:**

**Stochastic Empirical Loading and Dilution Model (SELDM)**

This course is available upon request. <https://doi.org/10.5066/F7BG2M33>

**Design and Implementation of Erosion and Sediment Control –NHI Course #142054**

This NHI course was developed as a joint effort between FHWA and the EPA Office of Water, this course reflects the agencies' commitment to providing education and training on planning, design, implementation, enforcement, inspection and maintenance strategies to control erosion and sediment on highway construction projects, as well as to ensure that regulatory issues are addressed accurately and uniformly. Each discipline involved in a highway construction project has a different set of priorities. Reflecting NHI's commitment to learner centered training, the course offers participants opportunities for discussion and joint problem solving, through which they will gain information about the roles and responsibilities of other team members. This course is being updated in 2010 to reflect future turbidity limits and monitoring requirements.

**Water Quality Management of Highway Runoff –NHI Course #142047**

This NHI course developed with EPA Office of Water provides an overview of the basic water quality parameters and processes, along with the requirements and guidance on best management practices the transportation community can use in mitigating highway runoff impacts and protecting water quality. This course shares approaches and technologies for the water quality management of highway runoff, including the effective maintenance, inspection and evaluation of Best Management Practices (BMPs).

**Managing Road Impacts on Stream Ecosystems: An Interdisciplinary Approach – NHI Course #142048**

Managing Road Impacts on Stream Ecosystems: An Interdisciplinary Approach is a three-day course that is intended to introduce and discuss the basic concepts related to the impacts that roadways have on streams and stream ecosystems. The course will be structured to first address the ecological and physical characteristics of stream ecosystems, discuss the impacts that roadways can have on those ecosystems, and then turn to tools that the practitioner can use to help avoid and mitigate those effects. Through the use of Case Examples, discussion, and other application techniques, the participants will be afforded an opportunity to use critical thinking to identify solutions and preventative measures related to the impacts of roads on streams and their riparian communities.