

# **DRAFT 2008 SOIL CONSERVATION STANDARD & GUIDELINES**

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These documents replace the 1991 Soil Conservation Guidelines/Standards. The Draft 2008 Soil Standard and Guidelines were developed over a two-year period by the Cooperating Agency Review Committee.

The Committee consisted of representatives from the following agencies: Off-Highway Motor Vehicle Recreation Division, Department of Conservation/Department of Forestry and Fire Protection, Bureau of Land Management, U.S. Forest Service, U.S. Natural Resources Conservation Service, and the U.S. Geological Survey. Through public workshops, input was also obtained from representatives of other governmental organizations, OHV recreation groups, OHV industry consultants, and environmental communities.

We thank all of the individuals for their efforts.

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## 1.0 Draft 2008 Soil Conservation Standard

In October 2004, Assembly Bill 2666 (Maldonado) was enacted, requiring the California State Parks (CSP), Off-Highway Motor Vehicle Recreation (OHMVR) Division to:

“...update the 1991 Soil Conservation Guidelines and Standards to establish a generic and measurable soil conservation standard by March 1, 2006, at least sufficient to allow restoration of off-highway motor vehicle areas and trails.” (Public Resources Code, Section 5090.35 (b)).

The Standard and supporting Guidelines are intended to ensure appropriate resource management and maintenance in areas of off-highway vehicle (OHV) use. They specifically apply to: (1) California’s State Vehicular Recreation Areas (SVRAs); and, (2) all projects involving a ground disturbing activity that receive funding from the California OHV Grants and Cooperative Agreements Program.

### 1.1 2008 Soil Conservation Standard

The 1991 document, entitled Soil Conservation Guidelines/Standards for Off-Highway Vehicle Recreation Management (California Department of Parks and Recreation, 1991), provided guidelines to achieve the following 1991 Standard:

Off-highway motor vehicle areas and trails will be maintained in a condition that will allow for feasible rehabilitation by natural resource managers.

The updated 2008 Soil Conservation Guidelines for Off-Highway Vehicle Recreation Management (2008 Guidelines) have been prepared to support the following Soil Conservation Standard (2008 Standard):

Off-highway vehicle (OHV) recreation facilities shall be managed for sustainable long-term prescribed use without generating soil loss that exceeds restorability, and without causing erosion or sedimentation which significantly affects resource values beyond the facilities. Management of OHV facilities shall occur in accordance with Public Resources Code, Sections 5090.2, 5090.35, and 5090.53.

Presented below are: statutes and regulations that apply to the 2008 Standard; minimum requirements applicable to the 2008 Standard; and definitions of terms in the 2008 Standard. These are followed by the 2008 Guidelines. The 2008 Guidelines provide tools and techniques that may be used to meet the 2008 Standard. Other tools and techniques that are more applicable to specific facility conditions and organizational protocols may be used as appropriate to comply with the 2008 Standard.

### 1.2 Applicable Statutes and Regulations

Section 5090.02 (c) of the Public Resources Code (PRC) states the California Legislature’s intent with regard to soil conservation:

86 5090.02 (c)(1) Existing off-highway motor vehicle recreational areas, facilities, and  
87 opportunities should be expanded and managed in a manner consistent with this  
88 chapter, in particular to maintain sustained long-term use.

89  
90 5090.02 (c)(2) New off-highway motor vehicle recreational areas, facilities, and  
91 opportunities should be provided and managed pursuant to this chapter in a manner  
92 that will sustain long-term use.

93  
94 5090.02 (c)(4) When areas or trails or portions thereof cannot be maintained to  
95 appropriate established standards for sustained long-term use, they should be closed  
96 to use and repaired, to prevent accelerated erosion. Those areas should remain  
97 closed until they can be managed within the soil loss standard or should be closed and  
98 restored.

99

100 Implementation practices to meet the Soil Conservation Standard within SVRAs are in  
101 Section 5090.35 of the PRC, as presented below:

102

103 5090.35 (a) The protection of public safety, the appropriate utilization of lands, and the  
104 conservation of land resources are of the highest priority in the management of the  
105 SVRAs; and, accordingly, the Division shall promptly repair and continuously maintain  
106 areas and trails, anticipate and prevent accelerated and unnatural erosion, and restore  
107 lands damaged by erosion to the extent possible.

108

109 5090.35 (b)(2) Upon a determination that the soil conservation standards and habitat  
110 protection plans are not being met in any portion of any SVRA the Division shall  
111 temporarily close the noncompliant portion to repair and prevent accelerated erosion,  
112 until the soil conservation standards are met.

113

114 5090.35 (b)(3) Upon a determination that the soil conservation standards cannot be  
115 met in any portion of any SVRA the Division shall close and restore the noncompliant  
116 portion pursuant to Section 5090.11.

117

118 5090.35 (d) The Division shall monitor the condition of soils and wildlife habitat in each  
119 SVRA each year in order to determine whether the soil conservation standards and  
120 habitat protection programs are being met.

121

122 5090.35 (e) The Division shall not fund trail construction unless the trail is capable of  
123 complying with the conservation specifications prescribed in subdivisions (b) and (c).  
124 The Division shall not fund trail construction where conservation is not feasible.

125

126 Similarly, Section 5090.53 of the PRC states that no funds may be granted or expended  
127 under the Grants Program unless all of the following conditions are met:

128

129 5090.53(a) If the project involves a ground disturbing activity, the recipient has  
130 completed wildlife habitat and soil surveys and has prepared a wildlife habitat  
131 protection program to sustain a viable species composition for the project area.

132

133 5090.53(b) If the project involves a ground disturbing activity, the recipient agrees to  
134 monitor the condition of soils and wildlife in the project area each year in order to  
135 determine whether the soil conservation standards adopted pursuant to 5090.35 and  
136 the wildlife habitat protection program prepared pursuant to subdivision (a) are being  
137 met.  
138

139 5090.53(c) If the project involves a ground disturbing activity, the recipient agrees that,  
140 whenever the soil conservation standards adopted pursuant to 5090.35 are not being  
141 met in any portion of a project area, the recipient shall close temporarily that  
142 noncompliant portion, to repair and prevent accelerated erosion, until the same soil  
143 conservation standards adopted pursuant to Section 5090.35 are met.  
144

### 145 **1.3 Minimum Requirements Applicable to the 2008 Standard**

146

147 Projects funded by the OHV Trust Fund (PRC Section 5090.06) must be managed in  
148 accordance with the 2008 Standard. Assessment, maintenance and monitoring activities  
149 are necessary for any OHV project to ensure that an OHV facility is managed for its  
150 sustainable prescribed use, without generating soil loss that exceeds restorability, and  
151 without causing erosion or sedimentation which significantly affects resource values  
152 beyond the facilities. New projects must also incorporate design and construction  
153 elements. Documentation of the elements listed below is necessary to verify adherence to  
154 the 2008 Standard.  
155

#### 156 1.3.1 Assessment, Maintenance, and Monitoring

157

158 All OHV projects must have:

- 159 • A Protocol for Assessment and Maintenance which considers:
    - 160 ○ Water, Wind, and Mechanical Erosion
    - 161 ○ Water and Sediment Control
    - 162 ○ Tread Condition
    - 163 ○ Off-site impacts
    - 164 ○ Watercourse Crossings
  
  - 166 • A Protocol for Monitoring Change Detection of Features, Trails, and Facilities which  
167 describes:
    - 168 ○ Objectives
    - 169 ○ Monitoring parameters
    - 170 ○ Monitoring site selection
    - 171 ○ Monitoring schedule
    - 172 ○ Data collection, including Quality Assurance/Quality Control measures
    - 173 ○ Data management
    - 174 ○ Data management
- 175

176 And incorporates one or more of the following:

- 177 ○ Photography (ground based and/or aerial)
  - 178 ○ Field Control Plots
- 179

- 180           ○ Transects
- 181           ○ Sampling Points
- 182
- 183       • A Compliance Report which includes:
- 184
- 185           ○ Historical conditions
- 186           ○ Change analysis
- 187           ○ Findings
- 188           ○ Conclusions
- 189           ○ A Compliance Action Plan that describes:
  - 190               ▪ Activities to be Implemented
  - 191               ▪ Schedule of Activities
- 192

### 193 1.3.2 Design and Construction

194

195 A new OHV project shall be designed and constructed for the sustainable prescribed use  
196 of the project and associated facility, without generating soil loss that exceeds restorability,  
197 and without causing erosion or sedimentation which significantly affects resource values  
198 beyond the facility. Accordingly, the development of a new OHV project shall incorporate  
199 the following elements, as applicable:

- 200
- 201       • A Project Description that includes:
  - 202           ○ The Purpose of the proposed project
  - 203           ○ Documentation of the proposed project design, such as grading and/or  
204           construction plans
  - 205           ○ Proposed construction methods, including equipment and materials, and  
206           expected as-built documentation
- 207
- 208       • A Review of the potential effects of the project on:
  - 209           ○ Local hydrology, including watercourse crossings, hillslope erosion, and  
210           adjacent landscapes
  - 211           ○ Adjacent infrastructure, such as intersecting roads and staging areas
- 212

213 1.3.3 Definitions of Terms in the 2008 Standard \*

214

215 Erosion: The wearing away of rock or soil by the detachment of soil or rock fragments by water,  
216 wind, ice, and other mechanical or chemical forces (CARC<sup>1</sup> 2006).

217

218 Facility: An OHV trail, track, road, corridor, SVRA, open-ride area, staging area, parking area  
219 (excluding structures) (CARC 2006).

220 Long-Term: At a minimum, 25 years.

221 Management: The coordinated implementation of budgeting, staffing, scheduling, design,  
222 construction, maintenance, monitoring and restoration activities at an OHV facility, as needed,  
223 combined with the effective utilization and coordination of resources, such as capital, labor,  
224 materials, and natural landscape, to achieve the soil conservation standard, and to ensure  
225 effective and efficient use of OHV recreational opportunities while protecting natural and cultural  
226 resources (CARC 2006 definition).

227 Off-Highway Vehicle: An off highway motor vehicle as specified in CVC Section 38006 and street  
228 licensed motor vehicles while being used off-highway.

229 Prescribed Use: The type of OHV activity at the facility, as established by the managing entity  
230 (CARC 2006).

231 Restoration: means, upon closure of the unit or any portion thereof, the restoration of land to the  
232 contours, the plant communities, and the plant covers comparable to those on surrounding lands  
233 or at least those that existed prior to off-highway motor vehicle use (PRC Sec. 5090.11).

234 Sedimentation: The process by which soils, debris and other materials are deposited, either on  
235 land or in water (CARC 2006).

236 Significant: Having a substantial or potentially substantial effect (CARC 2006).

237

238 Soil: All unconsolidated materials above bedrock; the unconsolidated mineral or organic material  
239 on the immediate surface of the earth that serves as a natural medium for the growth of land  
240 plants; the unconsolidated mineral or organic matter on the surface of the earth that has been  
241 subjected to and shows effects of genetic and environmental factors of climate (including water  
242 and temperature effects), and macro- and microorganisms, conditioned by relief, acting upon  
243 parent material over time. Soil differs from the material from which it is derived in many physical,  
244 chemical, biological and morphological properties and characteristics (AGI, Glossary of Geology,  
245 1997).

246

247 Soil Loss: Movement of soil material to a location where the soil cannot be reasonably retrieved  
248 and/or recycled (CARC 2006).

249 Sustainable: The facility is managed to meet the soil conservation standard for a minimum service  
250 life of 25 years as defined by CCR 4970 (CARC 2006).

251 \* See Appendix 1 of the 2008 Soil Conservation Guidelines for additional OHV-related definitions.

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<sup>1</sup> Cooperating Agency Review Committee

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253

## 2.0 Draft 2008 Soil Conservation Guidelines

254

The following Soil Conservation Guidelines (2008 Guidelines) provide resource management guidance for implementing the 2008 Soil Conservation Standard (2008 Standard) within California's State Vehicular Recreation Areas (SVRAs) and for projects on government lands that receive funds from the Off-Highway Vehicle (OHV) Trust Fund. The OHV activity includes all types of motor vehicles, including four-wheel drive (4WD), off-road motorcycles (MCs), all-terrain vehicles (ATVs), dune buggies, and snowmobiles. As mandated by state law, the 2008 Guidelines were developed with input from representatives from the California State Parks (CSP) Off-Highway Motor Vehicle Recreation (OHVMR) Division, Department of Conservation (DOC)/Department of Forestry and Fire Protection (CDF), Bureau of Land Management (BLM), U.S. Forest Service (USFS), U.S. Natural Resources Conservation Service (NRCS), and the U.S. Geological Survey (USGS). Through a series of public workshops, input was also obtained from representatives of approximately 30 other governmental organizations, OHV recreation groups, OHV industry consultants, and environmental communities.

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### 2.1 Application of the 2008 Soil Conservation Guidelines

270

271

California's wide range of climate and vegetation, as well as its complex geologic and topographic landscape provides a variety of soil types with a broad range of associated engineering properties, which can make erosion control challenging. The 2008 Guidelines are broadly written to provide flexibility to allow their application to all OHV sites statewide. Because the 2008 Guidelines serve as resource management guidance for OHV use on prescribed trails and roads, multiple-use roads, and in open ride areas, it is the responsibility of the land manager to determine the recreational activity causing any specific resource damage and initiate the appropriate action. Recipients of funding from the California OHV Grants and Cooperative Agreements Program and SVRA managers, may use or modify the example guidance, or may create their own reporting forms as appropriate for their facility and/or organizational needs, as long as the various components of the guidelines are addressed in achieving the Minimum Requirements Applicable to the 2008 Standard (see Section 1.3).

285

286

### 2.2 Other Applicable Laws and Regulations

287

The 2008 Guidelines are to be used in conjunction with provisions of PRC 5090 et seq. and CCR 4970 et seq. for OHV use. However, it is the land managers' responsibility to recognize other local, state and federal laws and regulations that are applicable to the assessment and management of OHV areas, especially where unique environmental conditions exist. Examples include, but are not limited to: the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA); the Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA) and the California Porter-Cologne Act; the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA); the Federal and State Clean Air Acts; statewide Airborne Toxic Control Measure (ATCM) regulation covering naturally occurring asbestos; federal, state, and local laws/ordinances that address erosion control and rider safety issues associated with mined land sites and other hazardous excavations within

299

300 public lands used for OHV activities; the Resource Conservation and Recovery Act  
 301 (RCRA), the Surface Mining Control and Reclamation Act (SMCRA), and the California  
 302 Surface Mining and Reclamation Act (SMARA); the National Forest Management Act; and  
 303 the Antiquities Act, the National Historic Preservation Act, the Archaeological Resources  
 304 Protection Act, the Native American Graves Protection Act, and the American Indian  
 305 Religious Freedom Act.

306  
 307 **2.3 Assessment**  
 308  
 309 An OHV soil conservation-related project (OHV project) could range from the installation of  
 310 a properly designed watercourse crossing, to the decommissioning of a trail network which  
 311 discharges excessive sediment to a watercourse, to the complete design, grading, and  
 312 construction of a new OHV facility. Current regulations require that an OHV facility be  
 313 planned, designed, constructed, and maintained with consideration for the ultimate long-  
 314 term sustainable use of the land. This includes the possibility that there may be a change  
 315 in land use. Proper assessment of area conditions prior to OHV project design affords the  
 316 opportunity to design the project with sensitivity toward the long-term sustainability of OHV  
 317 facility land. The following should be considered when area conditions are assessed for  
 318 an OHV project.

319  
 320 2.3.1 General Information  
 321

- 322 • Scale and scope of the proposed OHV project. This will determine the necessary  
 323 data needed to complete the project.
- 324 • Information regarding where the OHV facility is located and where the OHV project  
 325 is proposed, including:  
 326  
 327
  - 328 ○ The OHV facility name.
  - 329 ○ The landowner and OHV facility manager.
  - 330 ○ Boundaries and total acreage of the OHV facility.
  - 331 ○ The county or counties in which the project is proposed.
  - 332 ○ Applicable land use and zoning regulations.
- 333 • Paper and/or GIS maps, aerial photographs and other imagery to convey location  
 334 and physical setting of the OHV facility and proposed OHV project.  
 335  
 336
  - 337 ○ A regional scale map to show OHV facility and project locations.
  - 338 ○ Topographic maps of the project. The maps should contain equivalent  
 339 information to that on a standard United States Geological Survey (USGS)  
 340 topographic map. Specifically, the maps should:
    - 341 ▪ Show the detail necessary to illustrate the project.
    - 342 ▪ Depict slopes above and below the project.
    - 343 ▪ Show watercourses and other special features within and/or adjacent  
 344 to the project.
    - 345 ▪ Depict the OHV road and trail network, including unofficial “volunteer”  
 346 trails.

- 347                   ▪ Show facility infrastructure such as parking and staging areas,
- 348                   camping areas, toilets, information kiosks, etc.
- 349                   ▪ Have a scale of 1:24,000 (1" = 2,000') or larger. If the map is
- 350                   represented digitally, the base layer should be of a resolution that is
- 351                   the equivalent of or better than a United States Geological Survey
- 352                   (USGS) 7.5 minute topographic map.
- 353                   ▪ Have a topographic contour line interval of 80 feet or less.
- 354                   ▪ Show county lines and other jurisdictional boundaries.
- 355
- 356                   • Recreational inventory and history of land use. Include a brief description of past,
- 357                   existing and proposed recreational activities at the facility and how the project
- 358                   reflects the OHV area management goals.
- 359

### 360 2.3.2 Previous Land Use and Hazard Considerations

361 Maps and other data regarding of previous land use within and adjacent to an OHV

362 facility's boundaries, such as mining operations, military operations, and agricultural

363 activities, provide important historical record that should be available for reference. This

364 information may be important to an OHV project, particularly if the project requires soils to

365 be disturbed. Identifying natural hazards such as potentially hazardous minerals (e.g.,

366 arsenic, asbestos, mercury), as well as landslides and active faults, is an important

367 preliminary step to take when assessment activities for an OHV project are initiated.

368

369 Many former land uses and geologically hazardous conditions pose health and safety

370 concerns. It is recommended that when evaluating lands with potential hazard- and

371 health-related concerns, the OHV manager retain the assistance of a specialist trained,

372 and as appropriate, licensed, to assess the applicable standards. Examples include

373 specialists in abandoned mine land assessment, hazardous minerals assessment,

374 industrial hygiene, and unexploded ordinance on formerly used defense sites. Personnel

375 should not conduct field evaluations of such lands unless appropriately trained and/or

376 accompanied by trained personnel familiar with the potential hazards at these types of

377 facilities. Depending on concerns, evaluations regarding previous land use and hazard

378 considerations should:

379

- 380
- 381                   • Identify former mine sites located within and near an OHV facility, including the
- 382                   excavations, abandoned equipment, and tailings from the mine operations that may
- 383                   present physical or exposure hazards to OHV recreationists. Mine tailings may
- 384                   also present special erosion control considerations and/or environmental hazards to
- 385                   a watershed.
- 386                   • Utilize services from a qualified, and as applicable, licensed, geologist or
- 387                   engineering geologist, to assist in identifying and assessing potentially hazardous
- 388                   features, such as landslides and active faults. When possible, such features are
- 389                   best avoided. If such sites cannot be avoided, then special considerations may be
- 390                   necessary to comply with applicable state and federal laws.
- 391                   • Utilize services from an appropriately trained and, as applicable, licensed
- 392                   professional to identify and address potentially hazardous minerals, such as
- 393                   asbestos and mercury. If such areas cannot be avoided, then special
- 394                   considerations may be necessary to comply with applicable state and federal laws.

- 395 • Identify any industrial operations that used hazardous materials that may remain on  
396 the land or in the groundwater.
- 397 • Identify areas where military operations were conducted that may contain  
398 hazardous materials and unexploded ordnance.
- 399 • Identify past animal grazing and agricultural uses, where excessive, that may  
400 hinder vegetation from becoming established.
- 401 • Document the locations of the above features on a map. Include records of what  
402 the land use was, when it occurred, where it occurred, what human and/or  
403 environmental hazards may have been created, to what extent remediation was  
404 undertaken.
- 405 • Indicate whether the previous land use presents a current hazard or concern to  
406 OHV facility operations and erosion control.
- 407 • Provide the safety rationale and record for limiting access in certain areas of the  
408 OHV facility.

### 409 2.3.3 OHV Area Visitor Information

410 OHV area facility managers should know basic information about the visitors who frequent  
411 their OHV areas. This information is important to discern if a facility and its design are  
412 meeting the needs of the recreationists. If the facility is designed for the recreationists  
413 with intermediate skills but frequented by expert riders and drivers, volunteer trails may be  
414 created by visitors looking for more challenging routes. Conversely, beginning riders may  
415 jeopardize their safety when recreating within a facility designed predominantly for more  
416 skilled riders. To determine skill levels and other demographic data from the people who  
417 visit OHV areas, visitor information may be obtained in accordance with applicable state  
418 and federal agency policies and procedures. Regardless if whether survey data are  
419 available, the following demographic questions should be considered before proposing  
420 and implementing an OHV project at an OHV facility:

- 421 • What type(s) of vehicles access the area of the project?
- 422 • What is the designated skill level(s) of the trails and/or roads where the project is  
423 proposed?
- 424 • Are there other activities in the area of the project and should the design of the  
425 project consider these activities?
- 426 • What is the percentage breakdown of skill levels—beginner, intermediate,  
427 advanced—of the current visitors to the OHV facility, and how does that compare to  
428 the percentages of corresponding skill-rated trails, roads, and areas at the facility?
- 429 • With regard to staging areas, campgrounds, and parking, what are the percentage  
430 of day users at the OHV facility and the corresponding percentage of visitors who  
431 stay overnight?
- 432 • What are the desired future OHV opportunities at the facility?

### 433 2.3.4 Physiographic Data

434 An effective soil conservation-related OHV project maximizes soil retention, minimizes soil  
435 erosion, and needs minimal maintenance year-round, ensuring longevity. Depending on  
436 the scale of the project, a more detailed review of the physical setting of the OHV facility  
437 and the project site may be necessary. Topography, climate, geology and soils,

442 vegetation, hydrology, air quality and wildlife should be considered in the design of an  
443 OHV project to ensure its longevity and effectiveness.

444  
445 • Topography

- 446 ○ OHV projects should be designed to blend with the surrounding landscape.
- 447 ○ An analysis of topography can reveal landforms, such as landslides, which
- 448 ○ may impact a project's design and construction.
- 449 ○ A topographic map should be used to illustrate the location of the project,
- 450 ○ slope steepness, slope orientation. Topographic features such as ridgelines,
- 451 ○ which define watershed boundaries, should be discernable.
- 452

453  
454 • Climate

- 455 ○ Seasonal weather extremes and seasonal operation of the OHV facility
- 456 ○ should be considered when planning an OHV project.
- 457 ○ Precipitation can saturate hillsides, causing soil and slope instability by
- 458 ○ adding weight and reducing the cohesion of earthen materials.
- 459 ○ Rapid snowmelt can overwhelm drainages and hillsides with runoff.
- 460 ○ Lack of precipitation can create dust problems and prevent the
- 461 ○ establishment of vegetation
- 462 ○ Lack of soil moisture can affect timing and techniques available for
- 463 ○ maintenance.
- 464 ○ General and location-specific climatic data, including precipitation data
- 465 ○ necessary for erosion potential assessment and calculations (see Section
- 466 ○ 2.3.6), is available from a variety of sources, including the National Oceanic
- 467 ○ and Atmospheric Administration (NOAA), and the California Department of
- 468 ○ Water Resources (DWR).
- 469

470  
471 • Geology and Soils

- 472 ○ Assessment of geology is important when planning an OHV project as the
- 473 ○ type, distribution, and physical characteristics of the rock beneath an area
- 474 ○ may dictate the location and design of the project.
- 475 ○ Assessment of geology includes a description of the rock type and its
- 476 ○ orientation to determine the relative stability of the rock type on a hillside.
- 477 ○ Geologic references, such as geologic, landslide, and mineral hazard maps,
- 478 ○ are available from the California Geological Survey (CGS) and the United
- 479 ○ States Geological Survey (USGS).
- 480 ○ Equally important is the assessment of soil. The composition of the
- 481 ○ underlying rock determines the composition of the soil. The composition of
- 482 ○ the soil determines how well the soil will compact, how well it drains, and
- 483 ○ how resistant to erosion it is.
- 484 ○ Soil surveys published by the Natural Resources Conservation Service
- 485 ○ (NRCS) provide data regarding soil type, description, distribution,
- 486 ○ description, engineering properties, drainage characteristics, and general
- 487 ○ thickness.
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- Vegetation
    - Native vegetation and/or established vegetation should be incorporated in the assessment for an OHV project, for effective, cost-efficient erosion and sedimentation control. Native plants have adapted to their setting, adjusting to variations in climate and naturally available water.
    - The presence and effect of non-native vegetation should also be assessed. Non-native vegetation may be invasive, crowding out native vegetation.
    - Vegetation assessment should also incorporate an assessment for biological soil crusts, which form in arid and semi-arid regions where vegetative cover is sparse. These crusts consist of integrated communities of cyanobacteria, mosses, and lichens, and may constitute an area of environmental sensitivity.
    - Surface erosion protection from direct precipitation and from runoff water can be provided by native grasses, ground-covering brush, trees, and tree detritus, i.e., leaves, bark, fallen branches.
    - Botanical information and surveys of native vegetation and other plants are available on various internet sites, including the Online Floristic Interchange at the University of California, Berkeley (<http://ucjeps.berkeley.edu/interchange.html>). Additionally, most NRCS soil surveys indicate the native vegetation that typically grows in a particular soil. These data can be used to provide a general survey of vegetative cover for an area of concern.
    - Cultivation of local native plants and seeds using green houses and/or growing areas should be considered when planning a new OHV facility or redesigning a facility.
  - Hydrology—Watersheds
    - The watershed boundaries that encircle the area must be known to assess the hydrology of an area and its surroundings,
    - For most purposes, the boundaries of a watershed can be delineated on a topographic map that has a scale of 1:24,000 and a topographic contour interval of 40 feet or less, such as most USGS 7.5 minute topographic maps. The map should provide enough detail to delineate the ridgelines that separate watersheds.
    - Drainage networks, the tributary systems of draws, creeks, and rivers that drain various watersheds within the area, should be illustrated along with other water bodies and features, such as lakes, ponds, springs, and marshes.
    - California watersheds of different scales have been defined by CalWater, a State and Federal interagency mapping committee (<http://www.ca.nrcs.usda.gov/features/calwater/>). Watersheds assessed for OHV projects should be consistent with the defined CalWater watersheds.
  - Hydrology—Watercourse Types

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- Watercourses should be identified according to constancy of flow and the degree to which they support aquatic life and riparian species. The following watercourse types were derived from watercourse definitions provided in the previous Soil Conservation Guidelines/Standard document (DPR, 1991) and from the 2006 California Forest Practice Rules (Title 14, CCR, Ch. 4, 4.5 and 10). Individual agencies may use their own nomenclature for watercourse type but should explain how it corresponds with the definitions below.
    - Type I Watercourse: This watercourse can be 1) a fish-bearing stream, where fish are always or seasonally present, and includes habitat necessary for spawning and migration; or 2) a watercourse or spring that is consumed as a domestic supply where it is located within an OHV facility or within 100 feet downstream of the facility. A Type I watercourse is perennial (flows year-round) and is often referred to as blue-line drainage because this type of drainage is depicted on a USGS topographic map by a continuous blue line.
    - Type II Watercourse: This watercourse is a seasonal drainage. These drainages usually do not flow continuously throughout the year, but they do flow for an extended period of time beyond the rainy season. Therefore, these are often referred to as “intermittent” watercourses. Pools may be present throughout the year in these drainages, providing habitat for fish or other aquatic species, such as amphibians.
    - Type III Watercourse: This type of watercourse usually flows only in response to adequate rainfall or snowmelt. Consequently, it is often called an “ephemeral” watercourse. A Type III watercourse does not support aquatic life. Type III watercourses may show evidence of sediment and debris transport from past debris flows or high-runoff events. If the topography appears to form a trough-like depression but does not show evidence of sediment or debris transport by runoff it is not considered a watercourse.
- 568 • Hydrology—Watercourse Protection Zones
- To limit the amount of sediment that is unnaturally introduced into watercourses, the following buffers, or protection zones, may be used as a general guide for limiting OHV activity within the riparian corridor of the three watercourse types listed above, and in other wet areas, such as springs. These Protection Zone widths should be considered when designing new trails or watercourse crossings and in addressing problematic sections of existing trails. The Protection Zone widths listed below are not intended for OHVs on approach to designated watercourse crossings. These widths are presented as guidelines for protecting watercourses from sediment which may discharge from trails and roads that run parallel or sub parallel to watercourses. It may be appropriate to narrow or broaden the protection zones depending on the geomorphology of the watercourse banks, and the topographic and vegetative buffers between path and watercourse. If the protection zones are modified from the recommended widths, the modifications should be justifiable based on an assessment of the
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- 585 watercourse bank morphology and any other local conditions which may be  
 586 pertinent.
- 587     ▪ Type I Watercourse Protection Zone: 100 feet from the closest edge  
 588       of the watercourse channel
  - 589     ▪ Type II Watercourse Protection Zone: 75 feet from the closest edge  
 590       of the watercourse channel.
  - 591     ▪ Type III Watercourse Protection Zone: Two ranges of protection zone  
 592       measures to be defined by the OHV facility manager or designee and  
 593       implemented when the watercourse is visibly flowing (more restrictive)  
 594       and when it is not flowing (less restrictive).
  - 595     ▪ Springs, marshes, and other wet areas: Springs and other wet areas  
 596       are best avoided by establishing a protection zone of prohibited or  
 597       limited OHV travel defined by the OHV facility manager or designee.  
 598       If avoiding a wet area is impractical, then a raised causeway, such as  
 599       a puncheon structure, may be appropriate.
- 600
  - 601     • Hydrology—Watercourse Crossings
  - 602
  - 603       ○ A simple technique to identify the number and location of watercourse  
 604       crossings is a network analysis. A network analysis is a first approximation of  
 605       locations where drainage and erosion control may be needed. The  
 606       procedure consists of overlaying the drainage network with the trail network.  
 607       Potential problem areas are identified where the two networks intersect  
 608       (nodes). This analysis should be performed using maps that illustrate trail  
 609       and road networks and, at the least, all Type I and Type II drainages. This  
 610       analysis is most easily performed using electronic base maps and layers  
 611       using a geographic information system (GIS) data management program. It  
 612       can also be performed using paper maps and transparent overlays.
  - 613       ○ Each crossing should be monitored consistently to determine its  
 614       performance and the appropriateness of the crossing design to the crossing  
 615       setting.
  - 616       ○ Volumetric values necessary for proper watercourse crossing design should  
 617       be determined by using hydrologic data from stream gauges, weather  
 618       stations, and snow surveys within each watershed or sub-watershed. Public  
 619       entities such as the USGS, NOAA, and DWR collect this data from many  
 620       California watersheds. More location-specific data may be needed, which  
 621       can be obtained by stream gauging and use of precipitation gauges.
  - 622
  - 623     • Hydrology—Water Quality
  - 624
  - 625       ○ Discharge of sediment to a water body, such as a stream, river, or lake, is  
 626       the primary water quality concern at an OHV facility. Additionally, petroleum  
 627       products and other potentially hazardous chemicals may be spilled and seep  
 628       into the ground water and/or drain to a water body at staging areas, camping  
 629       facilities, and parking lots.
  - 630       ○ Each of California's nine Regional Water Quality Control Boards (RWQCBs)  
 631       has developed a Basin Plan specific to its geographic region of regulatory

632 authority. The Basin Plan identifies water quality concerns within the region,  
633 and it includes general mitigation measures to address those impacts.  
634 ○ Depending on local conditions and requirements, an OHV facility may need  
635 to have a water quality management plan.  
636 ○ If a listed water body in a Basin Plan is within or adjacent to an OHV facility,  
637 a water quality management plan should be developed that addresses those  
638 constituents of concern listed for that water body in the Basin Plan, as well  
639 as other water quality concerns specific to the facility.

640  
641 • Air Quality

642  
643 ○ The California Air Resources Board web site ([www.arb.ca.gov](http://www.arb.ca.gov)) provides  
644 contact information for Air Quality Management Districts and Air Pollution  
645 Control Districts throughout the state. These districts will have information  
646 about local air quality concerns that may apply to OHV areas.  
647 ○ General mitigation measures may be needed at an OHV area for dust  
648 control.  
649 ○ Naturally occurring minerals such as asbestos and silica may be exposed on  
650 ground surfaces at an OHV facility. There is a potential for OHV activity to  
651 disturb these minerals. When airborne, these minerals can be a health  
652 concern. Mitigation measures to control the airborne release of these  
653 minerals may be needed.

654  
655 • Wildlife

656  
657 ○ There may be potential wildlife concerns with regard to an OHV project.  
658 Potential wildlife issues for an OHV facility can be assessed by first  
659 consulting the California Natural Diversity Data Base (CNDDDB), maintained  
660 by the California Department of Fish and Game (DFG). The CNDDDB can be  
661 accessed via the DFG website ([www.dfg.ca.gov](http://www.dfg.ca.gov)). The CNDDDB provides  
662 information on various species of concern in California.  
663 ○ Additional assessment may entail the development of a Wildlife Habitat  
664 Protection Plan (WHPP). A WHPP includes a description and survey of  
665 threatened, endangered, and sensitive plants and wildlife and wildlife habitat  
666 in the area of OHV activity.  
667 ○ Depending on the species, avoidance or other protective measures may  
668 need to be implemented at an OHV facility to more effectively integrate the  
669 facility with its natural surroundings and inhabitants.  
670 ○ If a species of concern occurs in the vicinity of a project, studies regarding  
671 impact of the project on the species may be needed.

672  
673 • Cultural and Historical Resources

674  
675 ○ Cultural and historical resources within or adjacent to a dune or desert  
676 environment should be identified so that the OHV project can be designed to  
677 minimize potential impacts to the features.

- 678 ○ Sensitive areas, such as habitat for endangered wildlife and vegetation, and  
679 paleontological (fossil) sites, should be known and delineated, if necessary.  
680 OHV access to these areas may need to be limited.
- 681 ○ Open-ride-area OHV activity may need to be limited in vegetated areas.
- 682 ○ The location and number of parking areas, campsites, and access routes  
683 should be minimized to reduce potential impact to the environment. These  
684 OHV facility features should be located on naturally flatter areas to minimize  
685 grading.

### 687 2.3.5 Erosion Potential Assessment

688  
689 The primary purpose of an erosion potential assessment at an OHV facility is to identify  
690 areas which may be inherently more prone to erosion, and consequently may need  
691 specific drainage and erosion control design considerations. Several approaches can be  
692 used to estimate the potential for erosion on OHV facility lands. However, most large-  
693 scale methods of assessing erosion potential do not account for erosion susceptibility of  
694 trail tread. They are, however, useful in providing an assessment of erosion potential of  
695 broad landscapes on which a trail network may be planned or redesigned and are useful  
696 for assessing erosion potential within open-ride areas.

697  
698 It should be noted that erosion of the trail tread is a function of the mechanical energy of  
699 the vehicle, the drainage controls on the trail and surrounding area, and the nature of the  
700 underlying soils. Therefore, with proper planning, design, construction, and maintenance  
701 a trail can perform well (exhibit little erosion) in an area that is naturally more sensitive to  
702 erosion; while a poorly planned, designed, constructed, or maintained trail may erode in  
703 an area that is not naturally prone to erosion.

704  
705 Erosion potential assessment methods fall into two broad categories: empirical methods  
706 and analytical model methods. The two approaches offer specific advantages and may  
707 be used together or separately based on erosion potential assessment needs, size of the  
708 OHV project, and available information. It should be noted that the use of these methods  
709 requires specific expertise to obtain meaningful results.

- 710 • Empirical Methods of Erosion Potential Assessment—Observation

- 711 ○ The empirical observation approach to erosion potential assessment uses  
712 historical aerial photography (air photos). This approach captures mass  
713 wasting erosion features such as debris flows, landslides, and rock falls that  
714 are not discerned by other methods of erosion potential assessment.  
715 Typically, historical air photos and other imagery covering the last 50 years  
716 are used in conjunction with soils maps and geologic maps to develop  
717 relative erosion and mass wasting susceptibility maps for a specific project  
718 area. This process can be accomplished manually with hard-copy images or  
719 digitally using GIS software. Each step described below helps to further  
720 define the erosion potential for an area.  
721  
722     ▪ The subject area is divided into regions of similar geology using a  
723 geologic map and an overlay map. If the available geologic map also  
724 illustrates active mass wasting features such as landslides, these  
725

- 726 features should be transferred onto the overlay map as their own  
 727 regions. The overlay map is typically a topographic map. Its scale  
 728 should be 1:24,000 or larger, with a contour interval of 40 feet or less.  
 729
- 730 ■ The regions drawn onto the overlay map are subdivided into areas of  
 731 the same soil using soil survey data available from the NRCS.  
 732 Descriptions of soils in NRCS soil surveys typically include broad  
 733 evaluations of erosion susceptibility for a soil type.
  - 734 ■ Each subdivided area on the topographic overlay is subdivided again  
 735 according to slope gradient range, e.g., zero to 15 percent, 15 to 30  
 736 percent, etc. Steeper slopes are more prone to erosion processes.
  - 737 ■ The geomorphology of the subject area is analyzed using historical air  
 738 photos and other imagery, such as topographic maps. Observed  
 739 features mass wasting, such as denuded landslide scarps and  
 740 disrupted, irregular topography discerned from the images, is  
 741 transferred onto the overlay map. If possible, features such as  
 742 landslides mapped via aerial photographic review should be verified in  
 743 the field.
  - 744 ■ Other soil and geologic references which regard the area of concern,  
 745 particularly recently published geologic data, should be reviewed to  
 746 determine if all factors regarding erosion potential have been  
 747 catalogued and considered.
- 748 • Empirical Methods of Erosion Potential Assessment—Erosion Hazard Rating  
 749 Computation
- 750 ○ Checklists for erosion assessment have proven to be sufficiently  
 751 representative for assessing the relative susceptibility of an area to erosion.  
 752 The Erosion Hazard Rating (EHR) Computation Form (see the Training  
 753 Manual) combines factors affecting erosion potential to appraise the relative  
 754 risk of accelerated sheet and rill erosion. The system does not rate gully  
 755 erosion, dry ravel, wind erosion, or mass wasting. The checklist was  
 756 developed by an interagency team, under direction of the California Soil  
 757 Survey Committee, to provide a consistent method for evaluating the  
 758 likelihood that a soil disturbing activity will cause accelerated erosion.  
 759
  - 760 ○ The initial steps in applying the EHR Computation Form are the same as the  
 761 first three steps bulleted in empirical observation method described above.  
 762 These steps will define the subregions to which EHR calculations are  
 763 applied. An EHR is calculated for each subregion. Subregion boundaries  
 764 may be modified based on vegetation changes or other factors regarding  
 765 ground cover.<sup>[PAH1]</sup>  
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- 767
- 768 • Empirical Methods of Erosion Potential Assessment—Watercourse Crossing  
 769 Analysis
- 770 ○ A watercourse crossing analysis is conducted by creating an overlay map  
 771 that marks all points where trails and roads cross Types I, II, and III  
 772 watercourses. This creates a watercourse/trail node map which illustrates  
 773

774 locations where acute erosion due to poor watercourse crossing design may  
 775 be occurring. This enables other empirical analyses, such as the review of  
 776 aerial photographs or field observations, to focus on potential “trouble spots.”  
 777

- Analytical Models for Erosion Potential Assessment—Revised Universal Soil Loss Equation

- Analytical models are mathematical expressions used to predict erosion amounts and rates based on a simplified representation of natural processes. An advantage of analytical models is their ease of use (amenable to use in a spreadsheet). A primary drawback is that available models derive volumetric estimates of soil loss from sheet and rill erosion only. The Revised Universal Soil Loss Equation (RUSLE) is one of the most widely used analytical models for erosion assessment and prediction. It is a statistically derived equation used to predict average annual soil loss from hillslope elements in tons per acre per year. The RUSLE formula is:

$$A = R * K * L * S * C * P$$

792 Where: A = annual soil loss in tons per acre per year  
 793 R = rainfall erosivity factor  
 794 K = soil erodibility factor  
 795 L = slope length factor  
 796 S = slope gradient factor  
 797 C = cover management factor  
 798 P = erosion control practice factor  
 799

800 The erosion processes represented by these variables are similar to those  
 801 used in the calculation of an EHR.  
 802

803 There are two versions of the RUSLE released by the U.S. Department of  
 804 Agricultural. Version 2.0 of the RUSLE is for general, mostly agricultural  
 805 purposes. Version 1.06 of the RUSLE is used in area of mine reclamation.  
 806

- Analytical Models for Erosion Potential Assessment—Water Erosion Prediction Program

- The Water Erosion Prediction Program (WEPP) is a process-based model that employs a series of modules for weather generation, frozen soils, snow accumulation and melt, irrigation, infiltration, overland flow hydraulics, water balance, plant growth, residue decomposition, soil disturbance by tillage, consolidation, and erosion and deposition. These modules are ‘linked’ so that each module provides a piece of the input data for the soil erosion and deposition module.

- Analytical Models for Erosion Potential Assessment—Wind Erosion Prediction System



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- Criteria for making trail segments should be applied consistently over the entire trail network.
  - The primary purpose of the form is to identify trail segments which need more focused maintenance or reconditioning. Data collected from the form also provides the basis for a monitoring program.
  - To assist in consistent data entry on forms used at an OHV facility, the facility manager is encouraged to develop a series of facility-specific calibration cards. These cards consist of photographs of typical Green (acceptable), Yellow (marginal), and Red (action needed) conditions that might be found at the facility.
  - Particular attention should be paid to trail and road intersections to evaluate whether one system is negatively affecting the other.
  - Off-trail or off-site impacts may require a more detailed evaluation by an appropriately qualified professional.

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## 881 **2.4 Trail and Road Maintenance**

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883 Consistent observation and appropriate preventative action is the basis for conducting  
 884 proper maintenance of trails and roads at an OHV facility. Equipment used for  
 885 maintenance tasks, from heavy machinery to shovels, should be appropriate to the tasks.  
 886 Large, conventional earth-moving equipment, such as bulldozers and road graders, are  
 887 generally not appropriate for OHV trail maintenance. Personnel operating equipment used  
 888 in maintenance activities should be sufficiently experienced, competent, and, as  
 889 appropriate, qualified to use of the equipment.

890

891 To ensure consistent, appropriate maintenance is conducted at an OHV facility, a  
 892 maintenance plan should be developed and implemented by the OHV facility manager.  
 893 The maintenance plan should be modified over progressive seasons to address chronic  
 894 maintenance problems and the need to change maintenance approaches in some areas  
 895 of the facility.

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### 897 2.4.1 Maintenance Planning and Implementation

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899 Considerations in the development and implementation of a maintenance plan, as well as  
 900 general maintenance activities, are detailed below.

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- The maintenance plan should provide a process to rectify deficiencies in trail design or construction, as well as changing impacts to the trail by such things as increased trail use.

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- Maintenance for OHV trails should be conducted with deference to the skill rating of the trail. An expert trail may look “ugly,” to the casual observer but this may be due to features on the trail that qualify it for an expert skill rating. Maintenance may not be needed on such a trail if it is stable and not creating drainage or sedimentation problems and is otherwise in compliance with the Soil Conservation Standard.

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- The consistent documentation of observations and fieldwork conducted as part of an OHV facility maintenance plan can form the basis of an ongoing road and trail monitoring program.

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- The maintenance plan should be available to all pertinent personnel so that maintenance activities can be coordinated, conducted and documented properly.

- 915 • Applicable OHV guidelines in this document should be consulted when
- 916 constructing, maintaining, or reconditioning trails and trail features.
- 917 • At failed drainage structures, the cause of failure should be determined before
- 918 repairs are initiated. This may require input from qualified experts.
- 919 • Ideally, maintenance that entails compaction of soil should not be conducted if soil
- 920 moisture is too wet or too dry.
- 921 • Sediment that has accumulated in waterbreak (e.g., rolling dip) outlets should be
- 922 removed and used for trail structure needs, such as rebuilding the crests between
- 923 rolling dip troughs.
- 924 • Outside berms should be minimized or eliminated. However, they should not be
- 925 “bladed” off the trail as sidecast. Berm materials should be pulled back and graded
- 926 into the trail tread.
- 927 • Rills and gullies in trail treads should be repaired with soil reclaimed from
- 928 waterbreak outlets and outside berms. Soil should not be scraped from the trail
- 929 tread to fill rills and gullies.
- 930 • Soil and rock that may have sloughed onto a road or trail from a roadcut should be
- 931 graded smooth to make a safe trail. The earth materials should not necessarily be
- 932 removed because they may be providing a stabilizing buttress to the roadcut. In
- 933 some cases, analysis by a qualified expert may be needed.
- 934 • Repair of “whoops” or “stutter” bumps should be conducted by ripping the trail tread
- 935 and regrading. Earth materials should be graded and compacted back into the trail
- 936 tread when the moisture content of the materials is at or near optimal to allow for
- 937 proper compaction.
- 938 • Any road or trail maintenance objective should be conducted by moving the
- 939 smallest amount of soil necessary to meet the objective.
- 940 • The need for maintenance with mechanical equipment should be evaluated before
- 941 equipment is mobilized to the maintenance site.
- 942 • Maintenance equipment should be transported across sections of trail that do not
- 943 need maintenance without impacting those sections.

#### 945 2.4.2 Documentation of Maintenance Activities

946  
 947 Documentation of maintenance activities allows for a more thorough evaluation of the  
 948 effectiveness of the maintenance. A form regarding trail maintenance is presented in  
 949 Appendix 3 of these guidelines as examples of the type of documentation that should be  
 950 collected when trail maintenance activities are scheduled and conducted. The  
 951 Mechanized Construction - Maintenance Checklist Form should be completed within a few  
 952 days of completing scheduled maintenance. The Implementation and Effectiveness  
 953 Evaluation Form should be completed following one season of trail use. It may be  
 954 beneficial to have appropriately trained and qualified earth science professionals, such as  
 955 soil scientists, hydrologists, or geologists, to evaluate the effectiveness of maintenance  
 956 activities.

### 958 **2.5 Protocol for Monitoring**

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 960 A proper protocol for monitoring at an OHV facility will determine if the facility has been  
 961 designed, constructed, and maintained to limit soil erosion, promote sustainability, and  
 962 prevent sediment delivery to water bodies. A monitoring program developed according to

963 the protocol will readily detect and, if necessary, quantify, changes to features of the road  
 964 and trail networks at the facility. Detected changes can then be evaluated to determine if  
 965 specific features need to be modified or replaced to bring a trail, trail network, or area into  
 966 compliance with the Soil Conservation Standard.

### 967 2.5.1 The Monitoring Plan

968 As part of the monitoring protocol, a Monitoring Plan should be developed that effectively  
 969 detects changes at an OHV facility. To achieve this, the Monitoring Plan should stipulate:

- 970 • Monitoring objectives. The purpose of the monitoring effort should be clear.  
 971 Monitoring objectives should discern if the features of an OHV facility are  
 972 functioning properly and, if necessary, should address special requirements  
 973 imposed by regulatory bodies and by local, state, or federal statutes, regulations,  
 974 and rulings.
- 975 • Monitoring parameters and site selection. The Monitoring Plan should stipulate the  
 976 features to be monitored, and how they are to be monitored. The scope of the  
 977 monitoring effort should be appropriate to the size, type, and use of the OHV facility  
 978 and be manageable within the limits of facility staff and budget. The following types  
 979 of monitoring should be considered when developing monitoring parameters:  
 980
  - 981 ○ Implementation monitoring. Used to determine whether activities were  
 982 conducted as planned.
  - 983 ○ Forensic monitoring. Used to identify causes of acute erosion and  
 984 sedimentation.
  - 985 ○ Effectiveness monitoring. Used to determine if design, construction, and  
 986 maintenance practices are adequate.
  - 987 ○ Compliance monitoring. Used to determine if land-use activities are in  
 988 compliance with applicable regulatory standards.
  - 989 ○ Assessment monitoring. Used to characterize existing conditions.
  - 990 ○ Trend monitoring. Used to characterize any change in conditions over time.
- 991 • Appropriately trained and qualified personnel. Depending on the types of  
 992 monitoring tasks to be conducted, the personnel charged with conducting  
 993 monitoring activities may need specific training and qualifications to conduct  
 994 specific tasks.
- 995 • Monitoring program design. A monitoring program should be designed so that it can  
 996 be implemented effectively and conducted consistently within the constraints of  
 997 budget and staff capabilities.
- 998 • A schedule of monitoring activities. Specific monitoring activities should be  
 999 scheduled as appropriate—quarterly, seasonally, before or after peak use of the  
 1000 OHV facility, etc. Monitoring activities should also be prioritized based on potential  
 1001 detrimental impacts from feature failure and on available personnel.
- 1002 • General field observations. The OHV facility should be toured by monitoring  
 1003 personnel throughout the year to determine if monitoring schedules need to be  
 1004 modified or if additional features should be monitored. Observations to determine  
 1005 feature functionality are best made during or shortly after seasonal extremes, and  
 1006 during peak use of the OHV facility.

- 1011 • Proper data collection techniques, with quality assurance/quality control measures  
 1012 (QA/QC). The Monitoring Plan should stipulate the type of data that is to be  
 1013 gathered from the monitoring activities and how the data are to be collected and  
 1014 recorded. Appropriate selection and training of monitoring personnel will ensure  
 1015 that data is collected in a consistent manner. A small percentage of duplicate  
 1016 sampling by different individuals (generally about 10 percent) will provide a QA/QC  
 1017 check on the data collected.
- 1018 • Instruction for appropriate management of collected data. The monitoring plan  
 1019 should also describe the data management system for monitoring activities—how  
 1020 collected data will be stored, managed, and accessed for future uses. Databases  
 1021 are often used as data management systems because they can be customized to  
 1022 store different types of data and can integrate with GIS software. GIS software  
 1023 enables versatile geographic representation of collected data. Data entry into a  
 1024 data management system should be conducted concurrent to fieldwork or shortly  
 1025 thereafter. Data entry should not be delayed more than one month beyond the time  
 1026 data were collected.

### 1028 2.5.2 Change Detection Methodology—General Considerations

1029  
 1030 The monitoring program should employ one or more of the following to detect and quantify  
 1031 changes:

- 1032
- 1033 • Photographic analysis and comparison with photographic record
  - 1034 • Field control plots to make comparisons with disturbed and undisturbed areas with  
 1035 similar physical properties.
  - 1036 • Longitudinal and transverse profile plots of trail and road segments
  - 1037 • Recurrent point sampling

### 1038 1039 2.5.3 Change Detection Methodology—Monitoring for Specific Environments and OHV 1040 Activities

1041  
 1042 Some environments, and some OHV activities, should have change detection monitoring  
 1043 suited to the specific environment and activity, as detailed in the following sections.

- 1044
- 1045 • **Monitoring Open Ride Areas.** Open-ride areas are expansive areas used by OHVs,  
 1046 where vehicle use is not limited to specific routes. Almost any portion of an open-  
 1047 ride area may become impacted by excessive OHV traffic. The following tiered  
 1048 monitoring approach will allow adverse impacts in and adjacent to the open-ride  
 1049 area to be identified.
- 1050
  - 1051 ○ Tier one change detection—boundary monitoring of the open-ride area.  
 1052 Monitoring at this level should focus on the interaction of the open-ride area  
 1053 and its surroundings.
  - 1054 ○ Tier two change detection—monitoring areas of concentrated OHV activity  
 1055 and general use. Staging areas, camping areas, and specific OHV  
 1056 recreation features such as hill climbs, should be monitored at this level.
  - 1057 ○ Tier three change detection—monitoring specific features. Specific common  
 1058 riding sections with potential erosion problems, watercourse crossings, and

1059 environmentally sensitive areas, such as habitat for endangered plants and  
 1060 animals should be monitored at this level.

- 1061
- 1062 • **Monitoring Dunes and Desert Sand Environments.** Depending on conditions,  
 1063 dunes and desert sand environments can be fragile. Recovery of these  
 1064 environments, if damaged, can be lengthy. Monitoring activities should be  
 1065 designed specifically to evaluate impacts of OHVs on sensitive areas within the  
 1066 dune and desert sand environments. This may require comparative monitoring  
 1067 using fenced-off areas where no OHV-related disturbances occur as reference (i.e.  
 1068 control plot monitoring). Any monitoring effort should acknowledge and be  
 1069 designed to account for, as appropriate, factors such as wind transport of sediment  
 1070 and seasonal deluging from desert washes.
- 1071
- 1072 • **Monitoring for OHV Special Events and Races.** Special events and races at an  
 1073 OHV facility can strain the infrastructure and environment at the facility. This is  
 1074 because concentrated numbers of people congregate for the events, and in many  
 1075 cases aggressive, repeated runs occur on the event courses by competitors. OHV  
 1076 courses for special events and races are designed as either point-to-point routes or  
 1077 are on closed-loop routes. Competitions include cross-country races, enduros, dual  
 1078 sports, hare-and-hound races, trials riding, rock climbs, obstacle course contests  
 1079 for four-wheel-drive vehicles, and motocross races on closed-loop courses. Some  
 1080 monitoring considerations for OHV special events and races include:
- 1081
- 1082 ○ Runoff drainage should be monitored for volume and sediment load at fixed  
 1083 facilities, such as tracks and staging areas. Monitoring results may  
 1084 determine the need for runoff drainage holding facilities (i.e. sediment  
 1085 ponds).
  - 1086 ○ Climate considerations should be made prior to an event. Depending on the  
 1087 type of event and course conditions. For example, it may be necessary to  
 1088 postpone or cancel an event due to excessive precipitation.
  - 1089 ○ For temporary facilities, such as cross-country racecourses, monitoring  
 1090 should be conducted at each watercourse crossing and at randomly selected  
 1091 racecourse segments. Types of monitoring at these locations include:
    - 1092 ■ Photos taken before the event and after reconditioning has been  
 1093 completed.
    - 1094 ■ Turbidity monitoring down-stream from select watercourse crossings,  
 1095 before, during, and after an event.

#### 1097 2.5.4 Compliance Reporting

1098

1099 Finally, the monitoring program should employ a method for consistent reporting and  
 1100 analysis of data collected. The monitoring reports will provide a record to validate  
 1101 compliance with the Soil Conservation Standard, and with an OHV facility's maintenance  
 1102 plan. In general, a monitoring report should include:

- 1103
- 1104 • A description of current and historical conditions at the OHV facility or other area  
 1105 being monitored.
  - 1106 • Description and analysis of detected changes.

- 1107 • Additional findings.
- 1108 • Conclusions based on analysis of detected changes and additional findings.
- 1109 • Recommendations based on conclusions. Recommendations should be in the form
- 1110 of an action plan. The action plan should detail activities to be implemented and
- 1111 include a schedule of implementation. The action plan should be distributed to the
- 1112 appropriate responsible parties at an OHV facility, such as the facility manager and
- 1113 trail maintenance personnel.

1114

## 1115 **2.6 Project Design and Construction**

1116

1117 The purpose of this section is to provide basic design criteria that should be considered  
 1118 when an OHV Project is proposed and constructed. The intent of all design criteria  
 1119 discussed is to prevent or limit erosion and to promote soil conservation at OHV facilities.

1120

### 1121 2.6.1 Project Design Considerations

1122

1123 An OHV project as a whole should be sustainable per the Soil Conservation Standard and  
 1124 should minimally impact the landscape on which it is constructed. Project design should  
 1125 therefore not commence before such assessment activities as discussed above are  
 1126 conducted and available for review.

1127

1128 The design of an OHV project should not significantly alter or impact the local watershed  
 1129 where the project is proposed—watercourses, hillslope runoff, and native vegetation should  
 1130 be minimally affected. To achieve this ideal, OHV projects should be designed using the  
 1131 principals of hydrologic invisibility and hydrologic disconnection.

1132

1133 An OHV project designed with the principals of hydrologic invisibility allows runoff water to  
 1134 flow in a natural pattern down a slope and across the trail or road tread surface—not along  
 1135 the tread—as it continues downslope. Thus a hydrologically invisible trail or road avoids  
 1136 unnatural concentration of flows, and disperses concentrated runoff before it accumulates  
 1137 to volumes and velocities that can cause erosion. A project designed for hydrologic  
 1138 disconnection incorporates design elements of hydrologic invisibility on a network-wide  
 1139 level to ensure water in a watershed or subwatershed exits the watershed basin naturally,  
 1140 at the low point, or mouth, of the basin. Ridge tops and stream crossings are critical  
 1141 points for maintaining hydrologic disconnection: The lowest point of any trail or road in a  
 1142 basin should be at the watercourse crossing. If this is not the case, then the trail or road  
 1143 network has the potential to intercept and divert water from the natural channel. The  
 1144 highest point of any trail or road that traverses a ridge should be at the point where the  
 1145 trail or road intersects with the ridgeline. This ensures that runoff water will still flow away  
 1146 from the ridgeline, keeping adjacent watersheds disconnected. Aspects to consider  
 1147 regarding physical setting and layout of roads and trails are detailed below.

1148

- 1149 • OHV Trails and Roads—General Design Considerations

1150

- 1151 ○ Trails and roads designed to follow the principals of hydrologic invisibility will
- 1152 be less susceptible to erosion.
- 1153 ○ Design features which promote hydrologic invisibility include outsloping of
- 1154 tread, rolling tread profiles, and rolling dips.

- 1155 ○ Culverts, inside ditches, and similar drainage control features require
- 1156 frequent maintenance, hindering the sustainability of trails and roads, and
- 1157 generally should not be used if alternatives that better adhere to the
- 1158 principals of hydrologic invisibility and disconnection are feasible.
- 1159 ○ A trail or road should not be designed with a sustained uniform grade,
- 1160 including level or near-level grades. Runoff water will flow along a sustained
- 1161 grade, gaining velocity, volume, and erosive force.
- 1162 ○ The layout and grade of a trail or road should be designed to minimize the
- 1163 creation and size of cuts made into the natural grade of the landscape (cut-
- 1164 slopes). An engineer or geologist may need to be consulted to determine
- 1165 the suitability and stability of larger, steeper cut-slopes.
- 1166 ○ Trail and road networks should be designed to avoid known unstable areas
- 1167 such as landslides and earthflows. Trails and roads crossing unstable
- 1168 ground typically require extraordinary construction and maintenance costs.
- 1169 If an unstable area is unavoidable, an engineer or geologist should be
- 1170 consulted to determine proper layout and design of the trail or road.
- 1171

- 1172 • Specific Design Considerations—OHV Trails.
- 1173

1174 Successful trail design integrates numerous factors encompassing visitor  
 1175 satisfaction, hydrology, trail durability, construction technique, and ease of  
 1176 maintenance. Trail-specific design considerations include:

- 1177 ○ Trail types, difficulty, and length should be appropriately mixed to provide
- 1178 visitor satisfaction and potentially minimize the creation “volunteer” trails by
- 1179 dissatisfied recreationists.
- 1180 ○ Trails should not “dead end” or have major velocity changes at turns solely
- 1181 contained by hillslopes. Both of these conditions can lead to volunteer trails
- 1182 and hill climbs departing from these points.
- 1183 ○ Trail durability can be enhanced by routing the trail over erosion resistant
- 1184 soils and rock.
- 1185 ○ To avoid cascading erosion and cumulative sedimentation, trails should not
- 1186 be designed with vertically stacked switchbacks
- 1187 ○ The layout design of closely-spaced parallel trails should be avoided to
- 1188 prevent recreationists-created trails which connect the parallel trails.
- 1189

- 1190
- 1191 • Specific Design Considerations—Multi-Purpose Roads.
- 1192

1193 Multi-purpose roads within OHV facilities must be usable by a wide range of  
 1194 vehicles, including general transportation, utility, and emergency vehicles.  
 1195 Consequently, multi-purpose roads will not typically offer a challenge to the OHV  
 1196 recreationists as they must be designed to allow efficient conveyance of non-  
 1197 recreational vehicles. Some design considerations for multi-purpose roads are  
 1198 listed below.

- 1199
- 1200 ○ The layout of a multi-purpose road within an OHV facility should be designed
- 1201 for minimal length while still adhering to the principals of hydrologic
- 1202 invisibility and hydrologic disconnection.

- 1203 ○ If possible, a multi-purpose road should be located on the periphery of an
- 1204 OHV area.
- 1205 ○ Runoff from a multi-purpose road should not be intercepted by or otherwise
- 1206 diverted to an OHV road or trail.
- 1207 ○ The surface of a multi-purpose road must be durable. Appropriate surfacing
- 1208 with crushed rock, or other amendments, will improve load capacity of the
- 1209 road and smooth the running surface of the road.
- 1210

1211 2.6.2 Project Design Features

1212 An OHV project is a mix of different design features. Which features are incorporated

1213 depends on the management objective(s) for that project. Different design features are

1214 presented below, along with criteria to consider when incorporating these features into a

1215 project.

1216

- 1217 • Trail Tread Design

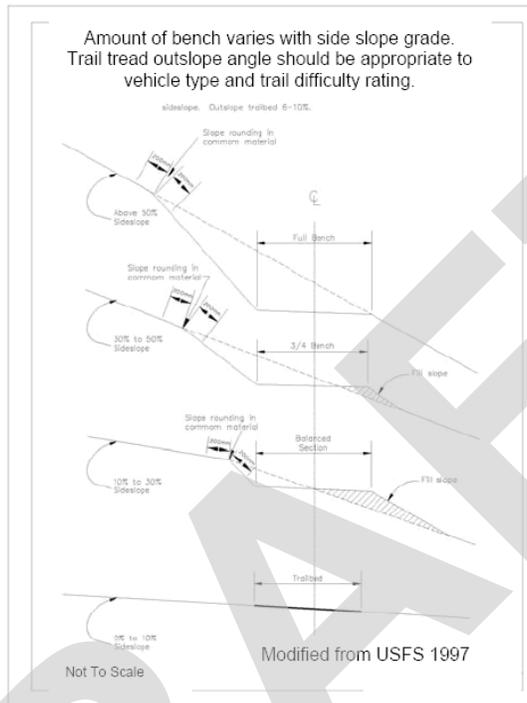
- 1218 ○ The width of trail tread that is designed for OHV recreation should be based
- 1219 on the type of vehicle expected on the trail (motorcycle, ATV, 4x4), the
- 1220 intended skill rating for the trail (less skilled operators require a wider tread
- 1221 for safety), and the topography on which the trail or road will be graded.
- 1222 Typical recommended widths are:
- 1223
- 1224
- 1225

DESIGNATED USE	TREAD WIDTH (INCHES)
Motorcycle - most difficult	12 – 18
Motorcycle – more difficult	18 – 24
Motorcycle – easiest	24 – 30
ATV - most difficult	48 – 60
ATV – more difficult	60 – 72
ATV – easiest	72 – 86
4X4 - most difficult	72 – 84
4X4 – more difficult	84 – 96
4X4 – easiest	96 -120

- 1226 ○ To achieve desired trail tread width, the following grading practices, as
- 1227 illustrated in the figure below, are recommended based on adjacent
- 1228 topography:
- 1229
  - 1230 ▪ The trail tread should be integrated with designed drainage control
  - 1231 measures to retain hydrologic invisibility and hydrologic
  - 1232 disconnection.
  - 1233 ▪ To maintain hydrologic invisibility, trail tread should not be insloped.
  - 1234 Insloped trails capture runoff and promote erosion.
  - 1235 ▪ Trail tread subject to high usage and/or other potentially intense
  - 1236 erosive forces can be protected by treating with a soil amendment
  - 1237 and/or armoring with hardened materials such as properly installed
  - 1238 paver stones, gravel, or native rock.
  - 1239 ▪ It should be anticipated that berms may form on the outside edge of a
  - 1240 trail. Periodic maintenance measures to breach the berm at regular

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intervals or grade the berm material back into the trail tread should be anticipated.



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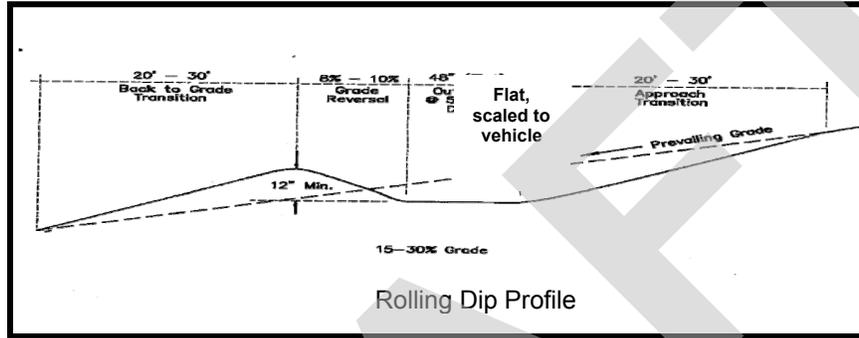
- Rolling Profile

- The primary benefit of a rolling profile is that it prevents long steady trail grades which capture and convey runoff.
- Rolling a trail profile allows the traveled path of the trail to vary or undulate.
- Inclusion and placement of the crests and troughs of the rolling profile is a primary design decision made when a trail or road network is planned for construction or realignment.
- A rolling profile prevents the creation of long, sustained trail grades, along which runoff drainage can flow, gaining velocity and volume and erosive force.
- Local topography, as well as natural features such as rock outcrops and trees, can be used as “pivot points” on the trail layout, making the trail more effective and challenging to the OHV recreationist.

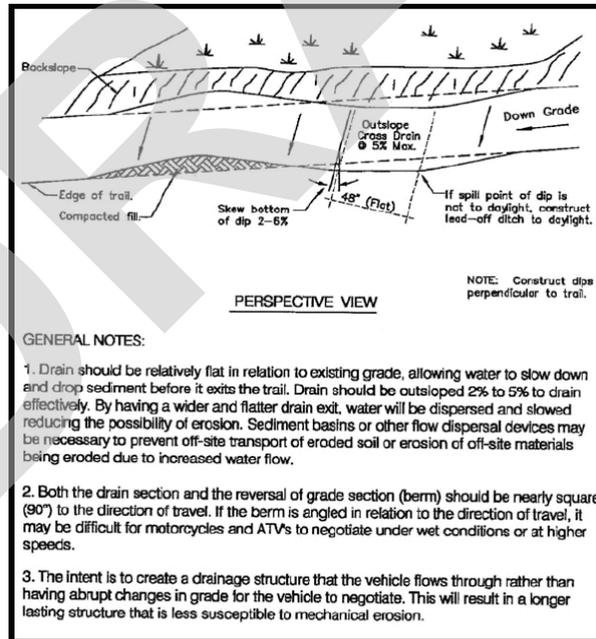
- Rolling Dips

- Rolling dips are broad undulations graded into a trail or road. Rolling dips may be built into a new trail or road, or retrofitted to an existing one.
- Rolling dips are usually placed in series on descending paths so that runoff volume is sufficiently dispersed off the path.
- Reinforcement measures, such as rock armoring, can be used at the rolling dip trough outlet to minimize erosion.
- Rolling dip troughs should be at least as long as the average wheelbase of vehicles on the trail or road. This limits gouging of the trail tread in the rolling dip trough. For example, if a trail is intended for motorcycles only, and the

- 1270 typical motorcycle wheelbase is 55 inches, then the trough flat on a rolling
- 1271 dip should be approximately 55 inches. The figures below provide examples
- 1272 of basic rolling dip design.
- 1273 ○ Rolling dips are nearly always installed in series so that any one rolling dip is
- 1274 not diverting too much runoff, which may lead to an additional erosion
- 1275 problem.
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• Waterbreaks

- A waterbreak is a design feature that diverts concentrated water from a trail or road tread. It may be a ditch, dike, or dip, or a combination thereof, which is constructed diagonally across the trail or road so that water flow is effectively diverted from the tread.

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- Prior to installing waterbreaks it is important to evaluate the conditions that caused the acute erosion. Many times, a water diversionary structure placed strategically on or adjacent to the trail path at the top of a slope can mitigate the problem.
  - Waterbreaks are nearly always installed in series so that any one waterbreak is not diverting too much runoff, which may lead to an additional erosion problem.
  - The spinning wheels of OHVs eventually obliterate the waterbreaks. More durable cores of waterbreaks can be made by mixing soil with rock or amending the soil with concrete to make a weak soil cement. Waterbreaks may also be hardened by positioning pre-formed concrete blocks known as “dogbones,” along the waterbreak crests. On-site materials, such as rock or timber, can be used if sufficient amounts of soil are unavailable.
  - The installation of flexible waterbreaks may be appropriate for some trail conditions.
- Drain Dips
    - A drain dip acutely tilts the trail to facilitate runoff drainage.
    - Drain dips are usually cut into the grade of an existing trail or road.
    - Drain dips are typically used on low gradient trails.
    - Drain dips should be considered where trails run into a swale or hollow in the landscape to promote hydrologic invisibility.
    - Use of drain dips can be a very effective drainage control measure on incised trails or roads, but the drain dips should be routinely monitored and maintained to ensure effectiveness.
  - Climbing Turns
    - To avoid cascading erosion and cumulative sedimentation, trails should not be designed with vertically stacked switchbacks. Instead climbing turns should be employed. Climbing turns differ from switchbacks in that they have a larger radius of turn (10 feet or more), with gradients up to 25 percent.
    - Climbing turns are designed with as large a radius as is practicable. The larger the turn radius, the greater the separation distance between upper and lower limbs of the turn. This provides more ground for dispersing drainage.
    - Climbing turns are typically banked. Trail drainage that flows around the banked turns should be diverted from the trail tread immediately above and below the turn, where the trail section between turns is relatively straight. Drainage diverted off-trail should be sufficiently dispersed so that the drainage does not flow onto any lower portion of trail.
    - Sequential climbing turns should be laid out so that the trail grade climbs a slope laterally.
    - Climbing turns should be designed to minimize excavation and cut-slope exposure.
  - Watercourse Crossings

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- A properly designed watercourse crossing allows water to remain in the watercourse and does not alter, or only slightly alters, the gradient of the watercourse at the crossing.
  - To prevent all or part of a watercourse from diverting onto a trail, the trail at the watercourse crossing should be lower than the trail segments that approach the crossing on either side, adhering to the principal of hydrologic disconnection discussed earlier.
  - There are many watercourse crossing designs, from rocked fords to culverts to bridges. Each watercourse crossing must be designed based on the anticipated flood flows of the watercourse it crosses, and, as appropriate, for fish and other aquatic species passage. Not all designs are appropriate for any one crossing.
  - Approaches to watercourse crossings should be designed according to the principals of hydrologic invisibility and hydrologic disconnection to minimize sediment delivery to the watercourses. Adequate drainage features such as grade breaks, outsloping, waterbreaks, and rolling dips should be incorporated on each approach limb so that runoff water is diverted off-trail and not conveyed along the path to the watercourse. The approaches should not be incised.
- Parking Areas, Staging Areas, and Other Large Surface Areas
    - Parking lots, staging areas, campgrounds and picnic areas, pits at race tracks, and maintenance facilities all have large surface areas which must be drained without causing erosion or excessive soil loss.
    - Options to prevent or limit erosion of a large surface area include:
      - Compaction of earth materials. This option entails scarifying the native surface, applying water to the earth materials as needed for proper compaction of soil, and compacting the soil to an engineering standard based on anticipated loads of the surface area. Typically, soil is compacted to at least 90 percent of the soil's maximum density
      - Paving. This option is expensive and not appropriate for many settings. Areas to be paved are usually prepared by compaction of earth materials as described above. A compacted crushed rock cover is also applied to the surface before paving if traffic load is anticipated to be heavy.
      - Crushed rock cover. This option is slightly more aesthetic than paving, and cheaper and more easily applied to different settings. Native surface areas may or may not be compacted prior to being covered with crushed rock.
    - Regardless of the surface area treatment chosen, surface runoff should not accumulate excessively as concentrated flow.
    - Drainage design of the surface area should incorporate multiple drainage swales to disperse runoff to multiple locations around the open area.
    - Runoff conveyance and discharge points should be well armored with rock to avoid erosion during storm events.

- 1386 ○ Land surfaces that slope gently away from large surface areas should be
- 1387 used to disperse surface area runoff.
- 1388 ○ If natural land surfaces suitable for dispersing runoff water are not in the
- 1389 vicinity of the large surface area, the construction a runoff control feature,
- 1390 such as a man-made containment or filtering feature, should be considered.
- 1391 ○ Runoff should not be discharged directly to a watercourse.
- 1392 ○ Runoff that is discharged to a watercourse may require, at a minimum, a
- 1393 National Pollution Discharge Elimination System (NPDES) permit or waiver.
- 1394

### 1395 2.6.3 Designing for Specific Environments and OHV Activities

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1397 Considerations which should be made when designing OHV projects within specific

1398 environments and designing for OHV event activities, such as competitions, is discussed

1399 below.

- 1400
- 1401 • Open-Ride Areas. All or part of an OHV facility that does not restrict OHV traffic to
- 1402 trails and roads is considered an open-ride area. Established routes of travel often
- 1403 exist or become developed within open-ride areas, but almost any portion of an
- 1404 open-ride area may become impacted by excessive OHV traffic. Erosion-related
- 1405 impacts on open-ride areas can be minimized if drainage courses are protected and
- 1406 sediment is kept within the open area boundaries. Specific design considerations
- 1407 include:
- 1408
- 1409 ○ Open-ride areas should be assessed, designed and maintained as an
- 1410 independent facility. The expectation is that some environmental impact will
- 1411 occur from OHV use but that such impacts will not extend beyond the
- 1412 boundaries of the open-ride area.
- 1413 ○ Roads and well-defined trails within an open-ride area should be away from
- 1414 major watercourses.
- 1415 ○ Areas that provide habitat for endangered plants and wildlife should be
- 1416 avoided.
- 1417 ○ Key monitoring points within the drainage network in an open-ride area
- 1418 should be identified for subsequent monitoring of potential erosion,
- 1419 sedimentation, loss of riparian habitat or other impact.
- 1420 ○ An erosion potential assessment should be conducted on an area being
- 1421 considered for open-ride designation. More detailed analysis should be
- 1422 conducted before considering the use of areas with high erosion hazard for
- 1423 open riding activities. If areas of high erosion hazard lie within existing open-
- 1424 ride facilities, analyses should be conducted to assess whether OHV traffic
- 1425 should be limited.
- 1426 ○ The potential for erosion from water, wind, and/or mechanical forces should
- 1427 be evaluated throughout the facility so that areas that receive concentrated
- 1428 use within an open-ride area, such as near camping and staging areas, are
- 1429 located away from areas that are more naturally susceptible to erosion.
- 1430
- 1431 • Dunes and Desert Sand Environments. Depending on conditions, dunes and desert
- 1432 sand environments can be fragile. Recovery of these environments, if damaged,
- 1433 can be lengthy. Dune environments vary and depend on the type of dunes that

1434 have developed, wind patterns that affect dune orientation, vegetation diversity, and  
 1435 hydrological conditions. Wind transport is one of the most important factors in the  
 1436 distribution of natural communities within dune and desert sand environments.  
 1437 Dunes and relatively bare areas within desert environments (i.e., sand drifts,  
 1438 blowouts, and washover fans) should be managed as dynamic (moving) systems.  
 1439 Stabilization measures specific to OHV use should be carefully evaluated prior to  
 1440 implementation so that potential impacts to these mobile systems is minimized.  
 1441 Other design considerations for OHV recreation in dune and desert sand  
 1442 environments are presented below.

- 1443
- 1444 ○ The location, type and extent of dune ecosystems on which an OHV facility
- 1445 may be located should be known prior to designing the OHV project.
- 1446 ○ Dune morphology (relative relief, orientation, arrangement, and relationship
- 1447 of the dune assemblages to the underlying geologic formations) should be
- 1448 assessed prior to designing the OHV project.
- 1449 ○ Sensitive areas, such as habitat for endangered wildlife and vegetation, and
- 1450 paleontological (fossil) sites, should be delineated, and OHV access to these
- 1451 areas should be restricted.
- 1452 ○ Cultural and natural resources within or adjacent to a dune or desert
- 1453 environment should be identified so that the OHV project can be designed to
- 1454 minimize impacts to the features.
- 1455 ○ Potential impacts of OHV use on the dune and desert sand environments
- 1456 should be assessed.
- 1457 ○ Open-ride area OHV activity may need to be limited in vegetated areas.
- 1458 ○ The location and number of parking areas, campsites, and access routes
- 1459 should be minimized to reduce potential impact to the environment. These
- 1460 OHV facility features should be located on naturally flatter areas to minimize
- 1461 grading.
- 1462
- 1463 • OHV Hill Climbs. A hill climb in an OHV area is, as it sounds, a trail leading straight
- 1464 up a steep slope. Hill climbs generally have gradients of 50 percent or more. Hill
- 1465 climbs are generally 125 feet or more in length and eight to 20 feet wide. Erosion
- 1466 can occur on hill climbs in areas where soils are poorly consolidated and where
- 1467 exposed bedrock, such as decomposed granite, is friable and erodes easily.
- 1468 Design considerations for hill climbs include the following:
- 1469
- 1470 ○ Hill climbs should be located on soil or bedrock units that are resistant to
- 1471 erosion.
- 1472 ○ As physical setting allows, no more than two hill climbs should be located for
- 1473 every 100 horizontal feet of slope face.
- 1474 ○ For safety, the approach to a hill climb should be relatively flat, and the “top”
- 1475 of the hill climb should be at least 20 feet below the crest of the slope.
- 1476 ○ To avoid gully erosion, any runoff drainage that originates from areas
- 1477 upslope from the hill climb should be diverted away from the hill climb.
- 1478 ○ Hill climbs should be located such that any runoff drainage that may flow
- 1479 down the hill climb does not flow directly into adjacent watercourses.
- 1480 ○ Topography and other physical conditions should allow for soil that is eroded
- 1481 from a hill climb to deposit on the landscape no more than 500 feet from the

- 1482 base of the hill climb. These eroded materials can be used for hill climb  
 1483 repair, if necessary.
- 1484 ○ The extent of disturbance at any hill climb shall not exceed the capacity of  
 1485 the facility manager to recondition the hill climb.
  - 1486 ○ Hill climbs not managed for sustained use should be closed to OHV  
 1487 recreation and rehabilitated.
- 1488
  - 1489 • OHV Routes for Special Events and Races. The OHV courses for special events  
 1490 and races are designed as either point-to-point routes or closed-loop routes.  
 1491 Competitions include cross-country races, enduros, dual sports, hare-and-hound  
 1492 races, trials riding, rock climbs, obstacle course contests for four-wheel-drive  
 1493 vehicles, and motocross races on closed-loop courses. Some events are timed  
 1494 while others are based on distances traveled and obstacles encountered. Some  
 1495 OHV areas have training facilities for these events which may also be used for the  
 1496 competitions. Other courses are built specifically for an event. Some  
 1497 considerations when designing OHV routes for special events and races include:  
 1498
  - 1499 ○ Facilities should be designed with consideration of prevailing wind direction,  
 1500 sun angles, noise, and anticipated crowds.
  - 1501 ○ Design facilities to keep displaced soils, erosion and sedimentation on site.
  - 1502 ○ For cross-country events, designated routes should be marked clearly with  
 1503 barrier tape. Exclusion fencing should be used to protect environmentally  
 1504 sensitive areas. Route markers and fencing should be removed at the  
 1505 conclusion of events.
  - 1506 ○ After an event, temporary tracks should be regraded to restore natural  
 1507 drainage patterns, and native vegetation should be restored if necessary.

#### 1509 2.6.4 Construction

1510  
 1511 Appropriate construction procedures and techniques should be employed when  
 1512 constructing an OHV project to ensure that the project is sustainable and minimally  
 1513 impacts the environment. Important elements which should be incorporated in the  
 1514 construction of an OHV project are discussed below.

- 1515
- 1516 • Construction Equipment
- 1517
- 1518 ○ Equipment and machinery should be chosen for trail-specific needs.
- 1519 ○ Bull dozers, loaders, road graders and other heavy machinery intended for  
 1520 large-scale earth-moving are not appropriate for trail construction or  
 1521 maintenance.
- 1522 ○ Specialized earthmoving equipment, scaled for narrow access, is available  
 1523 for OHV trail construction and maintenance projects. A good overview of  
 1524 specialized equipment is presented in Gonzales (1996).
- 1525 ○ For safety purposes and for the integrity of OHV roads and trails, personnel  
 1526 operating machinery should be sufficiently experienced, competent, and, as  
 1527 appropriate, certified in the use of the machinery.
- 1528 ○ Experienced personnel using shovels and other hand tools may be the most  
 1529 appropriate choice for trail construction in some settings.

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- Plan Documentation and Construction Control
    - At least one field copy of the plans for the OHV project should be on site and available for reference by the construction crew and others, as needed, during all phases of construction.
    - Sensitive areas, such as habitat for endangered wildlife and vegetation, and paleontological (fossil) sites, should be known and delineated if necessary. OHV access to these areas may need to be limited.
    - Any changes to the original project plans should be documented and noted on the field copy of the plans. The field copy of the plans, with annotations regarding plan changes, will be the primary reference for compiling as-built documentation.
    - As-built documentation for a project, including as-built plans, should be prepared and compiled following completion of the project. Reasons for changes made to the original design should be included in the as-built documentation.
    - For the grading of a new OHV road or trail, the intended alignment of the path should be staked or flagged in the field. The proposed trail grade elevation should also be surveyed and noted with stakes or flagging. If machinery is to be used for path construction, the equipment operator should review the staked or flagged alignment. Discrepancies between the planned path and actual geography can be visualized with the stakes or flagging, and modifications, if any, can be made before grading is underway.
    - Proposed watercourse crossings should also be visualized using stakes or flagging prior to grading and construction. Key elements of a watercourse crossing to stake include path approach to crossing, path width through crossing, path low point, gradient across path at crossing point, foundation locations if planned (i.e., bridge). The need for plan modifications can then be discerned before any materials are disturbed. Modifications should be noted for as-built documentation purposes.
    - Plans and associated documents should be maintained and updated as necessary by the OHV facility manager or designee. This documentation will assist in verifying compliance with the Soil Conservation Standard.
  
  - Compaction of Earth Materials
    - The degree of to which earth materials can be compacted is a function of soil type, soil moisture content, and compaction effort.
    - A natural surface that is to be compacted for construction purposes, and which may receive fill for compaction, must first be prepared prior to fill placement. Preparation, at a minimum, includes removing ground vegetation such as brush and grass and excavating below the roots of such plants. Soil that has abundant vegetative matter mixed with it should not be used as fill.
    - Prior to compaction, the moisture content of the soil should be assessed to determine if the soil moisture is at or near optimum for compaction purposes.

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- Soil will not compact if it is too wet or too dry. An informal method to determine if soil moisture content in a non-rocky soil is near optimum for compaction is to squeeze a handful of the soil. If the handful of soil becomes a clod that holds its shape and can be broken into two halves, moisture content is near optimum for compaction purposes. If the clod crumbles into several pieces, the soil is too dry. If the soil oozes through the fingers, the soil is too wet.
  - Soil moisture should be examined at several locations and depths. Under field conditions, soil moisture will vary by soil type, depth, and location. Slope angle and orientation, elevation, vegetation, shading, and surface drainage also influence soil moisture content.
  - Soils that consist of sand, or sand and rock, lack cohesion and so the above soil moisture test is not effective for these materials. Nonetheless, these soils drain well and compact well if used to fill a void, such as a steep-sided excavation.
  - Sand and sandy soil with rock should generally not be used for trail tread surfaces because the materials lack cohesion.
  - Assuming soil moisture is optimum, the exposed surface to be compacted should be scarified and compacted using appropriate equipment, such as a sheep's foot roller, the tire tread or track of heavy equipment, or vibrating pad backhoe attachment.
  - For the placement of compacted fill over a prepared surface, fill soil at or near its optimum moisture content should be spread onto the surface in "lifts" of six to eight inches, and compacted using appropriate equipment as described above.
  - Soil in lifts thicker than eight inches may not be compacted throughout the lift thickness. Lifts that are too thick can "bridge," where only the upper portion of the lift compacts. Over time, and with OHV traffic, fill with "bridged" lifts will settle, causing misalignment of the trail and low points, which create chronic drainage problems.
  - Soil compaction of each lift can be evaluated qualitatively and quantitatively. Compaction can be measured qualitatively using a soil probe or an L-shaped, two- to three-foot length of quarter-inch diameter steel rebar. The probe tip or rebar end at the top of the "L" is placed on the compacted soil surface. The person inspecting the fill compaction leans heavily on the probe crossbar or on the rebar. If the tip sinks more than 3 to 5 inches the fill should be excavated, moistened as needed, placed as a lift and recompacted.
  - Quantitative compaction testing entails first determining the maximum density of the soil that is compacted and then comparing that density with the density of the soil compacted in the field. Quantitative compaction testing of this sort requires use of equipment specified by the American Society of Testing and Materials (ASTM) and is usually performed under the supervision of a qualified engineering geologist or engineer. OHV trail projects in general do not need this level of compaction testing, but site conditions and proposed fill thicknesses may necessitate the supervision of a qualified professional and compaction testing according to ASTM standards.

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- Excess soil materials should be hauled to a suitable, stable location that is not directly upslope from a watercourse or other water body.
- Earth materials should not be cast over the downslope side of any trail or road.

DRAFT

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**APPENDIX 1: DEFINITIONS**

- 1713  
1714  
1715 All Terrain Vehicle (ATV): Any vehicle as defined by California Vehicle Code Section 111.  
1716  
1717 Beneficial Use: Uses of water as defined by Section 13050(f) of the Water Code and as  
1718 described in the applicable Water Quality Control Plan. FPRs, 2005, Title 14 CCR  
1719 895.1  
1720  
1721 Best Management Practices (BMPs): Methods, measures, or practices selected by an  
1722 agency to meet its non-point source control needs. BMPs include but are not limited to  
1723 structural and nonstructural controls and operation and maintenance procedures.  
1724 BMPs can be applied before, during, or after pollution-producing activities to reduce or  
1725 eliminate the introduction of pollutants into receiving waters. Ruffolo, 1999, California  
1726 Research Bureau, California State Library  
1727  
1728 Buffer: Land or physical barriers acquired or established contiguous to, or in the vicinity  
1729 of, existing or proposed off-highway motor vehicle recreational activities to protect plant  
1730 and wildlife habitat, soils, view sheds, or reduce noise and other effects on  
1731 development in the surrounding areas for the purpose of sustaining off-highway motor  
1732 vehicle recreation use.  
1733  
1734 CEQA: California Environmental Quality Act, Public Resources Code (PRC) Section  
1735 21000 et seq.; Title 14, California Code of Regulations (CCR) Article 20. CCR 4970,  
1736 2008, OHV Grants and Cooperative Agreements Program Regulations  
1737  
1738 Conservation: Activities, practices, and programs that sustain soil, plants, wildlife and  
1739 their habitat, and natural and cultural resources as referenced in PRC Sections  
1740 5090.10, 5090.35, and 5090.50.  
1741  
1742 Construction: The act of building or assembling using different parts, materials, or  
1743 elements in an ordered manner including, but not limited to physical barriers, trail  
1744 building, roads, facilities, hardening of stream crossings, fencing, sediment control  
1745 structures, and facilities landscaping.  
1746  
1747 Cultural Resources: Resources associated with events that have made a significant  
1748 contribution to the broad patterns of California's history and cultural heritage; are  
1749 associated with the lives of persons important in our past; embodies the distinctive  
1750 characteristics of a type, period, region, or method of construction, or represents the  
1751 work of an important creative individual, or possesses high artistic values; or has  
1752 yielded, or may be likely to yield, information important in prehistory or history. Cultural  
1753 resources also include Historical Resources. A resource shall be considered by the  
1754 lead agency to be "historically significant" if the resource meets the criteria for listing on  
1755 the California Register of Historical Resources. PRC Section 5024.1, Title 14 CCR,  
1756 Section 4852  
1757  
1758 Erosion: The wearing away of rock or soil by the detachment of soil or rock fragments by  
1759 water, wind, ice, and other mechanical and chemical forces. CARC 2006  
1760

- 1761 Erosion Controls: Drainage facilities, soil stabilization treatments, road and landing  
1762 (parking) area abandonment, removal and treatment of watercourse crossings, and  
1763 any other features or actions to reduce surface erosion, gully, channel erosion and  
1764 mass erosion. FPRs, 2005, CCR 895.1 Definitions  
1765
- 1766 Facility: An OHV trail, track, road, corridor, SVRA, open-ride area, staging area, parking  
1767 area (excluding structures). CARC 2006  
1768
- 1769 Grant: An award of funding to a local agency, educational institution or nonprofit  
1770 organization.  
1771
- 1772 Gully: An erosion channel cut into the soil along a line of water flow with a minimum depth  
1773 of 6 inches and cross-sectional area of one square foot. Schwab et al, 1993, Soil and  
1774 Water Engineering USDA, 1993, Soil Survey Manual; USDA, 1993, Soil Survey  
1775 Manual; and CDF Hillslope Monitoring Study  
1776
- 1777 Gully Erosion: Erosion of soil or soft rock materials by running water that forms distinct  
1778 channels generally greater than 6 inches deep and that usually carry water only during  
1779 and immediately after heavy rains or following the melting of ice or snow. Modified  
1780 from American Geological Institute, Glossary of Geology and CDF Hillslope Monitoring  
1781 Study  
1782
- 1783 Long-Term: At a minimum, 25 years.  
1784
- 1785 Maintenance: The work required to ensure effective and efficient use of physical facilities,  
1786 OHV recreational opportunities, and the protection of natural and cultural resources.  
1787
- 1788 Management: The coordinated implementation of budgeting, staffing, scheduling, design,  
1789 construction, maintenance, monitoring and restoration activities at an OHV facility, as  
1790 needed, combined with the effective utilization and coordination of resources, such as  
1791 capital, labor, materials, and the natural landscape, to achieve the soil conservation  
1792 standard, and to ensure effective and efficient use of OHV recreational opportunities  
1793 while protecting natural and cultural resources. Modified from CARC 2006  
1794
- 1795 Marsh: Flat, wet, treeless areas usually covered by standing water and supporting  
1796 grasses and grass-like plants. 1991 Soil Guidelines  
1797
- 1798 Monitoring: Data collection used by a land management agency and/or the Division to  
1799 make appropriate decisions.  
1800
- 1801 NEPA: National Environmental Policy Act pursuant to United States Code (U.S.C.) Title  
1802 42, Section 4371; 40 Code of Federal Regulations (CFR) part 1500.1 et seq. CCR  
1803 4970, 2008, OHV Grants and Cooperative Agreements Program Regulations  
1804
- 1805 Off-Highway Vehicle: An off highway motor vehicle as specified in CVC Section 38006  
1806 and street licensed motor vehicles while being used off-highway.  
1807

- 1808 Off-Site: Beyond the borders of the designated off-highway vehicle area. Off-site need  
1809 not mean transport onto land under a different ownership. 1991 Soil Guidelines  
1810
- 1811 Open Area or Open Ride Area: An expansive area used by off-highway vehicles, where  
1812 vehicle use is not limited to designated roads or trails. Established routes of travel  
1813 often exist or become established in Open Ride areas, but almost any portion of the  
1814 site may become impacted by off-highway vehicles at any time. 1991 Soil Guidelines  
1815
- 1816 Project: Work to be accomplished, either proposed or approved, with funding through an  
1817 OHV grant or cooperative agreement.  
1818
- 1819 Public Lands: Federal, state, county or city-owned or administered lands. 1991 Soil  
1820 Guidelines  
1821
- 1822 Recondition: To return a site to a functional condition. Modified from Webster's 10<sup>th</sup>  
1823 Edition Dictionary  
1824
- 1825 Repair: To fix, mend, make new, or revitalize to sound condition after being damaged.  
1826
- 1827 Restoration: Upon closure of an OHV unit or any portion thereof, the restoration of land to  
1828 the contours, the plant communities, and plant covers comparable to those on  
1829 surrounding lands, or at least those that existed prior to off-highway motor vehicle use.  
1830 PRC Section 5090.11  
1831
- 1832 Rill: An erosion channel cut into the soil along a line of water flow greater than 1 inch and  
1833 less than 6 inches deep. CDF Hillslope Monitoring Program  
1834
- 1835 Rill Erosion: The development of numerous closely spaced channels generally less than 6  
1836 inches deep that result from the uneven removal of surface soil by running water that is  
1837 concentrated in streamlets of sufficient volume to generate cutting power. Modified  
1838 from Glossary of Geology and CDF Hillslope Monitoring Study  
1839
- 1840 Riparian Area: The banks and other adjacent terrestrial environs of lakes, watercourses,  
1841 estuaries, and wet areas, where transported surface and subsurface freshwaters  
1842 provide soil moisture to support mesic vegetation. FPRs, 2005, 895.1  
1843
- 1844 Roads: Logging roads, service roads, and other roughly graded roads upon which  
1845 vehicular travel is permitted (CVC 38000).  
1846
- 1847 Route: A road, trail, course, or way for travel from one place to another. The American  
1848 Heritage Dictionary of the English Language, fourth Edition  
1849
- 1850 Sedimentation: The process by which soils, debris and other materials are deposited,  
1851 either on land or in water. CARC 2006  
1852
- 1853 Significant: Having a substantial or potentially substantial effect. CARC 2006  
1854
- 1855 Snowmobile: Any vehicle as defined in CVC 557.

- 1856  
1857 Soil: All unconsolidated materials above bedrock; the unconsolidated mineral or organic  
1858 material on the immediate surface of the earth that serves as a natural medium for the  
1859 growth of land plants; the unconsolidated mineral or organic matter on the surface of  
1860 the earth that has been subjected to and shows effects of genetic and environmental  
1861 factors of climate (including water and temperature effects), and macro-and  
1862 microorganisms, conditioned by relief, acting upon parent material over time. Soil  
1863 differs from the material from which it is derived in many physical, chemical, biological  
1864 and morphological properties and characteristics. American Geological Institute,  
1865 Glossary of Geology, 1997  
1866
- 1867 Soil Erosion: Detachment and movement of topsoil, or soil material from the upper part of  
1868 the profile, by the action of wind or running water, or as a result of changes brought  
1869 about by human activity. It includes: rill erosion, gully erosion, sheet erosion and wind  
1870 erosion. American Geological Institute, Glossary of Geology, 1997  
1871
- 1872 Soil Loss: Movement of soil material to a location where the soil cannot be reasonably  
1873 retrieved and/or recycled. CARC 2006  
1874
- 1875 Staging/Parking/Camping Areas: These areas include all sites (designated and  
1876 undesignated) that are used for these activities. Staging areas commonly include  
1877 areas to unload off-highway vehicles from trucks or trailers and areas to fuel, maintain,  
1878 and wash the vehicles during and after use. This includes areas in the vicinity of  
1879 restrooms and bulletin boards. 1991 Soil Guidelines  
1880
- 1881 Standard: Any definite rule, principle, or measure established by authority. Something  
1882 established by authority, custom, or general consent as a model or example (criterion);  
1883 something set up and established by authority as a rule for the measure of quantity,  
1884 weight, extent, value or quality. Webster's 9th New Collegiate Dictionary  
1885
- 1886 Stream: A natural watercourse as designated by a solid line or dash and three dots  
1887 symbol shown on the largest scale United States Geological Survey map most recently  
1888 published. FPRs, 2005, PRC section 4528 (f)  
1889
- 1890 Sustainability: Managing soil and crop cultural practices so as not to degrade or impair  
1891 environmental quality on or off-site, and without eventually reducing yield potential as a  
1892 result of the chosen practice through exhaustion of either on-site resources or  
1893 nonrenewable inputs. American Geological Institute, Glossary of Geology, 1997  
1894
- 1895 Sustainable: The facility is managed to meet the soil conservation standard for a  
1896 minimum service life of 25 years as defined by CCR 4970. CARC 2006  
1897 Track: A facility designed and constructed for confined use of races and practice riding.  
1898 1991 Soil Guidelines  
1899
- 1900 Trail: Any route that is not designated as a road. 1991 Soil Guidelines  
1901
- 1902 Volunteer Trail: A trail that was formed by the passage of vehicles and not built by earth  
1903 moving machines or hand tools. California State Parks

1904  
1905 Watercourse: Any well-defined channel with distinguishable bed and bank showing  
1906 evidence of having contained flowing water indicated by deposit of rock, sand, gravel,  
1907 or soil, including but not limited to, streams as defined in PRC 4528 (f). FPRs, 2005,  
1908 Title 14 CCR 895.1 Definitions  
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**APPENDIX 2: TRAIL CONDITION EVALUATION**

**Abbreviated Instructions for  
OHV Trail Condition Evaluation Form**

**I. Form Header Information**

Trail Name / No.

Enter name and/or number of the trail for the rated segment.

Vehicle Type

Circle one or more of the vehicle types, MC (motorcycle), ATV (all-terrain vehicle), or 4x4 (four wheel drive), or SM (snow mobile).

Trail Difficulty

Circle one of the trail difficulties, easiest, more difficult, most difficult.

USGS Quad

Enter the name of the USGS topographic map quadrangle on which the rated segment occurs.

Planning Watershed

Enter in either the name or the code for the CalWater (2.2) planning watershed in which the trail occurs (<http://www.ca.nrcs.usda.gov/features/calwater/> ).

Begin Segment

Enter the location where the rated segment starts. This could be a GPS file designation, a named trail junction, a milepost, etc.

End Segment

Enter the location where the rated segment ends. This could be a GPS file designation, a named trail junction, a milepost, etc.

Site Characteristics

Give a generic description of the site and soil-related conditions that exist along the trail.

Soil/Geology

Enter a brief description of the soil and/or geologic units on which the trail segment is located. Information can be provided from field observations by a qualified soil scientist or geologist, or it may be obtained from NRCS or USFS soils maps, geological publications listed in the California Geological Survey (CGS) geology/soils index and website, and other published and unpublished reports including various planning documents.

Vegetation

Enter a brief description of the primary vegetation present in the vicinity of the trail.

Range of Side Slopes

Circle the range of side slope percent (%) that the segment of trail crosses.

Trail Slope

Enter the average trail slope and the maximum trail slope in percent (%) for the segment evaluated.

Rating (GYR)

As the final step in completing the form, enter the recommended overall rating for the whole segment. Enter only one letter for the rating: a G, Y, or R.

GPS Ref

Enter the file name of the GPS record. Add location information following post-processing of the GPS record.

Rated By

Enter your name or initials as the rater.

Date

Enter the date the field observations were made and recorded.

Reviewed By

Signature of responsible official who reviewed and acted on the rating.

Date

Date reviewed by responsible official.

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Enter page number and total number of pages used to rate the segment.

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**II. Form Body Information**

Column 1 – Section: Begin – End

For features with a length dimension, enter the beginning and ending distance of that feature, e.g. 1200 feet to 1500 feet for a 300-foot feature. Distance can either be from an established reference point such as a trail marker (mile post) or intersection, or the GPS file designation for the beginning and ending points.

Column 2 - Section Length

Enter the length of the section being evaluated and note whether it is an estimate or has been measured.

Column 3 - Trail Slope

Enter the slope (grade) of the tread surface for the section evaluated as a percent (%) If the slope varies, enter the range followed by the slope most typical for the section in parentheses, e.g. 3 – 25% (6%).

Column 4 - Crossings

Facing downstream, every crossing has three primary components: the left approach (LA), the right approach (RA) and the channel section (CS). Enter a checkmark (✓ or X) in the column corresponding to the part of the crossing being evaluated, e.g. LA for left approach. Rate each component on a separate line. Rate each approach according to G7, Y7, or R7. Rate each channel section according to G8, Y8, or R8. Record the condition of all watercourse approaches even if the rating is a G7. This serves as documentation that the approach was evaluated.

	Approach Length (from last water break or drainage divide to channel)		
Trail Gradient	< 30 feet	30 – 150 feet	> 150 feet
< 8 %	G7	G7	Y7
8 – 20%	G7 or Y7	Y7 or R7	R7
> 20%	Y7 or R7	R7	R7

**Guidelines for Rating Approaches to Watercourse Crossings**

The key concept is sediment delivery. Where runoff water from a trail is drained onto a natural slope a long distance from a watercourse, most sediment is filtered out before it can reach a watercourse.

Column 5 - GYR Condition Codes

Enter the appropriate condition code using the Green, Yellow, Red indicators of trail conditions listed as guidelines. More detailed descriptions are presented in the expanded 2008 Soil Conservation Guidelines/Standards for OHV Recreation Management. Where variable conditions are encountered, the rater will have to use good judgment using the condition codes as an overall guide. Additional details can be written in the comments section of the form.

Column 6 - Cause Codes

Using the cause codes provided as guidelines, enter a cause code for each trail section where a condition code was entered in Column 5. More detailed cause code descriptions are presented in the expanded 2008 Guidelines/Standards. Most trail condition problems have multiple causes. Generally, one to three causes, listed in order of importance, will be enough to describe the problem. If the cause of an observed condition is unique, then describe that cause in the comments column. A cause code combined with a GYR condition code will usually both describe the problem and identify a treatment.

Column 7 – Comments

Record observations and recommendations not captured by the basic codes, including unique non-repeatable data.

Column 8 – Photograph Number (s)

Enter the identification number(s) for photographs taken of the evaluated section. As a minimum, one photo should be taken for each section given a Red condition code. If the entire trail segment has been rated Green, take at least one photograph of a representative section of the trail segment.

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040

## OHV Trail Condition Evaluation Code Key

	Green		Yellow		Red
G1	<b>Water control</b> is provided by enough functional water breaks to divert runoff from the trail before it has the volume and velocity to cause erosion. Where present, rills occur on less than 1/3 of the distance between water breaks.	Y1	Water breaks do not divert all runoff from the trail because they are nearly filled to capacity and/or are partially breached, or spaced too widely. Where present, rills occur on more than 1/3 of the distance between water breaks	R1	Water breaks no longer divert runoff from the trail because they are full and/or have been breached, or are absent or spaced too widely. Gully or rill erosion may be present.
G2	No accelerated <b>erosion off-trail</b> . Runoff at water break outlets and on slopes adjacent to the trail is dispersed effectively. Vegetation or litter filters all sediment.	Y2	Rill erosion and/or sediment deposition occurs at water break outlets and/or on slopes adjacent to the trail. All sediment is filtered or deposited before it reaches a watercourse.	R2	Gully erosion occurs at water break outlets or on slopes adjacent to the trail and/or sediment is transported to a Type I or Type II watercourse.
G3	<b>Sediment traps</b> , where present, are functional and have adequate capacity for at least one season of use. Trapped sediment can be retrieved during normal maintenance.	Y3	Where present, most sediment traps are full or nearly full, but still functional. Most trapped sediment can be retrieved during normal maintenance.	R3	Where present, sediment traps have been breached and have a plume of sediment and/or a gully below the breach. Most sediment cannot be retrieved.
G4	<b>Tread wear</b> is minimal. Tread is generally incised less than 6 inches. Tread wear is generally evident on less than 1/3 of the distance between water breaks or on less than 1/3 of the tread width.	Y4	Tread wear is evident. Tread is generally incised 6 to 12 inches and tread wear is generally evident on more than 1/3 the distance between water breaks and on more than 1/3 of the tread width.	R4	Tread wear is severe. Tread incision is generally greater than 12 inches deep and tread wear is generally evident on the entire distance between water breaks.
G5	<b>Tread width</b> is generally no greater than 1.5 times the design width for the designated use.	Y5	Tread width is generally greater than 2 times the design width for the designated use and appears to be increasing.	R5	Tread width is generally greater than 3 times the design width for the designated use and has caused or is causing erosion, sedimentation, and damage to vegetation.
G6	<b>Off-trail travel</b> is limited to single tracks or single passes generally less than 300 feet long. Tracks are not eroded and have little effect on water control.	Y6	Off-trail travel is common, well defined, and generally greater than 300 feet long. Water control is inadequate and some erosion is apparent.	R6	Off-trail travel has caused severe resource damage, gully erosion, eroded hill climbs, or extensive damage to vegetation and/or sensitive habitat.
G7	<b>Approach to watercourse crossing</b> is short and has a gentle gradient. Tread is stable, shows little evidence of erosion, and is at design width. No damage to riparian vegetation outside the tread.	Y7	Approach to watercourse crossing is short and steep or long and gentle. Tread may show some evidence of erosion and may show evidence of widening. Minimal damage to riparian vegetation.	R7	Approach to watercourse crossing is both steep and long and/or tread is unstable and shows evidence of accelerated erosion. Approach may be widening and damaging riparian vegetation.
G8	<b>Channel Section</b> has only minor channel widening, minor bank erosion, no bars.	Y8	Channel Section has widened moderately, modest bank erosion, modest lateral and/or mid-channel bars.	R8	Channel Section has widened significantly, extensive bank erosion, large lateral and mid-channel bars.
G9	<b>Outboard Fill</b> is stable. Exhibits minor surficial sloughing without sediment transport	Y9	Outboard Fill is distressed. Exhibits cracking and Moderate sloughing w/ limited sediment transport.	R9	Outboard Fill has failed and sediment is moving down slope.
<b>CAUSE CODES</b>		<b>CAUSE CODES</b>			
<b>C1</b>	Water breaks not constructed to design standards	<b>C11</b>	Rocks or roots exposed in tread		
<b>C2</b>	Water break spacing is too wide for conditions	<b>C12</b>	Barriers (natural or constructed) to control traffic are lacking		
<b>C3</b>	Cascading runoff from a trail or road upslope	<b>C13</b>	Mechanical erosion makes maintenance ineffective		
<b>C4</b>	Cascading runoff from an impervious surface upslope	<b>C14</b>	Storm intensity unusual or unique for the area		
<b>C5</b>	Wet area caused by a seep or spring	<b>C15</b>	Design / construction prevents effective drainage		
<b>C6</b>	Excess soil moisture at time of use	<b>C16</b>	Uncompacted sidecast on outboard slope		
<b>C7</b>	Trail section is poorly located (describe)	<b>C17</b>	Berms, Whoops, and stutter bumps		
<b>C8</b>	Trail gradient is too steep for the type and/or amount of use occurring	<b>C18</b>	Crossing alters channel dimensions and/or stream gradient.		
<b>C9</b>	Segment is not designated or designed for the type or amount of use occurring	<b>C19</b>	Rutting or vegetation damage to meadow, spring, wet area, riparian area		
<b>C10</b>	Trail Blockage, e.g. brush, logs, rockfall, landslide	<b>C20</b>	Trail design or layout facilitates condition.		

**APPENDIX 3: MAINTENANCE AND EVALUATION OF TRAIL CONDITIONS**

**Mechanized Construction - Maintenance Checklist**

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Trail Name \_\_\_\_\_ Trail No. \_\_\_\_\_ Segment No. \_\_\_\_\_

Trail Difficulty easiest more difficult most difficult Max Trail Slope \_\_\_% Ave Trail Slope \_\_\_%

Activity: maintenance reconditioning new construction Side Slope: \_\_\_%

Drainage: Outslope Rolling Dip Confined Flat Other \_\_\_\_\_

Equipment: Hand Trail Tractor Mini-excavator Other \_\_\_\_\_

Soil Type: clayey loamy sandy Rock Fragments (%): <15 15-50 >50

Soil Depth: shallow deep Vegetation Type: \_\_\_\_\_ Photo Numbers: \_\_\_\_\_

Operator \_\_\_\_\_ Assistant(s) \_\_\_\_\_ Date \_\_\_\_\_

Last Maintenance (mo/yr) \_\_\_\_\_ Maintenance Type : Hand Mechanical

Notes: \_\_\_\_\_

Guideline	Yes	No	N/A
1. This checklist was reviewed before starting maintenance or construction on this trail			
2. Prior to mobilization the completed OHV Trail Condition Evaluation Forms were reviewed and trail segments, sections, or features needing maintenance or reconditioning were confirmed.			
3. Equipment was operated by certified operators, or under direct supervision of certified operator			
4. If new, this trail was constructed to Guidelines			
5. OHV rolling dips were constructed/maintained by compacting moist soil in lifts no greater than 4 inches loose thickness			
6. Prior to mobilization, need for maintenance with mechanical equipment was validated			
7. The blade was lifted and the equipment walked across sections of trail that needed no maintenance			
8. Soil collected in rolling dip outlets was recycled into rolling dip structures or back onto the trail tread			
9. Berms were worked back into the trail tread, not bladed off the trail as sidecast			
10. Rills and gullies in treads were repaired with soil reclaimed from rolling dip outlets or from outside berms, not by blading the trail tread			
11. Soil sloughed from cutbanks or sideslopes above the trail was bladed only as needed to maintain a safe trail; cutbanks were not bladed into or undercut			
12. Whoops and stutter (braking) bumps were repaired by ripping, blading, and compacting trail treads when soil was moist (except for non-cohesive soils)			
13. The amount of soil moved was the smallest amount needed to meet the maintenance objective			
14. Where soil was too dry for compaction, maintenance was deferred or done by hand			

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If "no" is checked, enter a footnote number and write a brief explanation under comments.

Comments: \_\_\_\_\_

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