

Best Management Practices

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Best Management Practices and Rationale
for Activities within State Protected Surface Waters
Early Draft

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Purpose

This technical paper is the fifth in a series of five papers written by the Arizona Department of Environmental Quality (ADEQ) to support stakeholder engagement during the adoption of Arizona's State Surface Water Protection Program (SWPP). This paper is not policy. The SWPP papers are intended to be problem-solving artifacts to assist ADEQ in gathering information related to filing a Notice of Proposed Rulemaking (NPRM) for the SWPP. ADEQ believes that these papers will focus public engagement on the scientific basis for agency decisions and drive productive conversations regarding SWPP implementation.

Specifically, this paper will outline the best management practices ADEQ will recommend to maintain water quality standards in non-WOTUS protected surface waters. At a high level this paper addresses:

- The statutory requirements for BMPs.
- Recommended BMPs for rulemaking.

This is an early draft of this specific technical paper and it does not include ADEQ's final conclusion. That majority of this paper has been produced by an ADEQ contractor, WestLand Engineering & Environmental Associates and reformatted into a familiar

Introduction

The Arizona Department of Environmental Quality (ADEQ) engaged WestLand Engineering & Environmental Associates (WestLand) to identify best management practices (BMPs) that would conform with the requirement in A.R.S. § 49-255.05. Specifically, the statute requires the identification of appropriate BMPs to be used when working within the ordinary high water mark (OHWM) of intermittent or perennial non-WOTUS protected surface waters ("state protected surface waters"), or within the bed and bank of surface waters that materially impact state protected surface waters.¹

¹ § 49-255.04. Special provisions for discharges to non-WOTUS protected surface waters.

C. "...The director shall use a best management practices approach when issuing and implementing general permits for storm water discharges from industrial or construction activity to non-WOTUS protected surface waters and may include analytical monitoring and discharge limits if best management practices cannot achieve applicable surface water quality standards.

§ 49-255.05. Best management practices for activities within non-WOTUS.

A. The director shall adopt by rule best management practices and notification requirements to ensure that the activities prescribed in this section do not violate applicable surface water quality standards. The director may include only those best management practices that extend to:

1. Activities conducted within the ordinary high water mark of perennial or intermittent non-WOTUS protected surface waters.
2. Activities conducted within the bed and banks of waters that materially impact downstream non-WOTUS protected surface waters. The director shall determine through rulemaking what constitutes a material impact and that rulemaking shall be based on factors that include distance and topography.

In a previous memorandum (dated June 30, 2021), WestLand described a list of BMPs that had been informed by the list of recommended BMPs developed by ADEQ for Clean Water Act (CWA) Section 401 state water quality certification in Arizona. This memorandum revisits that BMP list and offers appropriate rationale for inclusion of the listed BMPs. During the SWPP rulemaking, ADEQ must develop:

1. Rules establishing BMPs for various activities enumerated in §49-255.05.
2. Notification requirement to ensure that activities enumerated in §49-255.05 do not violate applicable surface water quality standards.

Best Management Practices

The BMPs described below are intended to ensure that activities within the OHWM of state protected surface waters, or within the bed and bank of surface waters that materially impact state protected surface waters, do not cause or contribute to an exceedance of an Arizona surface water quality standard (SWQS).

Erosion and Sediment Control BMPs

The most common pollutant associated with construction activities is sediment, and ADEQ has identified multiple stream reaches in Arizona that are impaired or otherwise non-attaining for designated uses due to exceedances of total suspended solids. Excess sediment loads can result in deleterious alterations of downstream geomorphology and decrease the quality of water for aquatic wildlife and human consumption. The BMPs included in this section are intended to minimize or reduce the erosion and downstream deposition of sediment.

- When flow is present in any state protected surface waters within the project area, flow will not be altered except to prevent erosion or pollution of any state protected surface waters.
 - *Applicable activities:* bank protection, bridge construction, etc.
 - *Rationale:* Stream flow alterations have the potential to expose portions of the bed and banks to higher velocity flows than would have been experienced under natural conditions, resulting in greater scour and erosion. Similarly, redirected flows may result in the uptake of pollutants that might not have otherwise been exposed to natural flows. This BMP requires that stream flow alteration be utilized only to prevent erosive effects or the introduction of pollutants to the receiving water.

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3. Activities that are not already regulated under this title.

B. The director may not adopt best management practices and notification requirements for the following:

1. Discharges to a non-WOTUS protected surface water incidental to a recharge project.
2. Established or ongoing farming, ranching and silviculture activities such as plowing, seeding, cultivating, minor drainage or harvesting for the production of food, fiber or forest products or upland soil and water conservation practices.
3. Maintenance but not construction of drainage ditches.
4. Construction and maintenance of irrigation ditches.
5. Maintenance of structures such as dams, dikes and levees.

- Any disturbance within the OHWM of state protected surface waters should be stabilized as soon as practicable to prevent erosion and sedimentation.
 - *Applicable activities:* any activities requiring earth-moving equipment within the OHWM. – *Rationale:* Prevention of sediment pollution is most effectively achieved through early stabilization of disturbed areas. Non-stabilized areas have the potential to continue contributing eroded sediments to downstream stream reaches.
- As necessary, measures will be taken to prevent upland, adjacent approaches to/from any state protected surface waters (i.e., for low water crossings) from causing erosion or contributing sediment to any state protected surface waters.
 - *Applicable activities:* road crossings.
 - *Rationale:* Road crossings, particularly for unpaved roads, are often accomplished by pushing bank material across the drainage. In general, road approaches should be developed by laying back the bank in the adjoining uplands to minimize the volume of erodible unconsolidated sediment within the state protected surface waters.
- When flow in any state protected surface waters in the work area is sufficient to erode, carry, or deposit material, activities within state protected surface waters should cease until: 1) the flow decreases below the point where sediment movement ceases; or 2) control measures have been undertaken, i.e., equipment and materials easily transported by flow are protected within non-erodible barriers or moved outside the flow area.
 - *Applicable activities:* all construction activities within the OHWM.
 - *Rationale:* Low stream flows have commensurately less erosive power than higher stream flows, and if flows are low enough that sediment transport and deposition are absent, then construction activities may continue.
- Silt laden or turbid water resulting from activities should be managed in a manner to reduce sediment load prior to discharging so as not to exceed SWQS.
 - *Applicable activities:* all activities that have the potential to loosen the soil matrix and mobilize sediment in stream flows.
 - *Rationale:* Water with elevated sediment load may be maintained in place or otherwise managed to drop out sediments in place prior to continuing downstream.
- Any washing or dewatering of fill material should occur outside of any state protected surface waters prior to placement and the rinsate from such washing should be settled, filtered, or otherwise treated to prevent migration of pollutants (including sediment) into any state protected surface waters. Other than the replacement of native fill or material used to support vegetation rooting or growth, fill placed in locations subject to scour must resist washout whether such resistance is derived via particle size limits, presence of a binder, vegetation, or other armoring.
 - *Applicable activities:* all activities that require fill within state protected surface waters.
 - *Rationale:* Placement of fill material within OHWM must consider not only scouring effects during high flow conditions, but low flow conditions as well. Improperly placed fill for vegetation growth has the potential to become a downstream pollutant.

Pollutant Management BMPs

The suite of BMPs described in this section are intended to provide good pollutant management practices during construction activities to minimize the potential discharge of pollutants to state protected surface waters and the potential for SWQS exceedances.

- If activities within state protected surface waters are likely to cause or contribute to an exceedance of SWQS, operations should cease until the problem is resolved or until control measures have been implemented.
 - *Applicable activities:* any construction related activities within state protected surface waters.
 - *Rationale:* The purpose of the BMP program is to avoid SWQS exceedances.
- Construction material and/or fill (other than native fill or that necessary to support revegetation) placed in any state protected surface waters, will not include pollutants in concentrations that will cause or contribute to a violation of a SWQS.
 - *Applicable activities:* All activities requiring fill within the OHWM.
 - *Rationale:* Pollutants in fill material have the potential to be released into the downstream environment, and when those pollutant concentrations are elevated, the potential for release is greater. By ensuring that pollutant concentrations in fill material are minimized, the potential for release and SWQS violation is reduced.
- Barriers, covers, shields, and other protective devices will be erected as necessary to prevent any construction materials, equipment, or contaminants/pollutants from falling, being thrown, or otherwise entering any state protected surface waters.
 - *Applicable activities:* construction activities that include storage or staging of pollutant generating materials or equipment in adjoining uplands.
 - *Rationale:* This BMP is intended to prevent the inadvertent (e.g., wind-blown) introduction of pollutants to state protected surface waters.

Construction Phase BMPs

Similar to the pollutant management BMPs described above, the construction phase BMPs provide good management practices for construction period activities to minimize adverse effects to state protected surface waters.

- Equipment staging and storage areas should not be located within any state protected surface waters. Similarly, fuel, oil, and other petroleum product storage and solid waste containment should not be located within any state protected surface waters.
 - *Applicable activities:* Construction related activities utilizing staged or stored equipment.
 - *Rationale:* By storing these materials and equipment in upland areas, the potential for pollutant release to surface waters is minimized.
- Any equipment maintenance, washing, or fueling cannot be done within any state protected surface waters with the following exception: equipment too large or unwieldy to be readily moved, such as large cranes, may be fueled and serviced in the state protected surface waters (but outside of standing or flowing water) provided material specifically manufactured and sold as spill containment is in place during fueling/servicing. All equipment should be inspected for leaks, all leaks should be repaired, and all repaired equipment will be cleaned to remove any fuel or other fluid residue prior to use within (including crossing) any state protected surface waters.
 - *Applicable activities:* construction related activities utilizing equipment requiring maintenance, washing, or fueling, and those activities requiring the use of particularly large equipment such as cranes.
 - *Rationale:* To the extent practicable, activities that have the potential to add vehicle and equipment related pollutants (e.g., petroleum products, vehicle fluids, etc.) should be conducted away from surface waters. However, for some large equipment, demobilizing from the project area is not practicable, and the use of best management practices can minimize the potential for pollutant discharge in these cases.

- Washout of concrete handling equipment must not take place within any state protected surface waters.
 - *Applicable activities:* any activities utilizing poured concrete.
 - *Rationale:* Concrete may contain elevated metals and is generally caustic in nature (i.e., has an elevated pH) which may adversely affect the downstream ecosystem.

Post Construction BMPs

While construction period activities have potential to release pollutants to state protected surface waters, consideration must also be given to the post-construction condition. The BMPs presented in this section address the condition of the activity area once the construction activities have been completed.

- Upon completion of activities, areas within any state protected surface waters should be promptly cleared of all forms, piling, construction residues, equipment, debris, or other obstructions.
 - *Applicable activities:* all construction related activities.
 - *Rationale:* Any nonessential equipment or materials left in the construction area after cessation of construction activities have the potential to continue to contribute pollutants to receiving waters.
- If fully, partially, or occasionally submerged structures are constructed of cast-in-place concrete instead of pre-cast concrete, steps will be taken using sheet piling or temporary dams to prevent contact between water (instream and runoff) and the concrete until it cures and until any curing agents have evaporated or are no longer a pollutant threat.
 - *Applicable activities:* activities requiring poured concrete, e.g., bank protection, bridge construction.
 - *Rationale:* Concrete may have elevated metals and is generally caustic in nature (i.e., has an elevated pH) which may adversely affect the downstream ecosystem.
- Any permanent state protected surface water crossings (other than fords) should not be equipped with gutters, drains, scuppers, or other conveyances that allow untreated runoff (due to events equal to or lesser in magnitude than the design event for the crossing structure) to directly enter state protected surface waters if such runoff can be directed to a local stormwater drainage, containment, and/or treatment system.
 - *Applicable activities:* road crossings, bank protection, or other structures associated with development.
 - *Rationale:* Diversion of stormwater into a local stormwater management system allows retention and evaporation, or treatment for potential pollutants, prior to discharge to a state protected surface water.
- Debris will be cleared as needed from culverts, ditches, dips, and other drainage structures in any state protected surface waters to prevent clogging or conditions that may lead to a washout.
 - *Applicable activities:* road crossings, bank protection, or other activities using structures associated with development.
 - *Rationale:* Conveyances clogged with debris increase the risk of flooding and structural failure, thereby increasing the risk of excessive sediment and pollutant load downstream.
- Temporary structures constructed of imported materials are to be removed no later than upon completion of the noticed activity (“noticed activity” referring to those activities that require notice to ADEQ).
 - *Applicable activities:* road crossings, bank protection, or other structures

- associated with development.
 - *Rationale*: Any nonessential temporary structures left in the construction area after cessation of construction activities have the potential to continue to contribute pollutants to receiving waters.
- Temporary structures constructed of native materials, if they provide an obstacle to flow, or can contribute to or cause erosion, or cause changes in sediment load, are to be removed no later than upon completion of the noticed activity.
 - *Applicable activities*: temporary diversion dikes.
 - *Rationale*: Any nonessential temporary structures left in the construction area after cessation of construction activities have the potential to continue to contribute pollutants to receiving waters.

Design Consideration BMPs

Even before entering the field to begin construction activities in state protected surface waters, consideration should be given to designs that may reduce or minimize the potential for construction activities to contribute pollutants to the receiving waters.

- All temporary structures constructed of imported materials and all permanent structures, including but not limited to, access roadways, culvert crossings, staging areas, material stockpiles, berms, dikes, and pads, should be constructed so as to accommodate overtopping and resist washout by streamflow.
 - *Applicable activities*: those activities resulting in a temporary or permanent structure within state protected surface waters, including but not limited to, access roadways, culvert crossings, staging areas, material stockpiles, berms, dikes, and pads.
 - *Rationale*: Structures that are overtopped increase the risk of structural failure and washout, thereby increasing the risk of excessive sediment and pollutant load downstream.
- Any temporary crossing, other than fords on native material, should be constructed in such a manner so as to provide armoring of the stream channel. Materials used to provide this armoring should not include anything easily transportable by flow. Examples of acceptable materials include steel plates, untreated wooden planks, pre-cast concrete planks or blocks; examples of unacceptable materials include clay, silt, sand, and gravel finer than cobble (roughly fist-sized). The armoring must, via mass, anchoring systems, or a combination of the two, resist washout.
 - *Applicable activities*: temporary road crossings.
 - *Rationale*: Use of proper armoring reduces the risk of erosion or washout and the attendant downstream increase in sediment and pollutant load.

Conclusion

ADEQ is seeking comment on the proposed BMP's early in the technical paper drafting process. If you have any question or comments about this paper, please contact ADEQ at:

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Best Management Practices for Activities within non-WOTUS Protected Surface Waters

Prepared for: Arizona Department of Environmental Quality

Prepared by: WestLand Resources, Inc.

Date: June 30, 2021

Project No.: 2289.01

I. INTRODUCTION

WestLand Resources, Inc. (WestLand) was engaged by the Arizona Department of Environmental Quality (ADEQ) to support the identification of best management practices (BMPs) in conformance with Part 49-255.05 of House Bill 2691. Specifically, the bill requires the identification of appropriate BMPs to be used when working within the ordinary high water mark (OHWM) of intermittent or perennial non-waters of the U.S. (non-WOTUS) protected surface waters, or within the bed and bank of surface waters that materially impact non-WOTUS protected surface waters.

The list of BMPs provided in the following section was informed by the list of recommended BMPs developed by ADEQ for Clean Water Act (CWA) Section 401 state water quality certification in Arizona. These BMPs are focused on activities conducted within non-WOTUS protected surface waters themselves and not on adjacent uplands.

Included in Attachment 1 of this memorandum are examples of the types of structural controls that may be utilized to meet the intent of the BMPs described below.

2. BEST MANAGEMENT PRACTICES

The BMPs presented in this section are intended to ensure that activities within the OHWM of intermittent or perennial non-WOTUS protected surface waters (or within the bed and bank of surface waters that materially impact non-WOTUS protected surface waters) do not cause or contribute to an exceedance of an Arizona surface water quality standard (SWQS).

2.1. EROSION AND SEDIMENTATION CONTROL BMPs

- When flow is present in any non-WOTUS protected surface waters within the project area, flow will not be altered except to prevent erosion or pollution of any non-WOTUS protected surface waters (see, for example, Figure 1 in Attachment 1).

- *Applicable activities*: bank protection, bridge construction
- Any disturbance within the OHWM of non-WOTUS protected surface waters, that is not intended to be permanently altered, should be stabilized to prevent erosion and sedimentation.
 - *Note*: Unconsolidated sediments may result from any activities requiring earth-moving equipment within the OHWM.
- As necessary, measures will be taken to prevent approaches to any non-WOTUS protected surface waters crossing from causing erosion or contributing sediment to any non-WOTUS protected surface waters (see, for example, Figures 2 and 3 in Attachment 1).
 - *Note*: Road crossings, particularly for unpaved roads, often involve pushing bank material across the drainage. Road approaches should instead involve bank lay back to minimize the volume of unconsolidated sediment within the non-WOTUS protected surface waters.
- When flow in any non-WOTUS protected surface waters in the work area is sufficient to erode, carry, or deposit material, activities within non-WOTUS protected surface waters should cease until:
 - The flow decreases below the point where sediment movement ceases; or
 - Control measures have been undertaken, i.e., equipment and materials easily transported by flow are protected within non-erodible barriers or moved outside the flow area.
- Silt laden or turbid water resulting from activities should be managed in a manner to reduce sediment load prior to discharging so as not to exceed SWQS (see, for example, Figure 4 in Attachment 1).
 - *Applicable activities*: all activities that have the potential to loosen the soil matrix and mobilize sediment in stream flows.
- Any washing or dewatering of fill material should occur outside of any non-WOTUS protected surface waters prior to placement and the rinsate from such washing should be settled, filtered, or otherwise treated to prevent migration of pollutants (including sediment) into any non-WOTUS protected surface waters. Other than the replacement of native fill or material used to support vegetation rooting or growth, fill placed in locations subject to scour must resist washout whether such resistance is derived via particle size limits, presence of a binder, vegetation, or other armoring.

- *Applicable activities*: all activities that require fill within non-WOTUS protected surface waters.

2.2. POLLUTANT MANAGEMENT BMPs

- If activities within non-WOTUS protected surface waters are likely to cause or contribute to an exceedance of SWQS, operations should cease until the problem is resolved or until control measures have been implemented.
- Construction material and/or fill (other than native fill or that necessary to support revegetation) placed in any non-WOTUS protected surface waters, will not include pollutants in concentrations that will cause or contribute to a violation of a SWQS.
- Barriers, covers, shields, and other protective devices will be erected as necessary to prevent any construction materials, equipment, or contaminants/pollutants from falling, being thrown, or otherwise entering any non-WOTUS protected surface waters.

2.3. CONSTRUCTION PHASE BMPs

- Equipment staging and storage areas should not be located within any non-WOTUS protected surface waters. Similarly, fuel, oil, and other petroleum product storage and solid waste containment should not be located within any non-WOTUS protected surface waters.
- Any equipment maintenance, washing, or fueling cannot be done within any non-WOTUS protected surface waters with the following exception: equipment too large or unwieldy to be readily moved, such as large cranes, may be fueled and serviced in the non-WOTUS protected surface waters (but outside of standing or flowing water) provided material specifically manufactured and sold as spill containment is in place during fueling/servicing. All equipment should be inspected for leaks, all leaks should be repaired, and all repaired equipment will be cleaned to remove any fuel or other fluid residue prior to use within (including crossing) any non-WOTUS protected surface waters.
- Washout of concrete handling equipment must not take place within any non-WOTUS protected surface waters.

2.4. POST-CONSTRUCTION BMPs

- Upon completion of activities, areas within any non-WOTUS protected surface waters should be promptly cleared of all forms, piling, construction residues, equipment, debris, or other obstructions.

- If fully, partially, or occasionally submerged structures are constructed of cast-in-place concrete instead of pre-cast concrete, steps will be taken using sheet piling or temporary dams to prevent contact between water (instream and runoff) and the concrete until it cures and until any curing agents have evaporated or are no longer a pollutant threat.
 - *Applicable activities:* bank protection, bridge construction
- Any permanent non-WOTUS protected surface water crossings (other than fords) should not be equipped with gutters, drains, scuppers, or other conveyances that allow untreated runoff (due to events equal to or lesser in magnitude than the design event for the crossing structure) to directly enter non-WOTUS protected surface waters if such runoff can be directed to a local stormwater drainage, containment, and/or treatment system.
 - *Applicable activities:* road crossings, bank protection, or other structures associated with development
- Debris will be cleared as needed from culverts, ditches, dips, and other drainage structures in any non-WOTUS protected surface waters to prevent clogging or conditions that may lead to a washout.
- Temporary structures constructed of imported materials are to be removed no later than upon completion of the noticed activity.
- Temporary structures constructed of native materials, if they provide an obstacle to flow, or can contribute to or cause erosion, or cause changes in sediment load, are to be removed no later than upon completion of the noticed activity.
 - *Applicable activities:* temporary diversion dikes

2.5. DESIGN CONSIDERATION BMPs

- All temporary structures constructed of imported materials and all permanent structures, including but not limited to, access roadways, culvert crossings, staging areas, material stockpiles, berms, dikes, and pads, should be constructed so as to accommodate overtopping and resist washout by streamflow.
- Any temporary crossing, other than fords on native material, should be constructed in such a manner so as to provide armoring of the stream channel. Materials used to provide this armoring should not include anything easily transportable by flow. Examples of acceptable materials include steel plates, untreated wooden planks, pre-cast concrete planks or blocks; examples of

unacceptable materials include clay, silt, sand, and gravel finer than cobble (roughly fist-sized). The armoring must, via mass, anchoring systems, or a combination of the two, resist washout (see, for example, Figures 2 and 3 in Attachment 1).

3. OTHER RESOURCES

The following guidance manuals offer additional information regarding effective BMPs that may be utilized for reducing the potential for pollutant discharge in non-WOTUS protected surface waters.

- Maricopa County Flood Control District. 2013. *Drainage Design Manual, Erosion Control*.
- Arizona Department of Transportation. 2012. *Erosion and Pollution Control Manual for Highway Design and Construction*.
- Arizona Department of Transportation. 2019. *Clean Water Act Guidance Manual*.

ATTACHMENT I

**Example
Structural
Controls**

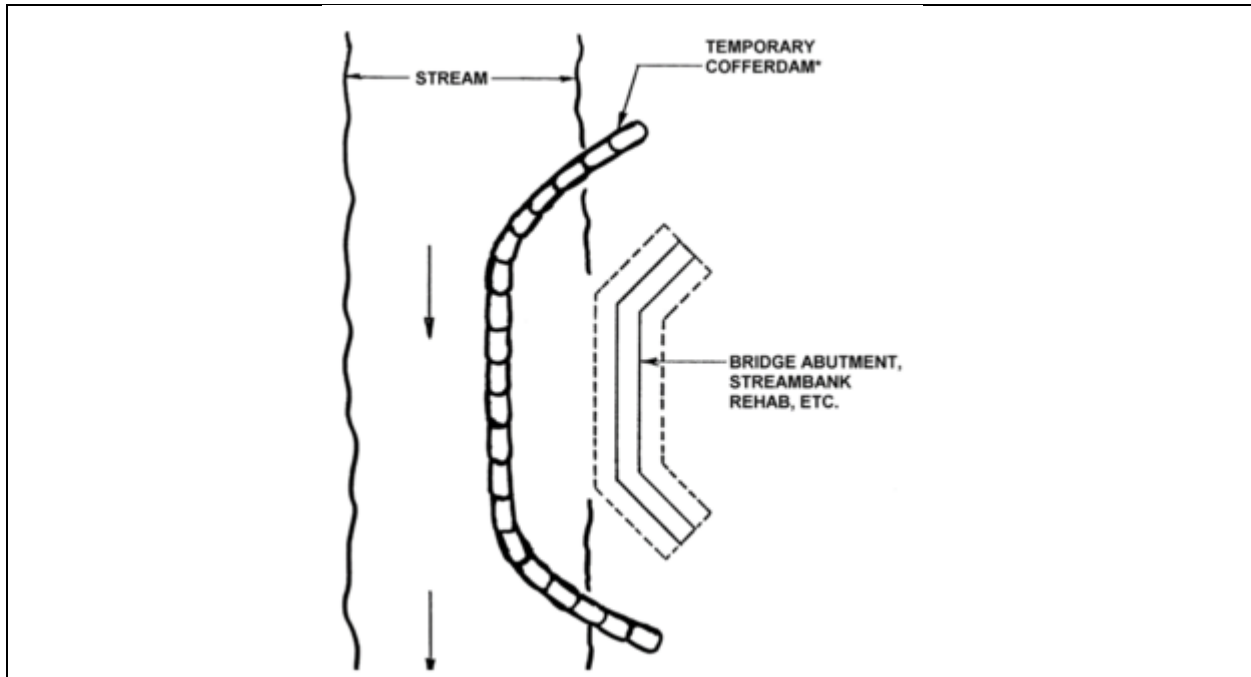


Figure 1. Temporary cofferdam to dewater work area. Source: [Sediment control practices - Cofferdams \(temporary dikes\) - Minnesota Stormwater Manual \(state.mn.us\)](https://www.state.mn.us/transportation/technical-services/technical-services-division/technical-services-division-projects/sediment-control-practices-cofferdams-temporary-dikes)

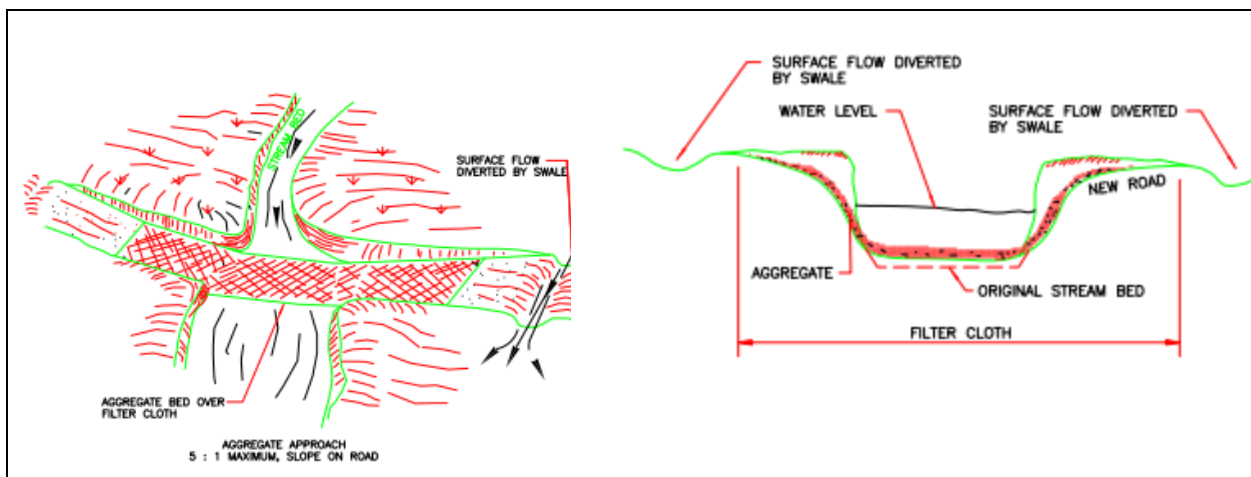
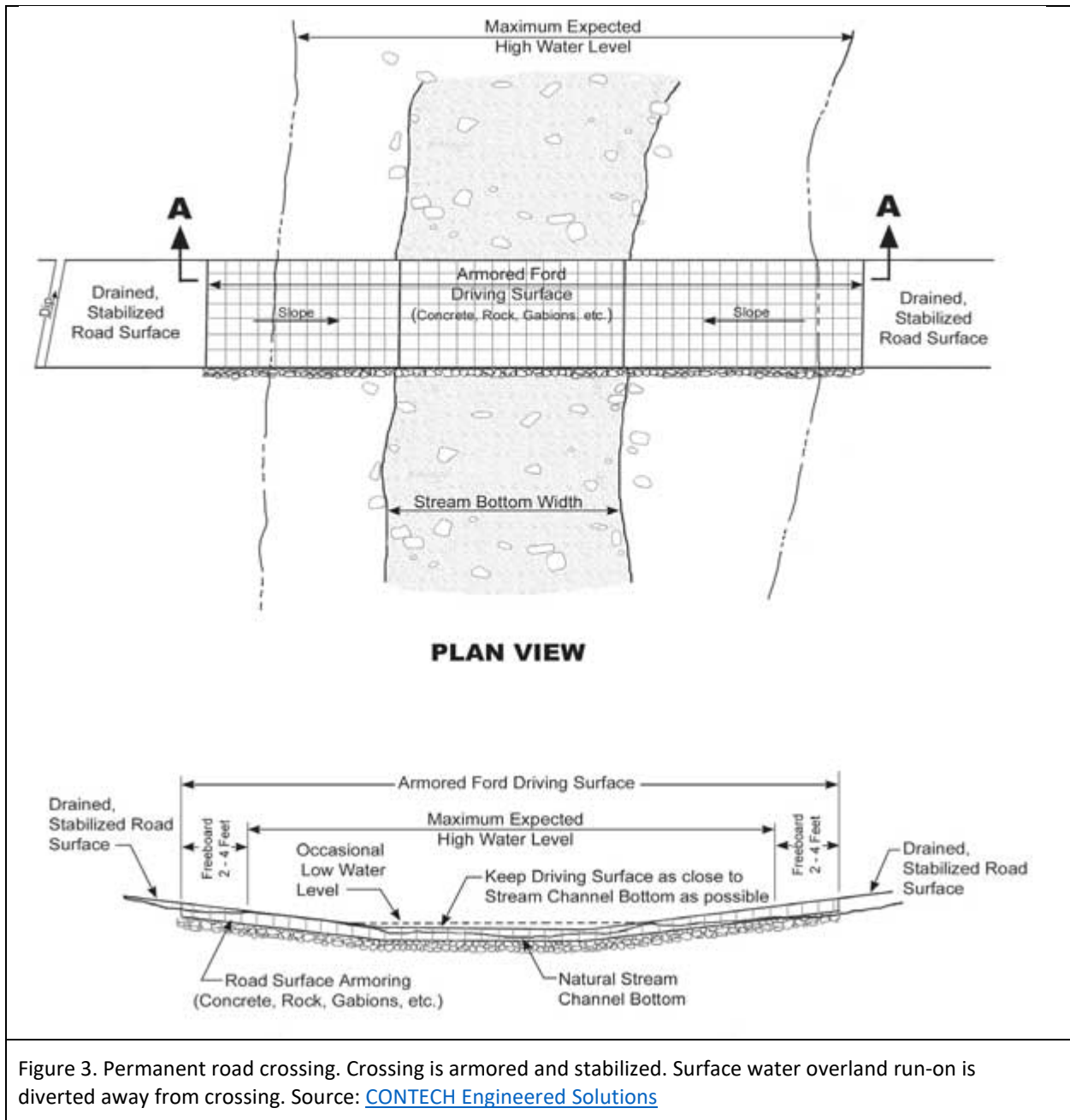


Figure 2. Temporary access waterway crossing drawing. Approach is laid back and armored to minimize erosion. Surface water overland run-on is diverted from crossing. Source: [Maricopa County Flood Control District. Erosion Control Manual.](https://www.maricopa.gov/DocumentCenter/View/11111111)



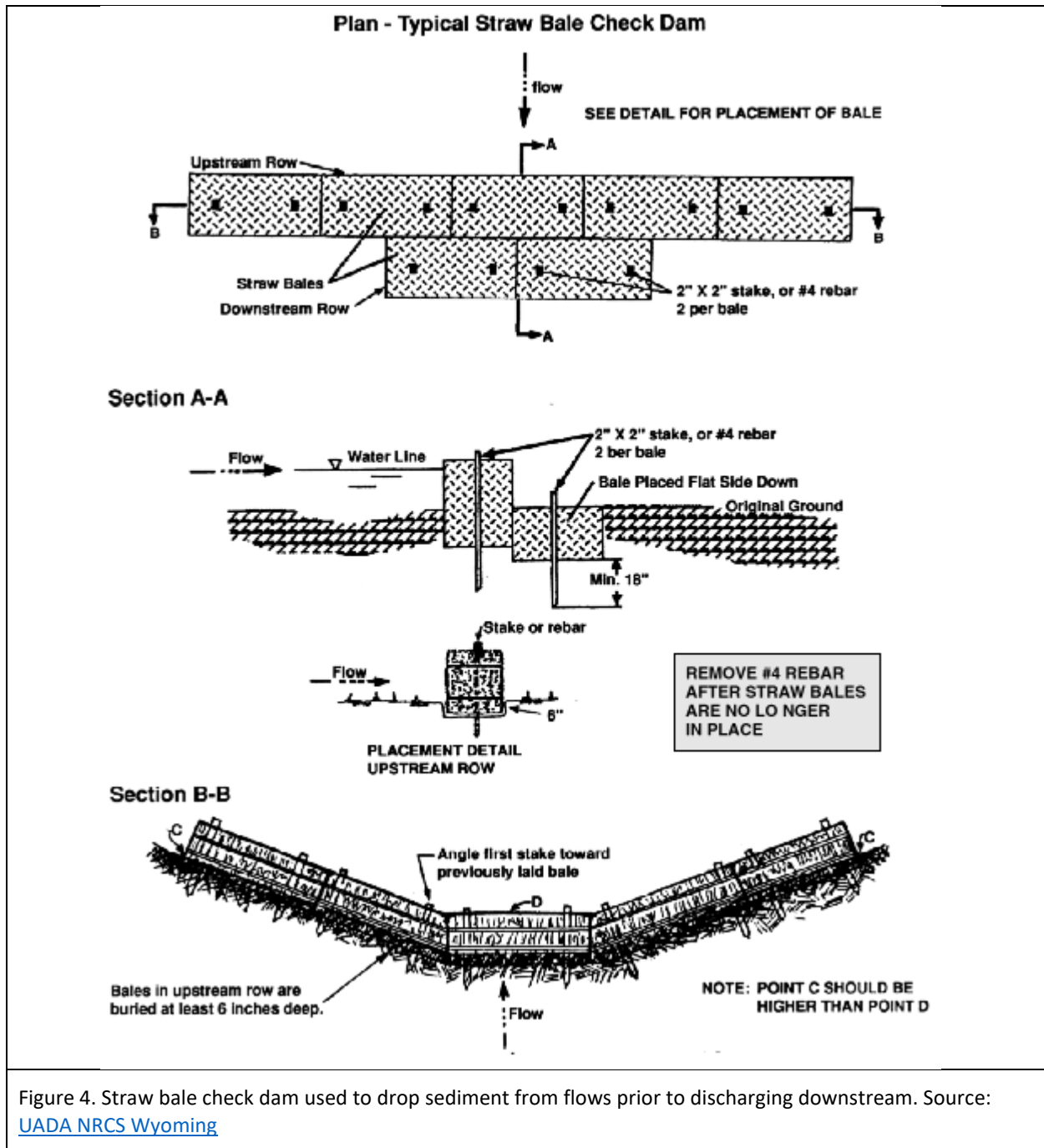


Figure 4. Straw bale check dam used to drop sediment from flows prior to discharging downstream. Source: [UADA NRCS Wyoming](http://UADA.NRCS.Wyoming)