

Gravel Road Design & Management Plan

*Wildewood Estates Road District Rome,
Maine*

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Maine Environmental Solutions, LLC

Original Plan - November, 2017

Updated July 2024





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INTRODUCTION

Wildewood Estates and the adjoining network of roads that make up the Association are not unlike many other unpaved, gravel roads in Maine. The major issues on the road are numerous shoulder berms that do not allow water to get off the driving surface and insufficient surface material and shaping. When water is not reaching the ditches and getting away from the driving surface, rutting and potholing during mud season is common. If the driving surface is flat potholes can occur at any time of year. Since water cannot always get away from the shoulders, erosion is occurring on hills.

Overall, portions of the road are in good condition and the design and past road maintenance work has been successful. Addressing the worst sections with additional surface material and ditching and maintaining the better sections will provide advantages to those who drive the road as well a cost savings to those who must maintain the infrastructure.

This management plan will address the road in sections and give recommendations for work sequence as well as how to address the various sections that need attention. Rankings are based on three factors:

- 1) Spending money on the worst sections of the road first to produce future savings
- 2) Protecting financial investments already made in the road and
- 3) The site's impact on the surrounding watershed

Existing Condition

The surface of the Wildewood Estates Road District consists of bluestone gravel that has been used in many sections as well as sections with 1" and ¾" minus gravel. There is also one area that has been paved. In most locations along the road, the road base is providing sufficient elevation above the surrounding grade and ditching has been completed in correct locations. Many of the problems that exist on Wildewood Estates are from water not reaching the ditches and a lack of sufficient surface crown. Several culverts carry water under the road network and vary in condition from good to poor.

Since the original plan was written in 2017, significant work has been completed on the road. There are several new culverts, ditching has been completed in many areas, drainage has been improved and surface gravel has been installed. Bluestone gravel has been the surface material of choice when new materials are added. Several large storms caused major washouts and required areas to be rebuilt. In these areas base gravel was installed, sometimes over geotextile fabric, and the damage required complete reconstruction from the bottom up. Chronic wet areas or spots the road became soft during winter and spring have been address with new materials, shaping or increased drainage. Two rock sandwiches have been installed and appear to have improved those areas significantly.

Constant improvements and attention to maintaining investments has led to significant progress in the last 7 years. Sites where work has been completed are identified in this updated version and additional work is suggested where necessary. Remaining sites have been given a new priority ranking number and all edits are shown in italics.

MATERIALS

Road Base

Ideally, all gravel roads would be constructed using proper methods and materials. The reality of gravel roads in Maine is something very different since most of our roads began as logging roads or horse paths. When building a new road, once a thin, level base has been established where the road will be built, a layer of woven geotextile fabric is installed. Fabric provides separation between groundwater and the road materials. Installed over the fabric is the road base material which should be a minimum of 12" (compacted depth) of a 4" minus gravel that is compacted in 6" lifts meaning that material is rolled each time 6" of material is put down until the desired depth is obtained.

Surface Materials

If gravel is to be used for surface material, it should be a ¾" – 1.5" minus gravel with 7-12% fines. A ¾ - 1" minus material is preferred for most gravel roads but gravel aggregate sizes vary by region so anything available within the range is acceptable. Surface material should also be properly shaped so water can drain away from the driving surface and rolled with the same vibratory compactor used for compacting the base material. Keep in mind that crushed gravel packs significantly better and maintains a better driving surface than round or bank-run gravel.

Bluestone gravel is another surface material option. Bluestone is a bit more expensive than regular gravel but in certain situations or sections of a road it will be the best option. Bluestone is made using a crusher to produce the proper aggregate size and the stone dust from the crushing process is used for the fine material. The angular nature of a product produced this way delivers a gravel that packs extremely tightly forming a very hard driving surface. Once installed, bluestone can and should be graded regularly, just like regular gravel, to maintain proper road surface shape.

Another popular surface material used on gravel roads and driveways is recycled asphalt or reclaim. ¾" minus is the most common size of recycled asphalt which utilizes a mixture of recycled road and driveway surface asphalt, crushed rocks, and sand which have all passed through a ¾" square screen. It packs well when rolled and can be graded to maintain surface shape but is not something I recommend anymore. Bluestone has proven to hold up better, pack more firmly and perform better overall on the trouble spots.

In most situations a good, crushed $\frac{3}{4}$ " - 1" minus gravel with 7-12% fine material is a sufficient surface material however some sections of road may require different materials. Some sites in the Photo Descriptions may specify the use of bluestone or other materials to address a chronic erosion site. Crushed gravel will pack nearly as well as bluestone and better than common "bank run". Surface gravel compacts to approximately $\frac{1}{2}$ the installed depth so if 12" of pre-compacted gravel is added to a road it will compact to approximately 6".

Maintenance

In order to protect the investments made in Wildewood Estates, the surface should be graded annually to maintain the crown. Special attention should be paid to keeping grader berms raked out so water can get off the road shoulders and into the ditches or woods. It is likely that Wildewood has become wider over the years as graded and plowed materials end up in the ditches. As the driving surface of gravel roads becomes wider, ditches are pushed further away and toward the boundaries of the right of way. As ditches are cleaned in the future, care should be taken so that they do not migrate away from the road center.

Any ditches, culverts and plunge pools should be kept free of obstructions like tree branches and sediment build up so they can function properly.

Dust Control

Controlling dust on gravel roads provides two important benefits for road owners and users. First, if the road is situated near a water body, blowing dust can cause a host of problems for the lake, river, or stream leading to a decline in water quality. Second, wind erosion or dust created from vehicle traffic means the investments made in the road are being lost each time the wind blows as fine material from the gravel disappears.

The two most common ways of controlling dust on gravel road are using Calcium Chloride or Lignin Sulfonate. Calcium Chloride works by absorbing water from the air, adding moisture and further tightening the compacted surface of the road. Calcium Chloride is slightly corrosive to steel and highly corrosive to aluminum so vehicle corrosion can be a concern. This product is generally applied in either a flake or liquid form. Lignin Sulfonate acts as a binder for road surface gravel and is a by-product of the wood pulp digestion process. Lignin is a natural cement that binds wood fibers together. It must be worked into the top 1-2" of the road surface usually by a grader or rake and should be the "processed" type and not the unprocessed lignin which is very sticky and odorous. This product comes in a powder form and is applied using the same methods as Chlorides.

EVALUATION OF WILDEWOOD ESTATES

Road is used **year round and plowed** in the winter

Contact Information: Jeff Gibbs – 207-592-5835. Charles Armentrout – 267-312-8777

Name of Evaluator: Josh Platt, President, Maine Environmental Solutions LLC

Date of Evaluation: October 27, November 5, 2017.

Updated plan in June/July of 2024.

Weather conditions: 50 degrees and sunny

Site # 7



Site # 1: Beginning of Wildewood Estates, 558' to end of new bluestone section beyond Pole # 3.

Issues: Site has good elevation above surrounding grades, some minor potholes and shoulder berms beginning to form

Fix: Cut potholes and maintain crown at ½" per foot with regular grading.

More bluestone has been added to this site but potholes persist. Having potholes cut and the road shaped with a large grader will remove existing potholes.

Priority #: Maintenance

Site # 8



Site # 2: End of Site # 1- 176' to Duggan driveway

Issues: Lack of sufficient surface crown causing rutting of shoulders. Shoulder berms

Fix: Shave shoulder berms and install 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to 1/2" per foot crown.

Shoulder berms have been removed. More bluestone has been added to this site but potholes persist. Having potholes cut and the road shaped with a large grader will remove existing potholes.

Priority #: Maintenance

Site # 9

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Site # 10



Site # 11

Site # 3: End of Duggan driveway *on right* – 887' to pavement on hill,

Issues: Insufficient surface crown, rutting, lack of ditching on left side to driveway culvert, ledge present. Left side ditch full of existing surface material (bluestone)

Fix: Define ditching on left to driveway culvert to greatest extent possible. Install 8" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to ½" per foot crown.

More ditching has been installed and bluestone added to increase crown. At end of Depetriotano driveway, increase crown with bluestone gravel so water reaches existing ditching and gets off shoulder. A water bar across Depetriotano driveway and shaping the shoulder, directing water to

existing ditching on north side of Wildewood would help limit stormwater entering Wildewood from

the driveway. Add more bluestone to increase crown by Pole # 10.5. Priority #:

Site # 12



Site # 4: Paved section of road

Issues: Pavement cracking but drainage is good

Fix: *When pavement fails completely and needs to be addressed, have it ground (reclaimed), crowned and rolled with a vibratory compactor. The new surface can be graded and shaped annually along with the rest of the road.*

Site # 13



Site # 5: End of pavement – 247' to Cedar Estates

Issue: Lack of sufficient surface material to shed water off driving surface, shoulder berms

Fix: Install 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to ½" per foot crown.

*Shoulder berms have been removed and bluestone has been added to this site. **Priority***

#: Maintenance

Site # 14



Site # 6: Beyond Pole # 13 – Cedar Estates – 400’ to Pole # 14.5

Issues: Shoulder berms inhibiting drainage off surface, lack of surface crown

Fix: Shave shoulder berms and install 6” (pre-compacted depth) 1” minus crushed gravel or bluestone and compact to ½” per foot crown.

Chronic wet area at Pole #13 has been excavated. Fabric and a rock sandwich have been installed. Shoulder berms have been removed and bluestone surface gravel added to increase crown.

Priority #: Maintenance

Site # 15



Site #7: Curve at Pole # 14.5 down -hill – 1467' to Pole # 19

Issues: Rutting on hill shoulders

Fix: Using existing surface material, grade to shape $\frac{1}{2}$ " per foot crown. Add surface material as needed.

Previously suggested work has been completed. Site was severely impacted by storm in December of 2023. Intersection with Aspen became saturated, and road washed out near Kish pond. 6" stone was added to soft area at intersection and surface gravel installed over the top. Area beyond Kish pond had to be rebuilt with base gravel. Continue to add smaller stone to saturated/soft areas as needed. Stone should be 1.5" or larger to augment existing base materials and increase drainage.

Surface gravel or bluestone can be added over stone and crowned to $\frac{1}{2}$ " per foot. A second culvert is planned for outlet of Kish pond.

Priority #:

Site # 8



Site # 8: Pole # 19 (Intersection on Balsam) 492' to Driveway # 171

Issues: Lack of sufficient surface material to shed water off driving surface, *potholes*

Fix: Install 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to 1/2" per foot crown.

Not completed, needs surface material and crowning.

Priority #:

Site # 9

2024 photo in same location with new house, #177, on right.



Site # 9: Driveway # 171 – 900’ to Byrne driveway (#204) **Issues:**

Middle to end sections lack crown.

Fix: Maintain crown in beginning section and add 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to 1/2" per foot crown on remainder

Not completed, needs surface material and crowning. At driveway #200, cut shoulder on east side before driveway. Plans in place to excavate and rebuild last 100' of site with fabric, base and surface gravel. Surface will be super-elevated, so water drains to west. Deepen/extend ditching for last 100' on west side.

Priority #:

Site # 10



Site # 10: Driveway # 204 – 440' to Driveway # 225 (Cardinali)

Issues: Surface is flat and lacks sufficient surface crown

Fix: Add 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to 1/2" per foot crown on remainder.

Previously suggested work has been completed.

Priority #: Maintenance

Site # 11



Site # 11: Driveway # 225 – 991' to Driveway # 90

Issues: ~~New bluestone in this section with older bluestone material on hill~~

Fix: Maintain crown at ½” per foot with regular grading. *Site is in good condition, continue to maintain.*

Priority #: Maintenance

Site # 12



Site # 12: Driveway # 90 – 1123’ to Pole # 8

Issues: Surface is flat and lacks sufficient surface crown, some potholes forming, ledge is present foot crown on remainder
Fix: Add 4” (pre-compacted depth) 1” minus crushed gravel or bluestone and compact to ½” per

Not completed. Add additional surface material to first half of site (Pole #6) and crown. When surface material added to remainder of site, it will be a combination of super-elevated and crowned sections as topography directs.

Priority #:

Site # 13



Site # 13: Pole # 8 – 482' to Spruce/Aspen intersection.

Issues: Shoulder berms present preventing water from getting off road surface and shoulders causing potholes. Surface material needs shaping.

Fix: Shave shoulder berms, cut potholes and reshape crown so water drains off surface and shoulders.

Fabric has been installed in a portion of the site and road rebuilt. Maintain crown.

Priority #: Maintenance

Site # 14



Site # 14: Beginning of Aspen – 555' to intersection with Wildewood

Issues: Site is in good condition with sufficient bluestone and crown

Fix: Maintain crown at ½" per foot with regular grading. *Site*

is in good condition, continue to maintain crown.

Priority #: Maintenance

Birch Estates

Site # 1



Site # 1: Beginning of Birch -629' to end of new gravel section

Issues: Site is in good condition with sufficient 1" minus gravel and crown. Existing 18" metal culvert at 424' has failed.

Fix: Replace existing culvert with 18" HDPE culvert and maintain crown at ½" per foot with regular grading. **Site # 2**

Culvert has been replaced and site remains in good condition.

Priority #: Maintenance

Site # 2



Site # 2: Bottom of hill – end of Site # 1 – 900’ to Pole # 3.1 at end of road.

Issues: Lack of surface crown, rutting, shoulder berms

Fix: On hill - Add 12” (pre-compacted depth) 1” minus crushed gravel or bluestone and compact to ½” per foot crown. Install 6” (pre-compacted depth) 1” minus crushed gravel or bluestone and compact to ½” per foot crown on remainder of road.

Bluestone has been installed on hill, but shoulders are eroding and surface needs shaping.

Increase depth of north side ditch above curve (approx. 50’) to driveway culvert at new house (#38). Remove large rock at outlet end of new driveway culvert. Add additional bluestone around curve and increase crown to ½” per foot.

Spruce Estates



Issues: Lack of surface crown, rutting, on hills, shoulder berms

Fix: Shave shoulder berms and install 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to 1/2" per foot crown.

Upper portion completed. Lower portion washed out from storm. 6" minus material was installed to rebuild base. New surface gravel or bluestone needed over area where stone was installed beyond driveway #21. Crown new material to 1/2" per foot. Make sure ditching and culvert that plugged during storm is kept clean and free of debris.

Hemlock Estates



Issues: Lack of surface crown, rutting, significant shoulder berms. *Two new houses built on Hemlock since original plan in 2017.*

Fix: Shave/remove shoulder berms and install 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to 1/2" per foot crown.

Not completed, needs surface material and crowning to Pole #3. Area beyond Pole #3 washed out in December 2023 storm and had 6" minus material added to rebuild base. This section needs surface gravel or bluestone so it can be crowned to 1/2" per foot.

Balsam Estates



Issues: Lack of surface crown in beginning. Remainder of road has had recent work done and is in good condition with new culverts and crown.

Fix: Install 6" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to $\frac{1}{2}$ " per foot crown along beginning section. Maintain remainder with $\frac{1}{2}$ per foot crown.

Previously suggested work has been completed as part of a Maine DEP 319 grant. Two 24" culverts and a single 12" have been installed before the beach parking area. Bluestone has been installed on surface and crowned to $\frac{1}{2}$ " per foot.

Juniper Circle



Issues: Beginning of south side of Juniper – new bluestone added, Remaining .1 mile – lack of surface crown *and rutting*.

Fix: Maintain crown on new section. Install 3-4" (pre-compacted depth) 1" minus crushed gravel or bluestone and compact to $\frac{1}{2}$ " per foot crown on remaining portion of road. *Rock sandwich has been installed between driveway #63 & 75. Add surface material as needed and crown to $\frac{1}{2}$ " per foot.*

Hill at Driveway # 98



Issues: Road is sloped to existing ditch on left (super-elevated)
Fix: Maintain super-elevation to left adding material as needed.

Continue surface shaping as needed so water drains to ditch.

Cedar Estates



Issues: Road is acting as the ditch and water not getting off surface

Fix: Super-elevate road to right side, for 75', so water can shed away from driving surface. Raise road base 1' with 4" minus gravel and add 6" (pre-compacted depth) of 1" minus crushed gravel or bluestone to the surface.

If runoff goes down driveway on right, install gravel water bar to move water off road surface.

Previously suggested work has been completed and drainage has improved.

Poplar Estates



Issues: Lack of surface crown, water not reaching ditching, shoulder berms

Fix: If construction of a new house on the lot at the end is planned, wait until large vehicles are finished to improve road.

Shave shoulder berms and install 8" (pre-compacted depth) of 1" minus crushed gravel or bluestone and compact to $\frac{1}{2}$ " per foot crown on sections that have existing ditching. Areas without ditching on left (*west*) should be super-elevated toward woods on right (*east*).

~~Previously suggested work has been completed. Add more surface material as needed for shaping and drainage.~~