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21. Water Source Development Consistent with Water Quality Protection (PRACTICE: 2-21)

a. Objective: To supply water for road construction and maintenance, fire protection, and other management activities, while maintaining existing water quality.

b. Explanation: Water source development is needed to supply water for road construction and maintenance, dust control, and fire control. Problems may arise when cofferdams or water holes are built in streams. Protection of exposed surfaces of water holes or other improvements is necessary to prevent stream banks from eroding, and ultimately discharging sediment back into the waterway. Contaminants from water drafting equipment,

Comment [DB1]: Something missing. Water drafting equipment pose potential risk of contaminants to water quality. Consider moving to next paragraph.

In addition to erosion of water source developments, degradation of water quality can occur at the water source approach, through introduction of sediment and contaminants into waterways as a result of access and equipment filling operations. All can alter water quality, water yield, runoff regimes, natural channel geomorphic processes, and fish and wildlife habitats.

Comment [DB2]: Good

Water sources designed for permanent installation, such as piped diversions to off-site storage, are preferred over temporary, short term use developments.

c. Implementation: Critical to the effectiveness of this practice is the coordination of engineering representatives, hydrologists, fishery biologists, and permit and sale administrators. Locate existing developments, or proposed streams, and evaluate for feasibility of use, determine scope and scale of environmental risks, selection of techniques to utilize to mitigate disturbance to water quality, and compare with the economics of development and use. Projects incorporate a list of BMP's to implement, with Line Officer signature and date. Erosion control plan includes measures to protect water quality at water source development and/or use sites.

Comment [DB3]: Distinguish between permanent and temporary water source developments. Permanent structures require more geomorphic design and analysis than temporary drafting structures. Temporary in-channel structures and access road require removal and geomorphic restoration after service to avoid potential long term water quality impact.

In many cases watering holes become de facto camping sites that can bring a host of water quality problems.

Every site is unique, and requires techniques customized to the site for the BMP to be most effective. Techniques include, but are not limited to:

Comment [TU4]: Aren't BMPs developed to avoid the need for mitigation?

Comment [TU5]: Reference source

- Water supply sources are located and developed with the intent of permanency whenever possible. Convenience by developing additional water sources is weighed against degree of degradation of water quality from that development.
- Materials that minimize sediment disturbance and contamination, in the development, use, and removal of improvements are utilized.
- Disturbance of adjacent vegetation is minimized to the extent possible, with intent to encourage vegetation recovery after source development and/or use.
- Earth fill for impoundment construction has protective surface materials, such as plastic liner or filter cloth for temporary sources, and sandbags with clean sand and gravels, or more permanent methods for long term use of water source developments.

Comment [DB6]: Earth fill impoundments should only be considered for temporary structures and NOT permanent structures. All stabilization methods proposed only offer a minimal factor of safety, all eventually fail and put unnatural material (garbage) in the water and distributed down stream.

- Natural stream flow is maintained while diversion is being constructed, for aquatic life protection.
- Screens of appropriate size opening are installed to prevent mature and juvenile organisms from entering [pump] intakes.
- Conveyances are designed and constructed to carry intended flows, without collapse or failure.
- Releases from developed water source into natural stream flow are controlled to prevent sediment discharge and erosion at the re-entry point.
- Access approaches are located as close to perpendicular as possible to prevent stream bank excavation.
- Access approaches are stabilized with appropriate materials, dependent on expected life and use frequency of the developed water source.
- Equipment accessing water sources is free of contaminants.
- BMP Implementation may be incorporated as a pay item in contracts.
- Erosion Control Plan is developed jointly with engineers, hydrologists, and fish biologists. It is included in all work and activities, and implementation of the plan is ensured by COR, ER, Permit or Sale Administrator, crew supervisor, and project manager, depending on type of project.
- Existing water source developments that are to be restored follow the same techniques as for new development.
- Use of commercial water sources is encouraged.

Water source development associated with roads follows FP-03 Edition of Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects (FP-03), Section 209 – Structure Excavation and Backfill.

BMP Implementation is considered as a pay item in contracts, rather than incidental to construction and maintenance. For all projects, contract and otherwise, BMP implementation is evaluated with multi-disciplinary team, and with Line Officer, to understand practices that were successful as well as to learn from those that were less than successful and to make improvements for future implementation.

Comment [DB7]: Permanent diversion intakes require maintenance, consider seasonal in stream use.

Comment [DB8]: Potential erosion and sediment discharge from water source releases will be controlled all along the route from source to re-entry point.

Comment [DB9]: Access approaches are located to minimize stream bank excavation and avoid potential stream diversion in compliance with Practice:2-4 and 2-7.

Comment [DB10]: If temporary, access road will be removed or decommissioned in accordance to geomorphic restoration principles.

Comment [DB11]: How does this fit the majority of cases? Unless all water source developments are required to install a concrete dam or only located at road crossings with modified drop inlets most of this section won't apply.

In stream water source developments are subject to debris loading from natural and anthropomorphic changes in their watershed. The most "stable" and effective water source development s, requiring less maintenance, are those designs that mimic geomorphic function.