Section B

SURFACE AND FLUVIAL EROSION (ROADS/SKID TRAILS)

Introduction

The surface and fluvial erosion module examines the past and present soil erosion from roads and skid trails of the Mendocino Redwood Company (MRC) ownership in the Noyo River watershed, the watershed analysis unit (WAU). This module also provides a hazard assessment of the potential for future surface and fluvial erosion from roads in the Noyo WAU. The potential erosion assessment is to assist in development of mitigation measures and actions to minimize future soil erosion from the road network. The road data that is the basis for most of this analysis was collected by MRC during a 100% road inventory of the Noyo WAU. The erosion estimates utilize a combination of field observations and the use of the surface erosion model presented in the Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices).

Surface erosion is defined as the removal of soil particles from the surface of the soil. Processes such as rill erosion, sheetwash, biogenic transport (animal burrows, treefall, etc.) and ravel are considered surface erosion. Gullies, road crossing wash-outs, and large erosion features created by erosion from overland flow of water are considered fluvial erosion. In contrast, the largest discrete erosion event, landslides, are considered mass wasting.

This module examines road and skid trail associated surface and fluvial erosion delivering sediment into watercourses. Excessive levels of fine sediments from surface and fluvial erosion can get trapped in porous streambed gravels; and can increase water turbidity and suspended sediment concentrations. Excessive coarse sediments from fluvial erosion can adversely affect stream channel morphology. These can reduce the survival of salmonids in their redds or affect habitat needs and physiological characteristics of rearing salmonids. Excessive surface and fluvial erosion when delivered to a watercourse can also affect other downstream uses such as water supplies, agricultural diversions and recreation users. It is important that best management practices be utilized in forest management operations to minimize the impacts of surface and fluvial erosion.

Surface and Fluvial Erosion from Roads

Methods

Past, current and potential surface and fluvial erosion from roads was determined from field observations and a road surface erosion model. All of the roads in the Noyo WAU were visited in the field during a road inventory of the Noyo WAU (1999-2000).

The road inventory consisted of traveling the road with a Global Positioning System (GPS) unit, identifying, mapping and inventorying all major features of the road network. Some of the features that are inventoried include watercourse-crossings and crossing structures (culverts, bridges, etc.), landings, erosion features and controllable erosion amounts (as defined below). Information relating to erosion and sediment delivery from the road inventory is analyzed in this report. Also dimensions of the road network such as length, width and sediment contributing road lengths are summarized. The road inventory collects information on the entire road infrastructure. This road infrastructure information allows for better management and tracking of the MRC road network, but is not presented in this report.

All road features (watercourse crossings, landings, road fill, etc.), during the road inventory, have the past deliverable fluvial erosion volume estimated for that feature. Deliverable fluvial erosion from a road is defined as rill or gully erosion which is observed in close proximity to a watercourse or which showed evidence of eroding directly into a watercourse. These measurements were used to calculate the volume of fluvial erosion delivered from the road. The volume of erosion was converted to a weight (in tons) assuming a soil bulk density of 100 lbs./cubic foot.

Future or potential fluvial erosion (gully or road fill wash-outs, not sheetwash) observations were collected during the road inventory. This potential future erosion is called controllable erosion, a term developed by the North Coast Regional Water Quality Control Board for Total Maximum Daily Load (TMDL) purposes. Controllable erosion is defined as soil that could potentially deliver to a watercourse in the next 40 years (the duration of a TMDL), is human created, and can be reasonably controlled by human actions. Typically controllable erosion is a measure of the fill material from a road that could erode if a road feature is left un-maintained or fails in the next 40 years. The controllable erosion amount is the volume of soil that can be controlled with high design standards for a road feature (i.e. watercourse crossing, side-cast fill, etc.).

The controllable erosion sites are further designated by the potential for sediment delivery and the immediacy of treatment for the site. Both the sediment delivery potential and the treatment immediacy are ranked low, moderate or high. The ranking of each controllable erosion site by these variables provides a hazard or risk assessment of the controllable erosion. This allows prioritization of road improvements and erosion control work.

Another important variable of potential future fluvial erosion from a road is the likelihood of diversion of water down the road prism. This diversion potential, as it is called, was evaluated for every watercourse crossing of every road in the Noyo WAU. A site has a diversion potential if when the watercourse crossing plugged, dammed or failed water could be diverted out of the “natural” watercourse channel and down the road prism. Water diverted out of its “natural” channel would erode the road prism creating

potentially high sediment delivery. Sites with a diversion potential can be engineered such that the diversion of water down a road prism does not occur if the watercourse crossing plugged, dammed or failed.

Surface erosion (sheetwash from the road tread and prism) from roads was not directly estimated in the field, the contributing length or extent of road that delivers erosion to a watercourse is measured in the field then used for surface erosion calculations. The contributing length of a road is the length of road prism that drains water and associated eroded soil into a watercourse. Thus it defines the length of surface erosion of any particular site on the road. The model used to calculate surface erosion from roads is from the Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices Board) and is described below.

Surface erosion from the road surface is influenced by the amount of road traffic (high use mainline, moderate use active secondary, etc.), the type of road surface material, precipitation, width and size of road (the more surface area to erode the more erosion), and vegetative cover (Reid, 1981). The Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices Board) provides relationships based on these factors to estimate the amount of surface erosion from different road types and conditions. For a complete description of all of the parameters used in calculating surface erosion from roads see the Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices Board).

Field observations from the road inventory determined the length of the road delivering sediment to a watercourse (contributing length), the road width, the road surface material and the type of road (seasonal or temporary) to aid in the surface erosion calculations. In some cases the road inventory lacked contributing road length. In these cases the contributing road length was assumed to be 200 feet. Typically culverts that drain an inside ditch of a road (cross-drain culverts) put the water and eroded soil on a hillslope and do not deliver to a watercourse. The exception to this is when the cross drain culvert is in close proximity to a watercourse. To account for this all cross-drain culverts within 200 feet of a watercourse were assumed to deliver sediment and surface erosion. If a contributing road length was not collected for these features a 200 foot contributing length is assumed for the surface erosion modeling.

The following parameters were used to calculate surface erosion from roads in the Noyo WAU. All of the observed roads were assumed to be older than 2 years, a base erosion rate of 60 tons/acre/year was used. This initial value was altered (multiplied) by the factors of traffic on the road, cut- and fill-slope vegetation cover, road surface type, annual precipitation and road type in an attempt to model the actual sediment volume contributed by a given road segment. The road tread width was determined in the field during the road inventory and is assumed to be 40% of the road prism. The cut- and fill-slopes are assumed to 60% of the road prism; their dimensions for the surface erosion model were determined by multiplying the tread width by 1.5.

Road cut- and fill-slopes usually had approximately 50% vegetative cover, giving a cover factor of 0.37. The majority of hauling on roads occurs during drier times of the year (i.e. late spring, summer and early fall). Therefore the lowest annual precipitation category is used (<47 in. precipitation annually). In this annual precipitation category a

road with at least a 6 inch rock surface is given a factor of 0.2, while a native surface road has a factor of 1.

There were 4 traffic factors used in surface erosion modeling:

1) *Mainline roads with heavy traffic* have a factor of 20; these roads are actively used and maintained for log haul traffic.
2) *Mainline roads with moderate traffic* have a factor of 2; these roads are used for heavy log haul traffic 2-3 times each decade.
3) *Seasonal roads* have a traffic factor of 1.2; these are tributary roads which receive moderate log haul traffic 1-2 years each decade and light traffic the remainder of the time.
4) *Temporary roads* receive a traffic factor of 0.61; these roads receive moderate log haul traffic 1-2 times per every 1-2 decades with little to no use in between.

The result of the surface erosion modeling is added to the total past fluvial erosion observed during the road inventory from a given road and presented as tons/year of sediment delivery (see Appendix B for erosion estimates of each road in the Noyo WAU). For relative sediment contributions from each planning watershed for roads for sediment input evaluation the tons/year calculations for all roads was totaled by planning watershed and normalized by dividing by the MRC ownership, in square miles, for the planning watershed. The result is a tons/square mile of MRC ownership/year estimate of road surface and fluvial erosion.

Finally, with this information each road in the Noyo WAU is assigned an erosion hazard class. The erosion hazard class is used to classify the roads in the Noyo WAU by their current and potential erosion hazard. The erosion hazard class was determined by the amount of erosion a road produced and the likelihood for that erosion to be delivered to a watercourse. High levels of traffic, road surface, proximity to the stream, high past fluvial erosion, and high modeled surface erosion all were considered when ranking roads for their erosion hazard. The roads with the highest risk of sediment delivery and soil erosion were given a high erosion hazard classification. The roads with medium risk of sediment delivery and soil erosion were given a moderate erosion hazard classification. The roads with the lowest risk of sediment delivery and soil erosion were given a low erosion hazard classification. A description of what each erosion hazard classification means can be found in the Road results and discussion sub-section of this Surface and Fluvial Erosion report.

Road Surface and Fluvial Erosion Results and Discussion

The surface and fluvial erosion estimates by planning watershed are presented in Table B-1. The breakdown of estimated erosion, road areas, road lengths and hazard rating by individual roads is in Appendix B of this report.

Overall the Noyo WAU is estimated to have 105 tons/mi^2/yr of sediment from road associated surface and fluvial erosion. The highest levels of total road associated sediment delivery (tons/yr.) is from the Middle Fork North Fork Noyo, Hayworth Creek

and North Fork Noyo Planning Watersheds. These are also the planning watersheds with greatest amount of MRC ownership. When the road associated sediment delivery is normalized by area (tons/sq. mi./yr.) all the planning watersheds are relatively close in their estimated road sediment delivery rates for the Noyo WAU (Table B-1).

Table B-1. Road Associated Surface and Fluvial Erosion Estimates by Planning Watershed for the Noyo WAU.

Planning Watershed	Total Road Assoc. Erosion (tons/yr)	Total Acres PLWS	MRC Owned Acres	Road Assoc. Erosion Rate (tons/sq mi/yr)
McMullen Creek	168	7066	2017	53
Hayworth Creek	722	7104	4816	96
Middle Fork North Fork Noyo	898	4563	4176	138
North Fork Noyo	867	6515	4938	112
Olds Creek	487	6963	2336	133
Redwood Creek	150	3360	1098	87
Upper Noyo River	105	8429	627	108
Noyo WAU	***3293***	***44000***	***20008***	***105***

The erosion rate, though only an estimate, provides a good indicator of where road associated surface and fluvial erosion issues are currently occurring. However, the timing and amount of road use affects the amount of erosion estimated from a road. If the assumptions on the timing or amount of road used change, the erosion rate estimates may lose their reliability as an indicator of problem areas. Another indicator that can help in interpreting a potential road associated surface of fluvial erosion risk is the amount and density of road, and the amount of road that contributes erosion to a watercourse (contributing area). The road density and road area totals are presented for each planning watershed in the Noyo WAU (Table B-2).

Table B-2. Road Surface Areas, Contributing Road Surface Areas, Road Lengths and Road Densities for the Noyo WAU.

Planning Watershed	Road Surface Area (ac)	Road Contributing Area (ac)	Road Length (miles)	Road Density (mi/sq mi)
McMullen Creek	41.5	1.7	21.5	6.8
Hayworth Creek	80.5	6.6	47.0	6.2
Middle Fork North Fork Noyo	85.3	7.9	49.1	7.5
North Fork Noyo	132.0	8.0	62.5	8.1
Olds Creek	37.7	4.9	27.2	7.4
Redwood Creek	19.9	1.8	13.2	7.7
Upper Noyo River	29.5	0.7	14.4	14.7
Noyo WAU Total	***426.2***	***18.9***	***250.0***	***8.0***

Road densities are high in every planning watershed of the Noyo WAU. The overall density of 8 miles of road per each square mile MRC owned is a density that needs to be improved upon (lowered). Past timber harvest practices in the Noyo WAU relied upon tractor based yarding, a practice that usually requires a higher amount of roads. As cable yarding techniques replace tractor based yarding of logs the opportunity for reducing the road density in the Noyo WAU will be greater. This goal should be strived for.

Road surface area and length of road was highest in the North Fork Noyo planning watershed. However, the contributing road area (sediment producing road area) is similar for the North Fork Noyo, Middle Fork North Fork Noyo and Hayworth Creek planning watersheds. The erosion rates are also high in these planning watersheds. The amount of sediment contributing road area needs to be considered for road improvements and erosion reduction throughout the Noyo WAU. By reducing contributing road area the amount of road that contributes sediment during forest management operations is reduced.

The road erosion hazard classification for each road in the Noyo WAU is presented on Map B-1 and for each individual road in the appendix of this module. The categorizing of roads into hazard classes is intended to identify current problem areas, consider reconstruction and prioritize maintenance. The following are the definitions for each road erosion hazard class.

High Road Erosion Hazard Class - These roads have the highest amount of recent deliverable surface erosion to watercourses and a high potential for future deliverable erosion. These roads can be active, abandoned or closed. Often roads in this class are close to watercourses creating a high sediment delivery potential. Erosion is typically due to long contributing road lengths or native surfaces near watercourses: a result of too few waterbars and/or rolling dips or lack of rock surface. Erosion may also be a product of problem areas such as watercrossing wash-outs, poor road drainage, plugged road watercrossings, water diverted down the road surface, culverts not fitted with downspouts, etc. Active roads in this class should get the highest priority for maintenance or improvements. Closed roads in this class will need improvements before opening again. Opening abandoned roads in this class should be avoided.

Moderate Road Erosion Hazard Class - These roads have moderate amounts of recent deliverable surface erosion to watercourses and potential for future deliverable erosion. These roads can be active, abandoned or closed. Erosion problems on roads in this class can usually be handled with good road maintenance. Erosion is typically from problem areas such as poor road drainage, water diverted down the road surface, culverts not fitted with downspouts, and an occasional plugged culvert or watercourse crossing wash-out. Active roads in this class should be a priority for maintenance. Closed or abandoned roads in this class will need some improvements before opening again.

Low Road Erosion Hazard Class - These roads have low amounts of recent deliverable surface erosion to watercourses and low potential for future deliverable erosion. These

roads can be active, abandoned or closed. Active roads in this class do not need to be a priority for maintenance. Closed or abandoned roads in this class will need only some improvements before opening again.

Potential controllable (fluvial) erosion sites were identified and prioritized in the Noyo WAU. In the Noyo WAU 43 controllable erosion sites have a high treatment immediacy and 123 controllable erosion sites have a moderate treatment immediacy. In addition to these controllable erosion sites 157 culverts or crossings in the Noyo WAU have a diversion potential. These diversion potential sites need to be considered a high priority for road improvement as they can represent a significant potential fluvial erosion hazard. The treatment immediacies, road site numbers and road numbers are found on Map B-2. The road number and site number of each controllable erosion and diversion potential site is in Appendix B of this report.

Surface and Fluvial Erosion from Skid Trails

Methods

Surface erosion from skid trails was determined from aerial photograph interpretation and the surface erosion model presented in the Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices). Aerial photographs from 1978 and 1996 were used to identify skid trail activity. It is assumed that the past 12 years of skid trail activity is observed in the aerial photograph. To determine the amount of surface erosion delivering sediment from skid trails, the average density of skid trail watercourse crossings per unit area was determined. A length of 300 feet was assumed to deliver sediment from skid trails per watercourse crossing. The 300 feet was multiplied by the number of crossings per unit area, which provided the deliverable length of skid trails per unit area. The area in the Noyo WAU that utilized skid trails was then determined from aerial photographs. The amount of area utilizing skid trails (Table B-3) was multiplied by the deliverable length of skid trails per unit area to yield the total deliverable length of skid trails per time period.

Table B-3 Area Yarded and % Area Yarded by Skid Trails for Noyo WAU Planning Watersheds by Time Period.

Planning Watershed	North Fork Noyo	Hayworth Creek	Olds Creek	Middle Fork	Redwood Creek	McMullen Creek
Area (sq. mi) 1966-1978	0.57	3.15	0.17	0.66	0.15	0
Percent Area 1966-1978	7 %	42 %	5 %	10 %	9 %	0 %
Area (sq. mi) 1984-1996	1.42	0.11	0.08	1.36	0.06	0.76
Percent Area 1984-1996	18 %	1 %	2 %	21 %	4 %	24 %

The Standard Methodology for Conducting Watershed Analysis (Version 3.0, Washington Forest Practices Board) provides relationships to estimate the amount of

sediment delivery from different road types and conditions. The light/nonactive road parameters were used for estimating skid trail sediment delivery with the exception that skid trails were given a narrower width (28 ft compared to 40 ft for an average truck road) in the erosion calculations. The road surface is assumed to be native or natural and the ground cover for the cut and fill slopes is assumed to be 50% vegetated. Skid trails are assumed to have contributed sediment for twelve years. During the first two years the road contributes considerably more sediment than the remaining ten. For this reason, two base erosion rates were used: one for a newly constructed trail and another for the trail beyond two years of age. Roads less than two years of age have a base erosion rate of 110 tons/acre/yr, while those over two years old have a rate of 60 tons/acre/yr. It is assumed that we observed 12 years of skid trial activity in the aerial photographs.

Skid Trail Erosion Results and Discussion

The results by time period for the skid trail sediment delivery estimates are summarized in Table B-4 and Chart B-1. The estimates should be considered only as a minimum possible sediment delivery for skid trails constructed in the twelve years prior to aerial photo coverage (i.e. 1978 and 1996). Undoubtedly, some if not many, sediment delivering skid trails were vegetated enough to be overlooked during the inventory. In particular are those trails constructed in the first five years after aerial photograph reconnaissance. It is unlikely that sediment from these roads was evaluated at all.

The highest sediment delivery rate occurred during the 1970's is in Hayworth Creek Planning Watershed where over 200 tons/sq. mi./yr. of sediment were delivered (Chart B-1). The other planning watersheds exhibited considerably lower sediment delivery from skid trails; all less than 50 tons/sq. mi./yr. (Table B-4).

In the eighties and early nineties, skid trail construction in the Hayworth Creek Planning Watershed was minimal, however other planning watersheds saw increased activity. North Fork Noyo and Middle Fork both had over 200% increases in sediment delivery from skid trails to approximately 92 and 95 tons/sq. mi./yr. respectively. McMullen Creek also increased sediment delivery.

The large discrepancy in skid trail related sediment input between Hayworth Creek and the other planning watersheds prior to 1978 is due to the intensive tractor logging in that area and the relative lack of such activity in other areas. Visual 1996-air photo assessment of those skid trails in the North Fork Noyo, Middle Fork of the North Fork Noyo and McMullen Creek Planning Watersheds suggests that they were constructed in the early part of the 1978-96 time frame. Most recent logging appears to make use of cable yarding more than skid trails.

Future skid trail sediment delivery rates will be much lower than current rates because current Forest Practice Rules require cable yarding on steep ground. Much of the skid trail erosion in the WAU came from skid trail use on steep terrain before the current Forest Practice Rule restrictions. Furthermore, skid trail operation next to or directly in watercourses is restricted.

Chart B-1. Skid Trail Sediment Delivery for MRC Ownership in each Planning Watershed of the Noyo WAU for different time periods.

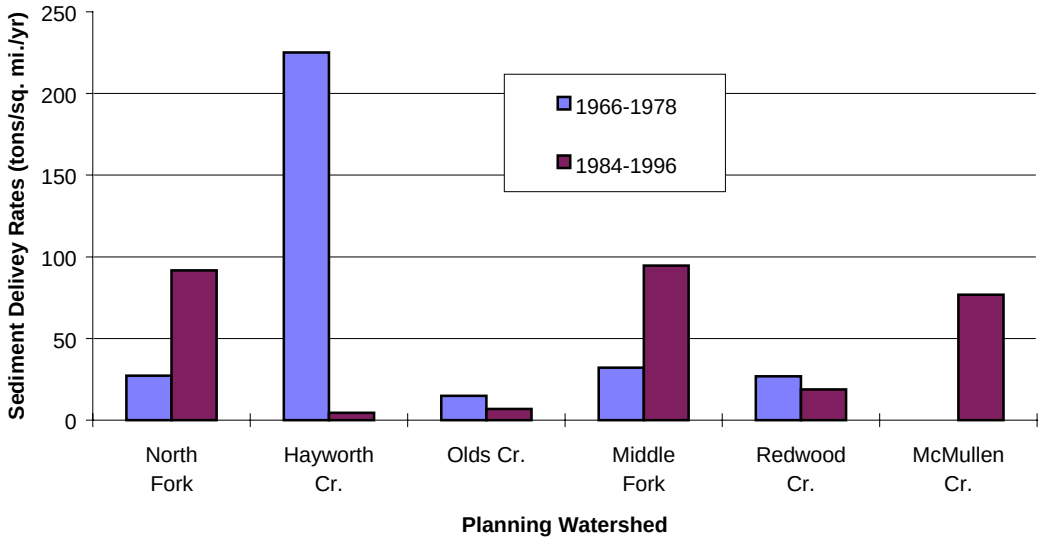


Table B-4. Skid Trail Sediment Delivery and Skid Trail Sediment Delivery Rates for Different Time Periods in the Noyo Watershed Analysis Unit.

Skid Trail Sediment Delivery (Tons)

Planning Watershed	1966-1978 (tons)	1984-1996 (tons)	Total (tons)
North Fork	2518	8491	11009
Hayworth Cr.	20344	414	20758
Olds Cr.	652	296	948
Middle Fork	2519	7411	9931
Redwood Cr.	553	390	973
McMullen Cr.	0	2900	2900

Skid Trail Sediment Delivery Rate (Tons/Sq. Mile MRC Owned/Yr)

Planning Watershed	1966-1978 (tons/sq. mi./yr)	1984-1996 (tons/sq. mi,/yr)	Total (tons/sq. mi./yr)
North Fork	27	92	60
Hayworth Cr.	225	5	115
Olds Cr.	15	7	11
Middle Fork	32	95	63
Redwood Cr.	27	19	23
McMullen Cr.	0	77	38

Conclusions

The overall road surface and fluvial erosion rate for the Noyo WAU is 105 tons/sq. mi./yr. Road surface and fluvial erosion sediment totals area highest in Middle Fork North Fork Noyo, North Fork Noyo and Hayworth Creek planning watersheds. These are also the planning watersheds with the greatest amount of MRC land. These areas also have the highest levels of sediment contributing road areas. The amount of sediment contributing road area needs to be considered for road improvements and erosion reduction throughout the Noyo WAU. By reducing contributing road area the amount of road that contributes sediment during forest management operations is reduced.

Road density is currently averaging 8 miles of road to every square mile of land MRC owns. This density is high and needs to be a source of improvement.

The road network is classified in to High, Moderate and Low surface erosion hazard (Map B-1). The roads with the high hazard are the highest priorities for improvements, monitoring or maintenance. The moderate hazard roads are a medium priority for improvements, monitoring or maintenance. The low hazard roads are not much of a concern for erosion.

High and moderate treatment immediacy controllable erosion and diversion potential sites were identified along the roads in the Noyo WAU and needs to be a focal point of ongoing forest operations. The Noyo WAU currently has 43 high treatment immediacy sites, 123 moderate immediacy sites and 157 sites with a diversion potential. This sites will be a priority for improvement of the road network in the Noyo WAU. The road number, site number for each individual site is shown on Map B-2 and in Appendix B of this report.

Skid trail erosion was found to be fairly high in the Noyo WAU. Hayworth Creek has the highest skid trail surface erosion inputs over time. This is mainly due to a high amount of tractor yarding done in the late 1960's and early 1970's. Future skid trail sediment delivery rates will be lower than current or past rates because current Forest Practice Rules require cable yarding on steep ground. Also MRC forest management policies favor more cable yarding. Much of the skid trail erosion in the WAU came from skid trail use on steep terrain before the current Forest Practice Rule restrictions. Furthermore, skid trail operation next to or directly in watercourses is restricted.

Literature Cited

Washington Forest Practice Board. 1995. Standard methodology for conducting watershed analysis. Version 3.0. WA-DNR Seattle, WA.

Noyo River Watershed Analysis Unit

Map B-1
Road Surface Erosion Hazard Ratings

Erosion Hazard Rating

- Low
- Moderate
- High

- MRC Ownership
- WWAA Boundary
- Planning Watershed Boundary

Transportation

- Paved Road
- Rocked Road
- Native Road
- Jeep Trail
- Railroad
- WLPZ Roads

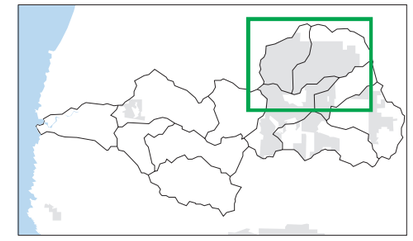
Flow Class

- Class I
- Class II
- Class III

Topography

- Index Contour (200′ interval)
- Regular Contour (40′ interval)

Sheet 1



0 1/2 1 Mile

January 9, 2001

Noyo River Watershed Analysis Unit

Map B-1
Road Surface Erosion Hazard Ratings

Erosion Hazard Rating
- Low
- Moderate
- High

- MRC Ownership
- WWAA Boundary
- Planning Watershed Boundary

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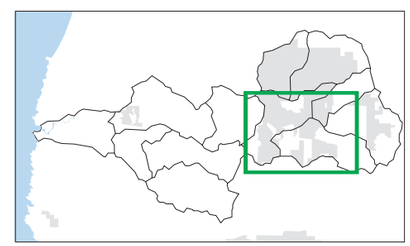
Sheet 2



0 1/2 1 Mile

January 9, 2001

Noyo River Watershed Analysis Unit

Map B-1
Road Surface Erosion Hazard Ratings

Erosion Hazard Rating

- Low
- Moderate
- High

- MRC Ownership
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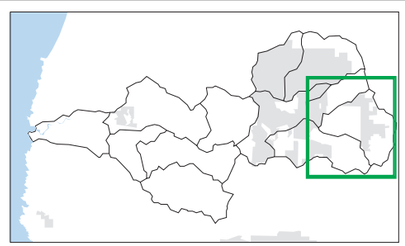
Sheet 3



0 1/2 1 Mile

January 9, 2001

Noyo River Watershed Analysis Unit

Map B-1
Road Surface Erosion Hazard Ratings

Erosion Hazard Rating

- Low
- Moderate
- High
- MRC Ownership
- WWAA Boundary
- Planning Watershed Boundary

Transportation

- Paved Road
- Rocked Road
- Native Road
- Jeep Trail
- Railroad
- WLPZ Roads

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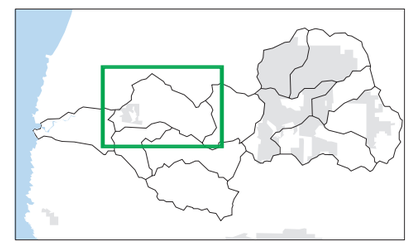
- Class III

Topography

- Index Contour (200′ interval)
- Regular Contour (40′ interval)

Sheet 4



0 1/2 1 Mile

January 9, 2001

Noyo River Watershed Analysis Unit

Map B-2
Road Feature Treatment Immediacy

Culverts	Crossings	Landings
High	High	High
Moderate	Moderate	Moderate
Low	Low	Low
None	None	None
Undetermined	Undetermined	Undetermined

- MRC Ownership
- WWAA Boundary
- Planning Watershed Boundary

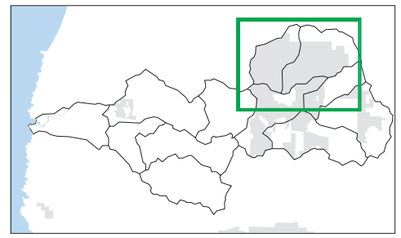
Transportation

- Paved Road
- Rocked Road
- Native Road
- Jeep Trail
- Railroad

Flow Class

- Class I
- Class II
- Class III

Sheet 1



0 1/2 1 Mile

January 9, 2001

Noyo River Watershed Analysis Unit

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Road Feature Treatment Immediacy

Culverts	Crossings	Landings
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Undetermined	Undetermined	Undetermined

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- Planning Watershed Boundary

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- Paved Road
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- Native Road
- Jeep Trail
- Railroad

Flow Class

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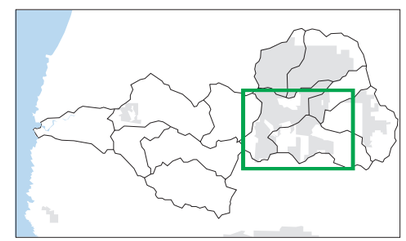
- Class II
- Class III

Sheet 2



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January 9, 2001

Noyo River Watershed Analysis Unit

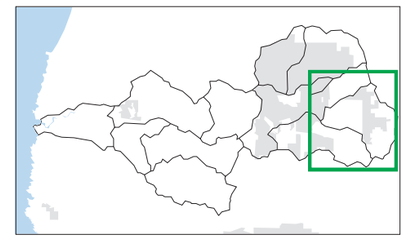
Map B-2
Road Feature Treatment Immediacy

Culverts	Crossings	Landings
High	High	High
Moderate	Moderate	Moderate
Low	Low	Low
None	None	None
Undetermined	Undetermined	Undetermined

- MRC Ownership
- WWAA Boundary
- Planning Watershed Boundary

Transportation	Flow Class
Paved Road	Class I
Rocked Road	Class II
Native Road	Class III
Jeep Trail	
Railroad	

Sheet 3



0 1/2 1 Mile

January 9, 2001

Noyo River Watershed Analysis Unit

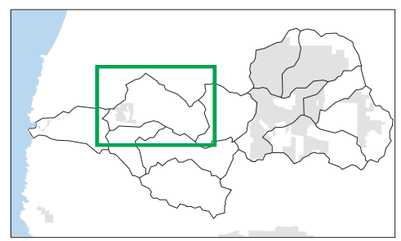
Map B-2
Road Feature Treatment Immediacy

Culverts	Crossings	Landings
High	High	High
Moderate	Moderate	Moderate
Low	Low	Low
None	None	None
Undetermined	Undetermined	Undetermined

MRC Ownership
WWAA Boundary
Planning Watershed Boundary

Transportation	Flow Class
Paved Road	Class I
Rocked Road	Class II
Native Road	Class III
Jeep Trail	
Railroad	

Sheet 4



0 1/2 1 Mile

January 9, 2001

Appendix B

Surface Erosion Module

Road Number	Road Length (ft)	Road Width (ft)	Road Surface Area (sq ft)	Contributing Road Length (ft)	Contributing Road Area (ft)	Contributing Percent of Road	Fluvial Erosion (tons)	Modeled Surface Erosion (tons)	Total Surface Erosion (tons)	Total Features Modeled	Number Features Estimated	Road Erosion Hazard Rating
70-A	8418	18	151525	1180	21240	14%	7	21	28	6	1	M
70-A-002	6028	14	84392	200	2800	3%	0	6	6	1	1	M
70-A-002-02	2680	14	37517	400	5600	15%	0	12	12	2	2	M
70-A-002-06	393	14	5507	200	2800	51%	0	4	4	1	1	M
70-A-004	6674	16	106789	400	6400	6%	0	14	14	2	2	M/L
70-A-004-02	818	16	13086	0	0	0%	0	0	0	0	0	L
70-A-004-02-	1569	16	25102	0	0	0%	0	0	0	0	0	L
70-AA	5669	16	90701	0	0	0%	0	0	0	0	0	L
70-AA-02	1664	16	26628	0	0	0%	0	0	0	0	0	L
70-B	16461	16	263381	85	1360	1%	9	4	14	2	0	M
70-B-012	13442	16	215079	582	9312	4%	7	20	26	5	1	M
70-B-012-01	9104	16	145657	265	4240	3%	0	9	9	2	0	M
70-B-012-01-	1063	16	17012	0	0	0%	0	0	0	0	0	M
70-B-012-01-	9171	16	146742	70	1120	1%	0	2	2	1	0	M
70-B-012-01-	1026	16	16412	0	0	0%	0	0	0	0	0	L
70-B-012-01-	2159	16	34537	200	3200	9%	0	4	4	1	1	M
70-B-012-02	5301	16	84815	370	5920	7%	0	12	12	3	1	M
70-B-012-02-	3861	16	61775	0	0	0%	0	0	0	0	0	L
70-B-031	10429	16	166858	520	8320	5%	1	18	19	3	2	M
70-B-031-01	4969	16	79500	200	3200	4%	0	7	7	1	1	M
70-B-031-01-	985	16	15761	0	0	0%	0	0	0	0	0	L
70-B-031-02	1059	14	14829	0	0	0%	0	0	0	0	0	L
70-B-031-02-	2376	16	38021	600	9600	25%	0	20	20	3	3	M
70-B-031-03	7215	16	115433	800	12800	11%	0	27	27	4	4	M
70-B-031-03-	3980	16	63682	200	3200	5%	0	7	7	1	1	M
70-B-031-03-	821	16	13136	0	0	0%	0	0	0	0	0	M
70-B-031-04	237	14	3321	80	1120	34%	34	1	35	1	0	M
70-B-033	9434	16	150946	240	3840	3%	15	8	23	5	0	L/M
70-B-033-01	1756	16	28103	200	3200	11%	0	7	7	1	1	M
70-B-033-02	1006	16	16097	0	0	0%	0	0	0	0	0	L
70-C	37424	16	598777	2210	35360	6%	296	114	409	19	2	H/L
70-C-019	622	16	9951	0	0	0%	0	0	0	0	0	L
70-C-021	2644	14	37010	0	0	0%	0	0	0	0	0	M
70-C-022	3654	16	58464	0	0	0%	0	0	0	0	0	M/L
70-C-022-01	2204	16	35258	0	0	0%	0	0	0	0	0	L
70-C-023	88	14	1232	0	0	0%	0	0	0	0	0	L
70-C-025	308	16	4922	0	0	0%	0	0	0	0	0	M
70-C-032	489	16	7826	0	0	0%	0	0	0	0	0	M
70-C-034	677	16	10832	0	0	0%	0	0	0	0	0	L
70-C-042	1076	14	15059	250	3500	23%	1	5	6	3	0	M
70-C-044	349	16	5591	0	0	0%	0	0	0	0	0	M
70-C-045	4934	15	74011	510	7650	10%	207	16	223	4	2	M
70-C-045-01	117	15	1757	0	0	0%	0	0	0	0	0	L
70-C-048	2481	16	39692	70	1120	3%	3	2	5	1	0	L
70-C-050	4555	16	72875	0	0	0%	0	0	0	0	0	M
70-C-052	2404	15	36066	0	0	0%	0	0	0	0	0	M
70-C-054	7547	16	120748	435	6960	6%	69	15	84	6	1	M
70-C-054-01	7983	16	127720	170	2720	2%	281	4	284	2	0	H
70-C-054-01-	599	14	8380	0	0	0%	0	0	0	0	0	M
70-C-054-01-	4306	16	68898	200	3200	5%	0	4	4	1	1	M
70-C-054-01-	259	18	4664	0	0	0%	0	0	0	0	0	L
70-C-054-01-	271	16	4334	0	0	0%	0	0	0	0	0	L
70-C-062	5169	16	82710	0	0	0%	0	0	0	0	0	M/L
70-D	23217	16	371474	2040	32640	9%	14	105	118	12	1	M
70-D-001	461	14	6453	0	0	0%	0	0	0	0	0	M
70-E	14938	16	239003	2830	45280	19%	3	145	148	14	10	H/M
70-E-002	3320	16	53114	320	5120	10%	0	10	10	3	1	H
70-E-002-01	4384	16	70142	130	2080	3%	41	3	43	2	0	H
70-E-002-01-	3343	16	53492	60	960	2%	0	1	1	2	0	H
70-E-002-01-	104	16	1657	0	0	0%	0	0	0	0	0	L
70-E-002-02	3462	16	55394	170	2720	5%	27	6	33	1	0	M
70-E-002-02-	159	16	2537	0	0	0%	0	0	0	0	0	L
70-E-004	1217	14	17031	200	2800	16%	0	4	4	1	1	M

Road Number	Road Length (ft)	Road Width (ft)	Road Surface Area (sq ft)	Contributing Road Length (ft)	Contributing Road Area (ft)	Contributing Percent of Road	Fluvial Erosion (tons)	Modeled Surface Erosion (tons)	Total Surface Erosion (tons)	Total Features Modeled	Number Features Estimated	Road Erosion Hazard Rating
70-E-011	4717	16	75478	740	11840	16%	0	25	25	9	1	M
70-E-011-01	1024	16	16389	0	0	0%	0	0	0	0	0	M
70-E-012	831	16	13298	0	0	0%	0	0	0	0	0	L
70-E-014	2276	16	36423	0	0	0%	0	0	0	0	0	L
70-E-022	1613	16	25806	375	6000	23%	1	13	14	3	1	M
70-E-022-01	184	16	2945	0	0	0%	0	0	0	0	0	L
70-E-024	261	16	4174	0	0	0%	0	0	0	0	0	L
70-E-026	99	14	1382	0	0	0%	0	0	0	0	0	L
70-E-027	3928	16	62851	200	3200	5%	0	7	7	1	1	L
70-F	4480	16	71679	255	4080	6%	0	13	13	2	0	M
70-F-001	446	16	7142	0	0	0%	0	0	0	0	0	L
70-G	10369	16	165909	1160	18560	11%	14	60	73	6	0	H
70-G-002	7607	14	106495	260	3640	3%	3	8	10	3	0	M
70-G-002-01	398	14	5569	200	2800	50%	0	4	4	1	1	M
70-G-002-02	14287	16	228599	1020	16320	7%	302	34	337	9	1	H
70-G-002-02-	179	14	2503	0	0	0%	0	0	0	0	0	L
70-G-002-02-	4552	16	72829	800	12800	18%	0	27	27	4	4	M
70-G-002-02-	514	16	8221	200	3200	39%	0	7	7	1	1	M
70-G-002-02-	2837	16	45399	0	0	0%	0	0	0	0	0	L
70-G-002-02-	103	14	1437	0	0	0%	0	0	0	0	0	L
70-G-012	2890	14	40461	425	5950	15%	57	13	69	4	1	M
70-G-013	15741	16	251849	250	4000	2%	1445	8	1453	4	0	H/M
70-G-013-01	268	14	3749	200	2800	75%	0	4	4	1	1	M
70-G-013-02	1506	16	24103	0	0	0%	0	0	0	0	0	M
70-G-013-04	6517	16	104276	200	3200	3%	0	7	7	1	1	M
70-G-015	2214	14	30994	150	2100	7%	3	3	5	1	0	M
70-G-017	891	16	14256	0	0	0%	0	0	0	0	0	M
70-G-022	987	14	13813	400	5600	41%	0	7	7	2	2	M
70-G-023	11101	16	177617	395	6320	4%	14	13	27	3	0	M
70-G-023-02	5828	14	81599	470	6580	8%	0	14	14	3	1	L/M
70-G-023-04	3461	14	48451	400	5600	12%	0	12	12	2	2	M
70-H	26107	16	417710	2190	35040	8%	82	113	195	13	5	H/M
70-H-002	4837	14	67719	270	3780	6%	68	5	72	3	0	H - ABANDONED
70-H-004	306	14	4285	0	0	0%	0	0	0	0	0	L
70-H-011	2435	14	34091	370	5180	15%	4	11	15	2	0	M
70-H-021	3786	16	60569	200	3200	5%	0	7	7	1	1	M
70-H-021-02	1239	16	19824	400	6400	32%	0	8	8	2	2	M
70-H-022	1118	16	17884	0	0	0%	0	0	0	0	0	L
70-H-024	7240	16	115836	550	8800	8%	131	19	150	7	0	M
70-H-024-02	5565	16	89036	1060	16960	19%	9	36	45	9	1	M
70-H-025	2439	16	39019	250	4000	10%	4	8	12	1	0	M
70-H-025-01	448	16	7172	0	0	0%	0	0	0	0	0	L
70-H-032	92	16	1467	0	0	0%	0	0	0	0	0	L
70-I	17191	16	275051	190	3040	1%	35	10	45	4	0	M/L
70-I-002	8779	16	140459	650	10400	7%	3	22	25	4	0	M/L
70-I-002-02	1872	16	29950	45	720	2%	1	1	2	1	0	H
70-I-002-02-	639	16	10227	0	0	0%	0	0	0	0	0	M
70-I-002-02-	253	16	4052	200	3200	79%	0	4	4	1	1	M
70-I-004	7005	16	112082	520	8320	7%	38	18	55	4	0	M
70-I-006	162	14	2264	0	0	0%	0	0	0	0	0	L
70-I-012	293	14	4109	0	0	0%	0	0	0	0	0	L
70-I-032	1417	16	22673	0	0	0%	0	0	0	0	0	L
70-J	13632	16	218111	690	11040	5%	68	35	103	7	0	M
70-J-001	732	16	11708	400	6400	55%	0	8	8	2	2	M
70-J-002	293	16	4681	0	0	0%	0	0	0	0	0	L
70-J-021	718	14	10059	0	0	0%	0	0	0	0	0	L
70-J-022	1424	14	19930	55	770	4%	1	1	2	1	0	M
70-J-024	9751	14	136516	472	6608	5%	70	9	79	6	1	M
70-J-024-02	823	14	11529	0	0	0%	0	0	0	0	0	M
70-J-024-04	3151	14	44117	200	2800	6%	0	4	4	1	1	M
70-J-024-04-	561	14	7856	0	0	0%	0	0	0	0	0	M
70-J-024-04-	121	16	1936	0	0	0%	0	0	0	0	0	M
70-J-024-05	804	16	12871	0	0	0%	0	0	0	0	0	M

Road Number	Road Length (ft)	Road Width (ft)	Road Surface Area (sq ft)	Contributing Road Length (ft)	Contributing Road Area (ft)	Contributing Percent of Road	Fluvial Erosion (tons)	Modeled Surface Erosion (tons)	Total Surface Erosion (tons)	Total Features Modeled	Number Features Estimated	Road Erosion Hazard Rating
70-K-002	7451	16	119224	150	2400	2%	0	5	5	1	0	M
70-K-002-02	2371	16	37934	200	3200	8%	0	4	4	1	1	M
70-K-002-04	530	16	8482	0	0	0%	0	0	0	0	0	M
70-K-002-06	1487	16	23799	100	1600	7%	4	3	7	1	0	M
70-K-002-06-	948	16	15166	225	3600	24%	68	5	72	2	0	M
70-K-002-08	172	16	2752	0	0	0%	0	0	0	0	0	L
70-K-004	888	14	12426	0	0	0%	0	0	0	0	0	L
70-K-005	433	16	6930	0	0	0%	0	0	0	0	0	L
70-K-007	1642	16	26274	20	320	1%	5	0	6	1	0	M
70-K-012	6683	16	106930	260	4160	4%	0	9	9	2	1	M
70-K-012-01	1434	16	22942	75	1200	5%	3	3	5	1	0	M
70-K-012-03	2050	14	28696	200	2800	10%	0	4	4	1	1	M
70-K-021	3229	16	51658	200	3200	6%	0	7	7	1	1	M
70-K-021-01	128	16	2041	0	0	0%	0	0	0	0	0	L
70-K-022	1489	16	23824	0	0	0%	0	0	0	0	0	M
70-K-022-01	2340	14	32754	150	2100	6%	27	3	30	1	0	M
70-K-022-03	1586	16	25379	75	1200	5%	0	2	2	1	0	M
70-K-022-03-	1281	14	17939	0	0	0%	0	0	0	0	0	M
70-L	19280	16	308481	970	15520	5%	24	50	74	9	1	M
70-L-001	124	16	1977	0	0	0%	0	0	0	0	0	L
70-L-002	277	16	4431	0	0	0%	0	0	0	0	0	L
70-L-004	2974	16	47590	0	0	0%	0	0	0	0	0	M
70-L-005	952	16	15233	0	0	0%	0	0	0	0	0	L
70-L-011	270	16	4323	0	0	0%	0	0	0	0	0	L
70-L-032	928	14	12999	0	0	0%	0	0	0	0	0	M
70-L-034	5846	14	81843	200	2800	3%	14	4	17	3	0	M
70-L-034-01	337	14	4714	0	0	0%	0	0	0	0	0	M
70-M	21811	16	348977	1275	20400	6%	16	66	82	12	1	M/H
70-M-002	2277	14	31874	60	840	3%	0	1	1	1	0	H
70-M-012	119	16	1909	0	0	0%	0	0	0	0	0	M
70-M-013	1332	16	21314	75	1200	6%	4	2	6	2	0	ABAND0NED
70-M-014	2237	16	35788	400	6400	18%	1	8	10	2	2	M
70-M-014-02	1609	16	25743	0	0	0%	0	0	0	0	0	M
70-M-014-04	1317	16	21065	150	2400	11%	132	3	135	2	0	M
70-M-022	2805	16	44883	320	5120	11%	0	11	11	2	1	M
70-M-023	3305	16	52879	0	0	0%	0	0	0	0	0	M
70-M-025	5858	16	93722	475	7600	8%	19	16	35	6	1	M
70-M-025-01	125	16	1996	0	0	0%	0	0	0	0	0	L
70-M-032	186	16	2969	0	0	0%	0	0	0	0	0	L/M
70-M-034	2469	16	39507	0	0	0%	0	0	0	0	0	L
70-N	19301	16	311454	3965	63440	21%	8	204	212	25	9	H/M
70-N-001	9498	16	151975	1115	17840	12%	49	38	86	7	2	M
70-N-001-01	501	14	7020	0	0	0%	0	0	0	0	0	L
70-N-003	327	14	4576	0	0	0%	0	0	0	0	0	L
70-N-012	417	16	6679	150	2400	36%	5	3	9	1	0	M
70-N-022	5013	16	80215	450	7200	9%	0	15	15	6	0	M
70-N-023	1251	14	17513	0	0	0%	0	0	0	0	0	M
70-N-024	11253	16	180048	380	6080	3%	5	13	18	3	0	M/L
70-N-024-01	1527	16	24425	70	1120	5%	0	2	2	1	0	M
70-N-024-03	847	16	13546	0	0	0%	0	0	0	0	0	L
70-N-024-05	127	16	2036	0	0	0%	0	0	0	0	0	L
70-N-032	11221	16	179539	210	3360	2%	0	7	7	2	0	M/L
70-N-032-02	4599	14	64382	0	0	0%	0	0	0	0	0	M
70-N-032-02-	621	14	8701	0	0	0%	0	0	0	0	0	M
70-N-033	2867	16	45865	0	0	0%	0	0	0	0	0	M
70-N-033-02	1174	16	18778	0	0	0%	0	0	0	0	0	L
70-N-034	1740	16	27842	200	3200	11%	0	7	7	1	1	M
70-N-042	20530	16	328474	1900	30400	9%	3	64	67	16	3	H/M
70-N-042-01	1311	16	20981	140	2240	11%	0	5	5	1	0	M
70-N-042-02	228	16	3645	0	0	0%	0	0	0	0	0	L
70-N-042-03	1639	16	26226	130	2080	8%	0	4	4	1	0	M
70-N-042-04	1076	16	17218	200	3200	19%	0	4	4	1	1	L
70-N-042-05	5962	16	95393	130	2080	2%	0	4	4	2	0	M

Road Number	Road Length (ft)	Road Width (ft)	Road Surface Area (sq ft)	Contributing Road Length (ft)	Contributing Road Area (ft)	Contributing Percent of Road	Fluvial Erosion (tons)	Modeled Surface Erosion (tons)	Total Surface Erosion (tons)	Total Features Modeled	Number Features Estimated	Road Erosion Hazard Rating
70-N-042-05-	292	16	4679	0	0	0%	0	0	0	0	0	L
70-O	3069	16	49103	140	2240	5%	1	7	9	3	0	M
70-P	12909	16	206542	1320	21120	10%	23	55	78	8	4	M
70-P-001	2839	16	45418	500	8000	18%	22	10	32	3	2	M - ABANDONED
70-P-002	4421	14	61897	390	5460	9%	134	7	141	4	0	M - ABANDONED
70-P-002-02	1376	14	19269	200	2800	15%	0	4	4	1	1	H - ABANDONED
70-P-002-02-	668	16	10694	150	2400	22%	0	3	3	1	0	H - ABANDONED
70-P-004	863	16	13809	0	0	0%	0	0	0	0	0	M
70-P-005	229	15	3434	0	0	0%	0	0	0	0	0	L
70-P-006	4214	16	67424	150	2400	4%	1	3	4	1	0	M
70-P-008	10218	14	143055	160	2240	2%	57	5	61	2	0	M
70-P-008-02	445	15	6680	0	0	0%	0	0	0	0	0	L
70-P-008-03	406	16	6493	0	0	0%	0	0	0	0	0	L
70-P-008-04	2268	14	31756	200	2800	9%	0	4	4	1	1	M
70-P-011	520	16	8325	0	0	0%	0	0	0	0	0	L
70-P-022	4828	16	77242	340	5440	7%	3	11	14	8	0	M
70-P-022-01	93	16	1495	0	0	0%	0	0	0	0	0	L
70-P-022-03	239	16	3827	0	0	0%	0	0	0	0	0	L
70-P-023	626	16	10012	0	0	0%	0	0	0	0	0	L
70-P-025	262	16	4185	100	1600	38%	1	2	3	1	0	M
70-P-026	1072	16	17150	0	0	0%	0	0	0	0	0	L
70-PR01	22956	18	413208	4319	77742	19%	238	61	299	14	6	N/A
70-PR02	18984	18	341708	800	14400	4%	0	11	11	4	4	N/A
70-PR03	22600	0	0	0	0	0%	0	0	0	0	0	N/A
70-PR04	12084	0	0	0	0	0%	0	0	0	0	0	N/A
70-PR05	122382	13	665941	0	0	0%	0	0	0	0	0	N/A
70-PR06	39920	0	0	0	0	0%	0	0	0	0	0	N/A
70-PR07	2103	0	0	0	0	0%	0	0	0	0	0	N/A
70-PR08	8803	0	0	0	0	0%	0	0	0	0	0	N/A
70-Q	820	14	11480	0	0	0%	0	0	0	0	0	L
70-R	61784	17	1061476	9315	167270	15%	26	642	668	45	14	H/M
70-R-011	673	16	10772	0	0	0%	0	0	0	0	0	L
70-R-013	4258	16	68128	200	3200	5%	0	3	3	1	1	L
70-R-022	942	16	15071	0	0	0%	0	0	0	0	0	L
70-R-022-01	575	16	9194	0	0	0%	0	0	0	0	0	L
70-R-024	299	16	4787	0	0	0%	0	0	0	0	0	L
70-R-026	7443	16	119092	180	2880	2%	1	6	7	1	0	L/M
70-R-026-02	4864	16	77821	0	0	0%	0	0	0	0	0	L/M
70-R-026-04	3867	16	61871	120	1920	3%	41	4	45	1	0	M
70-R-041	1663	16	26609	100	1600	6%	8	2	10	1	0	M
70-R-041-01	291	16	4655	50	800	17%	7	1	8	1	0	M
70-R-042	190	14	2666	0	0	0%	0	0	0	0	0	L
70-R-043	5762	14	80671	600	8400	10%	3	18	20	3	2	M
70-R-043-01	187	16	2985	0	0	0%	0	0	0	0	0	M
70-R-043-02	2977	16	47630	150	2400	5%	0	5	5	1	0	M
70-R-044	3651	16	58424	50	800	1%	0	2	2	1	0	M
70-R-044-02	146	16	2337	0	0	0%	0	0	0	0	0	L
70-R-062	8614	16	137825	380	6080	4%	16	13	29	4	1	M
70-R-062-02	1040	16	16647	0	0	0%	0	0	0	0	0	L
70-R-064	258	14	3618	0	0	0%	0	0	0	0	0	M
70-R-065	2185	16	34957	680	10880	31%	15	23	38	4	0	M
70-R-101	5730	16	91678	570	9120	10%	11	19	30	5	0	M
70-R-101-01	3463	14	48475	0	0	0%	0	0	0	0	0	M
70-R-101-03	332	16	5312	0	0	0%	0	0	0	0	0	L
70-R-103	4731	14	66230	0	0	0%	0	0	0	0	0	M
70-R-112	3596	16	57542	120	1920	3%	0	2	2	3	0	H
70-R-114	12050	16	192804	720	11520	6%	1	24	26	5	1	M/L
70-R-114-01	460	14	6434	0	0	0%	0	0	0	0	0	L
70-R-114-02	2795	16	44720	200	3200	7%	0	7	7	1	1	M
70-R-115	963	14	13477	0	0	0%	0	0	0	0	0	L
70-R-116	6271	16	100338	0	0	0%	0	0	0	0	0	L
70-S	15856	16	253702	230	3680	1%	0	12	12	2	1	L
70-S-001	2805	18	50497	70	1260	2%	3	3	5	1	0	L

Road Number	Road Length (ft)	Road Width (ft)	Road Surface Area (sq ft)	Contributing Road Length (ft)	Contributing Road Area (ft)	Contributing Percent of Road	Fluvial Erosion (tons)	Modeled Surface Erosion (tons)	Total Surface Erosion (tons)	Total Features Modeled	Number Features Estimated	Road Erosion Hazard Rating
70-S-001-01	309	16	4951	0	0	0%	0	0	0	0	0	L
70-S-002	3124	16	49992	0	0	0%	0	0	0	0	0	M
70-S-002-02	202	16	3238	0	0	0%	0	0	0	0	0	L
70-S-004	11649	16	186388	1290	20640	11%	5	44	49	8	0	M
70-S-004-02	286	16	4569	0	0	0%	0	0	0	0	0	L
70-S-011	10716	16	171451	1000	16000	9%	0	34	34	5	5	M/L
70-S-011-01	386	16	6183	0	0	0%	0	0	0	0	0	L
70-S-011-02	1380	16	22085	0	0	0%	0	0	0	0	0	M
70-S-011-03	422	16	6753	0	0	0%	0	0	0	0	0	L
70-S-011-04	1127	16	18039	200	3200	18%	0	7	7	1	1	M
70-S-012	505	16	8085	0	0	0%	0	0	0	0	0	L
70-S-021	1686	16	26981	0	0	0%	0	0	0	0	0	L
70-S-022	1929	16	30872	0	0	0%	0	0	0	0	0	L
70-SH20	45336	0	0	0	0	0%	0	0	0	0	0	N/A
70-T	47686	20	936852	0	0	0%	0	0	0	0	0	M
70-T-011	327	14	4583	0	0	0%	0	0	0	0	0	L
70-T-012	304	14	4258	0	0	0%	0	0	0	0	0	L
70-T-022	3374	14	47232	0	0	0%	0	0	0	0	0	L
70-T-032	3977	16	63635	0	0	0%	0	0	0	0	0	M
70-T-032-02	233	14	3267	0	0	0%	0	0	0	0	0	L
70-T-032-04	114	16	1830	0	0	0%	0	0	0	0	0	L
70-T-061	1104	16	17666	0	0	0%	0	0	0	0	0	L
70-U	684	16	10952	0	0	0%	0	0	0	0	0	L
70-V	27163	17	437078	2080	36280	8%	28	117	145	13	5	M/L
70-V-002	924	14	12929	200	2800	22%	0	6	6	1	1	M
70-V-004	9003	16	144050	425	6800	5%	58	14	72	4	0	M
70-V-004-02	116	14	1629	200	2800	172%	3	4	6	1	1	L
70-V-011	331	16	5290	0	0	0%	0	0	0	0	0	L
70-V-013	446	16	7136	0	0	0%	0	0	0	0	0	L
70-V-014	2712	16	43396	200	3200	7%	0	7	7	1	1	M
70-V-016	272	16	4352	0	0	0%	0	0	0	0	0	L
70-V-017	796	16	12737	0	0	0%	0	0	0	0	0	M
70-V-022	960	16	15358	0	0	0%	0	0	0	0	0	M
70-V-024	604	16	9656	150	2400	25%	0	3	3	1	0	L
70-V-026	1987	15	29804	0	0	0%	0	0	0	0	0	L
70-V-026-02	4541	16	72653	0	0	0%	0	0	0	0	0	L
70-V-028	558	14	7809	0	0	0%	0	0	0	0	0	L
70-V-051	1627	16	26039	400	6400	25%	0	8	8	2	2	M
70-V-053	6057	16	96909	0	0	0%	0	0	0	0	0	M
70-W	25772	16	412352	2525	40400	10%	54	130	184	13	4	H/M
70-W-001	7105	16	113677	1000	16000	14%	0	34	34	5	5	M
70-W-001-02	1040	14	14555	200	2800	19%	0	4	4	1	1	M
70-W-001-03	160	14	2237	200	2800	125%	0	4	4	1	1	M
70-W-012	2476	14	34666	200	2800	8%	0	4	4	1	1	M
70-W-021	233	14	3256	0	0	0%	0	0	0	0	0	L
70-W-023	493	14	6899	0	0	0%	0	0	0	0	0	L
70-W-024	1392	16	22274	0	0	0%	0	0	0	0	0	L
70-W-025	808	14	11315	0	0	0%	0	0	0	0	0	M
70-W-032	1282	14	17944	0	0	0%	0	0	0	0	0	M
70-W-032-01	85	16	1353	0	0	0%	0	0	0	0	0	L
70-W-034	1305	14	18266	200	2800	15%	0	4	4	1	1	M
70-W-034-02	1057	14	14800	0	0	0%	0	0	0	0	0	M
70-W-034-02-	509	14	7132	0	0	0%	0	0	0	0	0	M
70-W-036	549	16	8790	0	0	0%	0	0	0	0	0	L
70-W-041	7137	16	114186	300	4800	4%	4	10	14	3	0	M
70-W-043	8362	16	133796	165	2640	2%	150	6	155	3	0	M
70-W-045	1595	16	25525	0	0	0%	0	0	0	0	0	M
70-X	4555	16	72878	50	800	1%	0	3	3	1	0	M
70-Y	10432	14	146043	100	1400	1%	14	4	18	1	0	M
70-Z	12968	14	181556	150	2100	1%	0	7	7	1	0	M
70-Z-001-01	423	14	5915	25	350	6%	4	0	5	1	0	L
70-Z-001-02	364	14	5090	0	0	0%	0	0	0	0	0	M
70-ZZ	9824	14	137542	1020	14280	10%	12	46	58	7	4	M

Road Number	Road Length (ft)	Road Width (ft)	Road Surface Area (sq ft)	Contributing Road Length (ft)	Contributing Road Area (ft)	Contributing Percent of Road	Fluvial Erosion (tons)	Modeled Surface Erosion (tons)	Total Surface Erosion (tons)	Total Features Modeled	Number Features Estimated	Road Erosion Hazard Rating
71-C	7457	14	104400	1150	16100	15%	16	18	34	6	0	M
71-C-001	308	14	4309	0	0	0%	N/A	0	0	0	0	L
71-C-002	651	14	9114	0	0	0%	N/A	0	0	0	0	L
71-C-003	3269	16	52302	40	640	1%	35	14	49	2	0	M
71-C-004	3403	16	54453	540	8640	16%	0	7	7	4	0	M
71-C-004-01	129	16	2063	0	0	0%	N/A	0	0	0	0	L
71-C-004-02	6903	16	110447	95	1520	1%	4	5	9	1	0	M
71-C-004-02-01	1952	16	31225	0	0	0%	N/A	0	0	0	0	M
71-C-004-02-02	1591	14	22278	0	0	0%	N/A	0	0	0	0	M
71-C-004-02-03	1954	16	31267	0	0	0%	N/A	0	0	0	0	M
71-C-004-02-03	868	15	13022	0	0	0%	N/A	0	0	0	0	L
71-N	15270	16	244322	300	4800	2%	1	3	4	4	0	M
71-N-001	1654	16	26463	0	0	0%	N/A	0	0	0	0	M
71-N-002	2409	16	38541	0	0	0%	N/A	0	0	0	0	M
71-N-002-02	561	14	7849	0	0	0%	N/A	0	0	0	0	M
71-N-002-04	2122	14	29714	0	0	0%	N/A	0	0	0	0	L
71-N-002-04-01	695	14	9724	0	0	0%	N/A	0	0	0	0	L
71-N-003	2116	16	33864	50	800	2%	2	1	3	3	0	M
71-N-003-01	221	14	3101	0	0	0%	N/A	0	0	0	0	L
71-N-003-03	582	14	8154	0	0	0%	N/A	0	0	0	0	L
71-N-005	1489	16	23830	0	0	0%	N/A	0	0	0	0	M
71-S	14437	16	230994	0	0	0%	N/A	0	0	0	0	L/M
71-S-001	366	16	5860	0	0	0%	N/A	0	0	0	0	L
71-S-002	2391	16	38252	0	0	0%	N/A	0	0	0	0	M
71-S-003	4740	16	75847	0	0	0%	N/A	0	0	0	0	M
71-S-003-02	569	14	7964	0	0	0%	N/A	0	0	0	0	L
71-S-012	1666	14	23328	0	0	0%	N/A	0	0	0	0	L
71-S-013	411	14	5753	0	0	0%	N/A	0	0	0	0	L
71-S-014	512	14	7173	0	0	0%	N/A	0	0	0	0	L
71-U	1389	14	19443	0	0	0%	N/A	0	0	0	0	L
71-U-002	671	14	9398	0	0	0%	N/A	0	0	0	0	L

High Treatment Immediacy Road Sites in the Noyo WAU with at least Moderate Sediment Delivery Potential and their Associated Controllable Erosion Amounts (September, 2000)

Road Number	Site ID*	Controllable Volume (yd^3)	Delivery Potential	Treatment Immediacy
70-C-054	r7	2720	high	high
70-R	r4	740	high	high
70-W-043	c6	700	high	high
70-P-004	l2	645	high	high
70-G-013	x8	600	high	high
70-L-034	r1	545	high	high
70-K-021	r1	500	high	high
70-P	r7	500	high	high
70-G-013	x5	460	high	high
70-H-002	l2	444	high	high
70-G-002	r4	361	high	high
70-E-004	l2	330	high	high
70-E-002-01	x4	280	high	high
70-G-013	x4	280	high	high
70-N-001	x13	230	high	high
70-H-024	c2	222	high	high
70-G-002-02	x4	220	high	high
70-H	c11	210	high	high
70-C	r26	200	high	high
70-C	c18	150	high	high
70-G-002	c5	148	high	high
70-G-002-02	c6	120	high	high
70-P-008	c4	118	high	high
70-G-002-02	x13	98	high	high
70-B-033	r7	90	high	high
70-B-033	r8	85	high	high
70-H	c10	56	high	high
70-C	x26	50	high	high
70-P-022	c3	45	high	high
70-PR01	c17	44	high	high
70-L	r14	40	high	high
70-L	e5	39	high	high
70-P-008	e6	30	high	high
70-M	x6	20	high	high
70-J	11	15	high	high
70-P-008	e5	15	high	high
70-C-045	c5	12	high	high
71-N	x1	n/a	high	high
70-P	r8	100	moderate	high
70-N-042	r27	50	moderate	high
70-P-022	c8	20	moderate	high
70-M-022	r7	0	moderate	high
70-M-023	r2	n/a	moderate	high

* Site ID: r = road slide , c = culvert, l = landing, x = crossing other than culvert, e = erosion site

Moderate Treatment Immediacy Road Sites in the Noyo WAU with Moderate Sediment Delivery Potential and their Associated Controllable Erosion Amounts (September, 2000)

Road Number	Site ID*	Controllable Volume (yd^3)	Delivery Potential	Treatment Immediacy
70-B-033	r11	500	high	moderate
70-D	l9	440	high	moderate
70-B-012-01	r1	400	high	moderate
70-C-054-01-02	r1	310	high	moderate
70-G-002-02	r9	300	high	moderate
70-G-002-02	x15	240	high	moderate
70-C	r27	220	high	moderate
70-J-022	l4	200	high	moderate
70-P-002-02	x4	160	high	moderate
70-R-026-04	r5	160	high	moderate
70-P-002-02	x5	120	high	moderate
70-V-004	e8	110	high	moderate
71-N-003	c2	110	high	moderate
70-B-033	l9	100	high	moderate
70-G-012	x3	100	high	moderate
71-N-003	c3	90	high	moderate
70-G-002-02	r5	80	high	moderate
70-W-001	l7	70	high	moderate
70-G-002-02	r7	60	high	moderate
70-H-002	r7	50	high	moderate
70-I	r11	50	high	moderate
70-W-041	e10	50	high	moderate
70-B-031-02	l1	40	high	moderate
70-N-001	x15	40	high	moderate
70-L	x20	33	high	moderate
70-R-065	c8	31	high	moderate
70-C-032	e1	30	high	moderate
70-M-022	r6	30	high	moderate
70-B-031-02	l2	25	high	moderate
70-E-002-02	c2	25	high	moderate
70-G-002	e1	20	high	moderate
70-H-024	c7	20	high	moderate
70-V-004	x1	20	high	moderate
70-H-002	x3	18	high	moderate
70-R-043	r4	18	high	moderate
70-V	c29	18	high	moderate
70-M-025	x4	15	high	moderate
70-L	x18	9	high	moderate
70-PR01	c4	8	high	moderate
70-P-006	l7	1850	moderate	moderate
70-B-012-02	l3	600	moderate	moderate
70-R-062	c3	333	moderate	moderate
70-M	r14	300	moderate	moderate
70-R	c43	200	moderate	moderate
70-G-023-02	r7	167	moderate	moderate
70-S-004	c9	163	moderate	moderate
70-W-043	l3	150	moderate	moderate
70-G-023-02	r9	133	moderate	moderate
70-S-004	c8	133	moderate	moderate
70-C-054-01	l2	130	moderate	moderate
70-B-012	r3	100	moderate	moderate
70-B-012-01-01	r2	100	moderate	moderate
70-G-023	l7	89	moderate	moderate
70-G-023	r9	75	moderate	moderate
70-P	c14	75	moderate	moderate
70-H-024	c3	70	moderate	moderate
70-G-002-02	r11	60	moderate	moderate
70-I	e12	60	moderate	moderate
70-P	r9	60	moderate	moderate
70-B-012-01	r2	50	moderate	moderate
70-P-022	r5	50	moderate	moderate
70-W	c14	49	moderate	moderate
70-B-033-01	l3	45	moderate	moderate
70-G-023	c1	40	moderate	moderate
70-R	c47	35	moderate	moderate
70-L	l7	30	moderate	moderate

Moderate Treatment Immediacy Road Sites in the Noyo WAU with Moderate Sediment Delivery Potential and their Associated Controllable Erosion Amounts (September, 2000)

Road Number	Site ID*	Controllable Volume (yd^3)	Delivery Potential	Treatment Immediacy
71-C-004-02	r3	30	moderate	moderate
70-M-025	c3	27	moderate	moderate
70-R-026-04	x4	25	moderate	moderate
70-S-004	c15	24	moderate	moderate
70-B-033	e14	20	moderate	moderate
70-C-045	x2	20	moderate	moderate
70-G-002-02	x11	20	moderate	moderate
70-I	c15	20	moderate	moderate
70-P-008	r3	20	moderate	moderate
70-A	r7	15	moderate	moderate
70-B-033	x5	15	moderate	moderate
70-N-024	x1	12	moderate	moderate
70-B-031	e3	10	moderate	moderate
70-G-002-02	l6	10	moderate	moderate
70-I-004	x4	10	moderate	moderate
70-N-024	x2	10	moderate	moderate
70-P-008	e1	10	moderate	moderate
70-L	e17	8	moderate	moderate
70-M-013	x1	8	moderate	moderate
70-H	e17	7	moderate	moderate
70-PR01	c15	7	moderate	moderate
70-B-033	x12	6	moderate	moderate
70-H-002	r6	5	moderate	moderate
70-I	e3	5	moderate	moderate
70-R-044	l2	5	moderate	moderate
70-B-033	r10	0	moderate	moderate
70-H-024	r8	0	moderate	moderate
70-P-022	l6	0	moderate	moderate
70-V-026	r1	20	low	moderate
70-W-041	c8	16	low	moderate
70-H	c5	7	low	moderate
70-R	c57	4	low	moderate
70-H	c4	2	low	moderate
70-B-012-01	r4	0	low	moderate
70-B-031	r8	0	low	moderate
70-B-031	x7	0	low	moderate
70-B-031-04	x2	0	low	moderate
70-C	r20	0	low	moderate
70-C-052	l1	0	low	moderate
70-E	c5	0	low	moderate
70-E	c6	0	low	moderate
70-E	r2	0	low	moderate
70-E-027	r4	0	low	moderate
70-G-002-02	r3	0	low	moderate
70-H-024-02	r13	0	low	moderate
70-N-042-05	l10	0	low	moderate
70-P-022	l10	0	low	moderate
70-PR01	c10	0	low	moderate
70-PR01	c14	0	low	moderate
70-PR01	c9	0	low	moderate
70-PR01	x5	0	low	moderate
70-PR02	c26	0	low	moderate
70-R	c78	0	low	moderate
70-R	c80	0	low	moderate
70-R-013	r3	0	low	moderate
70-R-024	l1	0	low	moderate
70-R-026	r5	0	low	moderate

* Site ID: r = road slide , c = culvert, l = landing, x = crossing other than culvert, e = erosion site

Water Diversion Potential Sites from Roads
in the Noyo WAU (September, 2000)

Road Number	Site #	Diversion Potential
70-A	x2	yes, road
70-A	c3	yes, road
70-B-012	c4	yes, road
70-B-012-01	c6	yes, road
70-B-012-01-02	c2	yes, road
70-B-012-02	c4	yes, road
70-B-012-02	c6	yes, ditch
70-C	c16	yes, road
70-C	c18	yes, road
70-C	c2	yes, road
70-C	c23	yes, road
70-C	c29	yes, road
70-C-042	c2	yes, road
70-C-042	c3	yes, road
70-D	c1	yes, road
70-E	c21	yes, road
70-E	c22	yes, road
70-E	c24	yes, road
70-E-027	c3	yes, road
70-F	c5	yes, road
70-G	c4	yes, road
70-G	c6	yes, road
70-G-002-02	x13	yes, road
70-G-023	c1	yes, road
70-G-023	c3	yes, road
70-G-023	c5	yes, road
70-G-023-02	c4	yes, road
70-H	c1	yes, road
70-H	c10	yes, road
70-H	c11	yes, road
70-H	c12	yes, road
70-H	c15	yes, road
70-H	c18	yes, ditch
70-H	c19	yes, ditch
70-H	c2	yes, road
70-H	c21	yes, ditch
70-H	c23	yes, road
70-H	c24	yes, road
70-H	c4	yes, road
70-H	c5	yes, road
70-H	c6	yes, road
70-H	c8	yes, road
70-H	c9	yes, road
70-H-011	c1	yes, road
70-H-024	c5	yes, road
70-H-024	c6	yes, road
70-H-024-02	c12	yes, road
70-H-024-02	c17	yes, road
70-H-024-02	c2	yes, road
70-H-024-02	c3	yes, road
70-H-024-02	c6	yes, road
70-H-024-02	c7	yes, road
70-H-024-02	c8	yes, road
70-I-004	x4	yes, road
70-J	c4	yes, road
70-J	c7	yes, road
70-J-024	x9	yes, road
70-J-024	c4	yes, road
70-K	c7	yes, road
70-K-021	c2	yes, road
70-M	c15	yes, road
70-M	c17	yes, road
70-M	c20	yes, road
70-M	c3	yes, road
70-M	c4	yes, road
70-N	c1	yes, road
70-N	c10	yes, road
70-N	c2	yes, road
70-N	c24	yes, road
70-N	c3	yes, road
70-N	c31	yes, road
70-N	c5	yes, road
70-N-022	c2	yes, road
70-N-022	c5	yes, road
70-N-024	c8	yes, road
70-N-032	c5	yes, road
70-N-042	c10	yes, road
70-N-042	c16	yes, road
70-N-042	c2	yes, road

Water Diversion Potential Sites from Roads
in the Noyo WAU (September, 2000) (Continued)

Road Number	Site #	Diversion Potential
70-N-042	c23	yes, road
70-N-042	c25	yes, road
70-N-042	c5	yes, ditch
70-N-042-01	c1	yes, road
70-O	c1	yes, road
70-O	c2	yes, road
70-P	c10	yes, road
70-P	c15	yes, road
70-P-008	c2	yes, road
70-P-022	c3	yes, ditch
70-P-022	c4	yes, road
70-PR01	c4	yes, ditch
70-R	c15	yes, road
70-R	c16	yes, road
70-R	c17	yes, road
70-R	c18	yes, road
70-R	c20	yes, road
70-R	c21	yes, road
70-R	c22	yes, road
70-R	c24	yes, road
70-R	c33	yes, road
70-R	c34	yes, road
70-R	c35	yes, road
70-R	c36	yes, road
70-R	c39	yes, road
70-R	c43	yes, road
70-R	c44	yes, road
70-R	c47	yes, road
70-R	c49	yes, road
70-R	c5	yes, road
70-R	c50	yes, road
70-R	c53	yes, ditch
70-R	c59	yes, ditch
70-R	c60	yes, ditch
70-R	c64	yes, ditch
70-R	c65	yes, ditch
70-R	c8	yes, road
70-R	c81	yes, road
70-R-013	c1	yes, road
70-R-062	c1	yes, road
70-R-101	c2	yes, road
70-R-101	c4	yes, road
70-R-101	c5	yes, road
70-R-114	c62	yes, ditch
70-S	c1	yes, road
70-S-004	c15	yes, road
70-S-004	c16	yes, road
70-V	c11	yes, road
70-V	c13	yes, road
70-V	c14	yes, road
70-V	c15	yes, road
70-V	c4	yes, road
70-V	c8	yes, road
70-V	c9	yes, road
70-V-004	c3	yes, road
70-V-024	c16	yes, ditch
70-W	c14	yes, road
70-W	c22	yes, road
70-W	c27	yes, road
70-W	c29	yes, road
70-W	c3	yes, road
70-W	c31	yes, road
70-W	c5	yes, road
70-W	c8	yes, road
70-W-032	c20	yes, road
70-W-041	c8	yes, road
71-C	c1	yes, ditch
71-C	c2	yes, ditch
71-C	c3	yes, ditch
71-C	c4	yes, ditch
71-C	c5	yes, ditch
71-C	c6	yes, road
71-C-004	c1	yes, ditch
71-C-004	c2	yes, ditch
71-C-004	c3	yes, road
71-C-004	c4	yes, road
71-N	c1	yes, ditch
71-N	c2	yes, ditch