TURLOCK GROUNDWATER

East Turlock Subbasin GSA

IMPLEMENTATION STANDARDS AND MANAGEMENT PRACTICES
CONSTRUCTED BASINS

Overview

Description

Constructed Basins may be constructed on repurposed agricultural land to allow for controlled direct recharge and/or regulation of irrigation water supplies for in lieu recharge, providing the primary benefit of demand reduction, direct recharge and in lieu recharge, with potential additional benefits to agricultural operations and flexibility, wildlife and habitat, flood risk reduction, climate resiliency, and local economy. Depending on the application or desired outcome, constructed artificial basins may include excavation of the basin area and construction of compacted earthen berms around the basin perimeter, inlet and outlet structures, connection to existing or new surface water conveyance and irrigation lines, access ramps for maintenance, sediment settling basins, erosion control measures, and/or establishment of resident and/or beneficial vegetation within or around the basin.

This *Implementation Standards and Management Practices for Constructed Basins* covers: Benefits and Objectives, Applicable Land Repurposing Practices, Requirements, Best Practices and Guidelines, and References.

ETSGSA reserves the right to update these *Implementation Standards*.

Benefits and Objectives

The benefits of repurposing irrigated land to Basins vary depending on the application objective(s). Benefits may include, but are not necessarily limited to, the following:

- Reduced groundwater demand through repurposing of groundwater-irrigated agricultural land;
- Direct groundwater recharge and aquifer replenishment;
- Increased ability to regulate surface water supplies for irrigation and in lieu recharge;
- Attenuation of flood risk through diversion of flood flows;
- Ability to pressurize and filter surface water for drip and microjet sprinkler systems;
- Improved water quality through sedimentation and natural filtration with vegetation;
- Increased habitat for pollinators, amphibians, birds, and beneficial insects;
- Local employment for irrigated agriculture, and for design, construction, and maintenance services; and
- Other, applicant defined, benefit(s) (in addition to the primary groundwater sustainability benefit) deemed acceptable upon review by ETSGSA.

Applicable Land Repurposing Practices

These *Implementation Standard and Management Practices for Basins* apply to land repurposing practices that are part of ETSGSA's groundwater management framework, including but not limited to:

- Recharge Basins to support direct recharge;

- Regulating basins for irrigation to support in lieu recharge;
- Floodplain reconnection; and
- Flood flow dispersal.

Requirements

General

Unless otherwise indicated, these Requirements apply to Basins implemented by an Owner or Operator as defined in ETSGSA *Rules and Regulations* and subject to an agreement to receive monetary incentives under one or more of ETSGSA's incentive programs; such Basins are referred to herein as a Basin Project. To receive incentive payments for a Basin Project, the Owner or Operator must enter into an Incentive Agreement with ETSGSA to maintain the Project for at least ten years.

A Basin implemented by an Owner or Operator that is not covered by an agreement under ETSGSA's incentive programs is not considered a Basin Project and is not covered by these Requirements.

To participate in an ETSGSA incentive program, an Owner or Operator must do all of the following:

- Meet any eligibility requirements for the program specified by ETSGSA, as may be updated by ETSGSA;
- Follow any application or enrollment process specified by ETSGSA, as may be updated by ETSGSA; and
- Execute any agreement associated with the program specified by ETSGSA, as may be updated by ETSGSA.

Unless otherwise indicated, all Requirements listed herein are the responsibility of the Owner or Operator.

An Owner or Operator implementing a Basin Project shall:

- Be solely responsible for their management decisions and activities; and
- Maintain the land in a condition that does not create a nuisance as a result of, but not necessarily limited to, the following: fire danger, dust emissions, erosion, spread of noxious weeds and invasive plants, spread of plant or vector-borne diseases, and pests.

It is the responsibility of the Owner or Operator to:

- Identify, understand, and comply with all federal, state, and local laws, regulations, and ordinances relevant to the Basin Project;
- Comply with flow down terms of any grant agreement from which the Project obtains any funding and any applicable public contracting requirements;
- Comply with the requirements prescribed within all permits issued for the Basin Project; and

- Comply with all monitoring and mitigation measures specified in the CEQA documentation for the Basin Project.

Projects may include multiple land repurposing activities (i.e., other than Basins). Refer to the respective ETSGSA *Implementation Standards and Management Practices* for those activities for information on Requirements associated with those activities.

Site Review

The following Requirements related to Site Review apply to Basin Projects:

- Demarcate on a map and in the field the area(s) proposed for Basins in accordance with Project design, and provide the map to ETSGSA with the Basin Project Application and update the map as needed for inclusion in the Project Incentive Agreement;
- Utilize dig alert to identify and demarcate on a map any existing underground utilities within 50 feet of the proposed Basin location; and
- Document existing (pre-construction) conditions on the area(s) proposed for the Basin Project in accordance with the application requirements and the Project's Monitoring Plan including, at a minimum:
  - Taking a set of representative pre-construction photographs from locations that will be accessible after Project construction; and
  - Preparing a brief written description of the pre-construction conditions that is keyed to an aerial image of the Project area, indicating crops (type and age), and any man-made features that will be affected by implementation of a Basin as part of the Project.

ETSGSA may conduct desktop records searches and reconnaissance level field surveys of biological and cultural resources in the Project area to determine what, if any, further steps may be required for California Environmental Quality Act (CEQA) compliance and whether any environmental permits would be triggered. If reconnaissance level field surveys are to be conducted, the Owner or Operator shall facilitate these by:

- Providing access to the location(s) on the Project property where the Project will be implemented; and
- Providing general information about the Project, as requested by ETSGSA or ETSGSA subcontractor staff conducting the survey.

<u>Site Assessment</u>

Site Assessment is required for Basin Projects to support construction design and water management planning. Site Assessment for Basin Projects may vary from project to project but shall include, at a minimum:

- A site visit coordinated by the Owner or Operator with a consultant/engineer or ETSGSA staff to determine the layout of the Basin and associated facilities and any other existing site features relevant to planning and design for the Project; and
- Documentation of the existing (pre-construction) conditions in accordance with the Project's Monitoring Plan.

Additional Site Assessment activities may include, but are not limited to:

- Topographic surveys;
- Utility mapping to identify potential conflicts;
- Review of record drawings or plans to understand existing conveyance systems;
- For Basins intended for recharge:
  - Hydrogeological assessment that may include any of the following: review of soil maps, infiltration rate tests, soil borings or probes, or geophysical testing.

Planning and Design

General

The following general design Requirements shall apply for all Basin Projects:

- Design plans shall be developed for the Basin Project, including, at a minimum, maps illustrating the locations and dimensions of Basin Project features, and Basin capacity;
- Design shall be developed to avoid underground utility impacts;
- Design shall include consideration of the risk and possibility of overtopping and shall ensure that overtopping resulting in damage to or failure of the Basin, personal injury, or property damage, including to adjacent properties, does not occur;
- The Owner or Operator or their contractor shall be responsible to address shoring, heavy machinery, and other construction safety considerations during all construction activities;
- Project elements to be constructed using the services of a licensed contractor must be supported by a minimum of two (2) itemized bids in writing.
- Design layouts may include features from multiple project components in addition to Basins. Layouts should specify the land area planned for each project type and should include the details and planning documents specified in the respective *Implementation Standards and Management Practices* for each project type.

Water Management

The following water management design Requirements shall apply for all Basin Projects:

- The source(s) and quantities of water intended for the Basin shall be identified and documented by the Owner or Operator, subject to review and verification by ETSGSA;
- If the Owner or Operator seeks any portion of a recharge credit (as defined in ETSGSA Rules & Regulations) for a Project, inflow data shall be provided to ETSGSA in accordance with reporting requirements specified in the Incentive Agreement;
- Flow rate measurement device(s) shall be incorporated into the Project design to measure the volume of imported surface water brought into the Basin, as applicable;
- Flow rate measurement device(s) shall be incorporated into the Project design at any outflow point from the Basin if the Owner or Operator seeks any portion of a recharge credit (as defined in ETSGSA Rules & Regulations) for the Project;
- Any flow measurement device must meet standards defined by SB x7-7 and include a Registered Civil Engineers stamp verifying accuracy and that the device can accommodate planned flow rates. Note standards include required maintenance and the method of data collection and reporting.

Earthwork Design

The following earthwork design Requirements shall apply for all Basin Projects:

- Prior to commencing earthwork, areas to be excavated, filled or graded shall be stripped of vegetation and grubbed;
- Soils used for fill shall be generally free of organic materials and shall be of low plasticity;
- Cut and fill slopes shall have inclinations no steeper than 3:1 (horizontal:vertical).
- Surfaces to received fills shall be leveled and keyed as needed, scarified, moisture conditioned and compacted by mechanical means to at least 90 percent relative compaction (ASTM D1557);
- Fills shall be placed in lifts not exceeding 6 inches in uncompacted thickness, conditioned to near optimum moisture content and compacted by mechanical means;
- Fills less than 5 feet deep shall be compacted to at least 90 percent relative compaction and fills exceeding 5 feet in thickness shall be compacted to at least 95 percent relative compaction (ASTM D1557);
- Project design shall provide estimates of earthwork quantities with supporting calculations;
- Berms shall be limited to a size smaller than would be classified as a dam as defined by California Water Code Division 3 Part 1 (Sections 6000-6009), as may be amended;
- Project design shall incorporate erosion control elements for structural features through installation of artificial or vegetative cover or other suitable means; and
- Project design shall incorporate access routes for maintenance equipment.

Multiple Benefits Requirement

Basin Projects incentivized through ETSGSA's Multibenefit Land Repurposing Program (MLRP) for which the Owner or Operator seeks any portion of the recharge as a credit towards their Groundwater Management Account are required to incorporate at least one additional benefit other than recharge in the Project design. The Owner or Operator may choose to meet this Multiple Benefits Requirement by incorporation of habitat or wildlife benefits. Habitat or wildlife benefit shall be achieved through the establishment and maintenance of beneficial vegetation or habitat-friendly design features (e.g., variable water depths) within or around the Basin, in accordance with any published applicable guidance from the California Department of Conservation or other sources specified by ETSGSA.

Non-MLRP Basin Projects

An Owner or Operator implementing a Basin Project funded by ETSGSA under a separate incentive program from ETSGSA's MLRP shall comply with the same Planning and Design requirements defined above, except that such non-MLRP Basin Projects are not required to comply with the Multiple Benefits Requirement.

Environmental Compliance

Depending on Project specifics, implementation of Basin Projects may trigger environmental compliance requirements under the California Environmental Quality Act (CEQA). It is the

responsibility of the Owner or Operator to ensure the Project is compliant with the following requirements:

- The Owner or Operator shall facilitate ETSGSA's completion of CEQA compliance and permitting analysis by ETSGSA as the Lead Agency, which includes but is not limited to conducting Requirements as outlined in the Site Review, Planning and Design, and Permitting sections of this *Implementation Standard*;
- The Owner or Operator shall comply with all monitoring and mitigation measures applicable to the Project, as prescribed under the Project's CEQA documentation.

Projects may include multiple land repurposing practices (i.e., other than Basins). Potential environmental compliance requirements for other practices that may be part of a given Project are discussed in the *Implementation Standards and Management Practices* for those practices.

Permitting

Depending on Project specifics, implementation of Basin Projects may trigger environmental permitting requirements. Permits may include but are not limited to: a National Pollutant Discharge Elimination System (NPDES) Construction General Permit, a Lake and Streambed Alteration Agreement (LSAA), an Incidental Take Permit (ITP), Waste Discharge Requirements (WDRs), or other permits as applicable to the Project design. It is the responsibility of the Owner or Operator to comply with all requirements of any permits issued for the Project.

<u>Permitting Process and Requirements</u>

- ETSGSA intends to conduct a permitting analysis for all Basin Projects and the Owner or Operator shall facilitate ETSGSA's completion of the permitting analysis by conducting the following:
  - Conducting the Requirements as outlined in the Site Review and Planning and Design sections of this *Implementation Standard*;
  - Providing timely responses to requests for Project information from the ETSGSA;
  - Participating in meeting(s) and other correspondence with ETSGSA and permitting entities as may be necessary to complete the permitting analysis;
- The Owner or Operator shall obtain and pay all necessary fees to facilitate compliance with all required permits identified by the permitting analysis.

Projects may include multiple land repurposing practices (i.e., other than Basins). Potential permitting requirements for other practices that may be part of a given project are discussed in the *Implementation Standards and Management Practices* for those practices.

Construction and Implementation

The following construction and implementation Requirements shall apply to Basin Projects, as applicable to the Project's design:

- The Project shall implement construction Best Management Practices (BMPs) and other avoidance and minimization measures in accordance with any/all permits issued, as well as with CEQA documentation for the Project;

- The Project shall implement habitat features in accordance with the Project design, as applicable with the Multiple Benefit Requirement of the MLRP;
- Earthwork shall be constructed in accordance with Project design;
- Any mechanical water management infrastructure shall be installed/constructed in accordance with the Project design;
- Final volumes and dimensions shall be documented, and itemized contractor invoices shall be provided as a condition of final payment; and
- Documentation shall be provided to ETSGSA describing post-implementation conditions, including photographs taken at the same locations as the pre-Project baseline condition photographs, as well as written documentation of conditions at the Project site, in accordance with the Project's Monitoring Plan.

Projects may include multiple land repurposing practices (i.e., other than Basins). Potential construction and implementation requirements for other practices that may be part of a given project are discussed in the *Implementation Standards and Management Practices* for those practices.

Maintenance

The Owner or Operator is responsible for maintaining the Project in accordance with the specifications in any Project Incentive Agreement made with ETSGSA and in compliance with all environmental and CEQA requirements, as applicable.

The following additional maintenance Requirements shall apply to Basin Projects, as applicable to the Project's design:

- The Owner or Operator shall conduct regular routine inspections and as-needed maintenance of earthwork components of the Project to retain their intended function(s), including water infiltration, water retention, or water impoundment, as applicable; and
- Basins shall be maintained on a routine, or as-needed basis, to maintain Basin function and avoid nuisance conditions. Maintenance activities may include but are not limited to: sediment management, discing, or other reasonable and applicable methods of maintaining the Basin area to maintain permeability; vegetation management; and management for mosquitos or other disease vectors.

Monitoring

It is the responsibility of the Owner or Operator to ensure that all monitoring requirements specified herein, in any Project CEQA documentation, and in permits issued for the Project are met, and that the Project site maintains adequate access, facilities, instruments, and personnel for monitoring to take place.

The following monitoring requirements shall apply to Basin Projects, as applicable to the Project's design and in accordance with any Monitoring Plan included as part of any Project Incentive Agreement made with ETSGSA:

- Monitoring and recording of all water inflows into the Basin, in accordance with the Project's Monitoring Plan; and
- Monitoring and recording of all water outflows from the Basin using flow monitoring equipment incorporated into the Project design for Projects seeking any portion of recharge credits (as defined in ETSGSA' Rules and Regulations).
- Submit flow monitoring data to ETSGSAs General Manager on January 15th of each year. All data must meet the Engineers report for the type of flow monitoring device.

Reporting

It is the responsibility of the Owner or Operator to ensure that the following reporting Requirements are satisfied:

- Conduct all reporting required by any permits issued for the Project;
- Conduct all reporting required of the Owner or Operator under the Project's CEQA documentation;
- Report to ETSGSA all flow measurement data collected on water inflows to and outflows from the Basin, as applicable to the Project design and in accordance with the Project's Monitoring Plan included as part of any Project Incentive Agreement made with ETSGSA; and
- Provide all geo-tagged, date and time-stamped photographs of the Project site, including pre-Project, post-Project, and maintenance period conditions, in accordance with the Project's Monitoring Plan to ETSGSA's general manager or designee by January 15th of each year of the agreement.

Best Practices and Guidelines

General

The following Best Practices and Guidelines for Basins Projects are recommended but not required.

<u>Site Assessment</u>

- For Basins intended for recharge, a hydrogeological assessment may be conducted prior to Basin design to determine site suitability, basin size, recharge application rates, and management practices. United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Technical Note No. 450-06 may be used as guidance for soil infiltration capacity evaluation. Additional web sources that provide information relevant to hydrogeologic assessment are included in the References section.
- Water quality of the inflow source water should be considered as part of project planning and design. If deemed necessary to address potential high sediment loads, a sediment control basin or forebay may be incorporated into the design.

Planning and Design

- Design plans for Basin Projects should be developed prior to construction and should include all specifications and details related to earthwork, excavation, and grading. The design plans should include the following:
  - Description of the work and methods of excavation, soil salvage, and/or debris disposal, as applicable;
  - Plan-view layout map showing the location and extent of any earthwork activities (e.g., excavation areas, berms) and associated water infrastructure (e.g., pipelines);
  - Typical cross-section drawings of earthwork structures (e.g., berms), as applicable;
  - A grading plan showing existing and final proposed grades and specifying cut and fill quantities. The grading plan should aim to balance cut and fill operations, should utilize uniform slopes to the extent possible, and should adhere to applicable regulations for acceptable grades and maximum slope lengths. Avoid reverse grades by removing irregularities and grading short level sections, as applicable;
  - Any other designed infrastructure included in the Basin design (such as a forebay, settling basin, or sediment trap for Recharge Basins);
  - Typical design and construction details are provided in Appendix A of these *Implementation Standards*, and may be used as general reference material for designing Basin components, though Basin design will be unique for each Project.
- Basin design should incorporate the most current NRCS erosion prediction technology and the most current NRCS wind erosion prediction methods, as applicable;
- Structures for water control (i.e., outlet structures, etc.) should be selected, designed, and installed in accordance with USDA NRCS Conservation Practice Standard (CPS) 587 "Structure for Water Control";
- Design should consider applicable requirements contained in USDA NRCS CPS 378 "Pond";
- Basin design should allow for storage of available water volumes. When computing the storage volume capacity for the pond, project design should account for sedimentation, evaporation, season of use, and seepage loss;
- Basin design may include an outlet structure allowing outflow at a predetermined water surface elevation to allow passage of the design storm and prevent overtopping;
- Water safety and hazard prevention and mitigation measures (e.g., fences, ladders, safety ropes, flotation rings) should be incorporated into Basin projects to prevent accidental injury to people, livestock, and wildlife;
- For Basins intended for regulation of irrigation water, USDA NRCS CPS 435 "Irrigation Reservoir" and CPS 520 "Pond Sealing or Lining – Compacted Soil Treatment" may serve as reference guides for design;
- For Basins intended for recharge, USDA NRCS CPS 815 "Groundwater Recharge Basin or Trench" may serve as a reference guide for design; and

- A hedge row of drought resistant, perennial shrubs and bushes established around the Basin perimeter may be used to provide additional habitat benefits and as a buffer for wind to reduce wave erosion within Basins. USDA NRCS CPS 422 "Hedgerow Planting" may serve as a reference guide for design and implementation of vegetation around the perimeter of the Basin Project area.

Construction and Implementation

- Inlet and outlet structures should have erosion protection (e.g., riprap) and should be maintained regularly to clear out debris and sediment.
- An Operations and Maintenance Plan should be developed for the designed Basin and included in the final Project design package. Maintenance activities for Basins should include, but are not limited to:
  - Regular periodic evaluations of all structures, embankments, and spillways;
  - As-needed evaluations of all structures, embankments, and spillways, following significant storm events;
  - Repair or replacement plan for damaged components;
  - Trash removal from pipe inlet and trash rack, as applicable;
  - Periodic sediment and debris removal;
  - Vegetation establishment and re-seeding of bare areas, as needed;
  - Maintain berms, including erosion protection, structural investigation, and prevention of the establishment of woody vegetation on the constructed embankment fill and around the spillway.
- Water levels in the Basin may be monitored to assess changes in water storage occurring as a result of inflows (deliveries and rainfall) and outflows; (seepage, infiltration, and evaporation). Methods for water level monitoring may include stilling wells with pressure transducers, staff gauges with camera traps, or other methods; and
- Installation of shallow monitoring well(s) to assess changes to groundwater conditions in the vicinity of the Basin may be an additional element of a project. USDA NRCS CPS 353 "Monitoring Well" may be used as a reference for monitoring well installation.

References

United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), 2001. Guidelines for Soil Quality Assessment in Conservation Planning.

United States Environmental Protection Agency (USEPA), 2008. Green Remediation: Best Management Practices for Excavation and Surface Restoration.

USDA, NRCS, 2016. Conservation Practice Standard: Pond Sealing or Lining – Compacted Soil Treatment, Code 520.

USDA, NRCS, 2017. Conservation Practice Standard: Hedgerow Planting, Code 422.

USDA, NRCS, 2017. Conservation Practice Standard: Structure for Water Control, Code 587.

USDA, NRCS, 2020. Conservation Practice Standard: Irrigation Reservoir, Code 436.

USDA, NRCS, 2020. Conservation Practice Standard: Monitoring Well, Code 353.

USDA, NRCS, 2020. Conservation Practice Standard: Groundwater Recharge Basin or Trench, Code 815.

USDA, NRCS, 2021. Soil Health Technical Note No. 450-06: Cropland In-Field Soil Health Assessment Guide.

USDA, NRCS, 2022. Conservation Practice Standard: Pond, Code 378.

West Turlock Subbasin Groundwater Sustainability Agency and East Turlock Subbasin Groundwater Sustainability Agency (WTSGSA and ETSGSA), 2023. Consolidated Final Turlock Subbasin Groundwater Sustainability Plan Program Environmental Impact Report. State Clearinghouse No. 2022010100. March 2023. Available: https://turlockgroundwater.org/peir.

Web Sources:

UC Davis California Soil Resource Lab, Soil Agricultural Groundwater Banking Index (SAGBI), https://casoilresource.lawr.ucdavis.edu/sagbi/

Sustainable Conservation / Earth Genome, Groundwater Recharge Assessment Tool (GRAT) https://gratviewer.earthgenome.org/

USDA Web Soil Survey, https://websoilsurvey.nrcs.usda.gov/app/

Appendices

A. Typical Drawings for Basins (not for construction)