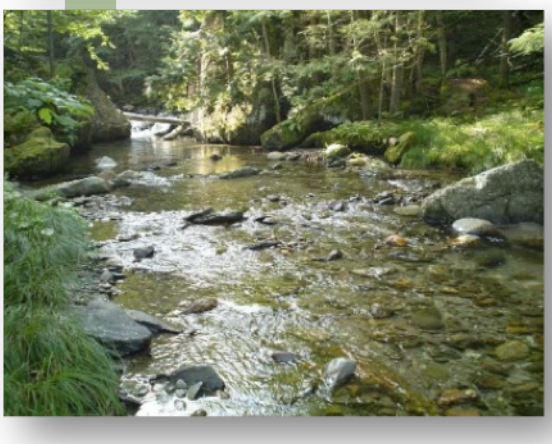

# WATERSHED RESTORATION AND RESILENCY PROJECT

# MAD RIVER VALLEY VERMONT

## STORMWATER MANAGEMENT REGULATION IN THE MAD RIVER VALLEY; *REVIEW AND RECOMMENDATIONS*

**FINAL REPORT**
**April 2013**

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WATERSHED

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**Vermont headwaters**

Watershed Consulting Associates (WCA), LLC has completed a comprehensive review of stormwater management regulation in the Mad River Valley Watershed including the Towns of Duxbury, Fayston, Moretown, Waitsfield, and Warren, as a component of the **Watershed Restoration and Resiliency** effort, undertaken by the Friends of the Mad River (FMR). This study was made possible by a Green Mountain Coffee Roasters (GMCR) grant, with the goal to address increasing stormwater and erosion issues in the Mad River Watershed which exacerbate flooding and water quality degradation. The goal of the project was to provide recommendations for the Mad River Valley (MRV) Towns to take action and strengthen stormwater management throughout the watershed in the face of future growth and climate change, and to consider the prospect of a Watershed-wide management strategy.

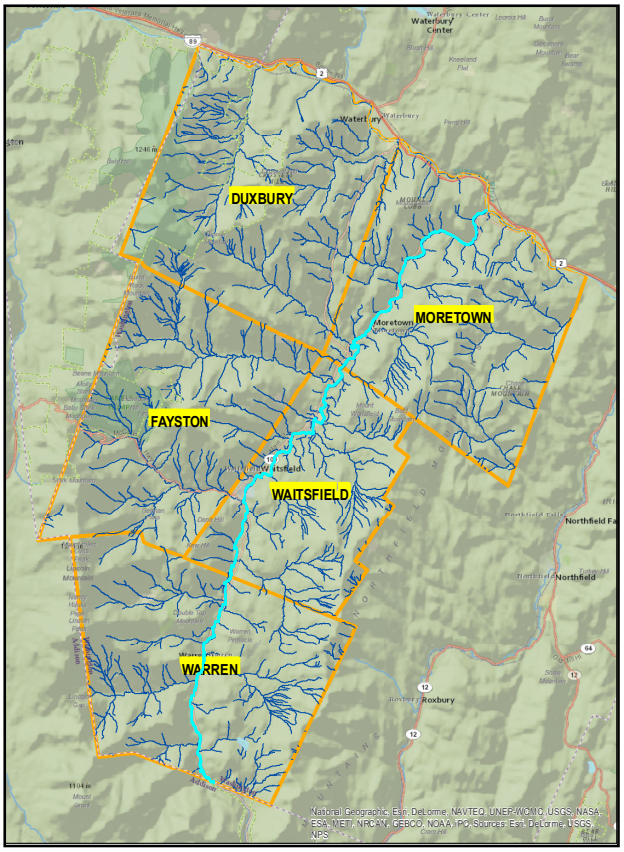
The study consisted of a review of the local town plans, and land-use/zoning regulations, for stormwater and erosion control related standards, objectives, and requirements. The review team looked specifically for low impact development (LID), green infrastructure (GI), and "pre-development" hydrology related language. Additionally, the team completed a literature review of relevant case-studies on how rural communities have dealt with stormwater management using regulatory strategies. The review team specifically looked at the benefits and challenges of adopting a watershed-wide stand-alone stormwater ordinance or incorporating more resilient stormwater management regulations into existing local landuse and/or zoning laws. In addition, the team investigated examples of funding mechanisms for stormwater programs, called utilities and the various approaches used by communities around the U.S.

In addition, the team reviewed another parallel U.S. EPA and FEMA grant funded project, "Smart Growth Implementation Assistance Project (SGIA)", completed in the past year by SRA international and Clarion Associates, on smart growth and flood resiliency in the MRV. SRA prepared a comprehensive policy memo, which the team reviewed to determine the work already completed in the valley related to flood resiliency and stormwater management, and to review SRA's recommendations for the MRV Towns to strengthen their flood resiliency-related policies and strategies.

## 1.1 Mad River Valley Town Background

The Mad River Valley Watershed is a 144 sq. mile area bordered by the Green Mountains including the Towns of Duxbury, Fayston, Moretown, Waitsfield, and Warren. The five communities are all primarily rural regions with a mix of steep mountainous terrain and low lying village centers. In addition to the FMR, all five Towns are supported by the Central Vermont Regional Planning Commission (CVRPC) for general planning and data management services. Additionally, Waitsfield, Fayston, and Warren, have additional regional support from the Mad River Valley Planning District (MRVPD) to help with planning on a multi-town basis. Each town has its own identity and goals for the future, as well as approach to the development and implementation of town-wide objectives, however they all share the persistent challenge of balancing the need to protect the scenic quality and natural environment while also allowing for healthy growth in the area.

**Duxbury, VT** is located at the Northwest portion of the watershed, characterized by steep terrain including the iconic Camel's hump mountain, and is home to about 1,300 residents.




**Fayston, VT** is the fastest growing Town in the valley home to a population of over 2,200 (fulltime and part time residents) with the primary attraction being it's two ski areas--Sugarbush Mount Ellen and Mad River Glen Resorts.

**Moretown, VT**, home to over 1,700 residents, is located within the Mad River and Dog River Watersheds. The town is characterized by a primarily residential mountainous rural landscape with some land used for farming.

**Waitsfield, VT** is centrally located in the Watershed, with an active village center, and is home to a rapidly growing population of 1,659 residents.

**Warren, VT**, located in the southern portion of the watershed, is home to 1,705 residents, with the primary attraction for the Town being Sugarbush Lincoln Peak Resort.

# 2 Project Need

This study is particularly relevant and important for the MRV due to recent flooding events that revealed the lack of flood resiliency in the valley and the need to strengthen the Town's policies and practices related to flood hazard mitigation. The valley's natural resources are a valuable asset to the MRV Towns and are at risk due to flood related issues. The following risks and issues were assessed and determined to provide reason and motivation for strengthening stormwater management in the MRV;

- Unpermitted Incremental development
- Threat to infrastructure
- Erosion and sedimentation in road drainage network
- Loss of Buffers
- Impacts to headwaters
- Climate Change Vulnerability
- Advances in Low Impact Development

## *2.1 Unpermitted Development*

The current State regulatory threshold for long-term (operational) stormwater management on a developed site is equivalent or in excess of one (1) acre of impervious surface. Impervious cover (IC) is defined as a man-made surfaces including rooftops, paved and unpaved roads, sidewalks, etc., from which precipitation runs off rather than infiltrates. Developments that create 1 or more acres of IC are subject to State operational stormwater permitting, which typically requires water quality treatment, recharge to groundwater, and control of larger storm events to address downstream flooding concerns. In cases where new development is proposed that is connected to existing development, for example a new expansion off of an existing residential subdivision, the threshold for compliance with State operational permit requirements can fall to as low as 5,000 square feet of new IC. In this case, the newly expanded IC would be subject to State operational permit requirements. In addition to the creation of new IC, existing IC that is redeveloped, such as a parking lot that is regarded and then repaved, is also subject to State operational permit requirements if the project will generate 1 or more acres of redeveloped IC.

The permitting thresholds for State operational stormwater jurisdiction do capture a significant number of development projects Statewide but many smaller projects that are a threat to water quality and downstream flooding fall below State thresholds and are permitted with little or no stormwater controls. In the Mad River Valley, typical residential development includes single family and small 1-4 lot residential subdivision (U.S. Census 2000). At this scale of development the State operational threshold of 1 acre will likely not be reached. If a project such as this expands in the future to a point where the 1 acre threshold has been crossed, it is sometimes difficult for owners, the Municipality, and/or the State regulatory agency to

determine a permit should be required for a portion of all of the development. So in many cases development projects that should have formal stormwater controls are not being permitting through the State system.

Unpermitted incremental development poses a significant risk to water quality and downstream infrastructure because the manner in which runoff is conveyed from a developed site is not controlled and is typically left up to the site contractor to decide without formal plans and analysis of site drainage conditions. This in some cases leads to unintentional consequences of erosion and flood risk downstream of a developed site.

Often times, older developments were originally designed to carry away drainage in the most efficient manner possible, typically by way of catch basins and culverts. Although relatively limited in the Mad River Valley, dense areas of IC exist in the core downtown areas such as Irasville, Waitsfield Village, Warren Village, and Moretown Village. In these areas, pollution accumulated on IC is efficiently transported into the storm drain network and then directly to receiving waters. Since these core downtown areas are older and are comprised of a patchwork of smaller parcels, the majority pre date any State stormwater regulation.

## *2.2 Threat to infrastructure*

**Eroded culvert due to stormwater, Mad River Valley**

In recent years the MRV Towns have seen a large number of severe storm events as well as in increase in the frequency of storms that have resulted in damage to private and public infrastructure; most recently storms in May 2011 (May 16th, 1.5" and May 27th, 5.5") and Tropical Storm Irene in August 2011 (August 28th, 5.0-8.0") (NOAA, 2011). As a result of these storm events that produced intense and/or long-duration precipitation, the local road network was severely impacted. Creation of new IC and channelization of runoff has resulted in greater amounts of stormwater runoff that is more apt to damage downstream infrastructure. In the case of unpermitted development, the consequence of channelizing flow and creating new IC is typically not assessed. The State operational permit requirement for most developments requires control of runoff from a site up to and including the 10-year, 24-hour recurrence interval storm. For perspective the severe storm events during 2011 likely generated flows in excess of peak flows regulated under current state regulation for effective protection of infrastructure during many storm events.

To compound this issue, numerous private driveway culverts in the Mad River Valley are undersized and/or poorly maintained. Currently, there is no comprehensive, watershed-wide mechanism in place to complete a formal drainage study when installing a new driveway

culvert. In Waitsfield during the May 2011 storm, a failed private driveway culvert resulted in significant damage to a Town Road with a cost of over $100,000. A properly sized, well-maintained driveway culvert would have a much better chance of withstanding large storm events. Therefore, a standard for new driveway culverts would be needed to specify a minimum culvert size as well as provisions for determining the appropriate design based on site-specific conditions.

## 2.3 Erosion and sedimentation from the road drainage network

**Roadway eroded after May 2011 storms, Mad River Valley**

The majority of MRV roads and driveways are steep and are underlain by erodible soil materials. Drainage from roads and from areas flowing into the road right-of-way is primarily controlled by open ditches (swales). These ditches serve to collect and route water away from the road toward a conveyance or water body. In many cases these roadside swales are not adequately protected from the force of runoff, and the result is erosion of the swale and the transport of sediment away from the road and into a water body or toward a restriction such as a culvert. New driveways or roadways sometimes compound this problem by relieving their drainage into the existing roadside swale, thereby adding additional runoff and greater potential for erosion. This is a typical compliant of road crews in the MRV. Provisions for new road drainage must be put in place to avoid excessive concentration of runoff and better protect steeper swales against erosion and sedimentation.

## 2.4 Loss of Buffers

A well-defined link exists between vegetated stream buffers and water quality. Buffer areas serve a critical role by providing erosion control and resilience for the stream channel, shading, habitat, and filtering and infiltration of polluted stormwater runoff. From headwaters to the main stem of the Mad River, preservation of existing buffer areas should be a top priority in any ordinance or stormwater regulations. Currently buffer requirements are included in landuse or zoning regulations in the Towns of Waitsfield, Moretown, and Fayston, but they are inconsistent across the watershed and are in need refinement based on latest available science and State level policy. For example, the current Vermont DEC Act 250 standard for riparian stream buffers is either 50-feet or 100-feet depending on site and project specific factors (VT ANR 2005). The watershed wide standard should be consistent with the State standard and be no less than 50 feet, and should include a clause for sensitive project situations.

## 2.5 Impacts to Headwaters

Vermont headwaters

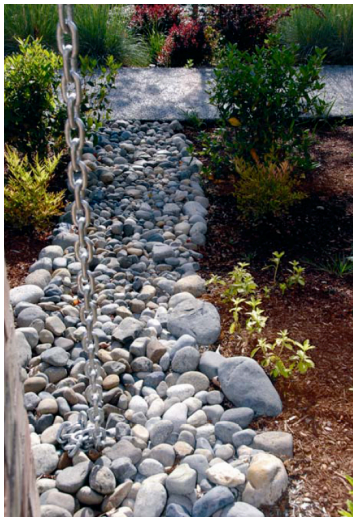
Headwater areas are the upper reaches of the Mad River watershed where undefined seeps and wetland areas concentrate into defined channels. These headwater areas are places where land and water interaction is most prevalent along a river system. Headwaters are critically important for sustaining habitat and downstream water quality. Headwater areas are extremely sensitive to disturbance such as road building and home development common in the upper reaches of the Mad River watershed. Often times these headwater areas are not well defined and are mistaken for drainage channels that are manipulated during land development. Filling and diversion of headwater areas results in impact to these resources. Impacts to headwater areas may also occur by the diversion of groundwater that typically occurs during road and foundation construction. This incremental destruction will pose a significant threat to water quality and downstream flooding in the Mad River watershed. A need exists for properly trained technicians to assess and inventory headwater areas on a site proposed for development. Clear regulation must be in place to avoid direct impact to headwater areas and interference of their hydrological regime.

## *2.6 Climate Change Vulnerability*

Currently stormwater conveyance structures and BMP treatment systems in the MRV Towns have been designed based on best judgment or, in the case of State-permitted systems, rainfall distributions which are now outdated. For example, the current VSMM relies on precipitation data from NOAA TP 40 1961, which is the data generated from a historic national rainfall study. Recent trend analysis for the northeast has shown that extreme events (greater than 2 inches in less than 48 hours) are becoming more frequent (Wake and Markham, 2005) in contrast to the old NOAA data. In addition, the number of extreme rainfall events that are greater than the long-term 95th percentile is increasing as the regional climate is changing. Resiliency to infrastructure failure is dependent on regulations that are based on most current precipitation data, and perhaps a margin of safety to account for projections in increased frequency and duration of precipitation events in the future. Sizing stormwater conveyance and treatment structures to match our changing climate will not eliminate the possibility of failures during extreme events. However, accounting for climate change will reduce our exposure to recurring infrastructure damage that would have otherwise been avoidable, if regulated structures were designed using best-available data.

## *2.7 Advances in Low Impact Development*

The State Stormwater Management Program is undergoing an initiative to overhaul the current technical standards for stormwater Best Management Practices (BMPs) that have been in place since 2002. The current technical standards, while state of the art at the time they were first introduced, are now antiquated because of newer research in stormwater and a better understanding about how best to preserve water quality by mitigating runoff. The newer trend in stormwater management is referred to as Low Impact Development (LID) and Green Infrastructure (GI) design. LID design involves integrating small-scale stormwater features onto a development site, which are designed to collect and infiltrate stormwater runoff before it can leave the site. Overall, the amount of stormwater volume generated from a developed site after development should equal or be less than before the site was developed, thereby preserving the hydrology of the undeveloped site (i.e. "pre-development hydrology"). LID design is in contrast to conventional or "gray" design where stormwater runoff is routed efficiently away from site impervious surfaces and into a centralized detention basin for control of the peak discharge of runoff.



**An Infiltration Trench installed to capture and infiltrate runoff from a house roof and driveway**

Current research shows that simply controlling peak discharge is not sufficient to protect downstream resources because the overall volume of runoff generated during a storm event has not been mitigated with this type of design approach. It is this excess stormwater volume that results in higher, longer duration flows in the receiving waters which weakens bank stability and ultimately leads to erosion. By 2014, it is anticipated that the State Stormwater Management Program will have an updated technical manual that will have LID as a central component. In addition, the State has released the Green Infrastructure Action Plan and hired a full-time employee to coordinate and promote GI activity in Vermont (VT ANR 2013). An action item included in this plan is to assist with GI integration into municipal programs.

There is a need for consistency between local stormwater regulation in the MRV Towns and impending new State standards. Designers producing development plans in the MRV will also typically design State permitted projects, and therefore, they will be most accustomed to State requirements. In addition as part of the State GI Initiative there will be a push for designer training on LID, and this could be valuable for educating designers permitting projects in the MRV Towns. LID should be a central focus of a MRV stormwater ordinance or local regulations.

# 3 Existing Regulatory Setting

The existing regulatory framework related to stormwater management and erosion control in the MRV is varied between Towns, with a common theme, to limit development on steep

slopes so as to reduce the risk of erosion. Each town has a 5-7 member Development Review Board (DRB), which reviews development projects for compliance with local land use and zoning bylaws. Additionally, each town has a 4-8 member Planning Commission (PC) that oversees longer-term planning issues and objectives, like preparing the Town Plan. Both entities influence the development and implantation of local laws and regulation, which it critical in addressing stormwater management goals on a project-by-project basis.

The overall regulatory framework consists of regulations and requirements at the Federal, State, and Local level (Table 1). The primary gap with the existing framework, as discussed in the previous section, is that development projects that are below the one (1) acre threshold are not required to manage stormwater on site by means of a permit or site design review, which is the most prevalent type of development in the MRV. Unpermitted small-scale development without stormwater management has resulted in a number of stormwater runoff-related issues, and can be addressed through changes in local legislation, enforcement, and community engagement

**Table 1: Stormwater Regulatory Framework**

| Regulatory Entity | Stormwater Regulation |
|---|---|
| Federal | US EPA Phase II Permitting;<br>➢ MS4 Requirements<br>➢ NPDES Permit for construction > 1 acre of disturbance |
| State | ➢ State Operational Stormwater Permit required for 1 or more acre new impervious<br>➢ State Construction Stormwater Permit required for 1 or more acre new impervious<br>➢ VT DEC administers Act 250 Stormwater and Erosion Control guidance on sites below State threshold. |
| Local | Varies by Town (see below) |

None of the MRV Towns have a stand-alone stormwater ordinance. However, they all have some type of stormwater management and erosion control regulation either as simply an objective and goal in the Town Plan or an actual regulatory requirement within subdivision site design standards and/or landuse regulation. Each Town's existing local laws and regulations addressing stormwater management and erosion control are summarized in Table 2, below, with the relevant document in bold, followed by the relevant clauses and/or sections. The Town of Fayston has the most current and robust regulation standards, requiring that all new projects that need to apply for a municipal landuse permit (this includes projects under the 1 acre threshold) must also be reviewed by the DRB for appropriate stormwater management on site. Additionally, the list of recommended runoff control approaches includes LID techniques to address stormwater. The Towns of Waitsfield, Warren, and Moretown also have a site design review requirement for stormwater management and erosion control, but are more lax stating the a site MAY be subject to a review, at the discretion of the DRB. This means that there is room in the standards to overlook this type of review.

**Table 2: Existing Stormwater Management Regulation for MRV Town's**

| MRV Town | Existing Stormwater Management Regulation |
|---|---|
| Duxbury | **Town Plan (2006) with Land Use Zoning Districts**<br>➢ No Specific Stormwater Management (SWM) or erosion control (EC) regulation within Town Plan |
| Fayston | **Town Plan (2008)**<br>➢ 3.8.6. Stormwater Runoff Management; Evaluate projects for SW impacts and appropriate management through Subdivision Review<br>**Landuse Regulations (2011)**<br>➢ Subdivision Review; Requires SWM and EPSC plan for projects that require a municipal land use permit<br>➢ LID Stormwater Guidelines/Recommendations |
| Moretown | **Town Plan (2008)**<br>➢ Steep slope development restrictions<br>➢ Water Resources; Language on threat of non-point pollution (SW) to water resources<br>➢ Land Use; High Elevations EC and SWM required<br>➢ No Subdivision Regulations; Objective to develop regulations to include NR protection standards for EC and SWM [pg 71].<br>**Zoning Regulations (2011)**<br>➢ Conditional Use Review. Sec. D. (5) Stormwater Management; NO adverse effect rule. SWM and EPSC plan *MAY* be required for approval. |
| Waitsfield | **Town Plan (2005)**<br>➢ *Natural Resource Policies*; (11) Steep Slope Restrictions, (19) Land Development Designed to address SW runoff.<br>➢ *Natural Resource Tasks*; (12) Implement Irasville Master Plan with comprehensive SW management system<br>➢ *Community Facilities and Services*; (8) SW must be managed on-site.<br>➢ *Community Facilities and Services Tasks*; (8) Revise Waitsfield Subdivision Regulations to include SWM, (11) Explore creation of a SW Utility.<br>➢ *Settlement Patterns*; Incorporate " 'green infrastructures' such as stormwater facilities" [pg. 133]<br>**Subdivision Regulations;**<br>➢ *Conditional Use Review (*D): Stormwater Management and EPSC plan prepared by licensed engineer MAY be required. |
| Warren | **Town Plan (2010):**<br>➢ Objective 10.6 (a) (i): To strengthen Erosion Control (EC) and Stormwater Management(SWM) standards<br>**Landuse and Development Regulations**<br>➢ General Erosion & Development on Steep Slope Restrictions, Subdivision Standards for SWM and EC.<br>➢ Site Plan review for SWM and EC |

# 4 Literature Review

In order to develop a perspective on the proven approaches to developing useful stormwater management regulation, the review team conducted a literature review of case studies where various approaches were applied. The following areas of stormwater management regulation and implementation were assessed:

- Stormwater Ordinances
- Local Land use and Zoning Regulations
- Financing Framework: Stormwater Utilities

## *4.1 Stormwater Ordinances*

Stormwater ordinances are a common regulatory mechanism used by municipalities to manage stormwater. They are stand-alone documents, which typically include stormwater management design standards and project review requirements for development in the jurisdiction to which it applies. Ordinances typically are comprehensive, and can address a number of issues overlooked by local codes including stormwater control and maintenance, illicit discharges, and post construction controls (EPA 2012).

**Town of Warsaw, Virginia—LID Stormwater Ordinance** (Weinstein 2012)

- Small rural Town of Warsaw, Virginia adopts LID stormwater ordinance as a way to reduce stormwater management costs compared to conventional end-of-pipe solutions.
- Re-evaluation of stormwater standards came from Town, as they assessed the costs, aesthetics and environmental impacts of conventional stormwater management for future development.
- Reviewed Town's existing codes. They were found to reference the State Stormwater Manual standards, but did not include any requirement to apply LID designs over conventional techniques.
- Completed an assessment of a "full-build" out scenario of the community with conventional pipe and pond strategy versus an LID build-out scenario and found the cost and maintenance of the conventional scenario to be unsustainable and beyond the Town's means.
- Updated **local stormwater ordinance** to establish LID approach as the standard methodology, and references National LID Design Manual for design guidelines.
- Developed an "Action Plan" that included revisions to the local stormwater ordinance with LID requirements, as well as LID review criteria for local plan reviewers, reference documents for local developers, and LID education for community, in order to make the revised regulations "actionable".

| **Washington County, Wisconsin—County and Town Ordinances** (Washington 2013) |
|---|
| ➢ County developed comprehensive Erosion Control and Stormwater Management Ordinance (Chapter 17), which required new land development to meet SWM and EC design standards.<br>➢ The County then revised the ordinance to make more applicable to the Town level.<br>➢ Each Town within the unincorporated areas of the County were provided with the ordinance, and given the choice whether to adopt the ordinance and administer as their own, or the County ordinance would be enforced in the Town and would supersede any Town regulations.<br>➢ The ordinance included requirements for stormwater management plans, plan review, technical design standards, maintenance of facilities, and enforcement of the ordinance.<br>➢ Requires administering body to review applications, issue permits, maintain records of permits and conduct site inspections for project approval and long-term maintenance compliance. |
| **Pennsylvania—Watershed-wide Stormwater Management** (PA DEP 2001) |
| ➢ The County develops a common watershed plan with standards for stormwater management. The development work is grant funded by the PA Department of Environmental Protection. Towns/Municipalities then adopt individual ordinances that are consistent with the watershed plan, so that all the Towns are regulating stormwater under a common Watershed Development plan.<br>➢ State legislation grants the authority of local municipalities to implement and enforce stormwater ordinances as they would local zoning and subdivision regulations.<br>➢ This approach allows for sound engineering and technical design standards, developed as a part of the watershed plan, to be incorporated into the local stormwater codes, rather than each municipality developing inconsistent and vague standards. |

**Benefits**:

- Robust regulatory document, which has proven to be a successful regulatory approach in many regions/cities.
- Places a stand-alone importance on stormwater management, rather than just another bylaw.
- Is comprehensive and therefore can be easier to attach on clauses and manage.

**Challenges**:

- Typically requires separate stormwater plan review, which requires a dedicated technical staff personal “Stormwater Management Officer”.

- May be more challenging to establish new separate regulatory document versus incorporation of a new set of standards into existing regulations,
- May be more challenging to implement a separate new ordinance, rather than incorporate the revisions into the local laws which the local government administration is familiar with and has an implementation framework already in place.

## *4.2 Local Landuse and Zoning Regulations*

A common approach to the development and implementation of stormwater regulations at the local government level is to incorporate them into the existing local laws. Many communities have land use and zoning regulations that define the manner in which development and growth are allowed to take place, and are commonly revised to include stormwater management standards. In addition, a site plan review is often already required by local regulations in order to assess if standards are being addressed through the design of a development project. Therefore, a common approach is to add on a stormwater management plan review requirement with the site plan review.

| **Clear Creek County, Colorado—Rural Mountainous community** (Topper 2009) |
|---|
| ➢ Comprehensive Plan Approach to be incorporated into local regulations.<br>➢ Includes LID design guidance.<br>➢ Water Law Ramifications for altering/reducing groundwater recharge. |
| **Maine LID Standards and Manual** (HWG 2007) |
| ➢ Require LID approach for SWM on new development projects.<br>➢ Addresses small projects, meaning that if a family residential development doesn't require review under the state law (larger project), then it must meet a certain SW standard ("Basic LID Standard") or alternate standard.<br>➢ Includes comprehensive design guidance for LID solutions. |
| **West Virginia Design Manual: Chapter 2- Regulatory Framework** (WV DEP 2012) |
| ➢ "Watershed Protection Elements" to incorporate into local development codes, policies, and ordinances as well as comprehensive and master plans for landuse<br>➢ Include Stormwater management through an overall watershed protection approach, rather than a separate stormwater standard, etc. |

**Benefits:**

- Revisions to local regulations works well for small rural communities that already have local zoning regulations in place, and can be easier to develop using the existing framework.
- The "Comprehensive Plan" approach puts SWM into perspective of other goals (land-use planning, better site design, use of natural assets on-site). This may motivate local

government officials to enforce SWM if they understand how SWM relates to other goals.

- A local Town-initiated program works effectively because it is supported and tailored to the Towns specific needs from the start allowing for efficient development of the regulatory stormwater management program and a more likelihood that the standards will be implemented successfully.

**Challenges:**

- Regulation alone can be unsuccessful at addressing stormwater management issues because many rural communities do not have adequate training and language criteria for local plan reviewers to assess LID site design ("local capacity" issues). Therefore, non-regulatory actions (i.e. education, training) are a recommended and necessary aspect to make any stormwater regulation program successful.
- Incorporation of stormwater regulation standards into Local Landuse and Zoning laws are not visible necessarily as visible as a stand-alone ordinance.
- Lack of knowledge of LID in development community makes implementation of new stormwater regulations challenging.

## *4.3 Financing Framework: Stormwater Utilities*

Stormwater utilities are a widely adopted funding mechanism for communities to finance management of their stormwater infrastructure. Over 800 communities in the U.S. have established utility programs, including the Vermont communities of South Burlington, Essex, and Burlington. Development of stormwater utilities is supported in Vermont by State legislation (Act 109) granting the authority of individual municipalities and/or regions to establish a utility to fund stormwater programs (VTDEC 2012). Stormwater utilities function in a similar manner to a typical municipal utility (i.e. water, energy) with user fees proportional to ones use of the service. The most common approach to determining user fees is based on a user's contributing impervious area, however some municipalities have simplified the process and charge a flat rate depending on property type (EPA 2009). The benefits and challenges to the various approaches were assessed through examination of several case studies.

**South Burlington, Vermont** (EPA 2009)

- Fee based on impervious area, either determined by the lot type (single-family, duplex) to which an average impervious area is known based on an Equivalent Residential Unit (ERU) for typical lot types, or actual on-the-ground impervious area.
- The Utility is a monthly fee charged to each homeowner, which funds a comprehensive stormwater program with more than $1 million collected annually.
- The fee is charged to tax-paying and tax-exempt properties.
- The Utility is managed by a stand-alone Municipal Stormwater Services Division, which requires local administrative capacity.

| **Newton, Massachusetts** (EPA 2009) |
|---|
| ➢ City of Newton developed a "Stormwater Drain Fee" which is based on a flat rate.<br>➢ Properties are charged a flat-rate quarterly fee.<br>➢ The selection of a simple "flat-rate" payment structure was due to the expense of developing a more sophisticated program based on lot size, impervious cover, etc. |
| **Yakima County, Washington** (Yakima 2007) |
| ➢ A countywide stormwater utility was established for the unincorporated area in the outskirts of the larger Yakima County Cities, which had their own stormwater utilities.<br>➢ User fees were established based on the ERU billing unit approach, where one ERU was set to 3,600 sqft of impervious surface. Different lot types were assigned a typical number of ERU's (e.g. residential properties were assigned one ERU).<br>➢ The purpose of the countywide approach was so that the less populated Towns could pool resources to develop a more sustainable budget necessary for larger municipal projects. |

**Benefits:**

- The impervious cover approach is fair and understandable to the user.
- A countywide Utility works well for smaller rural towns in order to pool resources to address issues across a board regional area.
- A utility can provide the necessary funding to develop local stormwater standards and/or a stand-alone ordinance.

**Challenges:**

- Determining user fees based on individual lot sizes or impervious cover may not be cost-effective (versus a flat rate) for small rural communities that do not expect to bring in a large amount into the Utility to cover program development costs. However this approach may be perceived as less equitable, as some users may be charged more/less than their actual contributing impervious area (i.e. "use of the stormwater management system").
- Utility programs require substantial development work up front, and therefore can be a challenge for small Towns with limited budgets and local staff support.

# 5 Recommendations

A stand-alone stormwater ordinance in conjunction with a watershed based stormwater utility is the recommended solution to provide a sustainable and effective stormwater management strategy for addressing existing stormwater problems and protecting water resources from new

development activity. An ordinance tied to a stormwater program funded through a utility would allow for permit review and tracking to be completed by a technical staff member proficient in stormwater management. This approach is in our option superior as compared to integrating new stormwater regulation into existing subdivision standards, as the latter keeps the burden with the Towns for review and tracking of permitted systems and does not address existing problems.

**Benefits:**

- Existing problems such as degraded or undersized culverts, erosion, flooding, and/or drainage could be systematically addressed and funded through the utility.
- A utility would require a dedicated staff, which will help support the start of a long-term solution
- A qualified professional would oversee permit review and tracking.

## *5.1 Permitting Thresholds*

One approach to regulating new development is to establish a threshold to identify development projects that are to be subject to treatment and control standards. As previously discussed, development projects that create 1 or more acres of impervious surface, and existing sites that redevelopment 1 or more acres of existing impervious surface, are subject to State operational stormwater permitting requirements. Similarly, for projects that disturb 1 or more acres of soil on a site are subject to erosion control, also known as construction stormwater permitting requirements. In certain cases where a development project is part of a larger common plan of development, these thresholds can be reduced significantly. However as previously discussed these thresholds do not capture a significant portion of the development activity in the MRV Towns.

In order to bring a larger portion of the development activity in the MRV Towns under proposed treatment and control standards, a maximum threshold of between 0.3 and 0.5 acre of new impervious surface or land disturbance should be considered. For perspective, 0.5 acre of new impervious surface is roughly equivalent to a 2-lot residential subdivision with an 800-ft access road. New development projects that are part of a larger common plan of development, such as the expansion of an existing residential subdivision, would also be subject to the new standards even if the expansion project falls below the designated threshold. This requirement would address the problem associated with continued small piecemeal development activity resulting in water quality and flooding impacts.

A second approach, which is recommended for further evaluation, is to require all development projects that are subject to local review to also receive a stormwater review as well. This would mean that smaller projects such as the development of a single lot and driveway would need to meet minimum standards for managing stormwater following LID design standards. Technical standards would be set up to fit the scale of the development, meaning that small projects may

only need to incorporate relatively low cost/low tech solutions such as preserving buffers and establishing adequate driveway cross drainage. This management scheme addresses the notion that even smaller development sites can have a substantial impact on water quality if not designed correctly.

## *5.2 Technical Standards: Non-structural vs. Structural Measures*

A comprehensive technical framework for managing stormwater requires treating runoff to remove pollutants including sediment, nutrients, and oils and greases, bacteria, and metals, and controlling runoff to mitigate peak discharge and overall volume of flows generated to protect against downstream erosion and flooding. New standards will require oversight including technical review and long term permitting tracking including inspection and maintenance, and for small communities with limited resources, this can be especially onerous. This is especially true when standards require implementation of structural measures to treat and control runoff such as ponds, swales, etc. The central focus of a LID design is to utilize natural features and runoff patterns on a site to preserve hydrology. For these reasons, a new regulatory framework should focus on guiding good site design (non-structural measures) as the primary means of mitigating stormwater runoff, and relying on structurally intensive practices as a secondary focus. For example, a regulation could set forth a series of non-structural measures requirements such as vegetated buffer establishment along all streams and wetlands as well as on the down slope side of a development project, maximum percentage of impervious cover restrictions, maximum spacing of drainage culverts under roadways, and diffuse dispersion of runoff from rooftop areas. If a certain development project can meet these non-structural requirements then the project would satisfy treatment and control standards and no further structural controls would need to be implemented on the site. If the project could not meet these non-structural measures, then structural measures could still be implemented as a fallback to satisfy treatment and control goals.

By promoting non-structural means first, stormwater management will be more successful given the LID approach, and there will be a reduced need for maintaining and tracking the function of structural practices over the long term.

## *5.3 Stormwater Utility*

One of the major challenges with addressing stormwater and erosion issues in the MRV is limited local administrative capacity and resources within the Towns to develop and manage a dedicated stormwater program. Therefore, the review team recommends that the initial best step would be to conduct a feasibility study on the implementation of a **watershed-wide Stormwater Utility**. A utility would provide the initial funding needed to develop a stormwater program including the creation of a stormwater ordinance, education, training, and other non-regulatory methods. There are several grant opportunities in Vermont that could be pursued

for this study, namely the Ecological Restoration Program (ERP) and the Lake Champlain Basin Program (LCBP).

As recommended by SRA in their smart growth and flood resiliency Policy Memorandum, the team recommends that the five Towns work together to form a utility, similar to the approach of many other small rural communities, to fund a stormwater management program. This approach will allow the Towns to pool resources and address stormwater long-term in an integrated and consistent manner throughout the MRV.

There are several approaches to determining how a user fee is established and administered, which would be assessed in depth in a feasibility study. Our recommendation is to base the user fee on impervious area, as this method is typically the most understandable to the property owner and charges users based on their use of the stormwater management system. In addition, this will require adequate mapping of IC in the watershed, which would support the development of a simplified watershed-wide runoff model. A runoff model would provide the Town's with an estimate for the amount of runoff and location of the major runoff issues so as to more strategically address stormwater. Additionally, quantifying the amount of runoff in the watershed would allow the Towns to develop reduction goals, which are more tangible to the community than a general identification of issues.

An additional benefit of developing a utility would be the ability to fund **non-regulatory measures**, which are critical to the successful implementation of new stormwater regulation, such as;

- Education for community members about addressing stormwater.
- Creative methods to get the community invested in the issues and on board with regulation changes (such as a "Community Stormwater Reduction Challenge" proposed by Mad River Planning District).
- Trainings for code enforcement officers, DRB and Planning Commission members.
- Guidance for the local development community to explain the standards in the local stormwater ordinance.

# 6 Next Steps

After a comprehensive review of the existing stormwater management regulation in the MRV it was determined that there is a need for the MRV Towns to strengthen their stormwater management regulations, in conjunction of other management measures. The following next steps are recommended to effectively address stormwater and erosion issues in the MRV watershed for the long-term:

- ✓ Embark on an outreach campaign to the watershed Towns, the MRVP, and the CVRP to introduce the findings of this report and to collect feedback on the specific challenges to implementation of a stormwater program and the needs of the community.

- ✓ Using the information gathered as part of the outreach to the Towns and planning agencies, conduct a feasibility study for the development of **Watershed-wide stormwater utility** to include a cost-benefit analysis of program implementation structures.

- ✓ Hire a **trained technical staff personnel** to develop and manage the Stormwater Utility

- ✓ Generate funding through the new utility to develop a dedicated **Mad River Watershed stormwater program** which would involve the following:

  - ✓ Development of **Watershed-wide stormwater ordinance** including but not limited to thresholds for project review requirements of LID project design, technical design standards that meet the latest LID Design Guidance.

  - ✓ Adoption of watershed stormwater ordinance under local Town law.

  - ✓ Educational Training Programs for code enforcement elected officials, Municipal personnel (Department of Public Works, Town Engineers, etc.)

  - ✓ Watershed-Wide stormwater education programming.

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