

# Road Evaluation and Hydrologic Assessment

11/02/2018



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## 1.0 Introduction

The purpose of this report is to record the conditions for a segment of a private access road that joins Mountain View Road in Kneeland at latitude 40.7126 and longitude -123.9076. This private access road was evaluated from where it meets Mountain View Road to approximately 1.8 miles down its length. The private road passes through four parcels within the segment evaluated and provides access to 5 other parcels. This report presents the features that are meeting modern rural road building standards, items that require immediate attention, projects that should be addressed during the coming dry season, and features that should be incorporated into long-term road improvement projects.

### 1.1 Summary of Evaluation

#### 1.1.1 Features Requiring Immediate Attention

- At MP11 use hand tools to remove loose fill that is in pile in the inboard ditch. Use 4" to 8" diameter riprap to reinforce cut bank to prevent erosion.
- Remove loose fill at MP12 with hand tools. Cover exposed earth area with gravel or riprap.
- Use hand tools to clear the outlet of ditch relief culvert at MP19.
- Use hand tools to clear the inlet and outlet of ditch relief culvert at MP28.

#### 1.1.2 Features Requiring Work During the Coming Dry Season (06/01/19-10/01/19)

- Use machinery to install a rolling dip at MP16, the site of a poorly defined dip. Install riprap at outlet.
- Use machinery to install riprap rock ford at site of seep spring at MP29. Regrade road into an outsloping surface.
- Ditch and road surface stormwater flow must be disconnected from directly flowing into the Class III watercourse at MP38. Use machinery to install waterbars or rolling dips on both sides of the watercourse crossing within 30 to 100 feet of the crossing.
- Ditch and road stormwater flow must be disconnected from directly flowing into the Class III watercourse at MP41. Use machinery to install waterbars or rolling dips on both sides of the watercourse crossing within 30 to 100 feet of the crossing.
- Install defined drainage at intersection of roads (MP32 and MP42) complete with energy dissipation and sediment capture at outlet.

#### 1.1.3 Long-term Projects

- Reshape poorly/undefined rolling dips so that there is complete drainage of all ditch and surface flow. Armor outlets of all rolling dips.
- Wherever possible regrade road surface so that it is outsloped. Regrade to remove drainage channels in the tire tracks and fill potholes.

## 2.0 Objective

The purpose of this study to hydrologically assess the private road as required by Humboldt County Commercial Medical Marijuana Land Use Ordinance utilizing the methods and practices found in the Handbook for Forest, Ranch & Rural Roads by Weaver et al.

### 3.0 Methods

The private road was evaluated 10/30/2018 from 12:00pm to 4:00pm by a Staff Engineer from Mother Earth Engineering. A Trimble TDC-100 was used to collect photos and GPS data of the pertinent road features. The road segment was traversed on foot record all road features. Figure 1 displays the total length of the private road that was evaluated. Figure 2 and 3 show the location of the map points that are described in this report.



*Figure 1: The yellow segment is the length of the private road that was evaluated.*





Figure 2: Map points MP10 through MP29 on the private road.



Figure 3: Map points MP30 through MP45 on the private road.

## 4.0 Site Description

The parcel that the private road joins Mountain View Road is a cattle pasture that is also zoned for timber production. The remaining parcels that the private road runs through are timber production parcels. The roadway is primarily compacted earth with some native rock. There is a locked gate where the private road and Mountain View Road meet, a cattle gate 0.25 miles down the road, and then another security gate another 0.4 miles further down the road.

## 5.0 Inventory of Road Features

Below is a table of each feature identified, the location, the elapsed mileage from the gate on Mountain View Road, a description, and priority level for being addressed if applicable. Items with a red background in the prescription comments should be addressed as soon as possible. Items with orange in the background of the prescription cell should be addressed in the next work year (June 1 to October 15 of 2019). Yellow cells indicate that the prescription should be incorporated in a long-term work plan for roadway improvements.



Prescription Box Color	Work Priority
	Feature is in satisfactory condition – maintain and monitor feature.
	Prescription should be addressed in the 2019 work year
	Prescription should be incorporated into a long-term work plan.
	Prescription should be addressed immediately.

Feature ID	Latitude	Longitude	Road Mileage	Description	Prescription
MP10	40.7135	-123.9093	0.03	From MP10 to MP18 road base has been recently installed. Road surface is in good condition.	Maintain and Monitor.
MP11	40.7136	-123.9089	0.05	Exposed cut bank at inboard ditch.	Remove loose fill and install riprap.
MP12	40.7137	-123.9088	0.06	Uncompacted fill at roadside. Exposed earth at a poorly defined drainage.	Remove loose fill. Armor exposed earthen area with gravel or riprap.
MP13	40.7141	-123.9086	0.08	Undefined rolling dip, exposed earth at outlet.	Reshape rolling dip and rock armor outlet.
MP14	40.7146	-123.9086	0.12	Undefined rolling dip, exposed earth at outlet.	Reshape rolling dip and rock armor outlet.
MP15	40.7152	-123.9084	0.17	Undefined rolling dip.	Reshape rolling dip and rock armor outlet.
MP16	40.7154	-123.9084	0.18	Undefined rolling dip. Possible hydrologic connection to stream crossing/headwaters at MP17.	Reshape rolling dip and armor the outlet.

Feature ID	Latitude	Longitude	Road Mileage	Description	Prescription
MP17	40.7155	-123.9083	0.18	Class III headwaters/stream crossing. Riprap rock armored crossing installed.	Maintain and Monitor.
MP18	40.7158	-123.9080	0.21	Undefined rolling dip, exposed earth at outlet.	Reshape rolling dip and rock armor outlet.
MP19	40.7161	-123.9080	0.23	12" metal ditch relief culvert. Outlet is covered in slash/debris.	Maintain and Monitor. Clear debris from outlet.
MP20	40.7164	-123.9082	0.25	Tire tread ruts throughout roadway.	Outslope road as feasible.
MP21	40.7169	-123.9084	0.29	Poorly defined rolling dip, exposed earth at outlet. Continuous tire ruts.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP22	40.7174	-123.9086	0.32	Poorly defined rolling dip, exposed earth at outlet. Continuous tire ruts.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP23	40.7181	-123.9084	0.38	Undefined rolling dip. Continuous tire ruts.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP24	40.7189	-123.9079	0.44	Poorly defined rolling dip, exposed earth at outlet. Continuous tire ruts.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP25	40.7193	-123.9077	0.47	Undefined rolling dip.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP26	40.7198	-123.9071	0.52	Undefined rolling dip.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.

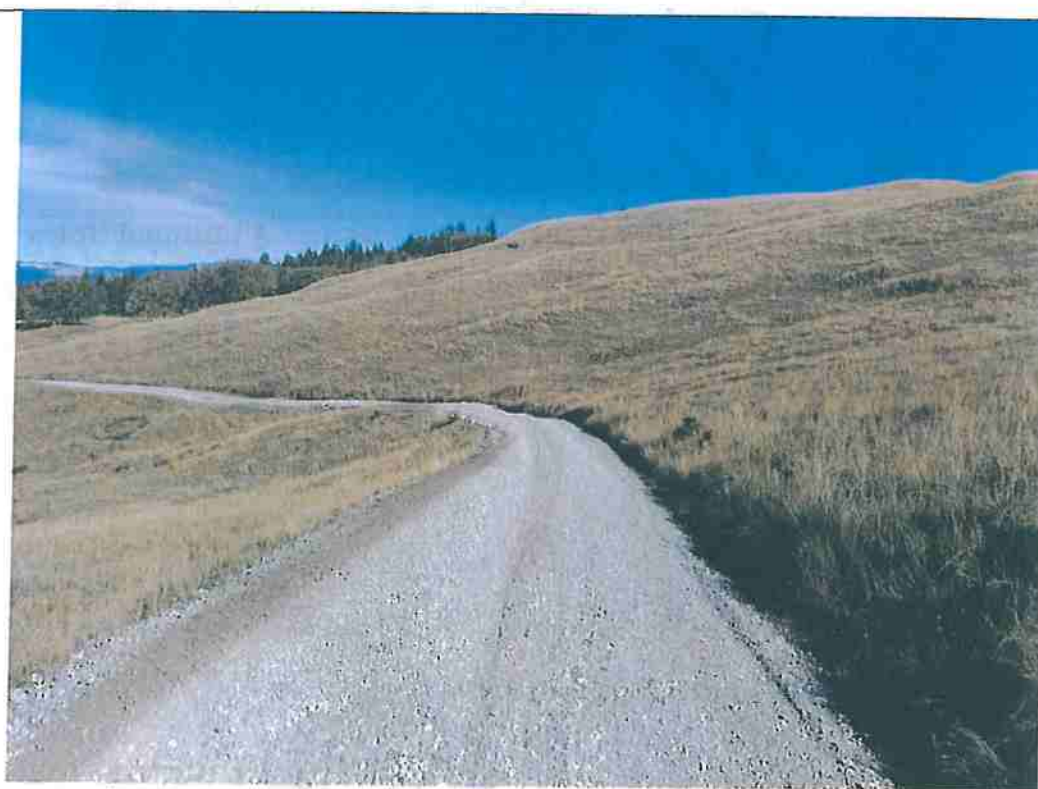


Feature ID	Latitude	Longitude	Road Mileage	Description	Prescription
MP27	40.7199	-123.9060	0.59	Class III watercourse crossing with corrugated metal 36" diameter culvert. Hydrologic connection roadside ditch at inlet in both directions	Hydrologically disconnect roadway from watercourse with waterbars or rolling dips.
MP28	40.7199	-123.9043	0.69	12" corrugated metal ditch relief culvert. Poorly defined inboard ditch. Debris build up at inlet and outlet.	Clean out inlet and outlet immediately. Long term objective: reshape ditch.
MP29	40.7198	-123.9039	0.71	Inboard seep flowing on roadway. Two 4" PVC perforated pipe installed to drain roadway. Potholes throughout roadway.	Install a rock armor crossing for seep to pass directly across roadway. Regrade road surface to outsloping surface.
MP30	40.7207	-123.9032	0.78	Undefined rolling dip.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP31	40.7209	-123.9016	0.87	Low point of road with no defined outlet.	Install rolling dip and rock armor outlet.
MP32	40.7214	-123.9011	0.92	Drainage for landing and surface water from spur road. No defined drainage.	Install rolling dip and rock armor outlet, install energy dissipation and sediment capture.
MP33	40.7217	-123.8989	1.04	Undefined rolling dip.	Install rolling dip and rock armor outlet.
MP34	40.7218	-123.8973	1.13	Poorly defined rolling dip.	Reshape rolling dip and rock armor outlet.
MP35	40.7215	-123.8969	1.16	Poorly defined rolling dip.	Reshape rolling dip and rock armor outlet.

Feature ID	Latitude	Longitude	Road Mileage	Description	Prescription
MP36	40.7212	-123.8970	1.19	Poorly defined rolling dip. Primary road drainage is in tire rut.	Reshape rolling dip and rock armor outlet. Outslope road as feasible.
MP37	40.7208	-123.8967	1.21	Meandering rut runs across road drains into old cast off.	Long term objective: regrade road and install a rolling dip. Armor outlet.
MP38	40.7205	-123.8966	1.24	Class III stream crossing through a 36" diameter corrugated metal culvert. Hydrologic connection on both sides at inlet and outlet.	Hydrologically disconnect roadway from watercourse with waterbars or rolling dips.
MP39	40.7209	-123.8962	1.28	Poorly defined rolling dip.	Long term objective: reshape rolling dip and armor outlet.
MP40	40.7212	-123.8961	1.30	Poorly defined rolling dip.	Long term objective: reshape rolling dip and armor outlet.
MP41	40.7207	-123.8947	1.41	Class III stream crossing through a 36" diameter corrugated metal culvert. Hydrologic connection on both sides at inlet and outlet.	Hydrologically disconnect roadway from watercourse with waterbars or rolling dips.
MP42	40.7212	-123.8938	1.47	Rutted drainage from cultivation area, poorly defined.	Develop defined drainage with energy dissipation and sediment capture.
MP43	40.7210	-123.8927	1.53	Poorly defined rolling dip.	Long term objective: reshape rolling dip and armor outlet.
MP44	40.7207	-123.8923	1.57	Poorly defined rolling dip.	Long term objective: reshape rolling dip and armor outlet.

Feature ID	Latitude	Longitude	Road Mileage	Description	Prescription
MP45	40.7209	-123.8915	1.62	Pot holes, low point with no defined outlet.	Long term objective: install rolling dip and armor outlet. Grade or fill potholes.
MP46	40.7192	-123.8886	1.82	End of road evaluation - road makes a hairpin turn and proceeds to adjacent parcels.	Maintain and Monitor.

## 6.0 Photographs of Road Features



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP10	40.7135	-123.9093	0.03	Photo of the recently spread roadbase.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP11	40.7136	-123.9089	0.05	Remove loose fill and install additional riprap.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP12	40.7137	-123.9088	0.06	Remove loose fill. Armor exposed earthen area with gravel or riprap.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP13	40.7141	-123.9086	0.08	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP14	40.7146	-123.9086	0.12	Reshape rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP15	40.7152	-123.9084	0.17	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP16	40.7154	-123.9084	0.18	Reshape rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP17	40.7155	-123.9083	0.18	Class III headwaters/armored crossing. Maintain and monitor.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP18	40.7158	-123.9080	0.21	Reshape rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP19	40.7161	-123.9080	0.23	This is the site of a 12" diameter metal ditch relief culvert. Clear debris from outlet of ditch relief culvert.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP20	40.7164	-123.9082	0.25	Maintain and monitor, regrade to outsloping surface wherever possible.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP21	40.7169	-123.9084	0.29	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP22	40.7174	-123.9086	0.32	Reshape rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP23	40.7181	-123.9084	0.38	Reshape rolling dip and armor outlet. Regrade road surface to remove ruts and create outsloping surface.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP24	40.7189	-123.9079	0.44	Reshape rolling dip and armor outlet. Regrade road surface to remove ruts and create outsloping surface.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP25	40.7193	-123.9077	0.47	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP26	40.7198	-123.9071	0.52	Reshape rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP27	40.7199	-123.9060	0.59	Site of a 36" diameter stream crossing culvert. Hydrologically disconnect roadway from watercourse with waterbars or rolling dips.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP28	40.7199	-123.9043	0.69	Clean out inlet and outlet immediately. Long term objective: reshape ditch.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP29	40.7198	-123.9039	0.71	Install a rock armor crossing for seep to pass directly across roadway. Regrade road surface into an outsloping surface.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP30	40.7207	-123.9032	0.78	Reshape rolling dip and armor outlet. Regrade surface to out slope.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP31	40.7209	-123.9016	0.87	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP32	40.7214	-123.9011	0.92	No defined drainage at intersection of roadways. Develop drainage with energy dissipation and sediment capture.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP33	40.7217	-123.8989	1.04	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP34	40.7218	-123.8973	1.13	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP35	40.7215	-123.8969	1.16	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP36	40.7212	-123.8970	1.19	Reshape rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP37	40.7208	-123.8967	1.21	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP38	40.7205	-123.8966	1.24	Site of a 36" diameter stream crossing culvert. Hydrologically disconnect roadway from watercourse with waterbars or rolling dips.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP39	40.7209	-123.8962	1.28	Install rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP40	40.7212	-123.8961	1.30	Install rolling dip and armor outlet.





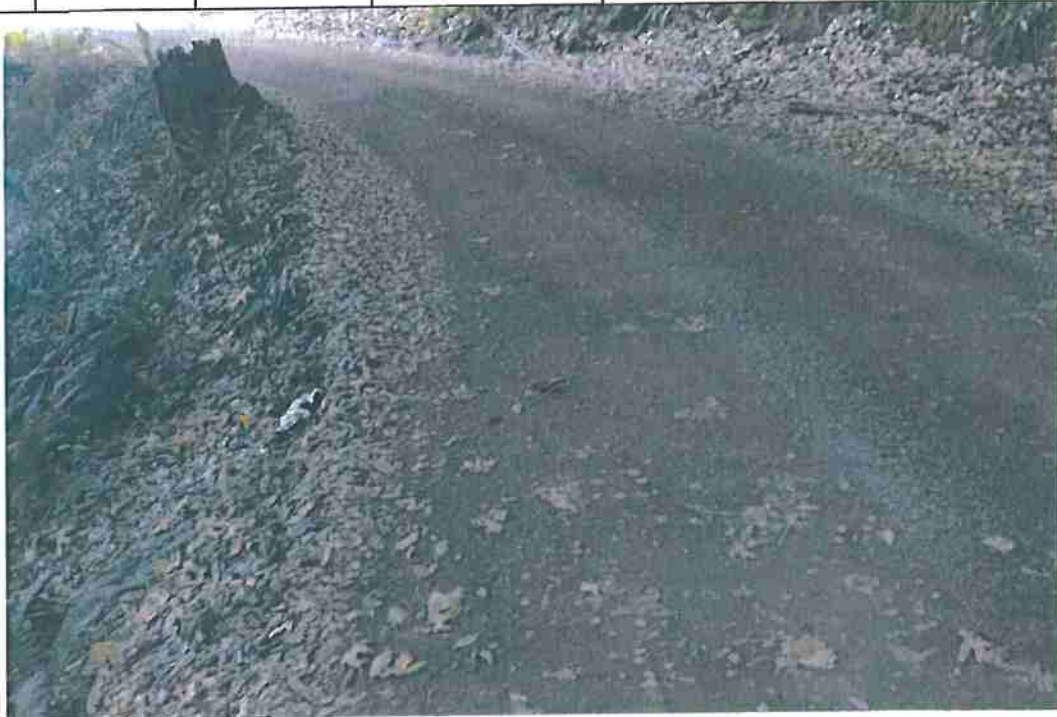
Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP41	40.7207	-123.8947	1.41	Site of a 36" diameter stream crossing culvert. Hydrologically disconnect roadway from watercourse with waterbars or rolling dips.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP42	40.7212	-123.8938	1.47	Develop defined drainage with energy dissipation and sediment capture.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP43	40.7210	-123.8927	1.53	Reshape rolling dip and armor outlet.



Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP44	40.7207	-123.8923	1.57	Install rolling dip and armor outlet.





Feature ID	Latitude	Longitude	Road Mileage	Additional Notes
MP45	40.7209	-123.8915	1.62	Long term objective: reshape rolling dip and armor outlet. Regrade road to outsloping surface.

## 7.0 Wet Weather Monitoring and Maintenance

Wet weather events should trigger inspection of the of access road, drainage features, and watercourse crossings. At a minimum, inspections should occur prior to the onset of fall and winter precipitation and following storm events that produce at least 0.5 in/day or 1.0 inch/7 days of precipitation. The following is a generalized maintenance task list:

- Remove any woody debris that may restrict flow in a culvert or drainage outlet.
- Remove sediment that impacts access road or drainage feature performance. Place any removed sediment in a contained location to be either green wasted, composted, or compacted into a flat stable area.
- Maintain records of access road and drainage feature maintenance and consider redesigning the access road to improve performance and reduce maintenance needs.