LAND USES AND BEST MANAGEMENT PRACTICES

TRANSPORTATION

Safe, efficient, and reliable transportation systems are a fundamental requirement of any modern society. Communities depend on transportation systems to provide opportunities for residential development, economic growth, jobs, and their tax base. Businesses depend on transportation systems to access materials or labor, and to deliver goods and services to customers. Households depend on transportation systems for access to work, school, shopping, medical care, social activities and entertainment.

Along with the positive benefits of transportation systems come negative consequences in the forms of increasing pollution and environmental degradation. Roads, highways, bridges and parking lots have direct impacts to the landscape and can contribute harmful pollutants into nearby rivers, streams, lakes and wetlands. Because most pavement surfaces are impervious, water cannot seep into the ground as it would under natural conditions. Therefore, when it rains water flows across the pavement as stormwater runoff, collecting and carrying any substances that may be on the ground surface. The runoff from roads and highways then washes harmful pollutants, mostly untreated, into waterways. Pollutants such as gasoline, oil, road salts and other chemicals can also infiltrate into the groundwater aquifers that McHenry County residents depend on for drinking water. These issues are by no means unique to McHenry County and are being addressed around the world with varying degrees of success.

The composition and quantity of pollutants found on any segment of road can vary widely from place to place. The most common pollutants can include suspended solids, oil, grease, toxic chemicals, heavy metals, road salts, nitrogen and phosphorus, pathogens, and trash. Many of these materials are deposited on roadways as a result of ordinary traffic activities, such as fluid leakage and the wear and tear of vehicle parts. For example, brake pad wear is a source of copper and zinc, which are the metals most commonly found in road and highway runoff. Polycyclic aromatic hydrocarbons (PAHs) are a group of known carcinogens that can be formed from burning fossil fuels and are commonly found on, or adjacent to, roadways. Wintertime salting practices may deposit chloride, sodium, and calcium onto roads, and application of fertilizers on median strips and rights-of-way is a source of nitrogen and phosphorus. Additionally, roads themselves may generate pollutants as their pavement degrades.

Factors such as traffic volume, roadway design, surrounding land use, regional climate, and accidental spills can influence the composition and concentration of pollutants. For example, arterial roadways such as Randall Road and U.S. Route 14 which carry over 30,000 vehicles per day may produce runoff with two to five times the pollutant levels found in runoff from rural, less-traveled highways L1. The concentrations of pollutants in road and highway runoff often exceeds levels that are established to protect the health of waterways. The effects of pollutants commonly found in roadway runoff include:

- Suspended solids—small solid particles, like sediment, that remain in suspension in stormwater—cause problems like increased turbidity, decreased light penetration, and direct toxicity to aquatic organisms.
- Large quantities of chloride, found in deicing agents, can damage plants, harm freshwater life, and leave water unpleasant to drink.
- Pathogens, including viruses and bacteria, may cause public health impacts when they are discharged into waters used for recreation or water supplies.

- High levels of nitrogen and phosphorus pollution may stimulate excessive algae growth. As the algae die and decompose, dissolved oxygen concentrations in the water decrease to harmfully low levels. This process is called "eutrophication".
- Heavy metals are toxic to aquatic life, are able to contaminate drinking water supplies, and can collect in sediments.

In addition to adverse impacts from pollutants, stormwater runoff from impervious roadways, parking lots, and driveways can contributes to flooding and erosion. Based on a one-inch rainfall, one acre of paved surface can produce 27,154 gallons of stormwater L2 and one mile of paved two-lane road can produce 55,000 gallons of stormwater L3. With nearly 2,500 miles of multiple lane roads, plus vast acreages of parking lots and driveways, McHenry County's paved surfaces create a tremendous volume of stormwater runoff.

In Illinois, precipitation rates are increasing and rainstorms are becoming more frequent and intense. According to the Illinois State Water Survey, over the past century the number of storms in Illinois producing over 2 inches of rain has nearly doubled, the statewide average annual precipitation has increased 11 percent, and temperatures in Illinois have risen by 1.2 degrees. Additionally, the largest increases in precipitation and heavy storms have occurred in the northern part of the state, which includes McHenry County L4. While most flood damage was historically associated with property in floodplain, over 92% of flood damages now occurs outside of the floodplain L5. Since these trends are expected to continue, the potential for flooding that causes damage to homes, businesses, roads and other infrastructure in McHenry County will also continue to increase. These challenges raise concerns regarding increased flooding from impermeable surfaces associated with roads, parking lots and other impermeable surfaces; the viability of existing transportation infrastructure to handle the increased runoff; and the possible need to resize infrastructure and implement stormwater best management practices (BMPs) to accommodate the increases in precipitation and storm intensity.

Fortunately, there are options that can be taken to help mitigate some of the negative impacts from transportation systems and other land uses. Green infrastructure and other BMPs can improve water quality, prevent erosion, and reduce flooding by temporarily storing stormwater and infiltrating runoff into the ground. How impervious surfaces, including roads, parking lots, and other paved surfaces are managed in McHenry County will have a tremendous influence on the rates of pollution entering waterways and the extent of flood damage to communities in the future. The following sections discuss ways for the State, County, municipalities, townships, and businesses to address water quality and flooding issues related to transportation:

Green Infrastructure/Low Impact Development: *The State, County, municipalities, and townships should implement green infrastructure/low impact development into roadway projects to reduce flooding, improve water quality, enhance habitat, and create natural beauty in the county.*

Green infrastructure or low impact development (LID) encompass a variety of stormwater BMPs such as rain gardens, planter boxes, bioswales, permeable paving systems and tree planting to capture, filter and reduce stormwater. These practices can cut down on the volume of runoff generated from paved roadways that could contribute to flooding and also reduce the amount of pollution reaching sewers, streams, lakes or other water bodies. Green infrastructure and LID systems mimic natural hydrologic processes and use natural elements such as soil and plants to capture and treat rain where it falls, turning it into a resource instead of a waste. As opposed to conventional gray infrastructure that

typically provides just a single use or benefit, green infrastructure and LID are designed to provide multiple benefits including flood prevention, water treatment, infiltration, wildlife habitat, and natural beauty.

*** Provide photos comparing concrete storm sewer and a bioswale at Three Oaks ***

The following section provides a brief overview of LID practices that can be used on transportation related projects. Please refer to the Green Infrastructure section of Chapter ??? for more detailed information about green infrastructure/LID practices and a comprehensive discussion about maintenance requirements:

Landscaping with native vegetation can be an effective method for managing stormwater. Landscapes with intact native vegetation produce little to no stormwater runoff. They stabilize soil and have deep root systems that act like a sponge by soaking up rainfall, allowing vegetation to absorb and transpire water back into the atmosphere. Remaining runoff continues to infiltrate into the ground and recharge groundwater aquifers as it follows the deep roots through the soil. Native plant species do not require fertilizer and therefore do not contribute additional water pollution from chemicals or excess nutrients. In fact, native vegetation filters out many pollutants from the water and air. When properly established, native vegetation does not require additional watering and requires little maintenance. Native plants are best adapted to the local climate, growing season, and soils. Native plants and native pollinator species are dependent on each other so landscaping with native plants also provides habitat for wildlife.

*** Provide photo of landscaping with native vegetation such as Three Oaks ***

Rain gardens and planter boxes are forms of bioretention that consist of shallow depressions that collect and absorb runoff from streets, sidewalks and rooftops. They mimic natural hydrology by temporarily storing, treating, or infiltrating stormwater where it falls thereby reducing the volume of runoff and improving the quality of stormwater. They are generally intended to draw down within 24 hours after a storm and some systems are designed with an underdrain. The depressions are planted with native grasses and flowering perennials that are adapted to survive periods of inundation and drought. The vegetation helps to provide water quality treatment and can be designed as attractive landscape features.

Raingardens are typically excavated depressions with slightly sloped banks that can be installed in a wide variety of locations from residential yards to ROWs. Planter boxes are constructed rain gardens that typically have vertical walls with either open or closed bottoms. The planter boxes are ideal for urban sites with limited space and as attractive streetscaping elements. In residential or commercial settings raingardens or planter boxes are usually designed to receive a percentage of rooftop runoff. For roadway projects they can be integrated as landscape features into urban sidewalks or streetscapes; in ROWs, medians, or cul-de-sac islands they are often designed to receive runoff from roadways; and they can be integrated into curb extensions where they receive roadway runoff while also serving as a traffic calming feature.

*** Sidebar of Crystal Lake Park District raingardens at Woods Creek Park ***

*** NEED photos of roadside raingarden and planter boxes ***

Bioswales - A bioswale is very similar to a raingarden except that it is designed to convey runoff from one point to another. The bioswale typically consists of an excavated swale that is planted with native wetland and prairie vegetation. The vegetated bioswales slow, infiltrate, and filter stormwater as it flows through. A comparable form of gray infrastructure would be a storm sewer whose sole purpose is usually to convey water. A bioswale on the other hand not only provides conveyance but also provides water quality treatment, flood storage, infiltration, wildlife habitat, aesthetic landscaping, and improved resiliency for the community. As linear features, they are particularly well suited to being placed along streets and parking lots.

*** Photo of bioswale at Walmart ***

Permeable paving systems include interlocking permeable paver systems, along with pervious concrete or porous asphalt, are paving systems with pore spaces that allow water to move downward through the paved surface rather than running off the surface and contributing to flooding. In permeable paving systems rain or snowmelt infiltrates downward through the paved surface into the underlying stone base where it is temporarily stored, allowing for infiltration into the soil and/or slow release into a storm drain system through an underdrain. Permeable paving systems can reduce the volume of runoff and improve water quality over conventional impervious paved surfaces. Common applications for permeable paving include residential streets, parking lots, driveways and patios.

Under the McHenry County Stormwater Management Ordinance, a project with a permeable paver system may qualify as a "pervious surface" if the design shows that native soil will be used to infiltrate stormwater that falls on the paver area (no underdrains would be allowed in this case). If the permeable paving system is designed to have underdrains, no credit would be given and the paving systems surface area would be considered impervious.

Permeable paving systems typically require less applications of deicer to maintain surfaces in winter. This is because when snow and ice melts, the water infiltrates through the permeable pavement allowing the surface to dry. On impermeable surfaces such as concrete or asphalt, snow and ice frequently melts during the day and refreezes at night, requiring repeated applications of deicers. Snow and ice management, including the application of deicers, will still be necessary on permeable pavement at some points in the winter. Therefore, care should be taken to avoid locating permeable pavements directly over the recharge areas for groundwater wells or aquifers. Resources such as the Illinois State Geological Survey's (ISGS) 3-Dimensional Geologic online mapping tool for McHenry County and well logs from the ISGS interactive ILWATER website, can be used to help evaluate site suitability. Refer to the References section for more information about the online tools.

*** Provide photo of aggregate base and pavers and a photo showing how pavers are installed ***

Stormwater treatment trains incorporate at least two LID practices in sequence to maximize the effectiveness of managing water quality. The combination of LID practices can provide progressively improved water quality treatment as water flows from one LID to the other. An example of a treatment train approach for a site may start with a parking lot with permeable pavers that directs runoff through a bioswale before flowing through a naturalized detention basin. When properly implemented, the runoff leaving a treatment train of multiple LID practices should provide improved water quality over conventional stormwater management systems.

*** Include an aerial of Walmart in Johnsburg with treatment train components labeled (confirm approval from Walmart) ***

Street trees have the ability to help clean air, reduce energy demands, raise property values, mitigate heat island effects, store carbon, and manage stormwater in urban environments. Trees reduce and slow stormwater by intercepting precipitation in their leaves and branches; absorb and transpire large quantities of water; promote infiltration around their roots; and improve water quality by storing or transforming pollutants into less harmful substances. By actively expanding the quantity and quality of trees in the rights-of-way of urban roads, municipalities, businesses and residents can enhance stormwater management and other benefits of trees including reduction of urban heat islands.

Rights-of-way can be a harsh environment for trees so it is important to select the correct species for the site and make sure that planting conditions will meet the needs of trees. Common design failures include compacted soil, improper (too small) tree pit size, a lack of soil for root growth, and impervious surfaces directly above the tree. Compaction under the tree canopy destroys soil porosity and permeability, limiting water infiltration and tree root growth. A tree pit that is too small and lacks the needed soil volume is inadequate for growing trees to their full potential, or even sustaining them for more than a decade. A tree placed in an area that lacks space and soil and regular access to rainfall or stormwater is destined for failure. Impervious surfaces over the root zone causes stormwater to run off the site, preventing infiltration and forcing tree roots to grow towards the surface in search of air and moisture.

*** NEED sidebar of street tree planting manual (e.g. Morton Arboretum or other sources ***

Fortunately, with the proper location, species selection, design, installation, and care, street trees can grow to full size and have long lives while providing beauty, stormwater benefits, and increased property values for the community. Refer to the Urban Trees section in the chapter on Residential and Commercial Development for a more comprehensive discussion about urban trees.

*** Include "Street tree failures and successful methods graphics" ***

Complete Streets are streets and their rights-of-way that are designed and operated to enable safe use and support mobility for all users. This includes people of all ages and abilities, regardless of whether they are travelling as drivers, pedestrians, bicyclists, or public transportation riders. Complete Streets encompasses many approaches to planning, designing, and operating roadways and rights-of-way with all users in mind to make the transportation network safer and more efficient. These approaches may address a wide range of elements, such as wider sidewalks, bicycle lanes, bus lanes, public transportation stops, crossing opportunities, median islands, accessible pedestrian signals, curb extensions, modified vehicle travel lanes, streetscape, and landscape treatments.

Landscaping treatments in Complete Street projects often include LID strategies that help manage stormwater runoff, reduce potential for flooding, and improve water quality. In addition to managing stormwater, properly designed LID strategies such as rain gardens, infiltration planters, bioswales, permeable paving, and street trees can help to create a safer, comfortable and more aesthetically pleasing streetscape for all users.

*** Provide ECT photo of Complete Street/LID features ***

The McHenry County has adopted an Active Transportation Policy that is committed to providing safe access for all users including cyclists and pedestrians. Additionally, the McHenry County Council of Mayors is actively encouraging municipalities to adopt Complete Street policies and utilize green

infrastructure as part of the Federal Surface Transportation Program (STP) that they oversee. If a municipality adopts a Complete Streets policy or if they utilize green infrastructure to manage stormwater, they may receive additional points (depending on project type) on their project application for Federal STP funding. http://www.mchenrycountycom.org/wp-content/uploads/2019/10/Final-Approved-2019-Methodology.pdf Other transportation related funding opportunities are also increasingly tied to municipalities having Complete Street policies.

*** Provide a graphic illustrating complete street cross section ***

Establish Native Plants in Rights-of-Way: *The County, municipalities, and townships should establish native vegetation on road rights-of-way to reduce flooding, improve water quality, expand pollinator habitat, and create natural beauty in the county.*

There are nearly 2,500 centerline miles of public roadway in McHenry County. Most of these roads have approximately 30 feet of public rights-of-way (ROW) on either side of the roadway. In many areas the majority of this ROW is unpaved with mowed vegetation that provides minimal environmental benefits and needs to be maintained on a regular basis. A healthier and more sustainable option is to convert appropriate sections of the ROW to a diverse mixture of native plant species that provides multiple benefits. When properly established, native plant communities can be resilient and require minimal maintenance because they have deep roots and are adapted to the local soils and climate conditions. Establishing native plants in roadside ROW is increasingly recognized as a cost-effective practice to improve roadside safety and maintenance while providing multiple additional benefits including:

- Vegetation and deep roots stabilize soil and prevent erosion
- Vegetation and deep roots help manage stormwater and reduce flooding by intercepting precipitation, slowing surface runoff, absorbing stormwater, and promoting infiltration
- Vegetation and deep roots help improve water quality by filtering out nutrients, pollutants, and sediment
- Promotes low-maintenance habitat by naturally controlling weeds and erosion
- Reduces the need for mowing (typically once a year)
- Minimizes the need for pesticide use
- Can improve safety by reducing drifting snow
- Improves sustainability by increasing species diversity
- Enhances habitat for pollinator species
- Can beautify the landscape by providing ever changing color and texture throughout the year.
- Preserves McHenry County's natural heritage.

Many transportation agencies have recently moved to establish native vegetation in ROWs because of the growing awareness that the populations of pollinator species have severely declined over the past decade. Pollinator species such as honey bees, native bees, butterflies, moths, and others contribute substantially to the food production systems of the United States, to the economic vitality of the agricultural sector, and to the health of the nation's environment. Some of the primary causes of these declines include habitat loss, increased exposure to pesticides, and rising impacts from pathogens.

Establishing native vegetation and creating habitat in ROWs can help to reverse the decline of pollinator species. Road ROWs are particularly important because they can provide corridors to help migratory pollinators travel.

*** Sidebar of McHenry Twp. ROW native vegetation projects ***

When properly established, native plant communities can require minimal maintenance over the long term and provide the benefits identified above. However, it is important that the best native species for the site conditions are selected and that the native plant communities are installed correctly, carefully managed during the establishment period, and properly maintained after establishment. This can require the use of trained contractors (or at least expert guidance) who can identify plant species, have a solid understanding of native plant management, and have the right equipment to properly install and maintain the native plant communities.

It typically takes three to five years for native plant communities to become established and self-sustaining. The following can be expected during the establishment period:

- Year One – Native seedlings will not get very tall and few, if any, will flower. Annual weeds and noxious perennial weeds that grow from the existing seed bank will need to be mowed to prevent further seed production and to reduce competition for sunlight and nutrients.
- Year Two – Some native species will mature, flower, and produce seed. Annual weeds and noxious perennial weeds that grow from the existing seed bank will need to be mowed, cut or spot treated to prevent further seed production and to reduce competition for sunlight and nutrients.
- Year Three – Cover crop species will decline as native perennials from the native seed mix become more visible and begin to outcompete weedy species. Weedy species should be declining but some selective cutting or spot treatment of weedy species may be necessary.
- Year Four and Beyond – Native perennials in the permanent seed mix will occupy most of the space and continue to outcompete weedy species. Some selective cutting or spot treatment may be necessary to control persistent weeds or invasive species. However, disturbances such as improper mowing, especially mid to late summer, can hinder the establishment of native species.

After the native plant community has been properly established, common maintenance schedules include at least two site visits per year by qualified individuals (in the summer and early fall) to monitor and manage the native plantings. By conducting these visits, the presence of weeds or invasive species can be identified and eradicated before they become well established. This practice keeps the level of long-term management to a minimum and maximizes the benefits provided. Mowing or controlled burns should also be conducted every one to three years to deter the growth of weeds and woody vegetation. Please refer to the Green Infrastructure section in Chapter ??? for more information about maintenance and Sidebar ??? in Chapter ??? for a discussion about how the Village of Algonquin effectively manages their naturalized BMPs.

*** Show photo of native planting along roadway. If possible show sequence site prep/during establishment/after establishment (check with eco contractors) ***

Invasive Species Control: *The State, County, municipalities, and townships should control the spread of invasive species along their roadways.*

Invasive plants are species that are typically non-native and are able to establish on many sites, grow quickly, and spread to the point of causing economic or environmental harm. These plants readily colonize disturbed areas and habitat edges, such as transportation and river corridors. Roadsides tend to be ideal habitat for invasive species because of the high level of disturbance and abundant sunlight. The right-of-way (ROW) environment along roads create long, linear habitats that serve as pathways for invasive plants to spread into new regions and onto adjacent lands. Once established, invasive plants can affect the safety and maintenance of transportation infrastructure, wreak havoc on the natural environment, and reduce the ability of the ROW or adjacent land to manage stormwater.

Once they become established along roadways, invasive plants often continue to spread to adjacent habitats. Invasive plant species are highly aggressive and since they have no natural competitors, they have the ability to displace existing vegetation and significantly reduce diversity of native plant and animal species. Invasive plants can impact transportation corridors by reducing sight distance, blocking signs, increasing the risk of fire, encroaching on travel lanes or pushing up through pavement, damaging shoulders and road edges, reducing effectiveness of drainageways, and increasing maintenance costs. Some invasive plants contain compounds that can cause burns, blistering or other health problems to people who come into contact with the plants. When invasive plants encroach into natural areas, they can degrade native habitat and drive up maintenance costs for agencies or property owners. Next to habitat loss, invasive species are considered the second most important factor in the decline of biodiversity in North America L6.

*** Sidebar with photos about roadside invasive species of greatest concern (e.g. teasel, phragmites, wild parsnip, poison hemlock, etc.) ***

Invasive plants can be spread by a variety of natural mechanisms, including birds, wind, and water. However, human activities are a major factor in the spread of these plants. Routine maintenance and construction activities along transportation corridors have played a role in the spread of invasive plants by dispersing or introducing seeds and other viable plant materials. Mowing equipment has been particularly problematic by transporting seeds and material of invasive species along entire transportation corridors and from one site to another. Eliminating or reducing the spread and establishment of invasive plants requires a proactive approach with two key elements.

1. New introductions of invasive species, especially those that occur due to human activities, must be avoided to the maximum extent possible. For example, transportation agencies could implement an equipment cleaning program to prevent the spread of invasive species from site to site. Equipment cleaning typically involves power washing equipment in the field, or at a controlled location to remove seeds and prevent transporting seeds to other locations.
2. There should be an emphasis on <u>early detection and eradication</u> of new populations. Control measures are far more likely to be successful, as well as significantly less expensive, on small, young populations rather than on larger, more established populations. For example, transportation agencies could develop a monitoring program to identify and map (using GIS) invasive species and implement a management program to control the most problematic invasive species.

Refer to Appendix ??? for a list of invasive species that are known to occur in Illinois.

Street Sweeping: *The County, municipalities, and townships can protect water quality and maintain the appearance of roadways by implementing or expanding street sweeping practices.*

Modern street sweeping involves the use of vehicles equipped with brushes, vacuums, and jets to propel water or air. The goals of street sweeping is usually to maintain a clean look on roadways and to remove trash, dirt, chemicals, motor oil or other pollutants that can pollute water resources. Regular street sweeping reduces the amount of pollutants that get washed into the storm drain and ultimately discharge to lakes and rivers. Water quality protection is dependent on the sweeping equipment's ability to collect fine-grained sediment because many pollutants bond to them. Historically street sweeping was primarily effective at removing large-sized particles which only provided minor pollution prevention, but newer equipment is able to efficiently remove the smaller, fine-grained particles.

There are three main types of street sweeping vehicles including mechanical broom, regenerative-air, and vacuum-assist. Mechanical broom sweepers are the more traditional and typically the least expensive types of sweepers that are better suited to pick up the large-grained sediment particles and clean on wet surfaces. They tend to create dust during operation, potentially increasing the amount of fine particles on the pavement that could ultimately be carried by stormwater to surface waters. The newer regenerative-air and vacuum-assist sweepers have higher pick up efficiency and are better at removing fine-grained sediment particles, but are less effective on wet surfaces and are more expensive.

The frequency of street sweeping will vary based on many factors including the organizations objectives, type of street sweepers available, road conditions, and weather conditions. In general, the more often a road is swept the better the water quality benefits. The national average for sweeping streets is 10 times a year L7. Organizations may opt to sweep twice a year, monthly, weekly or even daily depending on the communities needs and the organizations objectives. For instance, a community with a lake, river or other important aquatic habitat may have greater incentive to sweep frequently to protect the water resource. At a minimum, it's advised that street sweeping should be timed with the following:

- In the early spring, after the snow is gone, in order to pick up sand, rock salt, and other winter debris.
- In June, after trees have dropped their seeds and flowers to reduce phosphorus in stormwater runoff.
- In the fall, after leaves have fallen to reduce phosphorus in stormwater runoff. Schedule street sweeping coordination with leaf collection, and give priority to areas with large amounts of deciduous trees.
- If regenerative air or vacuum-assist equipment is available, sweeping should be done proactively before significant rain so that contaminants can be collected before they can be washed down the storm drains by the rain.

Sweeping has been shown to be more thorough when performed with two vehicles working in tandem or with the same vehicle making a second pass over the same area. For instance, using a mechanical sweeper for large particles followed by a regenerative-air cleaner can be particularly effective L7.

When planning routes, prioritize areas that drain into sensitive bodies of water since they can be adversely impacted by pollutants, those with greater tree coverage to collect excess nutrients from the trees leaves and flowers, and those routes that generally tend to be the dirtiest. Sonce longer routes can reduce the sweeper's performance, plan sweeping routes to be efficient. Make sure to properly dispose of collected material so pollutants do not run back into storm sewers or water bodies. Additionally, keep sweepers out of the rain and wash them in a place where residual pollutants on the sweepers won't wash pollutants into storm drains.

*** Provide photo of street sweeper ***

Catch Basin Cleaning: *The County, municipalities, townships and applicable businesses can protect water quality and protect infrastructure by implementing or expanding catch basin cleaning practices.*

A catch basin is an inlet to a storm drain system that typically includes a grate in the street or parking lot where stormwater enters the catch basin, and a basin or pit to capture sediment, debris, and associated pollutants. The purpose of the basin is to prevent the downstream pipes from becoming clogged with sediment and debris. By removing the accumulated sediment, pollutants are also removed before being discharged into lakes, rivers and streams. Catch basins must be cleaned periodically to maintain their ability to trap sediment and provide drainage for stormwater.

The removal of sediment, decaying debris, and associated pollutants from catch basins has both aesthetic and water quality benefits. The benefits include reducing foul odors, solids, and other pollutants that reach receiving waters. Cleaning schedules should be developed to ensure the catch basins continue to operate properly. In general, the more frequently catch basins are cleaned out, the better the pollutant removal efficiency. Studies show that when catch basins are regularly cleaned out they can achieve significantly greater removal of coarse sediment, total suspended solids, nutrients, metals, and other pollutants L8.

*** NEED Graphic with cross section view of a catch basin ***

The ability of a catch basin to remove pollutants decreases as it fills up with sediment and debris. Typically, a catch basin should be cleaned when the depth of deposits is about one third full from the basin's bottom to the invert of the lowest opening into, or out of, the basin L9. The catch basin may need to be cleaned more frequently if woody debris or trash regularly accumulates. Since some catch basins will likely fill up more quickly than others, operators should monitor and track their storm sewer systems to determine how quickly catch basin sumps fill up. They can then establish clean-out frequencies on that monitoring data, to maximize the amount of residue removed and the water quality benefits provided.

Proper disposal of the collected waste is necessary since the solid and liquid material collected from the catch basins may contain heavy metals and other pollutants from roadways, parking lots, or other areas. A common and effective disposal practice is to take the waste to drying beds at a municipal wastewater treatment plant to separate the liquids and solids. The liquid portion of the waste stream is then run through the wastewater treatment plant and the solids are transported to a landfill after they dry.

*** Photo of Vac Truck cleaning out a catch basin ***

Snow and Ice Management: *The State, County, municipalities, townships, and applicable businesses can use Sensible Salting practices to manage snow and ice while reducing excess applications of chloride based deicers and protecting water resources.*

Winter weather conditions in McHenry County cause icy surfaces on roads and parking lots that can create dangerous conditions for drivers and pedestrians. To maintain safety the State, County, municipalities, townships, and businesses manage snow and ice using a variety of tools including shovels, plows and other equipment to physically remove snow. They also frequently employ the use of chemical deicers to melt or prevent the formation of ice. In their solid form, chemical deicers are incapable of melting snow and ice. To work, the chemical deicer needs to get wet to dissolve in water and form a liquid brine. Once it is formed, the liquid brine then lowers the freezing point of water thereby melting snow or ice and either preventing a bond from forming, or breaking the bond, between ice and paved surfaces.

*** Include photo comparing dry salt pellet and pre-wetted salt pellet ***

Chloride is the main chemical component that melts or prevents the formation of ice in most common deicers. While chloride-based deicers have the ability to greatly improve safety on roads and other paved surfaces, they are highly corrosive, pollute water resources, and have negative impacts on infrastructure, the environment, wildlife, and pets. When snow melts or rain falls, chlorides in the deicers dissolve rapidly into the water which then either seeps into groundwater aquifers or is carried by stormwater into waterways. Once the chlorides dissolve into water there is no practical way to remove it from the environment or at a municipal scale. Of particular concern is the increasing concentration of chlorides that are accumulating in groundwater aquifers. McHenry County relies solely on groundwater for its drinking water and studies show that the concentration of chlorides is increasing in the sand and gravel aquifers L10. Therefore, it is important for everyone in the county to manage snow and ice in ways that maintain safety but minimize the use of chloride-based deicers. This is often referred to as Sensible Salting.

The use of salt and other chloride deicers in the U.S. began in the 1960's and their use has continued to grow exponentially with little awareness or understanding of the negative impacts. As such, excessive amounts of deicers are regularly over-applied on America's paved surfaces, far beyond what is needed to maintain safety. Such excess applications are particularly noticeable on parking lots where over-applications of deicers are driven in part by misunderstanding of how deicers work, liability concerns, and contracts that incentivize excessive application. The excess deicer provides no benefit to the public but comes at great economic and environmental costs. There are currently no safe, economically viable alternatives to chloride based deicers, so the best solution is to use these deicers sensibly. "Sensible Salting" is the use of Best Management Practices for snow and ice management that maintains safety for pedestrians, drivers, vehicles and property while eliminating the unnecessary use of salt to minimize impacts to water and the environment.

The McHenry County Division of Transportation (MCDOT) has long been a national leader in the use of Sensible Salting practices. In addition to developing and employing Sensible Salting practices on the county's roadways, MCDOT along with the County's Department of Planning and Development, the Village of Algonquin and other municipalities, have been hosting annual Sensible Salting workshops since 2009 where they have trained over 1,000 people.

*** Sidebar for Sensible Salting workshops with classroom & hands on training

Examples of common Sensible Salting practices include:

- Store Salt Properly - Protect salt from water by storing it on an impervious surface, preferably on high ground and away from stormwater inlets or drainage features. Always keep salt covered to prevent contact with rain or snow. Practice good housekeeping and sweep any salt spilled while loading back under cover.
- Calibrate Equipment - Make sure to calibrate equipment one or more times annually so the amount of salt being dispersed can be accurately controlled.
- Pre-Wet Salt - Road salt needs to be wet in order to be effective. Pre-wetting salt means that the deicer is being applied in an active state, making it more effective and requiring less salt to be applied. Pre-wetting salt also helps keeps the salt on the road, while dry salt tends to bounce off the road.
- Use Anti-Icing Techniques - Anti-icing techniques prevent the formation of ice on roadways. This is commonly done by proactively tracking the weather and applying liquid brine in advance of a snow event. The brine prevents an ice bond from forming, enabling plows to remove snow more effectively without repeated applications of salt.
- Use Liquids as Deicers - Liquids can also be used as a deicer instead of solid materials during storm events, resulting in lower salt use and cost savings.
- Attend Training – Attend Sensible Salting training and certification workshops such as those held by county governments or trade organizations. McHenry County holds workshops every fall and certifications are valid for three years.
- Hire Certified Contractors – Businesses can hire contractors who have up to date Sensible Salting certification and are implementing Sensible Salting practices.

*** Provide photos of each technique ***

There are currently no viable alternatives to chloride-based materials to manage ice on roads and paved surfaces. Therefore the best option is for the county, municipalities, businesses and residents to diligently utilize Sensible Salting practices to maintain safety and protect water resources.

Living Snow Fences: *The State, County, municipalities, and townships should implement or expand the use of snow fences and living snow fences to improve safety, reduce snow and ice management costs, and protect water resources.*

Drifting snow is a common problem on roadways in winter. The snow drifts can require repeated mobilizations of snowplows and applications of chemical deicers on roads that would otherwise clear. Snow fences and living snow fences can be a practical way of reducing snow drifts from forming. Less drifting results in less mobilization of snowplows, thereby reducing the need for repeated applications of deicer and ultimately reducing the amount of chloride pollution.

*** NEED photo of drifting snow on roadway ***

A snow fence is a barrier that forces windblown, drifting snow to accumulate in a desired place and minimize the amount of snow drift onto roadways. Snow fences in McHenry County typically consist of 4-foot tall plastic fencing that is temporarily installed during the winter months on private land located along roadways that are prone to drifting snow.

*** NEED photos of a snow fence, living snow fence (ag field), and a permanent Living snow fence ***

Living snow fences can be temporary or permanent. Temporary living snow fences typically involve working with farmers to leave approximately 16 rows of corn, parallel with a road, in place throughout the winter. The corn rows capture snow and prevent drifting from occurring. The farmers are compensated for the cost of the crops left in place, and are also able to collect and sell any remaining corn in the spring. Permanent living snow fences typically consist of perennial vegetation such as native shrubs or prairie plants, or a mixture of evergreen and deciduous shrubs, planted parallel to the road to act as a natural wind break to prevent drifting. These living snow fences can also provide important habitat and protection for wildlife over winter. Costs for the living snow fences are offset, in part, by reduced mobilizations and deicer use, as well as lower manpower costs from not having to install and remove traditional physical snow fencing.

*** Include photos comparing road conditions with/without living snow fence ***

*** Sidebar for MCDOT Living Snow Fence Program ***

L1 East-West Gateway Coordinating Council (EWGCC), "Highway Runoff and Water Quality Impacts", August 2000, Page 3
L2 American Rivers, "Transportation Bill Reauthorization: Reducing Polluted Stormwater Runoff Using Green Infrastructure," http://www. americanrivers.org/assets/pdfs/clean-water-/stormwater-and-transportation.doc
L3 https://www.usgs.gov/special-topic/water-science-school/science/rain-and-precipitation?qt-science_center_objects=0#qt-science_center_objects
L4 https://blogs.illinois.edu/view/7784/782388
L5 Presentation by Paul Osman, Chief, Statewide Programs Section of the Illinois Office of Water Resources at the McHenry County Water Forum on September 11, 2019.
L6 https://eol.org/docs/discover/invasive-species
L7 https://stormwater.pca.state.mn.us/index.php?title=MS4_fact_sheet_-_Street_%26_Parking_Lot_Sweeping.
L8 https://www.michigan.gov/documents/deq/deq-wb-nps-cab_250605_7.pdf
L9 https://nepis.epa.gov/Exe/ZyPDF.cgi/200044BA.PDF?Dockey=200044BA.PDF
L10 https://www.isws.illinois.edu/pubdoc/B/ISWSB-74.pdf

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