SSCAFCA Criteria Manual

Volume 2: Hydraulics

Part 2: Ponds & Dams

Table of Contents

Tables

Figures

1 Document Revision History

SSCAFCA Board of Directors Approval Date: **XXXXXXXXXXXX**

Revisions:

Version	**Date**	**Description**
V1.0	X**XXXXX**	Adoption of Criteria Manual Volume 2, Part 2 – Ponds & Dams

2 Introduction

Volume 2: Hydraulics – Part 2: Ponds & Dams provides design criteria and standards required by SSCAFCA. There may be other requirements by local, state, and federal agencies in addition to the criteria provided herein. This document refers to ponds/dams generally as stormwater storage structures.

In general, the criteria set forth in this Chapter must be met for SSCAFCA to consider ownership and/or maintenance responsibility of pond and/or dam infrastructure. Per SSCAFCA's Drainage Policy, SSCAFCA only owns, operates, and maintains ponds with an inflow of 500 cubic feet per second (cfs) or greater from the 100-year, 24-hour storm event (See SSCAFCA Drainage Policy). SSCAFCA does not own, operate, or maintain retention ponds.

For the purposes of this manual, the word "Dam" only applies to a Jurisdictional Dam, as defined by the New Mexico Office of the State Engineer (OSE). All other stormwater basins are considered "Ponds", see the Jurisdictional vs. Non-jurisdictional Dams *section below*

This is a working document. SSCAFCA welcomes feedback, suggestions, and corrections to the information within. SSCAFCA may periodically update the document, and the most current version will be available on SSCAFCA's website (https://www.sscafca.org).

3 General Design Guidance

Ponds and dams within SSCAFCA's jurisdiction generally only receive inflow during intense rainfall events over the contributing watershed. In general, the upstream portions of SSCAFCA's watersheds are undeveloped, while the lower portions contain urban and semi-urban development.

3.1 Detention vs. Retention

A retention pond consists of a stormwater storage structure designed to temporarily retain runoff by storing and releasing it via a combination of infiltration and evaporation with no principal spillway or pipe outlet. A detention pond is a stormwater storage structure designed to temporarily detain runoff by storing it and releasing it gradually via a hydraulic structure. SSCAFCA does not own, operate, or maintain retention ponds.

3.2 Jurisdictional vs. Non-jurisdictional Dams

Classification of a Jurisdictional and Non-jurisdictional Dam is defined in the New Mexico Office of the State Engineer (OSE)'s Dam Design, Construction and Dam Safety regulations (19.25.12.1 NMAC). Any facility that qualifies as a jurisdictional dam must meet all requirements of the OSE.

Wherever possible, SSCAFCA prefers to construct, operate, and maintain non-jurisdictional dams.

3.3 Geotechnical Engineering

Permanent structures and embankments will require subsurface exploration, unless waived by SSCAFCA.

Unless otherwise approved in writing by SSCAFCA, the subsurface exploration, laboratory testing, and analysis for permanent structures must follow the U.S. Army Corps of Engineers in EM 1110-2-2300: General Design and Construction Considerations for Earth and Rock-Fill Dams.

In-situ testing such as Standard Penetration Tests (SPT) or Cone Penetration Tests (CPT) should be conducted to evaluate soil strength and consistency. These procedures are outlined in the Bureau of Reclamation's Guidelines for Drilling and Sampling in Embankment Dams (BOR, 2014). The Double Ring Method (ASTM D3385) is recommended method for determining infiltration rates.

All findings from the borehole investigation should be documented in detailed logs that include soil classification (using the Unified Soil Classification System), depth to water table, visual descriptions, sampling intervals, and laboratory test results. These logs should be compiled into a comprehensive geotechnical report that supports embankment design decisions, slope stability analysis, seepage control measures, and settlement predictions.

3.4 Joint Use Considerations

Opportunities for providing joint use (non-flood control) elements shall be considered with the design of pond & dam facilities within SSCAFCA's jurisdiction. These Joint Use facilities may include parks, walking trails, utility alignments, open space, etc. The inclusion of non-flood control uses must in no way impair or delay the implementation of the drainage and/or flood control function of any facility.

When Joint Use elements are implemented, maintenance responsibilities for each use must be defined and formalized in either an agreement or plat. If easements are required to allow other agencies access to SSCAFCA property, a plat is required. SSCAFCA maintains the flood control function of facilities, while other agencies may be responsible for the maintenance of the non-flood control elements, depending on the element.

SSCAFCA's *Quality of Life Master Plan* and *Maintenance Access & Trails Master Plan* outline some of SSCAFCA's objectives for implementation of other uses in flood control facilities. These master plans are available on SSCAFCA's Resources webpage.

3.5 Geometry Considerations

3.5.1 Slope

All plan grading should use smooth curvilinear lines to ease constructability of facilities. The pond bottom shall slope 0.5% minimum from inlet to outlet structures. Where grass is planned to be installed (park/pond concept), side slopes shouldn't be steeper than 4 horizontal units to 1 vertical unit. Other protection measures such as shrub planting, rock riprap, gravel mulch, or other structural measures, shall not exceed 3 horizontal units to 1 vertical unit unless approved by the appropriate jurisdictional agency.

3.5.2 Configuration

Configure basins with a length-to-width ratio between 2:1 and 3:1, measured along the line connecting the inlet and outlet. The distance between the inlet and the outlet should be maximized to promote sediment and pollutant removal.

3.5.3 Embankment

The crest of an embankment's width shall accommodate the following:

- 12 feet minimum width if an access road on crest is required for maintenance
- Crest width may be less than 12 feet if a maintenance access road is not required, but not less than 3 feet. In any case, the selected crest width must be supported by the geotechnical investigation.

3.6 Lining Materials & Surface Treatments

Pond/dam banks with a slope equal to or steeper than 4:1 must be treated with a gravel mulch lining to prevent erosion and encourage re-vegetation. Seeded slope areas must be protected with an aggregate mulch lining consisting of crushed or screened material featuring a minimum of one fractured face. The size of the angular aggregate must be graded according to the slope incline, shifting from smaller material on gentler inclines to larger rock on steeper embankments. Contour swales or terraces along the slope can be used to mitigate flow velocities and erosion. The New Mexico Department of Transportation's National Pollutant Discharge Elimination System Manual (NMDOT, 2023) provides typical contour swale construction guidance.

Use of concrete rubble in pond and/or dam design is prohibited. Non-native grass and/or landscape plantings are not preferred surface treatments, unless part of a joint use implementation. Other acceptable materials for erosion control include:

- Loose rock riprap with a specific engineered gradation
- Gabions
- Soil cement, shotcrete, or concrete
- Geogrid reinforced slope, engineered to retain soil
- Other methods may be proposed but must be accepted by SSCAFCA.

Pipe penetrations through embankments shall be armored to prevent erosion and piping failure. Acceptable armoring methods include riprap protection, reinforced concrete collars, or other engineered solutions designed to dissipate flow energy and protect the surrounding soil.

3.7 Boundary Setback Requirements

A minimum of 5-feet must be observed between the top of pond/dam slope and the SSCAFCA Right-of-Way (ROW) boundary. This setback requirement is shown in Figure 1 and does not consider the width of

maintenance access roads, turnarounds, etc. SSCAFCA may waive this requirement if providing the minimum setback distance is not achievable.

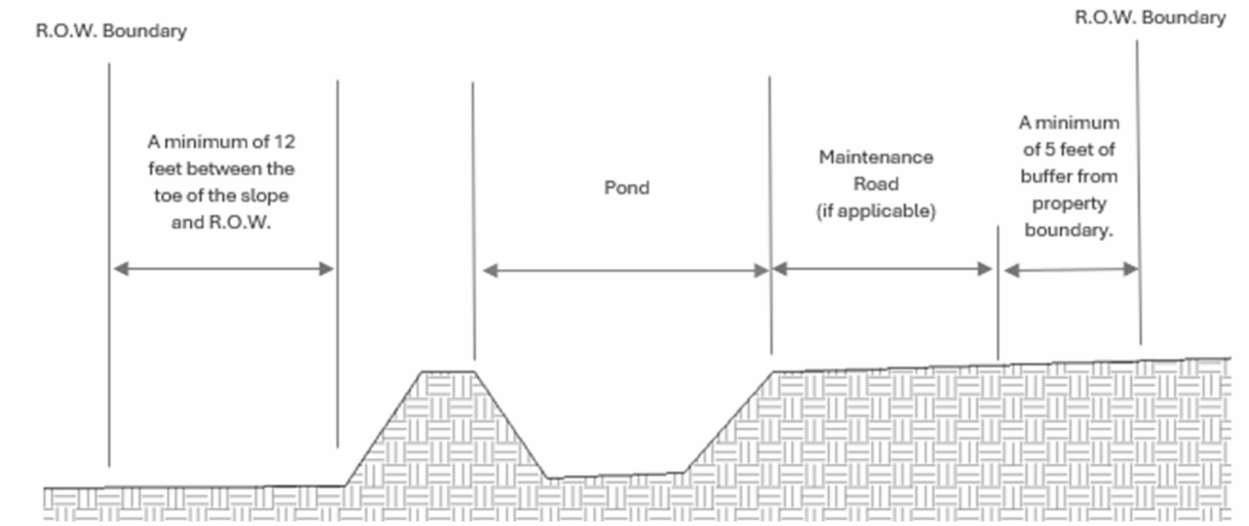

Figure 1 Setback requirements for ponds and/or dams

3.8 Maintenance Access Roads

Access roads must be constructed for ponds to provide operations and maintenance access. These roads should be constructed to allow all-weather access for service and maintenance vehicles. Acceptable materials for maintenance access roads include concrete, asphalt, and base course. Every pond site is unique and may require a specific road treatment; therefore, the designer shall confirm with SSCAFCA early in the process which treatment will be required. Provide pond access for front-end loaders and hauling equipment and ensure accessible areas free of trees to accommodate equipment movement. Access control gates should be provided if restricted access is required.

See SSCAFCA's Resources webpage for **Maintenance Access Road** details.

3.9 Ramps

Ramps connecting from the maintenance access road to the pond/dam bottom must be provided to allow for operations and maintenance. Unless site conditions prohibit, ramps shall be oriented in the direction of flow (the downhill direction of the ramp should be oriented downstream).

The portion of the ramp above the design water surface elevation (plus freeboard) within the pond can be paved using gravel or base course surfacing (similar to maintenance access roads). In contrast, the portion of the ramp lower than the design water surface elevation and should be constructed of reinforced concrete. At the base of the pond, an apron slab placed at the end of the ramp should be provided. The apron slab is recommended to have a perimeter cutoff wall (turn down slab) extending below grade to a depth greater than the expected scour depth. Figure 3 shows an example of an apron slab placed at the base of an access ramp.

The designer should provide a lined swale at the interface between the pond side slope and the ramp, as this area is highly susceptible to erosion. Figure 2 below shows an example of erosion occurring at this

interface. The designer shall provide a lined swale at the interface between the pond side slope and the ramp, as this area is susceptible to erosion. Alternatively, the ramp may be designed with an inverted crown to facilitate the conveyance of water to the base of the pond, provided that the ramp is constructed of concrete.

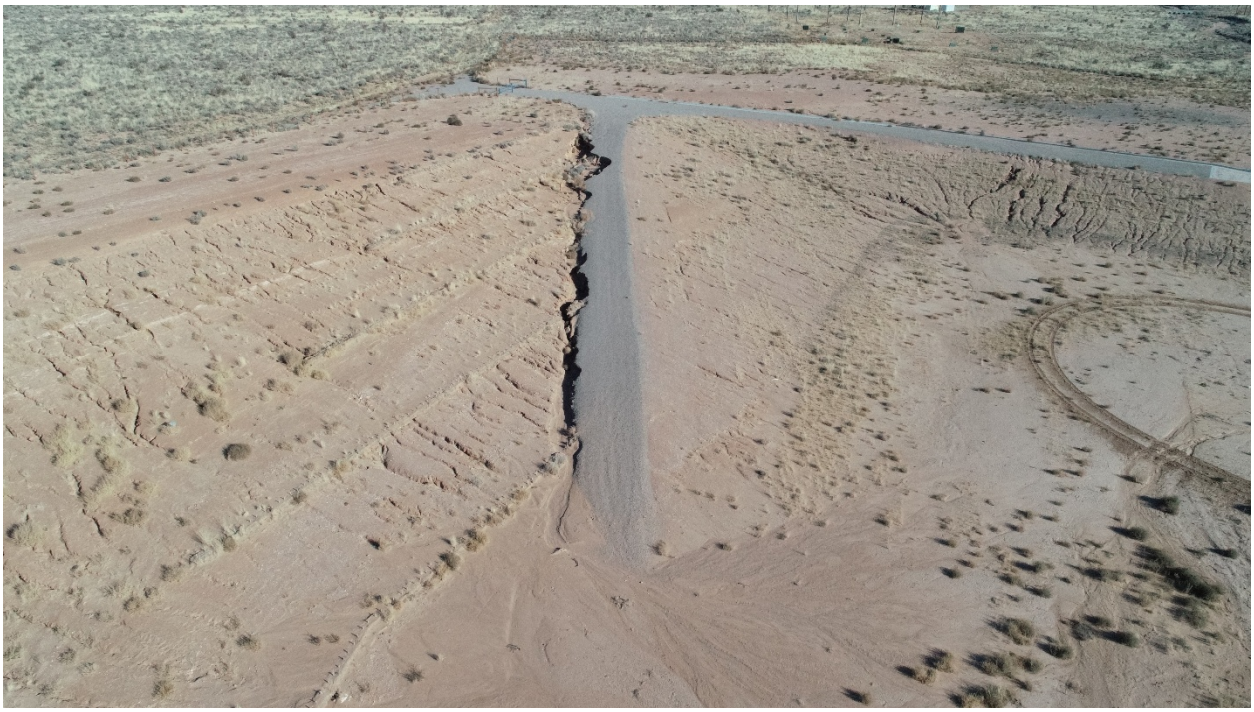

Figure 2 Channel degradation & damaged maintenance access ramp.

Ponds with higher anticipated sediment yield rates from undeveloped upstream areas must have ramp angles and turn radii that accommodate tandem dump trucks.

Ingress and egress ramps are required for each project element that would otherwise be inaccessible, such as inline or downstream energy dissipaters and grade control structures.

The ramp providing access to the pond bottom should meet the following criteria:

- Maximum slope allowed shall be 10%.
- Cross slope shall not exceed 2%.
- Road surface shall (above the design water surface) be designed to ensure access for heavy construction equipment and may be crushed gravel, base course, or other approved materials and design as required. Ramp road surfaces below the design water surface are recommended to be reinforced concrete.
- Consider an inverted crown cross-section option for access roads to improve drainage and reduce erosion.
- Provide typical details for interior drainage features along access roads.

See SSCAFCA's Resources webpage for **Ramp** details.

Figure 3 Reinforced concrete ramp and apron configuration.

3.10 Gates

Unless otherwise specified by SSCAFCA, gates shall be provided where access roads intersect with property lines.

Where maintenance access roads intersect non-residential roads such as arterial or collector roads, the access gate must be offset 60 feet from the non-residential road to allow maintenance vehicles to pull off without blocking traffic during facility access. A base course driveway shall be provided between the non-residential road and the gate. Installed gates shall be painted with Sherwin-Williams paint color Safety Blue (SW4086) or equal.

Maintenance access roads and gates should be readily accessible, but inconspicuous, to not encourage unauthorized use. Gates should allow adequate sight distance for maintenance access and should not be placed adjacent to walls that obstruct visibility. The New Mexico Department of Transportation's Standard Drawing 607 provides details for gates which are acceptable for use on SSCAFCA projects.

3.11 Signage

At least two facility signs are required to be installed with each pond and/or dam project.

See SSCAFCA's Resources webpage for **Facility Sign** details.

Ideally, signs are placed at points of ingress/egress, or in locations most visible to the public. Confirm signage locations with SSCAFCA prior to final placement.

Use signs that are made of aluminum or other durable material that does not corrode or cannot be burned. Secure signs to posts or standards with tamper-proof fasteners. Use posts or standards that will not be damaged by anticipated flooding or vandalism.

3.12 Fencing & Fall Protection

All pond and/or dam facilities shall be fenced using 5-strand Barbless Wire Fencing.

See SSCAFCA's Resources webpage for **5-strand Barbless Wire Fencing** details.

When possible, fencing should be provided along SSCAFCA's ROW boundary to prevent unwanted access to the facility. Generally, SSCAFCA installs perimeter fencing 6 inches inside SSCAFCA's property line.

Post & Cable Fencing can be used to restrict access into/across a facility by installing it perpendicular to flow. Post and cable fencing will typically be used at surface inlet structures to limit vehicular access to the pond by unauthorized vehicles. Post and cable fencing shall be equipped with reflectors or other highly visible markings.

See SSCAFCA's Resources webpage for **Post & Cable Fencing** details.

Designs incorporating any vertical walls (including headwalls, wingwalls, etc.), shall incorporate **fall protection** (pipe rail, etc.) on or in front of the vertical drop per applicable OSHA safety regulations.

Locate fences away from areas likely to collect debris and act as a blockage to incoming water or water moving within the basin. Design fences, gates, walls, etc., to minimize damage or accidental opening during normal area use or by flooding. In non-critical areas, design fences with an open or "clear-space" at grade to allow shallow water and debris to flow or blow under them. Design fences, such as backstops, with break-away or swing-away panels so flow is not impeded through the basin.

3.13 Water Quality Treatment

Each pond/dam facility should incorporate water quality elements when feasible, see 4.2.2. For water quality volume for ponds, see Volume 3. Stormwater storage facility design for water quality control should maximize settling to the extent possible. This consideration may alter typical design features. In general, low energy flow conditions and infiltration should be maximized while short circuiting should be minimized.

Inlet and outlet structures should be located at opposite ends of the basin to promote uniform flow distribution. Incorporate baffles or flow retarders to minimize turbulence and enhance settling. Use riser outflow structures rather than ground-level pipes to maintain a slow-draining pool that encourages infiltration and provides water quality treatment by removing floatable debris/materials from stormwater discharged from the facility.

The function of water quality elements within a stormwater detention facility is to provide for collection of trash and pollutants, thereby improving downstream water quality. Periodic removal and proper disposal of accumulated debris and sediment will be needed to prevent their accumulation.

3.14 Offsite Runoff – Historic Flow Path

The existing pattern of offsite runoff to the proposed facility site must not be affected. Designs shall ensure that offsite runoff is discharged into the facility in a controlled, non-erosive manner (i.e. concrete rundown, side weir, piped conveyance, etc.) and the historic flow path is maintained as runoff exits the facility. This may be achieved by consolidating offsite flows at a single discharge point and constructing a rundown to convey these flows to the bottom of the pond. The conveyance of sheet flow directly down the pond slope is not permitted.

4 Technical Design Guidance

4.1 Hydrology

The design storm will guide the design of all ponds and dams and is defined as the 100-year, 24-hour recurrence interval storm. Hydrologic information may be obtained from the applicable existing SSCAFCA *Watershed Management Plan* or calculated using the *SSCAFCA Criteria Manual – Volume 1: Hydrology*.

A pre- and post-project hydrograph shall be calculated and included with design reporting to:

1) Determine the project's hydrologic impact; and

2) Demonstrate the project intent is met.

To ensure compliance with local municipalities and county jurisdictions, the designer shall verify all hydrologic land use assumptions with the applicable agency and SSCAFCA prior to proceeding with the design.

All SSCAFCA ponds and dams shall completely drain within **96 hours** and must comply with **19.26.2.15 NMAC**.

4.2 Hydraulics

The designer must have SSCAFCA approval of the hydraulic analysis methodology prior to beginning design effort.

4.2.1 Freeboard

Freeboard shall be 1-foot to the emergency spillway for the 100-year event and 1 foot to the top of embankment for the 500-year event.

4.2.2 Outlet Structures

All outlet structures shall be installed with trash and debris control devices to reduce discharge of debris and solid waste. Examples of these devices include trash racks, debris weirs, ported risers with inclined inlets, or inclined risers. Figure 4 below shows an example of a ported riser with inclined inlets. Where hydraulic conditions may create vortexing at the outlet intake structure and reduce discharge efficiency, outlet structures should include anti-vortex devices. The use of Polyvinyl Chloride (PVC) piping is prohibited for culverts through embankments. Seek guidance from SSCAFCA prior to specifying PVC piping for intake structures or other penetrations through embankments.

(a) (b)

Figure 4 (a) Example of a ported riser for trash and debris control (b) Top grate of outlet structure.

4.2.3 Grade Control Structures (Drop Structures)

Ponding stormwater allows suspended solids to settle out. As a result, water discharged from stormwater basins is typically low in sediment and draws sediment from the downstream channel bed and banks. Grade control structures (GCS) are essential for controlling the vertical stability in an open channel downstream of a stormwater basin, while lateral movement of open channels is mitigated through bank stabilization. Both sloping and vertical grade control structures are used within SSCAFCA's jurisdiction. See *SSCAFCA Criteria Manual – Vol. 2: Hydraulics* for design guidance of GCSs.

In general, the maximum GCS drop height shall be limited to 5-feet for safety reasons.

A low flow notch, sized for 2% of the 100-year flowrate, shall be added to the center of all GCS.

It is necessary to provide energy dissipation directly downstream of all GCS to mitigate flanking, erosion, scour, and other hydraulic forces. Fencing & Fall Protection may also be required.

4.2.4 Emergency Spillway

An emergency spillway must be able to safely convey the 500-year hydrologic events to a public ROW or historic flow path without overtopping the embankment structure. The invert of an emergency spillway should be no less than 2-ft below the top of any embankment. Emergency spillways should be designed with a lining material that is resistant to erosion and other geologic phenomenon to prevent sediment aggradation, such as concrete, corrugated steel, or asphalt. The emergency spillway should be constructed such that the surface is uniform and flat, avoiding low points (bird baths) and irregularities in the finished surface. Placement of shotcrete as the emergency spillway surface is discouraged as shotcrete applied across the emergency spillway may vary in elevation.

4.3 Sedimentation Considerations

Figure 5 below provides a guide for sediment bulking factors in relation to sediment concentration for sand arroyos in the Sandoval County area. This figure assists in estimating sediment bulking factors in

arroyos.

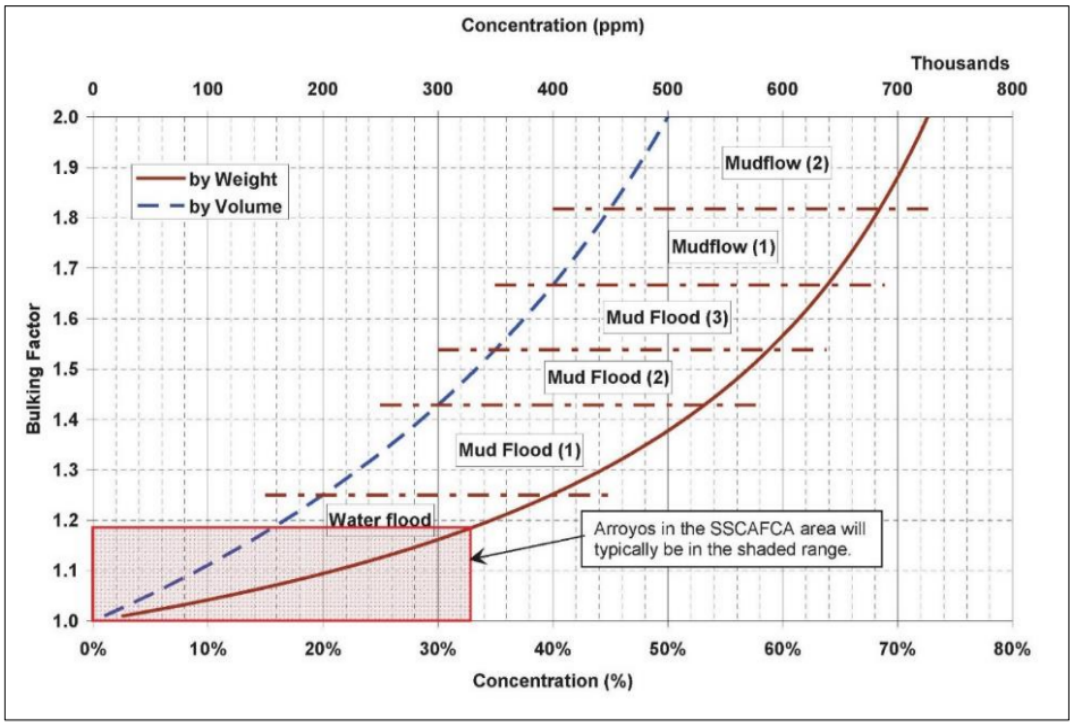

Figure 5 Relationship between total sediment concentration and bulking factor.

4.3.1 Sediment Storage

Sediment will inevitably accumulate within the stormwater pond. It is advisable to include a designated staging area within the pond to temporarily store removed sediment prior to hauling. This material can then be transported for beneficial uses such as import fill, landfill cover, or other approved applications.

4.4 Scour Analysis & Energy Dissipation

A scour analysis must be provided for pond/dam elements such as inflow pipes, intake/outlet structures, rundowns, etc. to identify the extent of below-grade protection required to mitigate scour damage from the Design Storm. For cases where a proposed drainage system is connecting to an existing SSCAFCA pond/dam, see the Discharging to SSCAFCA section below.

Designers are encouraged to read SSCAFCA's Sediment & Erosion Design Guide *(SEDG)*, as well as Section(s) *4.5 Scour Analysis* and *4.6 Energy Dissipation* in *SSCAFCA Criteria Manual - Volume 2: Hydraulics - Part 1: Open Channel*.

Energy dissipation features can come in many different forms and materials. In addition to the *SEDG*, commonly referenced Energy Dissipation design guides include:

- *Mile High Flood District - Criteria Manual - Volume 2 - Chapter 9 - Hydraulic Structures*
- *Federal Highway Administration – Hydraulic Engineering Circular No. 14 (HEC-14) Hydraulic Design of Energy Dissipators for Culverts and Channels (2006)*
- *Bureau of Reclamation – Engineering Monograph No. 25 – Hydraulic Design of Energy Dissipators, Eighth Printing (1984)*

4.5 Utility Crossings

SSCAFCA does not permit dry or wet utilities to cross beneath ponds or embankments due to risks associated with structural integrity, maintenance, and potential utility failure. Any existing utilities within these areas must be relocated outside the pond footprint and embankment zone. It is acceptable for utilities to run parallel to maintenance access roads, provided they do not interfere with operations or maintenance activities. Designers shall coordinate early with all utility providers to ensure compliance with these requirements. Operation and maintenance easements shall be granted to utility owners via plat.

5 Discharging to SSCAFCA Storage Facilities

The hydraulic grade line (HGL) of any pipe discharging into a pond should not exceed the pond's calculated freeboard elevation for the emergency spillway during 100-year event. Flap gates may be necessary on new storm drain connections to existing facilities to prevent backflow during high water levels. Unless otherwise approved by SSCAFCA, United States Bureau of Reclamation (USBR) Stilling Basin Type VI shall not be used in SSCAFCA ponds and/or dams due to access and maintenance issues. Local storm water discharges to SSCAFCA pond/dam facilities typically take the form of a storm drain pipe or open channel connection.

Any proposed storm water discharge to a SSCAFCA pond/dam shall include energy dissipation and scour mitigation measures. The proposed structure must:

- Consider current/anticipated sediment accumulation in the receiving facility (consider invert elevation relative to pond bottom);
- Not be constructed within any part of the pond/dam embankment;
- Include protection/armoring from scour and erosion due to local runoff; and
- Include scour protection at the proposed outfall and ensure proposed improvements will not affect maintenance activities or facility performance.

As much as possible, storm water discharges should enter the pond/dam at less than or equal to 90-degrees to the channel alignment and should never discharge in a direction opposing receiving channel flow.

Ensure that the invert of the proposed discharge structure is located at least 6-inches above the receiving pond/dam invert.

Prior to beginning design, consult with SSCAFCA staff to determine design constraints at the proposed discharge location. The final design of the discharge into a SSCAFCA facility must be approved by SSCAFCA.

6 Reporting & Submittal Requirements

Design Analysis Reports (DAR) are typically provided in two separate submittals: Preliminary DAR and Final DAR. The Preliminary DAR submittal should follow the outline in Table 6-1 and typically includes an evaluation of design alternatives. The Preliminary DAR submittal can only occur before construction plans are drawn since it typically contemplates multiple design alternatives. The Final DAR submittal

occurs after the construction plans are approved (or are near approval). The recommendations provided in the Final DAR submittal should be incorporated in the final construction plans.

6.1 Design Analysis Report Outline

The format below outlines relevant items to be documented in the DAR. In addition to the Hydraulic Analysis Description shown in the table below, exhibits showing labeled cross sections (1D), mesh layout (2D), existing and proposed contours, extents of floodplain(s), and storm drain/utility sizes & invert elevations must be included in the DAR.

Table 6-1: General outline for drainage analysis reports

DAR Section	Description
Executive Summary	Brief, concise summary of analysis results and recommendations.
Introduction	Project background information, location, required permits, FEMA floodplain status.
Hydrology	Assumptions used in determining the design flowrate (or the origin of the flowrate) including land use assumptions upstream of the project reach. Include an electronic copy of the hydrologic model, if applicable.
Hydraulic Analysis	Confirmation that the proposed geometry provides sufficient height for the spilling elevation plus freeboard. Include assumptions used in the hydraulic model, such as ported primary spillway. Describe analysis and discussion of downstream infrastructure capacity constraints. Include an electronic copy of the hydraulic model, if applicable. Include pond rating table, showing water elevation, stored volume and discharge rate. Identify spilling elevation for emergency spillway and top of the pond elevation used in the analysis.
Scour Analysis	Computation and discussion of scour depth for the outfall for primary spillway outfall (and emergency spillway). Computation and discussion of proposed scour mitigation measures such as energy dissipator, downstream GCS, etc. Include an electronic copy of scour calculations, if applicable.
Attachments	A. Floodplain maps. B. Permits required/obtained: USACE, FEMA, local Floodplain Administrator, environmental documentation, etc. C. Project ROW ownership information and identification of additional ROW, if required. D. Hydraulic model and supporting documentation. E. Freeboard calculations to verify pond height. F. Shear stress calculations to support proposed lining material selection in the downstream channel, if needed. G. Scour calculations for primary and emergency spillways.

7 References

Brown, S. A., Schall, J. D., Morris, J. L., Doherty, C. L., Stein, S. M., & Warner, J. C. (2009). Urban Drainage Design Manual: Hydraulic Engineering Circular 22. National Highway Institute (US).

Bureau of Reclamation. (2014). Guidelines For Drilling and Sampling in Embankment Dams. U.S. Department of the Interior. https://www.usbr.gov/tsc/techreferences/mands/mands-pdfs/GuidelinesForDrillingSamplingInEmbankmentDams_April2014v2_508.pdf

City of Albuquerque. (2023). Design Process Manual. Albuquerque, NM.

Federal Highway Administration (FHWA). (2013). Urban Drainage Design Manual: Hydraulic Engineering Circular No. 22 (HEC-22). U.S. Department of Transportation.

Flood Control District of Maricopa County. (2018). Drainage Design Manual for Maricopa County. Author.

King, H. W., & Brater, E. F. (1976). Handbook of Hydraulics for the Solution Of Hydraulic Problems (6th ed.). McGraw Hill.

Maricopa County Flood Control District. (2021). Drainage Design Manual. Phoenix, AZ.

Mile High Flood District (MHFD). (2022). Urban Storm Drainage Criteria Manual. Denver, CO.

Mussetter Engineering Inc. (2008). SSCAFCA Sediment and Erosion Design Guide. Document prepared for Southern Sandoval County Arroyo Flood Control Authority, Rio Rancho, NM.

Natural Resources Conservation Service (NRCS). (2004). National Engineering Handbook – Part 630: Hydrology. U.S. Department of Agriculture.

Natural Resources Conservation Service (NRCS). (2022). Conservation Practice Standard: Pond (Code 378). U.S. Department of Agriculture.

New Mexico Department of Transportation (NMDOT). (2020). Drainage Design Manual. Santa Fe, NM.

New Mexico Department of Transportation. (2023). *National Pollutant Discharge Elimination System (NPDES) Manual: Stormwater Management Guidelines for Construction, MS4, and Industrial Activities (Rev. 4).* https://www.dot.nm.gov/wp-content/uploads/2024/01/NMDOT-NPDES-Manual-Rev-4-2023.pdf

New Mexico Office of the State Engineer (NMOSE). (2024). Dam Safety Bureau: 19.25.12 NMAC. https://api.realfile.rtsclients.com/PublicFiles/5f809ddfc9864dad89f9d03375144a14/937e4c82-bf41-4459-ae4e-7bbd1b3e82f4/19.25.12%20NMAC%202010%20Updated%202024-02-09.pdf

Southern Sandoval Arroyo Flood Control Authority (SSCAFCA). (2010). *Development Process Manual*. [Superseded]. Author.

Southern Sandoval Arroyo Flood Control Authority (SSCAFCA). (2022). *Drainage Policy*. Author. https://www.sscafca.org/resources/development-process/

Urban Drainage and Flood Control District (Mile High Flood District). (2016). Urban Storm Drainage Criteria Manual: Volume 1 management, hydrology, and hydraulics. Author.

U.S. Army Corps of Engineers (USACE). (1990). Hydraulic Design of Navigation Dams. Hydrologic Engineering Center (HEC).

U.S. Army Corps of Engineers. (2004, July 30). EM 1110-2-2300: General Design and Construction Considerations for Earth And Rock-Fill Dams. U.S. Army Corps of Engineers. https://www.publications.usace.army.mil/portals/76/publications/engineermanuals/em_1110-2-2300.pdf