NMDOT

GSI Maintenance Manual

Maintenance Guidance for

Green Stormwater Infrastructure

April 2024

New Mexico DEPARTMENT OF TRANSPORTATION
MOBILITY FOR EVERYONE

NMDOT Green Stormwater Infrastructure (GSI) Maintenance Manual

April 2024

New Mexico Department of Transportation
Environmental Bureau
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ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
AD	Administrative Directive
ASCE	American Society of Civil Engineers
BMP	Best Management Practice
FHWA	Federal Highway Administration
GSI	Green Stormwater Infrastructure
IVM	Integrated Vegetation Management
LID	Low Impact Development
LoE	Level of Effort
MS4	Municipal Separate Storm Sewer System
NMDOT	New Mexico Department of Transportation
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
OSE	Office of the State Engineer
PPE	Personal Protective Equipment
SHB	Stormwater Harvesting Basin

COMMONLY USED TERMS

Throughout the Manual, the reader will find references to specific terms. To better understand the processes and goals of the green stormwater infrastructure (GSI) maintenance program, these commonly used terms and definitions are listed here.

Bioswale – A stormwater conveyance feature with biological components including plants, organic mulches, and/or compost. Bioswales are designed to improve water quality by carrying (conveying), slowing, and treating stormwater runoff. Bioswales allow pollutants to settle out and promote stormwater infiltration. A bioswale can also be referred to as a bioretention swale, swale, or ditch.

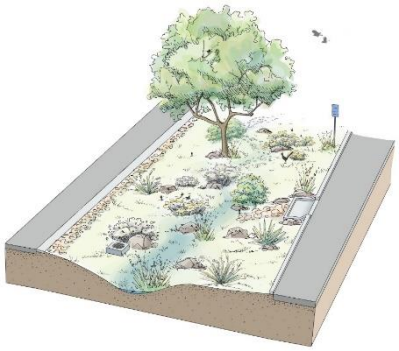

Figure 1: Graphic Depicting a Bioswale

Check Dam – A structure in a conveyance feature (such as a bioswale) designed to slow water, reduce erosion, and increase infiltration. Check dams can be used in roadside GSI features, bioswales, depressed medians, chicanes, or stormwater bumpouts.

Figure 2: Example of Check Dams in a Roadway Median Bioswale

Chicane – Chicanes are stormwater curb extensions that add curves to an otherwise straight roadway. The space created by the chicane is capable of infiltrating stormwater and accommodating streetscape planting. Chicanes also serve as traffic calming devices and have been used on many New Mexico streets.

Clear Zone – A clear zone is defined in the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide as the unobstructed, traversable area provided beyond the edge of the through travelled way for the recovery of errant vehicles.

Compost – A soil-like product formed from the decomposition of organic materials. It is used as plant fertilizer and to improve soil's physical, chemical, and biological properties.

Curb Treatment – Any curb structure that allows stormwater runoff to leave a roadway or parking lot and enter an area of infiltration, such as a GSI feature. A curb treatment can function as an inlet or an overflow for a GSI feature. Curb treatment can also be referred to as curb cut, curb inlet, curb opening, or sidewalk culvert.

Green Stormwater Infrastructure (GSI) – Stormwater infrastructure that has both engineered and biological components, including plants, mulches, and/or compost. GSI features are designed to capture, treat, and infiltrate stormwater. They also provide many co-benefits including providing shade, habitat, and beauty to a community.

Gray Stormwater Infrastructure – Stormwater infrastructure that is designed to move urban stormwater away from the built environment and includes curbs, gutters, drains, piping, and collection systems. Generally, traditional "gray" stormwater infrastructure collects and conveys stormwater from impervious surfaces, such as roadways, parking lots, and rooftops, into a series of piping that ultimately discharges untreated stormwater into a local water body.

Integrated Vegetation Management (IVM) – The process of using appropriate, environmentally sound, and cost-effective treatments to eliminate invasive and undesirable plants and replace them with desirable species.

Level of Effort 1 (LoE 1) – A visual inspection of a GSI feature that should be performed quarterly or as needed. Each component of the GSI feature is inventoried for issues that require maintenance or repair. Components that need repair are noted in the Visual Inspection Checklist.

Level of Effort 2 (LoE 2) – Routine maintenance that can be completed with basic tools listed in the NMDOT GSI Maintenance Field Guide. These maintenance actions address issues noted in the LoE 1 visual inspection.

Level of Effort 3 (LoE 3) – LoE 3 are issues identified in the LoE 1 visual inspection that require more significant remediation than what can be fixed with routine maintenance (LoE 2). An example of LoE 3 includes repairs for larger areas of erosion, such as undercutting at inlets, side slopes, or around check dams that cannot be corrected with routine maintenance. Additionally, LoE 3 maintenance could be addressing sediment-clogged soil that causes water to pond more than 48 hours after a storm event. LoE 3 also addresses major infestations of invasive plant and/or insect species.

Mulch – A natural material that covers bare dirt, allows stormwater infiltration, helps retain soil moisture, reduces invasive species growth, and protects against erosion. Mulch is also known as organic mulch, wood chips, gravel, aggregate, riprap, and cobble.

Overflow or Outlet – The point where excess water leaves a GSI feature. In some features, the inlet becomes the overflow once the feature capacity is reached. This feature can also be referred to as a weir, spillway, or overflow drain.

Phytoremediation – The use of plants and associated soil microbes to reduce the concentrations of toxic effects of contaminants in the environment.

Sediment Trap – A pretreatment area located at the inlet to a GSI feature used to capture sediment and other debris before reaching the GSI feature. This is also referred to as a forebay.

Slope Drain – A small channel created at the inlet of a GSI feature that directs runoff into a stabilized area of the basin. This structure can be concrete or rock lined. Slope drains are installed in situations where slopes are or may be eroded by the concentrated runoff from an inlet. Slope drains are also referred to as rundowns.

Stormwater Harvesting Basin (SHB) – A depressed area with biological components, including plants, mulches, and/or compost, where stormwater collects and infiltrates. A SHB can also be referred to as bioretention basin, detention basin, retention basin, or pond.

Figure 3: Example Stormwater Harvesting Basin (SHB)

Soil Sponge – An excavated hole filled with a mix of pumice, compost, and wood chips. Soil sponges absorb and store stormwater while inoculating the surrounding soil with beneficial micro-organisms. They also improve infiltration and support plant health. Soil sponges can also be referred to as a water retention sponge, mulched vertical infiltration drain, or an infiltration sponge.

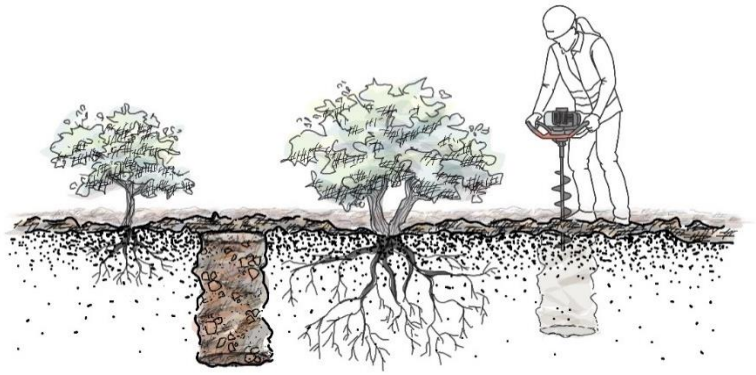

Figure 4: Graphic of a Soil Sponge

Treatment Trains – Several GSI features used together in combined applications. For example, a bioswale that outflows to a stormwater harvesting basin.

Zuni Bowl – An erosion control feature that generally consists of rock-lined steps and basins used to control erosion by preventing headcuts and/or rills from forming. These features work by slowing down and removing energy from stormwater runoff.

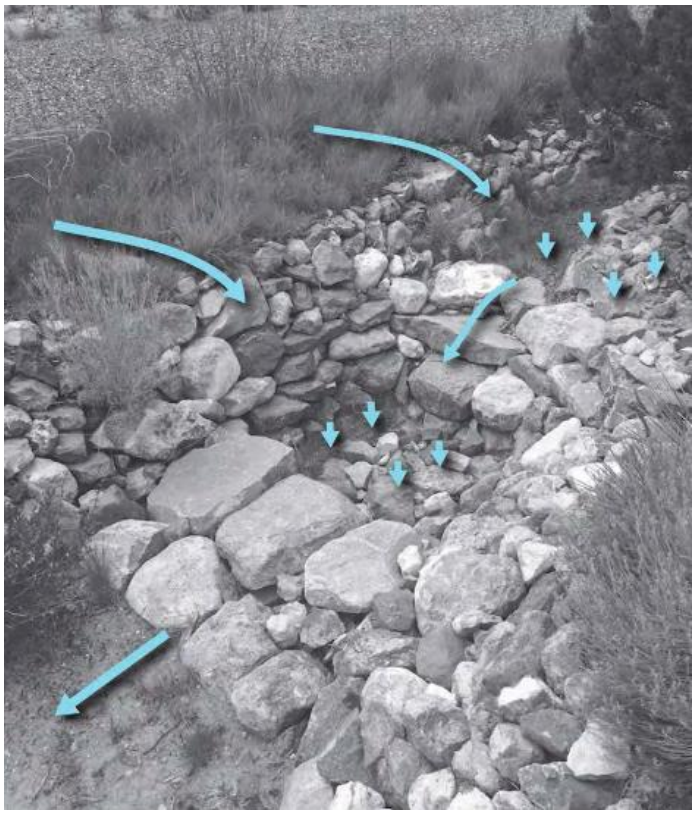

Figure 5: Zuni Bowl Example
(Image from Bernalillo County GSI/LID Design Strategies for Desert Communities)

FORWARD – PURPOSE OF THIS GREEN STORMWATER INFRASTRUCTURE (GSI) MAINTENANCE MANUAL

This New Mexico Department of Transportation (NMDOT) Green Stormwater Infrastructure (GSI) Maintenance Manual recognizes that GSI features are different from traditional maintenance activities performed by NMDOT and their contractors. GSI features include both engineered and biological components, including plants, mulches, and/or compost. Features are often designed in series and distributed throughout a project. Therefore, they must be inspected and maintained properly to ensure they are functioning as planned for stormwater management. This manual was created to familiarize NMDOT staff and contractors with the maintenance of GSI features, specifically stormwater harvesting basins and bioswales.

This NMDOT GSI Maintenance Manual is a companion to the NMDOT GSI Maintenance Field Guide. This manual and the NMDOT GSI Maintenance Field Guide include GSI maintenance guidance for various levels of effort depending on the scale of maintenance needed. Please consult the NMDOT GSI Maintenance Field Guide for additional guidance on visual inspections for Level of Effort 1 (LoE 1) and routine maintenance for Level of Effort 2 (LoE 2). This maintenance manual provides further detail on LoE 1 and LoE 2, as well as guidance on Level of Effort 3 (LoE 3), when more significant remediation than what can be fixed with routine maintenance (LoE 2) is required.

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NMDOT acknowledges that this NMDOT GSI Maintenance Manual and associated NMDOT GSI Maintenance Field Guide were created through community collaboration. There is a regional effort to increase the implementation of GSI in the Middle Rio Grande and New Mexico that is coordinated through the Arid LID Coalition and championed by many local cities, counties, and agencies.

1 OVERVIEW AND BENEFITS OF GREEN STORMWATER INFRASTRUCTURE

Green Stormwater Infrastructure (GSI) is an approach to stormwater management that aims to reduce the negative impacts of untreated stormwater runoff by mimicking natural processes to improve water quality and to mitigate environmental impacts. When rain falls in natural, undeveloped areas, the water soaks into the ground and is filtered by soil and plants. In developed areas, when rain falls on impervious surfaces (roofs, streets, highways, and parking lots), the water can no longer soak into the ground. Stormwater that runs off these impervious surfaces results in increased runoff rates in roadways, gutters, inlets, storm sewers, ditches, and other traditional stormwater management systems, eventually discharging into arroyos, streams, and rivers. Stormwater runoff carries trash, microplastics, bacteria, heavy metals, hydrocarbons, brake dust, rubber particles, and sediment that pose a threat to human health and the environment. Higher flows resulting from heavy rains on impervious surfaces also can cause flooding and property damage as well as erosion and flooding in streams, damaging habitat, property, and infrastructure.

GSI stormwater management approaches offer drainage solutions while also providing many co-benefits with real community impact. GSI benefits include:

- reduces flooding;
- reduces erosion and allows for sediment capture;
- filters and removes pollutants, improving water quality;
- irrigates plants and trees with captured stormwater, which shades and cools neighborhoods and improves air quality;
- reduces the urban heat island effect with added vegetation;
- creates habitats, increases biodiversity, and encourages pollinators with the added vegetation;
- promotes restoration of riparian buffers, greenways, and wildlife corridors;
- promotes recreation by increasing green spaces;
- promotes water conservation;
- provides traffic calming; and
- addresses environmental justice issues when applied in impacted communities.

Stormwater management approaches that incorporate GSI recognize stormwater as a resource and provide a nature-based complement to traditional “gray” stormwater infrastructure. GSI features have both engineered and biological components, including plants, organic mulches, and/or compost. GSI is often distributed throughout a project and

integrated with traditional “gray” stormwater infrastructure, including inlets, curb cuts, storm sewers, and outfalls (refer to Figure 6 for a GSI example). GSI can be used to reduce flooding by infiltrating and treating stormwater before entering the traditional storm sewer system. GSI is often used to comply with Municipal Separate Storm Sewer Systems (MS4) permit requirements with the goal of preventing or reducing pollutant runoff from municipal areas into surface waters.

Figure 6: GSI Feature in Taos, NM

Several GSI features are typically used together or in series in combined applications or “treatment trains”. The NMDOT National Pollutant Discharge Elimination System (NPDES) Manual (QR code provided below) provides examples of combined GSI features for example roadway projects, including an urban intersection, a roundabout, a rural roadway, and a highway interchange.

These examples assist with understanding how distributed GSI features function within a roadway project for stormwater management. The urban intersection graphic from the NMDOT NPDES Manual is provided in Figure 7 as an example.

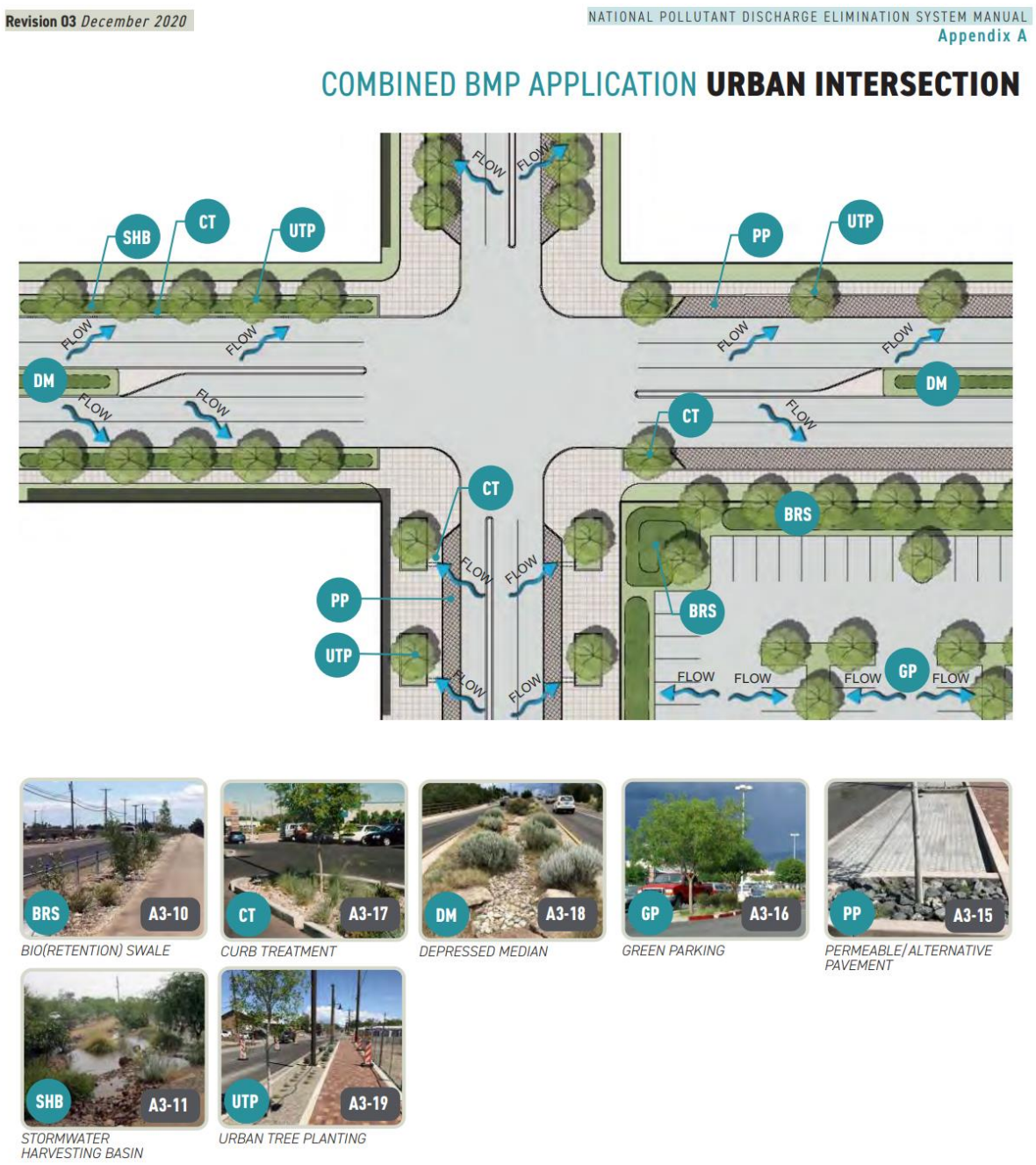


Figure 7: Combined Application of GSI Features in an Urban Intersection

Vegetation and healthy soil are key components to functioning GSI features. Maintaining the plants in a GSI feature is a big part of the maintenance job. Plant roots hold soil together, improve infiltration, and prevent erosion which reduces damage to infrastructure. Healthy soils, plant roots, and organic matter filter and break down pollutants in stormwater. There are several pollutants that wash from roadways into GSI features, such

as particles from tires including rubber, hydrocarbons, carbon black, and many other chemicals. Additionally, microplastics from litter, brake dust, sediment carried on vehicles, hydrocarbons from oil and gasoline, and heavy metals such as lead, zinc, and copper all wash into GSI features from the roadway. However, there are several plants that have phytoremediation properties, such as common yarrow and Apache plume, which can be used to combat these pollutants. A detailed list of plants to use within GSI features in the various NMDOT revegetation zones, including those preferred for their phytoremediation properties, is included in the NMDOT GSI Maintenance Field Guide, pages 38-45.

NMDOT recognizes that GSI provides a sustainable long-term solution to watershed drainage challenges including those related to increasing development or natural disasters in watersheds. For GSI to provide the stormwater management solutions intended, features – the engineered and biological components including plants, organic mulches, and/or compost – must be inspected and maintained properly. Figure 8 and Figure 9 illustrate a poorly maintained GSI feature and a well maintained GSI feature. Details on proper maintenance of the various GSI feature components are provided in this manual and in the NMDOT GSI Maintenance Field Guide (QR code provided below).

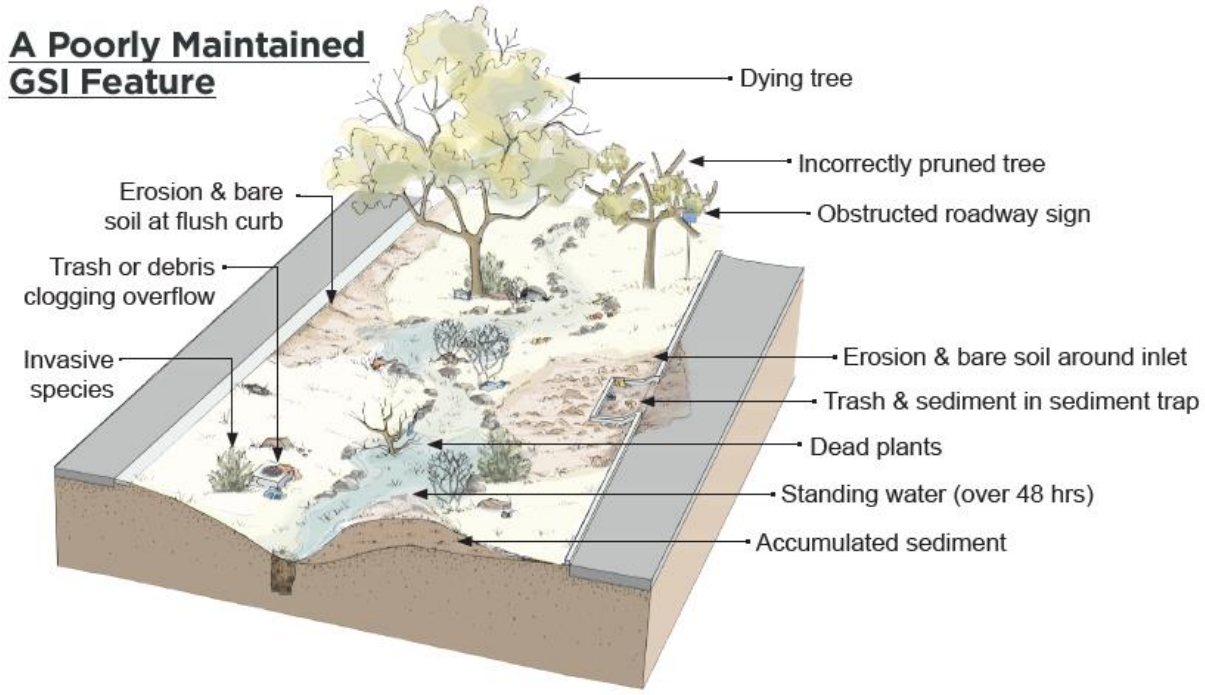


Figure 8: Example of a Poorly Maintained GSI Feature

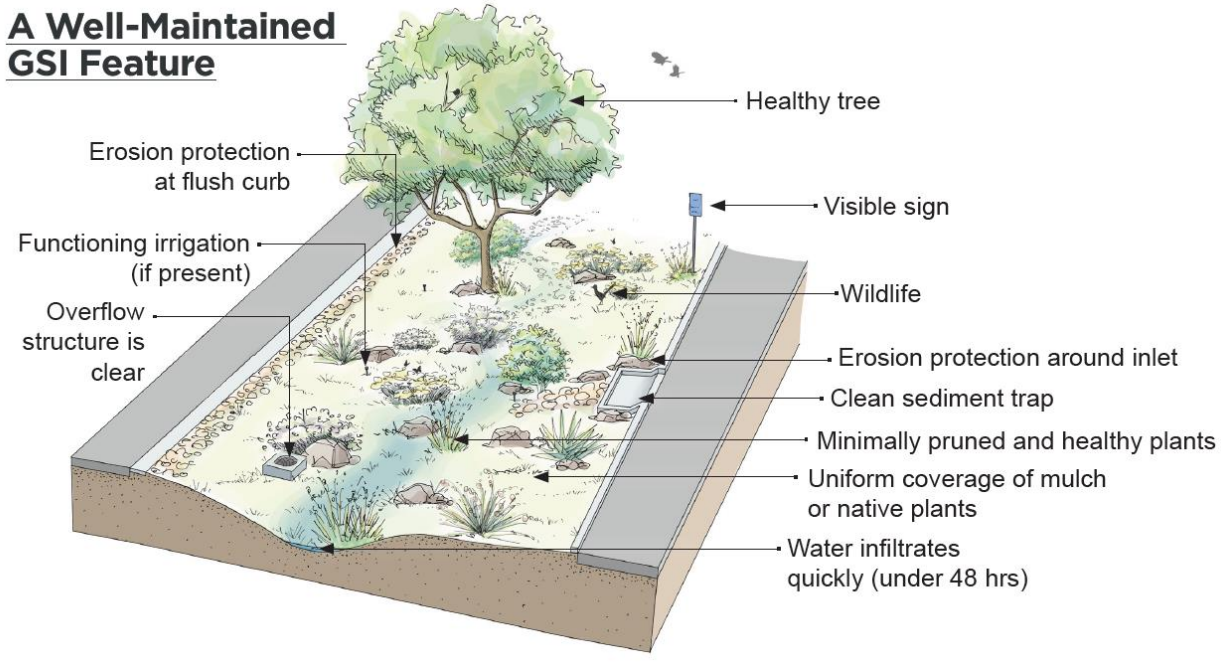


Figure 9: Example of a Well-Maintained GSI Feature

2 GSI MAINTENANCE OVERVIEW

For GSI features to function properly and allow stormwater runoff to soak into the ground, proper maintenance is needed. Inadequate or improper maintenance of vegetated GSI features can affect performance and stormwater management goals. If vegetation dies and is not replaced, bioretention, bioswales, and other GSI features lose the pollutant uptake and evapotranspiration benefits provided by the plants. Properly installed mulch layers provide some direct pollutant removal, help retain soil moisture for plants, and protect the soil from clogging by fine sediment particles. Clogged soil or mulch prevents infiltration and can lead to a failure of a GSI feature to function for stormwater management, requiring maintenance to improve infiltration.

As discussed earlier, GSI features are used to comply with MS4 permit requirements with the goal of preventing or reducing pollutant runoff from municipal areas into surface waters. Regulated MS4s are required to address stormwater feature maintenance as part of their Stormwater Management Plan, as described in two of the MS4 permit required minimum control measures:

- Post-Construction Runoff Control Minimum Control Measure – Ensure adequate long-term operation and maintenance of stormwater controls.
- Pollution Prevention/Good Housekeeping Minimum Control Measure – Develop and implement an operation and maintenance program with the ultimate goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system.

This NMDOT GSI Maintenance Manual recognizes that GSI features are different from traditional maintenance activities performed by NMDOT and their contractors. GSI features are often designed in series and distributed throughout a project, so they must be inspected and maintained properly to ensure they are functioning as planned for stormwater management. Unlike traditional landscaping, the vegetation and soil in a GSI feature is not just for aesthetic purposes but are an integral part of the function of the stormwater management system. The sections below, along with the corresponding NMDOT GSI Maintenance Field Guide, provide maintenance guidance for GSI from inspections through emergency repairs.

The NMDOT GSI Maintenance Field Guide provides additional information to support the contents of this manual, including tools and materials needed for various routine maintenance activities for GSI, how to identify and remove invasive species, replace dead plants, prune as needed, and reseed bare soil. The field guide also has general checklists

for LoE 1 - Visual Inspection, and LoE 2 - Routine Maintenance for the GSI feature components, including inlets and sediment traps, the main GSI feature, vegetation, and overflow structures.

Please note that all maintenance activities within NMDOT right-of-way shall be performed with the required Personal Protective Equipment (PPE). Please see the NMDOT Administrative Directive AD-802 in Attachment A of this manual for further guidelines on PPE. The following PPE must be worn during maintenance activities within NMDOT right-of-way:

- Hard hats
- Safety garments
- Eye protection
- Respirators (if required)
- Hearing protection
- Gloves and protective clothing
- Footwear

2.1 LEVEL OF EFFORT 1 – VISUAL INSPECTIONS

Visual inspections include observations of vegetation growth and health, ponded water, clogged inlet and outlet structures, sediment accumulation, erosion, and other conditions. Level of Effort 1 (LoE 1) is a visual inspection that should be performed quarterly, or as needed. Each component of the GSI feature is inventoried for issues that require maintenance or repair. Components needing repair or maintenance are noted and shared with NMDOT. A checklist for LoE 1 Visual Inspections is provided in Attachment B of this manual and in the NMDOT GSI Maintenance Field Guide on pages 56-65. The completed checklist from Attachment B should be provided to NMDOT (email: Roadside@dot.nm.gov), along with photos of the GSI feature inspection.

2.2 GENERAL MAINTENANCE ACTIVITIES (LOE 2 AND LOE 3)

Issues identified in the LoE 1 Visual Inspection should be resolved with routine maintenance that is identified as Level of Effort 2 (LoE 2). LoE 2 actions can be completed with the basic tools listed in the NMDOT GSI Maintenance Field Guide on pages 12-19. However, some issues identified in the LoE 1 inventory may be more significant than what can be fixed with routine maintenance – these will be considered LoE 3. LoE 3 is needed when an inspection identifies that performance does not meet the original project stormwater management goals, or if LoE 2 tasks are not resolving the observed problems.

LoE 3 issues may require special contractors and/or equipment depending on the severity of the issue. Issues requiring action further than routine maintenance to correct hazards are to be coordinated with NMDOT districts. Additionally, the original GSI feature designer should be consulted before major rehabilitative maintenance to ensure that the proper methods are used and that the integrity and design intent of the stormwater management practice is kept. A survey of the surrounding contributing area and watershed is also recommended to identify activities that may be contributing to the GSI feature issues (e.g., inadequate sediment control on a nearby construction site). LoE 3 interventions can and should be minimized or avoided by diligent visual inspections and regular, routine maintenance. Examples of LoE 2 and LoE 3 items are listed below, and additional information is available in the NMDOT GSI Maintenance Field Guide.

2.2.1 LEVEL OF EFFORT 2 – ROUTINE MAINTENANCE

Examples of LoE 2 routine maintenance activities include:

- Remove accumulated trash, sediment, and obstructions from inlet and/or outlet.
- Install soil sponges (mulched vertical infiltration drains) to move water more quickly down into the soil. For soil sponge installation, an auger or post-hole digger will be needed. Refer to Section 3.1 in this manual for additional information on installing soil sponges.
- Repair minor erosion.
- Remove invasive species.
- Mow or trim grass as appropriate for the vegetation.
- Replace dead plants.
- Test and repair or adjust irrigation system as needed.
- Prune as needed and as appropriate for the vegetation.
- Reseed bare soil.
- Repair check dam(s) and associated erosion.
- Report damages that require further investigation or repair to NMDOT.

Routine maintenance tasks will occur as needed and some may be triggered by an extreme weather event. In the latter case, properly timed inspections help identify maintenance needs beyond the regularly scheduled tasks. While the importance of maintenance is clear from a pollutant source perspective, the timing of maintenance needs can vary and is often specific to geography, climate, and site conditions. Maintenance requirements based on growing seasons in different areas of New Mexico are discussed in

section 3.3.1. A number of factors should be considered in maintenance schedules, including runoff volume, traffic along the project area, sediment loading, litter/debris loading, seasonal variations, adjacent construction, and irregular weather events.

2.2.2 LEVEL OF EFFORT 3 – REMEDIATION MAINTENANCE

Examples of LoE 3 remediation maintenance activities include:

- Repair issues that could not be achieved with LoE 2 resources.
- Remediate any significant blockage of inlets or outlets.
- Repair inlets or overflows that easily become blocked and cause water to back up.
- Repair erosion or undercutting at the inlet, side slopes, or around check dams that cannot be corrected with routine maintenance.
- Consider using larger excavation equipment for removal and replacement of clogged soil or side slope repair and replacement.
- Complete major replanting if the plants in the system are not functioning, or in case of infestations of invasive plants or insect species.
- Replace damaged concrete structures, such as curbs, culverts, sediment traps, check dams, or outlet structures.

Mechanized equipment may be required to conduct LoE 3 maintenance activities but should only be used as a last resort. The use of mechanized equipment will likely compact the soils and negatively impact infiltration within the GSI feature. To minimize negative impacts during maintenance activities:

- A provision should be included in the maintenance contract to facilitate quick replacement of vegetation that is damaged or removed (during LoE 2). New plants and a native seed mix should be available to contractors to allow them to quickly re-establish vegetation where it has been damaged or removed.
- Do not stage or drive heavy/mechanized equipment on or across GSI features which include infiltration areas to avoid compaction of soil. If mechanized equipment is required, use wheeled rather than tracked equipment where possible.

If inspections and monitoring show that soil contains high levels of pollutant contamination, the next step in LoE 3 is to determine whether that soil can be reused or if removal and disposal is needed. Disposal of soil removed from GSI features generally falls within two categories: regulated and unregulated. Unregulated sediment is characterized as sediment that does not have contamination and is typically managed locally, without

disposal restrictions. However, disposal of contaminated sediment can be more challenging and more expensive. If the soil has staining, discoloration, slimy/oily parches, or odors, soil testing for contamination may be needed. Excavated contaminated sediment that is considered regulated fill is generally sent to a solid waste landfill. Depending on the types and concentrations of contaminants, sediment may need to be disposed of at a landfill that has an industrial solid waste management plan. If there is any concern about contaminated soil in a GSI feature, coordination with NMDOT Environmental Bureau as well the New Mexico Environment Department (NMED) Groundwater Bureau, is recommended.

3 MAINTENANCE GUIDANCE FOR STORMWATER HARVESTING BASINS & BIOSWALES

Two of the more common GSI features utilized and appropriate for NMDOT roadways include stormwater harvesting basins and bioswales.

Stormwater harvesting basins are purposely vegetated depressions in the ground that collect stormwater runoff and allow that runoff to infiltrate the soil. Stormwater harvesting basins help to control local flooding and minimize pollutants from entering nearby arroyos and rivers. The collected stormwater in these features supports trees and other vegetation, cooling our communities and making them more livable, while conserving potable water.

Components of stormwater harvesting basins that need inspection and maintenance include:

- Inlet and outlet/outflow structures
- Sediment traps
- Erosion control/repair
- Vegetation and mulch management, removal, and replacement
- Irrigation system (if present)
- Maintenance access ramps/features (if present)

Bioswales, also called bioretention swales, swales, or ditches, are shallow, linear, or curved linear features that include organic (wood/plant material) or inorganic (rock) mulch and plants (preferably native). They are designed to improve water quality by carrying (conveying), slowing, and treating stormwater runoff. Bioswales allow pollutants to settle out and promote infiltration of stormwater. Components of infiltration conveyances that need inspection and maintenance include:

- Inlet and outlet/outflow structures
- Sediment traps

- Erosion control and repair
- Check dams, if present
- Vegetation and mulch management, removal, and replacement
- Irrigation system (if present)
- Maintenance access ramps/features (if present)

3.1 MAINTENANCE FOR INFILTRATION

It is best practice to allow water within GSI features to infiltrate in under 48 hours. If water is standing in the basin for more than 48 hours, you may need to drain small to medium sized basins using a pump to prevent mosquitoes and make repairs to increase infiltration. Additional information related to infiltration for GSI can be found in the Green Infrastructure Implementation in New Mexico document developed by the NMED in coordination with the Office of the State Engineer (OSE). Please contact NMDOT at Roadside@dot.nm.gov if the ponding water issues cannot be resolved with LoE 2 maintenance or if there are concerns about mosquitos. Mosquitoes thrive on hot weather and temperature plays a key factor in determining the mosquito season. Generally, mosquito activity will begin when the temperature reaches 50° F. The mosquito season varies in New Mexico based on local temperatures and elevation, but typically ranges from March – November.

One LoE 2 routine maintenance solution to standing water or prolonged ponding in a GSI feature is to install a soil sponge, shown in Figure 10, which may improve the infiltration of the GSI feature. The NMDOT GSI Maintenance Field Guide has soil sponge information on pages 11 and 58-59.

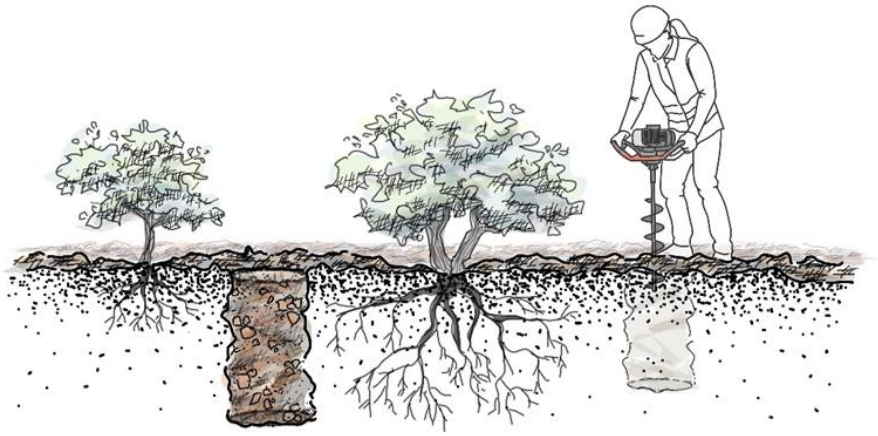


Figure 10: Soil Sponge Installation

The following steps should be followed when installing a soil sponge:

1. Call before you dig (811) to identify locations of all subsurface utilities and pipes.
2. Select a location at the lowest point of the feature or where there is evidence of ponding.
3. Using a shovel or auger, excavate roughly a 5-gallon bucket amount of soil (12-18” width, 18-30” depth; or as needed to access loose soil).
4. Fill the hole with water, let it soak in completely.
5. Fill the hole with water again, observe and time how quickly it soaks in. This is the infiltration rate. Soil sponges should only be installed in areas with a minimum infiltration rate of 1” per hour.
    a. If infiltration rate is less than 1” per hour, try excavating in another location or increase the depth of the excavated hole, then retest infiltration.
6. If the infiltration rate is sufficient, fill the excavated hole with a blend of approximately 1/3 compost, 1/3 wood chips, and 1/3 pumice.
7. Lightly tamp to prevent major settling, refill with blend, as needed, to completely fill the hole.
8. Cover the soil sponge with same mulch as the rest of the GSI feature.
9. If the GSI feature includes weed block fabric, cut an ‘X’ in the fabric above the soil sponge to allow water to quickly enter the sponge. The ‘X’ cut should be 4-6” in size.

The following LoE 3 maintenance tasks may be needed for corrective measures to improve infiltration in GSI features:

- If there is caliche (a hard clay layer common in the desert) or another confining layer (a layer of soil that allows little if any infiltration) in or under the basin, you may need to use a digging bar or pick to punch through the confining layer in some areas. Installation of a soil sponge or French drain may also help in this situation.
- Clogged soil can cause standing water. GSI features generally clog from the top down, so it may be possible to limit maintenance of clogged GSI features to the top few inches of the soil. Maintenance may range from tilling the top 6” of clogged mulch and soil, removing and replacing the mulch layer and top 6” of soil, or removing and replacing the entire GSI feature to something more favorable for the application.

- Look for any movement of mulch to find pooling zones (areas where water collects) in the existing GSI feature. If stormwater runoff isn't spreading throughout the basin evenly, regrading to direct runoff to the entire basin may be needed to improve infiltration. If the regrading is not feasible, a re-design may need to be considered.

As a reminder, issues requiring action further than routine maintenance to correct hazards are to be coordinated with NMDOT districts. Additionally, the original GSI feature designer should be consulted before major rehabilitative maintenance or re-design to ensure that the proper methods are used and that the integrity and design intent of the stormwater management practice is kept.

3.2 MAINTENANCE FOR EROSION

It is important to check for and repair erosion (washed out or displaced soil or rock mulch) because it can impact the function of the GSI feature by causing clogging from increased sediment, and it can impact the long-term integrity of the feature's structures. When inspecting a GSI feature, look for places where water is flowing around the inlet/outlet or check dam structures and causing erosion. Additional modifications to inlet height may be needed to redirect flow to the inlet. If erosion is happening within the main GSI feature, consider installing a check dam, shown in Figure 11, use of a Zuni bowl, a slope drain, or a media luna made of riprap. These structures can help slow the water down, minimize the amount erosion, and reduce sediment collected in the GSI feature, which can cause clogging and additional maintenance.

Figure 11: Example of a Rock Check Dam in a Bioswale Maintenance for Vegetation

3.3 MAINTENANCE FOR VEGETATION

Healthy plants and root systems are critical components of GSI features. Plants with phytoremediation properties are able to break down pollutants or pull pollutants out of the soil and into their leaves. Plants can also provide shade that cools the surrounding area and create habitat for pollinators and other species.

Maintenance for vegetation includes consideration of the growing season when completing the maintenance, consideration of the revegetation zones in New Mexico, proper pruning, roadway safety considerations, maintenance of mulch, and irrigation system maintenance, if present.

3.3.1 GROWING SEASONS FOR VARIOUS REVEGETATION ZONES

The maintenance of the vegetation in a GSI feature is a critical piece of its function. Vegetation maintenance can include removing invasive species, replacing dead plants, pruning as needed, or reseeding bare soil. The NMDOT GSI Maintenance Field Guide provides information on vegetation maintenance on pages 20-51. Figure 12 outlines the vegetation maintenance tasks for GSI features that are required during different times of the year. Emergency pruning may be required at any time during the year and should be performed as needed regardless of the growing season. Otherwise, non-emergency pruning can be performed during the winter season and pruning of frost-damaged plants can occur after the last frost date. Table 1 defines when the growing seasons are for the New Mexico revegetation zones. Figure 13 shows a map of the revegetation zones. Ideally, dead plants should be replaced between June and September. They may also be replaced during Fall or Spring, although it is important not to confuse dormant plants in these seasons with dead plants. Some plants do not show new leaves until early Summer. Reseeding can occur between April and September. Grasses should be mowed before the growing season starts, and weeds should be controlled at the beginning and the end of the growing season.

New Mexico has six revegetation zones. See Figure 13 to find the appropriate revegetation zone for the site and consult the NMDOT GSI Maintenance Field Guide, pages 37-45, for guidance on what plants are appropriate for GSI features in the designated revegetation zone.

The plants on the standard replacement lists in the NMDOT GSI Maintenance Field Guide have been selected for their lower water needs, habitat value, phytoremediation properties, and drought tolerance.

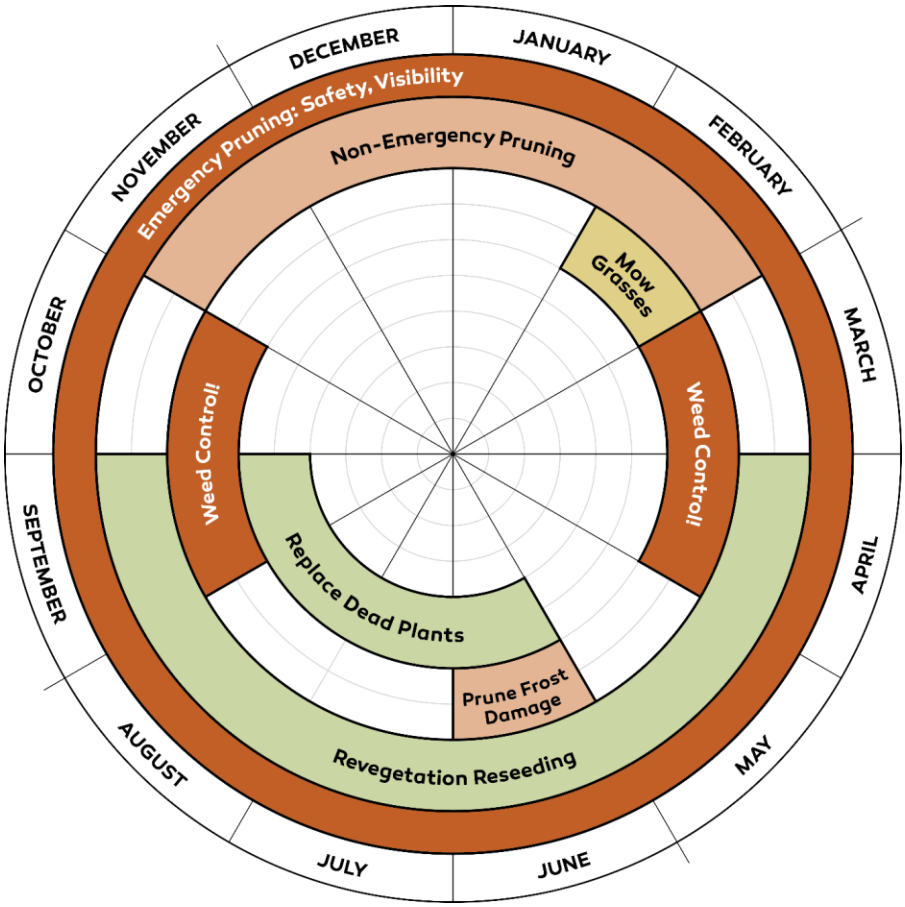


Figure 12: Calendar Wheel of New Mexico Vegetation Maintenance

Table 1: Approximate Time Frames for Growing Seasons in New Mexico

Revegetation Zone	Growing Season
Zone 1	April 15 – Oct 10
Zone 2	April 15 – Oct 10
Zone 3	March 21 – Oct 15
Zone 4	April 15 – Oct 10
Zone 5	March 15 – Nov 1
Zone 6	March 15 – Nov 1

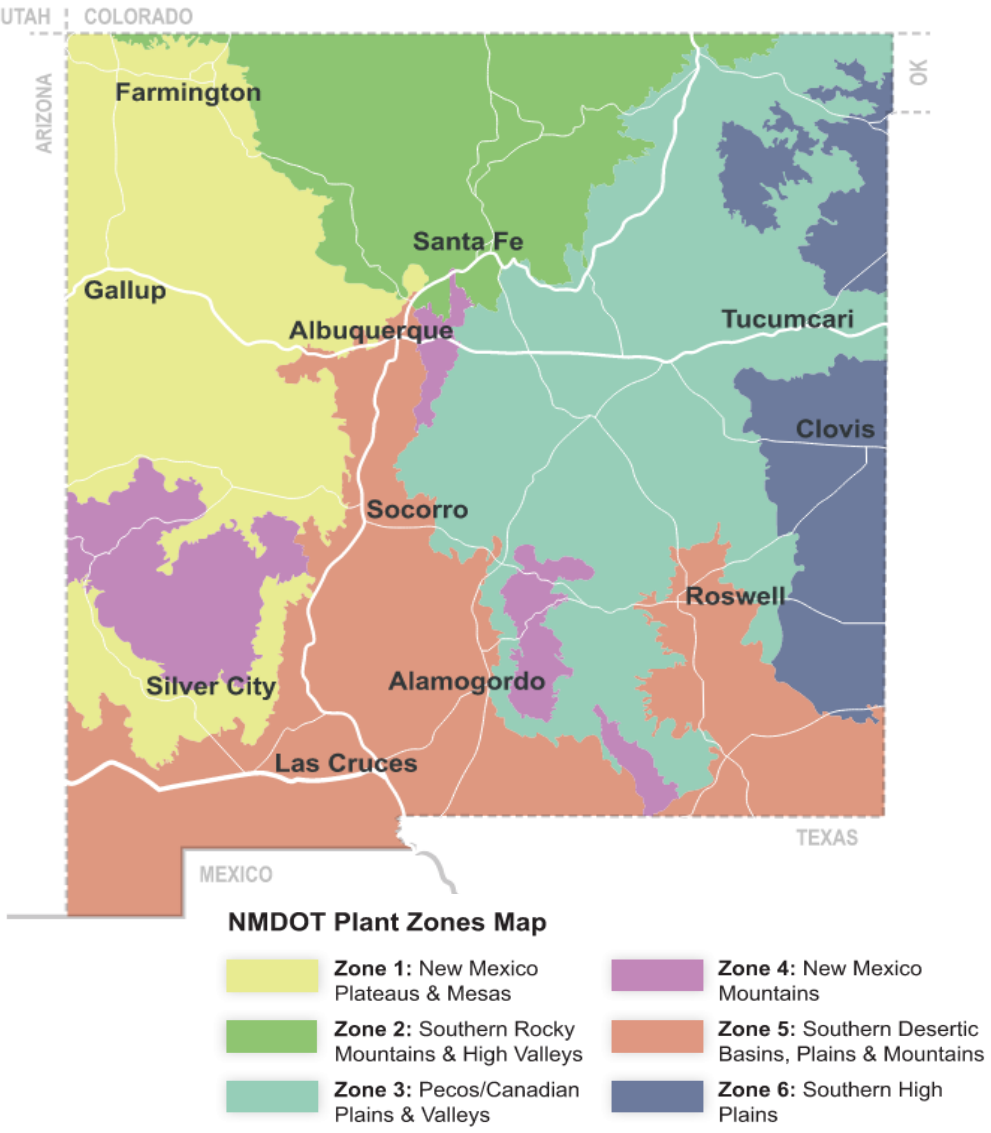


Figure 13: NMDOT Revegetation Zones

3.3.2 SAFETY CONSIDERATIONS FOR VEGETATION

For NMDOT roadway projects, GSI features are typically located near the roadway, within NMDOT right-of-way. Visibility and clear zones were considered during the design of the GSI features, including the tree and vegetation choices, and these will also need to be considered during GSI maintenance. There are various safety considerations that should be made with every LoE 1 visual inspection to ensure vegetation is not obstructing signage or visibility around a GSI feature, including consideration of adequate clear zone, sign visibility, clear sight triangles, and unobstructed pedestrian zone (if applicable).

The AASHTO Roadside Design Guide provides detailed guidance related to the clear zone concept and visibility guidelines. The AASHTO Roadside Design Guide discusses the benefits of roadside landscaping for a community and encourages the designer to "…balance the benefits of landscaping with the requirements for roadside safety when possible". A clear zone is defined in the AASHTO Roadside Design Guide as the unobstructed, traversable area provided beyond the edge of the through travelled way for the recovery of errant vehicles. The clear zone distances depend on many complex variables including the roadway design speed, traffic volumes, and roadside slopes. Vegetation in the clear zone with trunks greater than 4-inches in diameter are typically considered hazards and should be protected or removed and replaced with a plant with a smaller diameter trunk. AASHTO also defines the visibility for turning at intersections as a sight triangle. Figure 14 illustrates the required sight triangle for intersections with stops (stop-controlled) and intersections with yields (yield-controlled). The size of the sight triangle varies based on the intersection, however, keeping vegetation out of the approximate sight triangle is critical to ensuring the safety of the intersection.

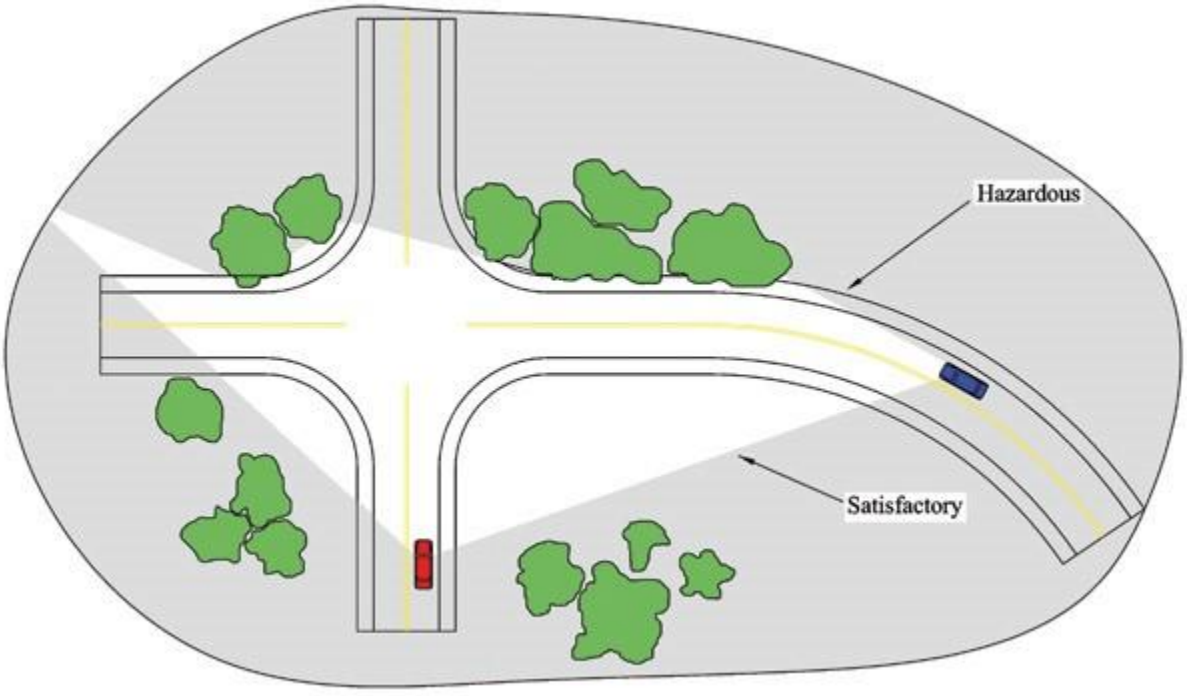


Figure 14: Satisfactory and Hazardous Sight Lines at an Intersection (Vegetation Control for Safety, FHWA)

When completing the LoE 1 visual inspection, look for signs and other traffic control devices (including chevron signs in curves) blocked by brush, trees, grass, or weeds. Often, a small branch from an overhanging tree or bush near the sign is all that needs to be trimmed. If vegetation along a GSI feature blocks a driver's view of a sign, then prune just enough to allow a driver sufficient time to see the sign and respond to its message. Table 2 from the Federal Highway Administration (FHWA) Vegetation Control for Safety Guide provides a suggested guideline that considers two groups of signs: critical signs, such as STOP, YIELD, ONE WAY, DO NOT ENTER, WRONG WAY or any sign that might require a motorist to stop, and all other signs. Table 2 shows the minimum distances; longer distances are preferable.

Table 2: Clear Distance to See Signs
(from FHWA Vegetation Control for Safety Guide)

Speed Limit (mph)	Critical Signs (feet)	Noncritical Signs (feet)
30	250	150
40	350	200
50	450	250
60	600	300

See pages 46-48 in the NMDOT GSI Maintenance Field Guide for guidance on how to prune vegetation, and Figure 15 (page 47 of the NMDOT GSI Maintenance Field Guide) below for a visual representation of what should be pruned for safety considerations in a typical roadway. Note that Figure 15 is general in nature and the person conducting the maintenance should consider site specific concerns, such as intersections, railroads, etc., for safety and visibility. The maintenance personnel should consult the original design, if available, for safety concerns specific to the site.

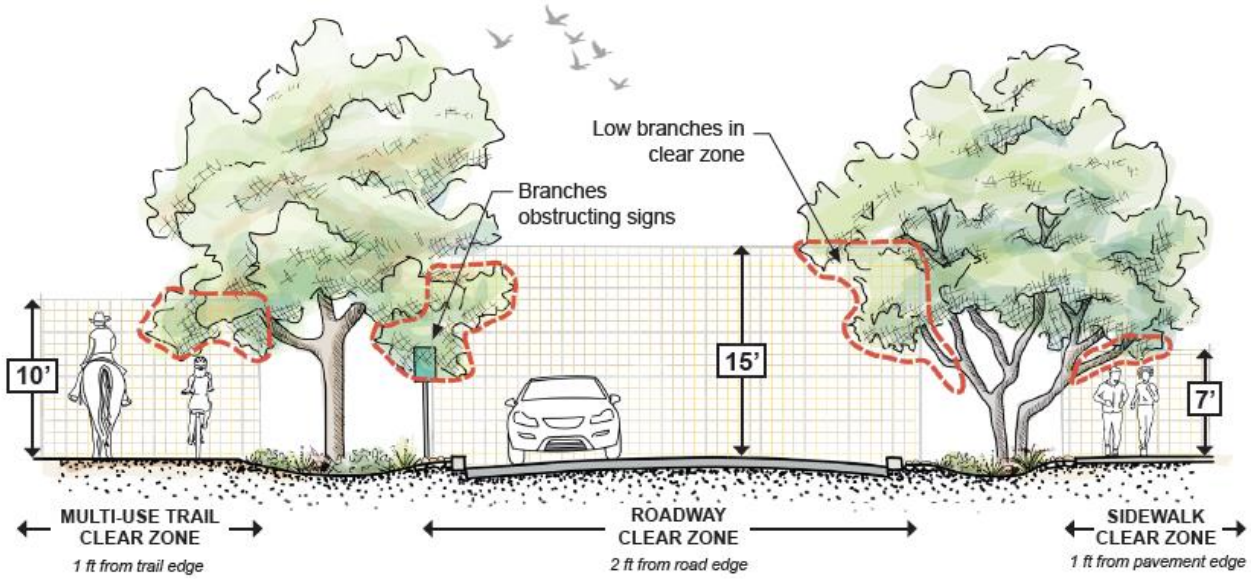


Figure 15: Clear Zone Diagram for GSI Maintenance

3.3.3 MULCH MAINTENANCE

Properly installed mulch layers provide some direct pollutant removal, help retain soil moisture for plants, protect the soil from erosion, and prevent the soil from clogging with fine sediment particles. Clogged soil or mulch prevents infiltration and can lead to a failure of a GSI feature to function for stormwater management, requiring maintenance to improve infiltration. Organic mulch is organic material that decomposes over time (e.g., wood mulch) and therefore requires periodic replacement, however, mulch can also be inorganic (e.g., aggregate).

Mulch will need periodic replenishment and replacement in GSI features. Refer to the NMDOT GSI Maintenance Field Guide, pages 14, 50, and 58, for additional information on mulch maintenance. Bare soil in GSI features should be covered with a minimum of 3” deep mulch. Displaced mulch may be raked back into place, but replenishment may also be needed. When reseeding bare areas, cover the surface of the seeded area with a thin layer of wood mulch (less than 1”) or a one-rock layer of Class C rock mulch.

3.3.4 INTEGRATED VEGETATION MANAGEMENT (IVM)

The NMDOT has adopted an IVM Program to maintain good environmental stewardship within its right-of-way. IVM is the process of using appropriate, environmentally sound, and cost-effective treatments to eliminate invasive and undesirable plants and replace them with desirable species. The new vegetation can provide valuable resources to

pollinator species, increase biodiversity, and promote ecosystem goods and services. Effective GSI features use IVM principles in the design, construction, and maintenance processes. Refer to the NMDOT GSI Maintenance Field Guide, pages 21-35, for specific guidance on priority invasive species that should be removed and for how to effectively remove these at the various life stages of the plants. To learn more about the IVM Program, please follow the link from the QR code below.

For major infestations of invasive plants or insect species, determine if herbicide and/or pesticides are required. Please consult the NMDOT IVM Best Management Practices document to determine if they are appropriate.

3.3.5 MAINTENANCE FOR IRRIGATION

The supplemental irrigation system within a GSI feature needs to be properly maintained in order to preserve the vegetation, especially during the establishment period for the plants. The NMDOT GSI Maintenance Field Guide provides irrigation maintenance information on pages 16, 37, and 60. During regular LoE 1 visual inspections, if the plants look dry or overgrown there may be an issue with the irrigation system. The irrigation system should be tested and repaired or adjusted as needed. Examples of repairs include cleaning valves, repairing drip tubing, replacing or cleaning emitters, testing controllers, and/or adjusting run times as needed for plant health. If the irrigation system malfunction is significant, this should be noted as LoE 3 and a consultation with a contractor may be needed. If the plants are drought stressed, this maintenance operation may be urgent so that plants do not die. Please consult the irrigation manufacturer's instructions before performing any LoE 3 maintenance.

Plant species selected for the GSI feature should have been selected for their lower water needs, habitat value, and drought tolerance. Therefore, once the vegetation is established, it will no longer need to be irrigated, except perhaps during periods of extreme drought. See Table 3 for the duration of irrigation that various types of vegetation will typically require in New Mexico.

Table 3: Duration of Required Irrigation for Various Types of Vegetation

Type of Vegetation	Duration
Trees	10 – 15 years
Shrubs	3 – 5 years
Grasses	1 – 2 years

4 REFERENCES

Arid LID Middle Rio Grande Green Stormwater Infrastructure Maintenance Manual – https://aridlidcoalition.org/wp-content/uploads/2022/08/ARID-Manual-v6_28-web.pdf

Arid LID GSI Maintenance Training Videos – https://aridlidcoalition.org/index.php/gsi-maintenance/

ASCE Inspection and Maintenance of Stormwater Control Measures. Downloaded from https://ascelibrary.org/doi/book/10.1061/9780784415436

EPA Operation and Maintenance of Green Infrastructure Receiving Runoff from Roads and Parking Lots – https://www.epa.gov/sites/default/files/2016-11/documents/final_gi_maintenance_508.pdf

NMDOT GSI Maintenance Field Guide – https://www.dot.nm.gov/infrastructure/environment/roadside-community-design-section/
NMDOT GSI Maintenance contact email: Roadside@dot.nm.gov

NMDOT Integrated Vegetation Management: Best Management Practices – https://www.dot.nm.gov/wp-content/uploads/2023/02/NMDOT_IVM_BMP_Report_January-2023.pdf

NMDOT NPDES Manual – https://www.dot.nm.gov/wp-content/uploads/2024/01/NMDOT-NPDES-Manual-Rev4-2023.pdf

New Mexico Environment Department (NMED) in coordination with the Office of the State Engineer (OSE): Green Infrastructure Implementation in New Mexico – https://www.env.nm.gov/wp-content/uploads/sites/25/2017/06/notice-2017-05-01_Green-Infrastructure-FAQs_Final.pdf

NMED Stormwater Page – https://www.env.nm.gov/surface-water-quality/stormwater/

USDOT FHWA Vegetation Control for Safety guide – https://highways.dot.gov/sites/fhwa.dot.gov/files/2022-06/vegetationfv1108.pdf

ATTACHMENT A: NMDOT AD-802

NEW MEXICO DEPARTMENT OF TRANSPORTATION

AD 802
12/6/23

PERSONAL PROTECTIVE EQUIPMENT

Digitally signed by Ricky Serna
Date: 2023.12.18 15:25:34 -07'00'

Ricky Serna, Cabinet Secretary

Supersedes Administrative Directive No. 802 dated December 6, 2018.

AUTHORITY: **1.00** Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Parts 1910.132 through 140, 1926.28, and 1926.95 through 107.

PURPOSE: **2.00** To provide guidelines to insure that employees wear the necessary Personal Protective Equipment (PPE) during work on any assignment.

DEFINITIONS: **3.00** "Personal Protective Equipment" ("PPE") is defined as protective equipment worn to minimize exposure to hazards that cause workplace injuries and illnesses to the body including, but not limited to, the eyes, face, head, and extremities. PPE includes, but is not limited to, hard hats, safety vest, eye protection, respirators, hearing protection, hand protection, and footwear protection. See Addendum for additional descriptions and guidelines concerning PPE.

3.01 "Right of Way" ("ROW") means real property, including air space above and below, that is vested in the State and under the purview of the Department, with identified boundaries and rights therein used for construction, operation, or maintenance of a transportation or related facility. ROW typically includes, but is not limited to, the roadway(s), shoulders, and sidewalk(s), if any; areas for drainage, utilities, landscaping, berms, and fencing; rest areas; and the defined clear zone. ROW may be defined by fence line to fence line, property marker to property marker, or some other industry-acceptable method of demarcation.

PROCEDURES: **4.00** **General Requirement.**

4.00a NMDOT employees shall wear required PPE in conformance with OSHA regulations, Manual of Uniform Traffic Control Devices ("MUTCD") guidelines currently in use by the NMDOT, and Department standards, including but not limited to those in the NMDOT Safety Handbook.

4.00b Examples for when required PPE shall be worn include whenever an employee is (1) working or attending on-foot, construction, maintenance, or surveying activities, including excavation, trenching and shoring, within the right-of-way of a State roadway, highway, interstate, or other Department facilities, including equipment training grounds; (2) working in confined spaces; (3) handling hazardous chemicals and materials; (4) operating air compressors, fueled or power tools, and motorized equipment, (5) responding to incidents in State ROWs, directing traffic and handling lane; or (6) as otherwise directed by a supervisor.

4.00c Supervisors shall ensure that employees wear the necessary PPE, provided that supervisors, in coordination with Risk Management, may allow PPE to be removed or find a viable alternative if the PPE poses an additional hazard for the specific operation being performed, on a specific case-by-case basis only.

4.01 Employee Receipt, Replacement and Return of PPE. Employees shall adhere to the following expectations:

4.01a Acknowledge receipt and responsibility for all PPE issued to them;

4.01b Return unsafe items to the supervisor for inspection and replacement;

4.01c Replace or repair equipment lost, stolen or damaged through employee negligence in accordance with Administrative Directive (AD) No. 607, Employee Accountability for Department Property; and

4.01d Return all issued equipment upon termination of employment.

4.02 Care and Wear of PPE. Required PPE shall be regularly inspected and maintained in a safe condition and worn properly. (See Addendum for further guidelines.)

4.03 Self-Provided PPE. Recognizing the importance of uniformity of PPE, an employee may, under certain circumstances, provide his or her own PPE on condition that:

4.03a The employee shall request in writing approval prior to providing his or her own PPE from the Division Director or District Engineer, who will assess the request in coordination with Risk Management, and should the request be approved, do so in writing;

4.03b Whenever employees are approved to provide their own PPE, supervisors in coordination with Risk Management shall ensure the PPE is properly maintained and in compliance with the applicable standard specifications and sanitation requirements; and,

4.03c **E**mployees shall not be reimbursed for self-provided PPE.

4.04 Failure to Comply. When PPE is required to be worn for a specific operation, this requirement constitutes a condition of continued employment. An employmee who fails to comply, and/or refuses to comply, with PPE requirements is regarded as failing to report ready and fit to perform his or her duties, and shall be considered absent without leave until such time he or she

is deemed ready or fit. Failure to comply with the PPE requirements shall be grounds for disciplinary action up to and including termination.

PROCEDURES: **5.00** See Addendum for guidelines and application of particular PPE.

CROSS REFERENCE: **6.00** OSHA Regulations, 29 CFR Parts 1910 and 1926.95 through 1926.107;
AD 640, Boot, Clothing and Tool Provisions; and,
NMDOT Risk Management Bureau Safety Handbook

ADDENDUM

A. HARD HATS

Department prescribed hard hats shall be hardboiled and non-conductive in accordance with American National Standards Institute (ANSI) guidelines (Z89.1-2014) (Z89.1-2009) (Z89.2-1971). Hard hats shall be replaced when dents. cracks, chips, gouges and/or other signs of wear show on the shell of the hard hat, or when signs of stress appear on the liner. At the discretion of the District Engineer, white in color hard hats may serve to designate supervisory personnel.

1. In accordance with OSHA Regulations at 29 CFR 1910.132 and 1910.135, and 29 CFR 1926.28 and 1926.100, hard hats shall be worn within construction project limits, maintenance work zones, and when employees may be exposed to falling and or flying objects. This specifically includes all times an employee is on-foot on any roadway.

2. "Bump caps" may be substituted for hard hats when an employee is engaged in work where the possibility of raising up or walking into low overhead objects exist, but little danger exists from falling or flying objects.

3. Employees shall not place or affix any decals, tags, stickers, monograms, badges, or similar items on their hard hats.

B. SAFETY GARMENTS

1. Risk Management prescribed safety vests, furnished by the Department, shall be worn when employees are on-foot on the grade, within the limits of the right-of-way, as directed, or who work within construction project limits and/or maintenance work zones. Safety vests shall be worn at all times any employee is on any open roadway or in an area where equipment is in operation. Safety vests shall comply with ANSI/ISEA standard 107-2020 or 107-2015. All NMDOT approved vests will be at a minimum ANSI Class III at all times. Stores may continue issuing their remaining Class II vests until stock is depleted.

2. Risk Management prescribed safety tee-shirts may be worn in place of wearing the prescribed safety vest. Allowing the use of the prescribed tee-shirt is optional and is at the discretion of the District Engineer or Division Director. Approved tee-shirts will be at a minimum ANSI class III.

3. Until the Department completes the transition to class III safety vests, employees engaged in night traffic flagging operations shall wear Risk Management prescribed high visibility trousers in combination with the prescribed safety vest noted in item 1 above. In combination with Item 1, the trousers combine to make an ANSI class III garment. Department issued glow sticks may also be used.

C. EYE PROTECTION

Eye protection shall be used by employees working where flying particles, corrosive vapors, glare, injurious radiation or liquids are likely to be hazardous. Eye protectors shall meet the minimum requirements of 29 CFR 1910.133 and 29 CFR 1926.102 and comply with ANSI Standard Z87.1-2015 and Z87.1-2003.

D. RESPIRATORS

Respiratory protective devices approved by the regulatory authority shall be furnished to employees. Employees who are required to use respirators shall comply with the provisions of 29 CFR 1910.134 and 29 CFR 1926.103.

E. HEARING PROTECTION

Risk Management prescribed hearing protection, furnished by the Department, shall be worn when working in an environment where the noise level has been determined to equal or exceed an 8-hour time-weighted average of 85 decibels measured on the A scale or the impulsive (impact) noise exceeds 140 decibels peak sound pressure level.

F. GLOVES AND PROTECTIVE CLOTHING

1. Appropriate protective gloves shall be furnished and used for handling hot objects and materials, sampling fresh concrete, lime or cement, washing parts and handling, mixing or spraying chemicals. Gloves may be furnished to fencing crews and transport drivers.

2. Employees shall never use gauntlet type gloves or loose clothing when working around moving parts and shall not have cleaning rags hanging from pockets.

3. Protective clothing (aprons, smocks) shall be furnished and used when handling, mixing, spraying chemicals, steam cleaning parts and equipment, arc welding or to prevent exposure to contaminants.

4. Chainsaw chaps shall be furnished and used when operating a chainsaw.

5. Field, shop, warehouse, lab and buildings and grounds maintenance employees shall wear full length trousers and sleeved shirts.

G. PERSONAL ADORNMENT

1. Rings, piercings, watches, bracelets and necklaces shall be removed before beginning any activity which involves access to moving parts of machinery or electrically charged components.

2. Hair, which is beyond shoulder length, must be braided or restrained to prevent being caught in machinery.

H. FOOTWEAR

1. Rubber boots shall be furnished by the Department when it is necessary for employees to work in wet concrete or other wet environments on a regular basis.

2. Employees engaged in mechanical work, handling heavy objects and who work within construction project limits and/or maintenance work zones shall be required to wear safety-toed boots. Safety-toe footwear shall comply with the most current ASTM F2412 and F2413 requirements. Maintenance, Construction and Survey Crew employees shall be required to wear high top boots.

ATTACHMENT B: GSI LOE 1 VISUAL INSPECTION CHECKLIST

NMDOT Green Stormwater Infrastructure (GSI) Visual Inspection Checklist

2024 Edition

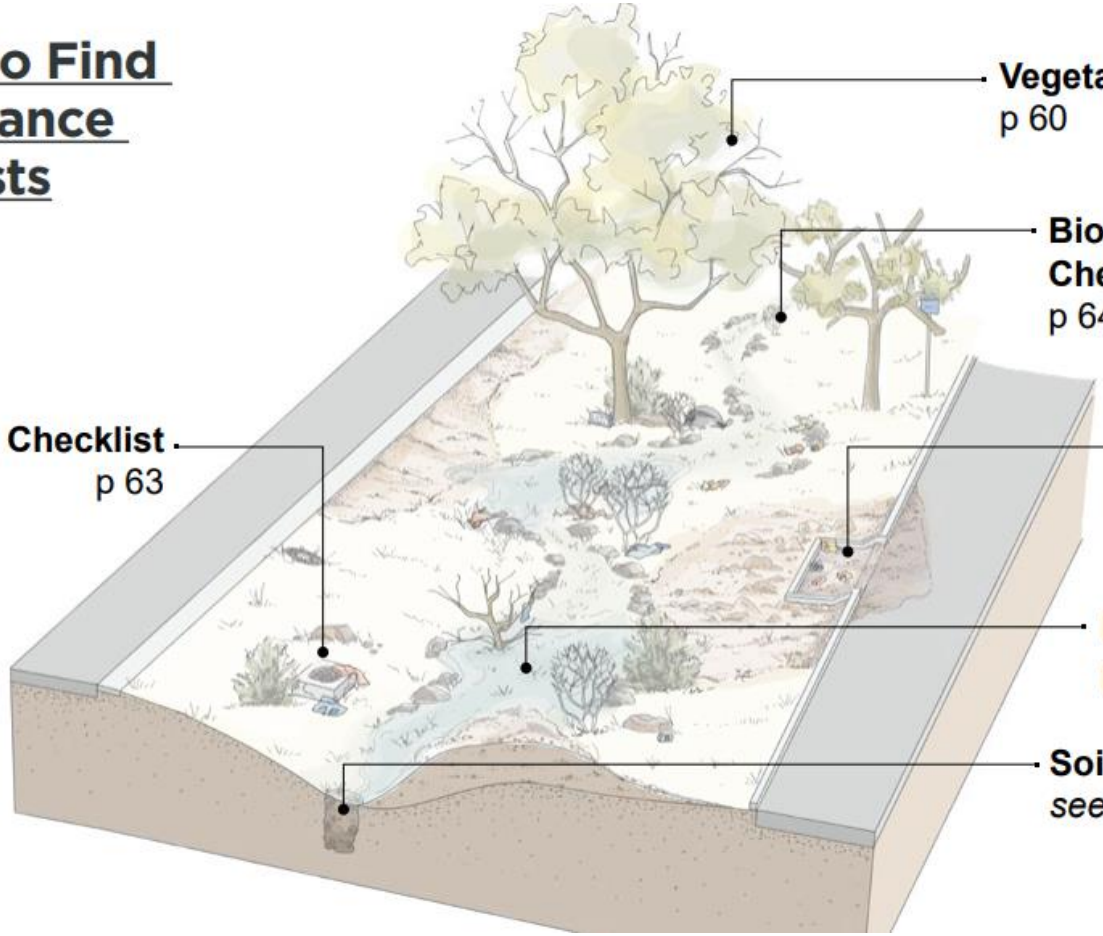
Level of Effort 1 (LoE 1) is a visual inspection of a GSI feature that should be performed quarterly or as needed. Each component of the GSI feature should be inventoried for issues that require maintenance or repair.

The completed visual inspection checklist and inspection photographs (please use the photo log attached to this checklist) should be provided to NMDOT. Components needing repair or maintenance should be noted on the inspection form. Email the inspection information to NMDOT at: Roadside@dot.nm.gov.

The GSI Maintenance Field Guide provides additional resources and graphics to support the LoE 1 visual inspections. GSI Maintenance Field Guide page numbers are provided in the diagram on p. 2 of this checklist, as applicable.

New Mexico DEPARTMENT OF TRANSPORTATION
MOBILITY FOR EVERYONE

Where to Find Maintenance Checklists



Vegetation Checklist
p 60

Bioswale-Specific Checklist
p 64

Overflow Checklist
p 63

Inlet & Sediment Trap Checklist
p 56

Main Feature Checklist
p 58

Soil Sponge Installation
see GSI Maintenance Manual

New Mexico DEPARTMENT OF TRANSPORTATION
MOBILITY FOR EVERYONE

Site Name:_____ **Site Latitude/Longitude:**_____

Inspector:_____ **Date:**_____ **Time:**_____

CHECKLIST AREA 1 – INLET AND SEDIMENT TRAP *GSI Maintenance Field Guide page 56*					
LoE 1: **VISUAL INSPECTION**	***NO*** *PASSES* *INSPECTION*	***YES*** *NEEDS* *MAINTENANCE*	***N/A***	***PHOTO TAKEN?*** *YES/NO*	***NOTES***
Are there any obstructions preventing water from flowing into the GSI feature?					
Has the inlet or sediment trap collected sediment, cinders, or trash/debris?					
Are there signs of cracking, chipping, or damage at the inlet (on curb, sediment trap, culvert, etc.)?					
Is erosion visible at the inlet (rills, gullies, or bare soil)?					
CHECKLIST AREA 2 – GSI MAIN FEATURE *GSI Maintenance Field Guide page 58*					
LoE 1: **VISUAL INSPECTION**	***NO*** *PASSES* *INSPECTION*	***YES*** *NEEDS* *MAINTENANCE*	***N/A***	***PHOTO TAKEN?*** *YES/NO*	***NOTES***
Is trash present?					
Is there more than 2” of accumulated sediment or debris in the bottom of the GSI feature?					

LoE 1: VISUAL INSPECTION	NO PASSES INSPECTION	YES NEEDS MAINTENANCE	N/A	PHOTO TAKEN? YES/NO	NOTES
Is there bare soil? Mulch or vegetation should be covering all soil.					
If organic mulch is present, is it less than 3" thick?					
Is there evidence of erosion (undercutting, rills, gullies, or bare soil)?					
Is there standing water or evidence of ponding more than two days after a storm event? If yes, please note when the last rainfall occurred.					
Mosquito season only (*varies by region & elevation):* Is there evidence of mosquitoes breeding in standing water?					
Are any hazards to the public observed in or around the GSI feature (broken signs, heaved pavement, etc.)?					
Is there evidence of routine maintenance not being performed (overgrown vegetation, etc.)?					
CHECKLIST AREA 3 – VEGETATION *GSI Maintenance Field Guide page 60*					
LoE 1: VISUAL INSPECTION	**NO** PASSES INSPECTION	**YES** NEEDS MAINTENANCE	**N/A**	**PHOTO TAKEN?** YES/NO	**NOTES**
Is vegetation obstructing signage or visibility around the GSI feature?					
Are any plants dead, diseased, or damaged?					

LoE 1: VISUAL INSPECTION	NO PASSES INSPECTION	YES NEEDS MAINTENANCE	N/A	PHOTO TAKEN? YES/NO	NOTES
Late winter only: Is non-emergency pruning or mowing needed?					
Is there evidence of pest infestation?					
Is there evidence of poisoned plants? (Poisoning may be caused by heavy metals, road salts, improper herbicide application, etc.)					
Are any plants looking dry or overgrown (indication of irrigation system issue)?					
If a test of the irrigation system was performed, does the system need any maintenance?					
Are invasive species present? If yes, please list what species in the notes column and make sure to take photos.					
CHECKLIST AREA 4 – OUTLET/OVERFLOW *GSI Maintenance Field Guide page 63*					
LoE 1: VISUAL INSPECTION	**NO** PASSES INSPECTION	**YES** NEEDS MAINTENANCE	**N/A**	**PHOTO TAKEN?** YES/NO	**NOTES**
Is water unable to flow into the outlet/ overflow?					
Is cracking or damage visible at the outlet? (drop inlet, drain, etc.)					

New Mexico DEPARTMENT OF TRANSPORTATION
MOBILITY FOR EVERYONE

CHECKLIST AREA 5 – BIOSWALE SPECIFICS *GSI Maintenance Field Guide page 64*					
LoE 1: VISUAL INSPECTION	***NO*** *PASSES INSPECTION*	***YES*** *NEEDS MAINTENANCE*	***N/A***	***PHOTO TAKEN?*** *YES/NO*	***NOTES***
Has sediment collected behind check dams? (if present)					
Is water unable to flow through entire length of structure?					
Is there erosion visible around check dams? (if present)					
Is there any damage to check dams? (if present)					

The completed visual inspection checklist and inspection photographs (using photo log attached to this checklist) should be provided to NMDOT. Components needing repair or maintenance should be noted on the inspection form.

Email the inspection information to NMDOT at: Roadside@dot.nm.gov.

NMDOT GSI LoE 1 Visual Inspection Checklist Photo Log

Site Name:_____ **Date:**_____

Site Latitude/Longitude:_____ **Inspector:**_____

CHECKLIST AREA 1 – INLET AND SEDIMENT TRAP

GSI Maintenance Field Guide page 56

[insert photo(s) here]

CHECKLIST AREA 2 – GSI MAIN FEATURE

GSI Maintenance Field Guide page 58

[insert photo(s) here]

CHECKLIST AREA 3 – VEGETATION

GSI Maintenance Field Guide page 60

[insert photo(s) here]

CHECKLIST AREA 4 – OUTLET/OVERFLOW

GSI Maintenance Field Guide page 63

[insert photo(s) here]

CHECKLIST AREA 5 – BIOSWALE SPECIFICS

GSI Maintenance Field Guide page 64

[insert photo(s) here]