DEPARTMENT OF THE ARMY
SOUTH PACIFIC DIVISION, CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1399

REPLY TO
ATTENTION OF

16-Feb-2013

CESPD-PDC

MEMORDANDUM FOR Commander, San Francisco District US Army Corps of Engineers

Subject: Review Plan Approval for the Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California

1. The enclosed Review Plan for the Sacramento River Flood Protection Project, Glenn-Colusa, dated 26 Novemeber 2012, has been prepared in accordance with EC 1165-2-214. The Review Plan has been coordinated internally within the District Support Team. The CESPD-RBT will serve as the Review Management Office.

2. With MSC approval the Review Plan will be made available for public comment via the internet and the comments received will be incorporated into future revisions of the Review Plan. The Review Plan does not include independent external peer review.

3. I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

4. For any additional information or assistance, contact Karen Berresford, District Support Team Lead, (415) 503-6557, Karen.G.Berresford@usace.army.mil.

Encl

MICHAEL C.WEHR, P.E.
BG, USA
Commanding

ED-DC 6 de

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

CESPK-ED-DC

JUL 09 2012

MEMORANDUM FOR: Commander, South Pacific Division, ATTN: CESPD-PD-C, (Berresford)

SUBJECT: Review Plan for the Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California, P2 Project No. 105618

1. The enclosed Review Plan (Encl 1) for the Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California Project dated 23 April 2012 has been prepared in accordance with EC 1165-2-209. The Review Plan Checklists for Implementation Documents are included in the Review Plan as Appendix H. Also included is a draft of the memorandum for approval by the Commander, South Pacific Division as Appendix I.

2. This Review Plan describes the DQC and ATR activities anticipated for the subject project. A chair has not yet been identified to conduct the ATR.

3. Based on the nature and functionality of this submerged grade control structure, the enclosed Review Plan does not recommend that a Type II IEPR be conducted. Please reference Pages 3 and 4 of the Review Plan for further detail of this justification.

4. The SPK District point of contact is Mr. Peter Valentine at (916) 557-6618.

FOR THE COMMANDER:

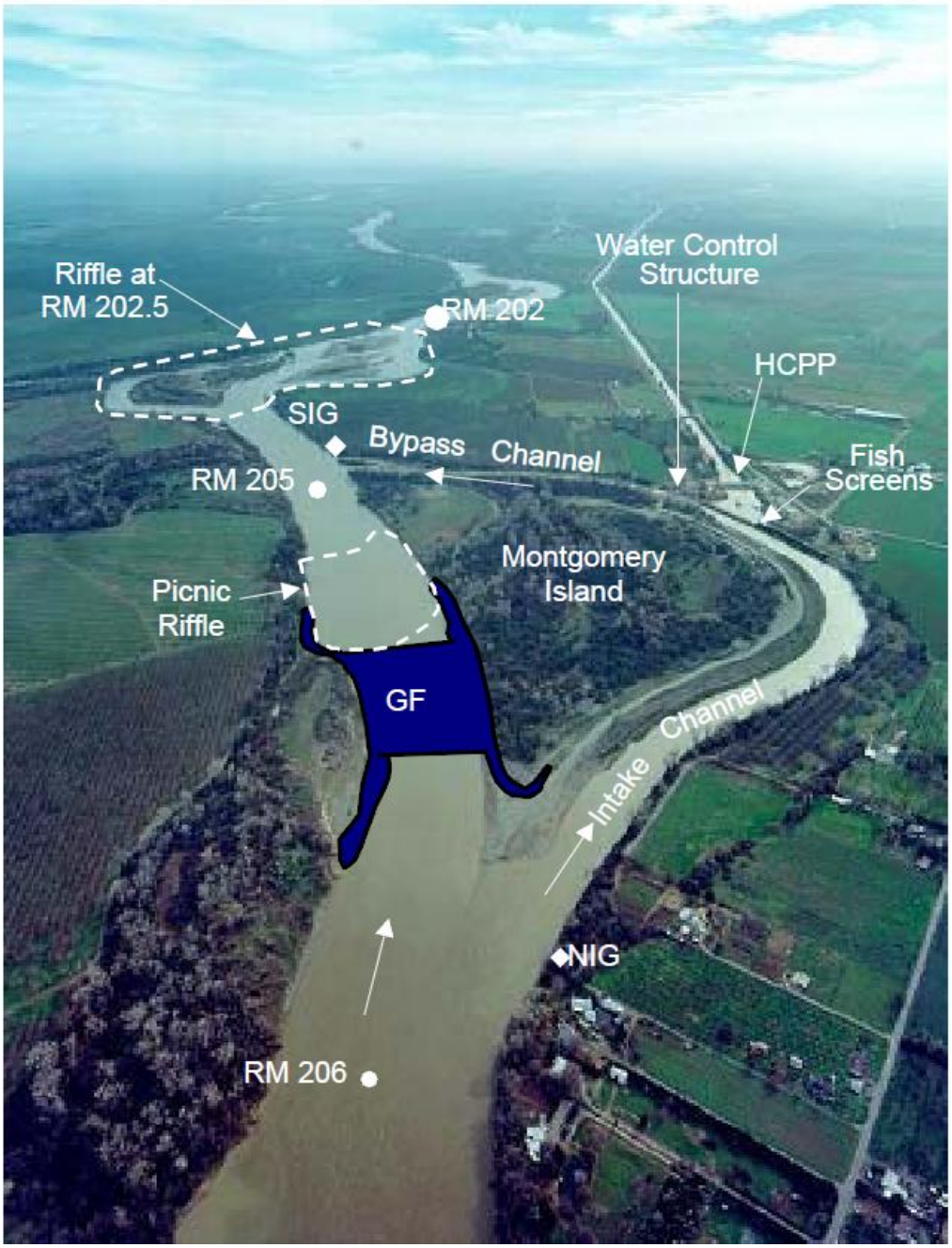
Rick L. Poeppelman

RICK L. POEPPELMAN, P.E.
Chief, Engineering Division

Encl

CF: CESPD-RBT (Bigornia)

Review Plan
SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA, Hamilton City, California



Prepared by:
U.S. Army Corps of Engineers, Sacramento District

Date:
23 April 2012
MSC Approval Date:
Last Revision Date:

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REVIEW PLAN
SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA
HAMILTON CITY, CALIFORNIA

APPENDICES

APPENDICES (cont'd)

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

Term	Definition
A-E	Architect-Engineer
ATR	Agency Technical Review
ATRT	Agency Technical Review Team
BCOE	Biddability, Constructability, Operability and Environmental
DDR	Design Documentation Report
EC	Engineering Circular
EM	Engineering Manual
COE	Corps of Engineers
DQC	District Quality Control
EA	Environmental Assessment
FRM	Flood Risk Management
HQ	Headquarters
IEPR	Independent External Peer Review
ITR	Independent Technical Review
ITRT	Independent Technical Review Team
MSC	Major Subordinate Command
NEPA	National Environmental Policy Act
NIG	North Island Gage
OMRR&R	Operation and Maintenance, Repair, Replacement and Rehabilitation
PDT	Project Delivery Team
P&S	Plans and Specifications
PM	Project Manager
PMP	Project Management Plan
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
RIT	Regional Integration Team
RMO	Regional Management Office
RTS	Regional Technical Specialists

SIG	South Island Gage
SPD	South Pacific Division
SPK	Sacramento District
USACE	U.S. Army Corps of Engineers
WRDA	Water Resources Development Act

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA HAMILTON CITY, CALIFORNIA

1. PURPOSE AND REQUIREMENTS

A. Purpose. This document outlines the Review Plan for the Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California**,** P2 Project No. 105618. It includes the Hydraulic Data Collection and Analysis report (awarded to contractor September 2011), Analysis and Design Tools memo, the interim and final project Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) manual and project features as they relate to any future construction plans and specifications (P&S), design documentation report (DDR) and environmental assessment (EA) to address downstream erosion areas.

The project construction was completed in 2000; however, due to issues with the project, discussed in Section 3, turnover of the project has not been executed.

In addition to earlier post construction evaluations a Blue Ribbon Panel of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009. For the Hydraulic Data Collection and Analysis work product, data will be collected, processed, and analyzed to address these concerns and develop, recommend, and model corrective repair options.

An interim OMRR&R manual is currently being prepared, for transfer of the project to the sponsor for maintenance and operation activities.

The Government will be preparing P&S for a downstream scour repair. The analysis and design of the scour hole will be challenging. The Government is currently preparing an Analysis and Design Tools memo for the contractor to use during analysis and design of scour hole repairs. .The EA will be prepared upon notification that construction funding is to be available for downstream erosion repairs. The P&S will be amended, if necessary, to include any environmental considerations.

B. References.

(1) ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999

(2) ER 1110-1-12, Engineering and Design Quality Management, 21 Jul 2006

(3) WRDA 2007 H. R. 1495 Public Law 110-114, 8 Nov 2007 (Independent peer review/safety assurance review requirements)

(4) EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010

(5) South Pacific Division Regulation (CESPD-R) 1110-1-8, Quality Management Plan (QMP), December 2002

(6) Sacramento District (CESPK) 01-B Quality Management Plan, Appendix A, Engineering Division Quality Manual, June 2007

C. Review Requirements. This review plan was developed in accordance with Engineering Circular (EC) *Civil Works Review Policy* 1165-2-209, dated 31 January 2010, which defines the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation and operations and maintenance documents.EC 1165-2-209 outlines three requirements to the review process. These are a district quality control review (DQC), an agency technical review (ATR), and an independent external peer review (IEPR). Depending on which requirement is performed, the reviews will investigate the quality of workmanship which in itself minimizes the risk for failure.

(1) District Quality Control. DQC is the review of basic science and engineering work focused primarily on fulfilling the project quality requirements for the project. The DQC is managed in the Sacramento District (SPK) and may be conducted by in-house staff as long as the reviewers are not doing the work involved in the study, including contracted work that is being reviewed. Basic quality control tools include a Quality Management Plan providing for seamless reviews, quality checks and reviews; supervisory reviews; and Project Delivery Team (PDT) reviews. Additionally, the PDT is responsible for a complete review of all design and specification milestone packages in order to assure overall integrity, which could include changes and recommendations to design and specification submittal before approval of the ATR report by the District Commander. DQC efforts will include the necessary expertise to address compliance with published Corps policy. The district quality manuals will prescribe specific procedures for the conduct of DQC efforts including documentation requirements and maintenance of associated records for internal audits to check for proper DQC implementation. DQC is required for this project.

(2) Agency Technical Review. EC 1165-2-209 characterizes the ATR effort as an in-depth review managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the design effort. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole. For each ATR event, the ATR event shall review relevant DQC records and provide written comment in the ATR report as the apparent adequacy of the DQC effort. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists (RTS), subject matter experts, etc.) and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC (district). EC 1165-2-209 requires that DrChecks (https://www.projnet.org/projnet/) be used to document all ATR comments, responses, and associated resolution accomplished.

At this level of review, any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products, or any other services provided by the local sponsor(s) directly related to the work products described in Paragraph 1A shall be reviewed by the ATR team.

The review plan outlines the proposed approach to meeting this requirement for the hydraulic analysis, interim and final OMRR&R manual, plans and specifications, design documentation report (DDR), and environmental assessment. An ATR is required for all of the previously referenced implementation documents for the project.

(3) Independent External Peer Review (IEPR).

(a) Type I Independent External Peer Review (IEPR). Type I IEPR is conducted on project studies. It is of critical importance for those decision documents and supporting work

products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental and social effects to the nation. Type I IEPR is mandatory if any of the following are true:

(i) Significant threat to human life.

(ii) Where the estimated total cost of the project, including mitigation costs, is greater than $45 million.

(iii) Where the Governor of an affected State requests a peer review by independent experts; or

(iv) Where the Chief of Engineers determines that the project study is controversial due to significant public dispute over the size, nature, or effects of the project or the economic or environmental costs or benefits of the project.

(b) Type II IEPR Safety Assurance Review (SAR) Review. EC 1165-2-209 characterizes the IEPR effort as an external review process that was originally added to the existing Corps review process via EC 1105-2-408. The Project, while authorized under flood control does not provide any flood risk management. No residences or communities are threatened if the structure fails, so there is no life safety risk.

The District considered risks and risk triggers for Type I IEPR and Type II IEPR.

Type I IEPR is required for decision documents under most circumstances. This project does not involve the production of decision documents and there is no significant threat to human life.

Decision on Type I IEPR: The District considered these risks and determined that **Type I IEPR is not required.**

Type II IEPR (SAR). Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

Any project addressing hurricane and storm risk management and **flood risk** management or any other project where Federal action is justified by **life safety** or the failure of the project would pose a **significant threat to human life.** This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities (based on identified risks and threats).

Other Factors to consider for Type II IEPR (SAR) review of a project, or components of a project;

- The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices
- The project design requires redundancy, resiliency, and robustness.

- The project has unique construction sequencing or a reduced or overlapping design and construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

The GF is a submerged grade control structure. It does not have a hurricane, storm risk management or flood control management function. The failure of the structure does not pose a significant threat to human life.

Decision on Type II IEPR: Based on the information and analysis provided in the preceding paragraphs of this review plan, the project covered under this plan is excluded from IEPR because it does not meet the mandatory IEPR triggers and does not warrant IEPR based on a risk-informed analysis. The District considered these risks and the District Chief of Engineering has determined that **Type II IEPR (SAR) is not required** considering the risks triggers.

(4) Policy and Legal Compliance Reviews. All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority. There is no decision document required for the project OMRR&R document review or any future construction plans/environmental assessment so a formal policy and legal compliance review is not anticipated. The interim and final OMRR&R manuals will be reviewed by SPK legal counsel from a DQC perspective only.

(5) Review Plan Approval and Posting. In order to ensure the Review Plan is in compliance with the principles of EC 1165-2-209 and the MSC's QMP, the Review Plan must be approved by the applicable MSC, in this case the Commander, South Pacific Division (SPD). Once the Review Plan is approved, the Sacramento District will post it to its district public website and notify SPD.

Table 1: Overall Summary of Reviews for the Sacramento River Flood Protection Project, Glenn-Colusa (Requirements As Noted in the Civil Works Review Policy, EC 1165-2-209).

Review Type	Acronym	Management	Applicable	Notes:
Review Plan Approval	RPA	-	Required	Approved by: MSC Commander
Public Review Plan Approval	-	MSC	Required	Posted only after Commander's approval
District Quality Control	DQC	SPK	Required	
Agency Technical Review	ATR	RMO	Required	
Safety Assurance Review	IEPR	HQUSACE	Not required	No life safety issues
Policy and Legal Compliance Review	PLCR	MSC, RMO, HQUSACE	Not Required	No decision documents
Planning Center of Expertise	FRM	FRM @ RMO	Not Required	Required for decision documents only
Certification of Agency Technical Review	Certification of ATR	MSC	Required	After all successful reviews are completed

2. PROJECT DESCRIPTION

A. Project Authority

The authorizations of the Project were as follows:

Energy and Water Development Act of 1990 (Public Law 101-514), Section 102.

> Sec. 102. The Sacramento River Flood Control Project, California, as authorized by the Flood Control Act of 1917, as amended, is further modified to direct the Secretary of the Army, acting through the Chief of Engineers, to proceed in fiscal year 1990 and in subsequent years as necessary with construction of riverbed gradient restoration structures in the vicinity of River Mile 206, Sacramento River, California, at an additional estimated cost of $6,000,000, generally in accordance with the plan contained in a report prepared by the Glenn-Colusa Irrigation District and the California Department of Fish and Game, dated December 1988. Local cost-sharing is to be obtained in accordance with the flood control requirements of the Water Resources Development Act of 1986.

Water Development and Resources Development Act of 1996 (Public Law 104-303), Section 301(b) (3).

> (3) GLENN-COLUSA, CALIFORNIA. - The project for flood control, Sacramento River, California, authorized by Section 2 of the act entitled "An act to provide for the control of the floods of the Mississippi River and of the Sacramento River, California, and for other purposes," approved March 1, 1917 (39 Stat. 949), and modified by Section 102 of the Energy and Water Development Appropriations Act, 1990 (103 Stat. 649), is further modified to authorize the Secretary to carry out the portion of the project at Glenn-Colusa, California, at a total cost of $14.2 million.

Energy and Water Development and Appropriations Act of 1998 (Public Law 105-245).

> That the flood control project for Sacramento River, Glenn-Colusa Irrigation District,
>
> California, authorized by Section 2 of the Act entitled "An Act to provide for the control of floods of the Mississippi River and the Sacramento River, and for other purposes'', approved March 1, 1917 (39 Stat. 949), is modified to authorize the Secretary of the Army, acting through the Chief of Engineers, to construct the project at a total cost of $20,700,000 with an estimated first Federal cost of $15,570,000 and an estimated first non-Federal cost of $5,130,000:

Water Resources Development Act of 1999 (Public Law 106-53), Section 305, SACRAMENTO RIVER, GLENN-COLUSA, CALIFORNIA.

> (a) IN GENERAL.—The project for flood control, Sacramento River, California, authorized by section 2 of the Act entitled ''An Act to provide for the control of the floods of the Mississippi River and of the Sacramento River, California, and for other purposes'', approved March 1, 1917 (39 Stat. 949), and modified by section 102 of the Energy and Water Development Appropriations Act, 1990 (103 Stat. 649), section 301(b)(3) of the Water Resources Development

Act of 1996 (110 Stat. 3110), and title I of the Energy and Water Development Appropriations Act, 1999 (112 Stat. 1841), is further modified to authorize the Secretary—

(1) to carry out the portion of the project at Glenn-Colusa, California, at a total cost of $26,000,000, with an estimated Federal cost of $20,000,000 and an estimated non-Federal cost of $6,000,000; and

(2) to carry out bank stabilization work in the riverbed gradient facility, particularly in the vicinity of River Mile 208, if the Secretary determines that such work is necessary to protect the overall integrity of the project, on the condition that additional environmental review of the project is conducted.

B. Location and Descriptions

The riverbed gradient facility (GF), the Project, was constructed in 2000 for the purpose of restoring the river hydraulic conditions in the vicinity of the existing Glenn-Colusa Irrigation District (GCID) intake facility to pre-1970 conditions. The local sponsor is the GCID, 344 East Laurel Street, Willows, California 95988, and telephone (530) 934-8881. The GF is one of several components included in a comprehensive fish screen improvement project at the Hamilton City Pumping Plant (HCPP), which is located at the GCID intake facility. The specific objectives of the GF are to: (1) stabilize the local Sacramento River reach to reduce the effect of river gradient changes on screen performance, (2) increase water-surface elevations at the fish screening facility to provide adequate hydraulic gradient to operate a fish bypass system, and (3) stabilize water levels to increase the efficiency of pumping plant operations.

The project site is located in the Sacramento Valley Region of California, approximately 100 miles north of the city of Sacramento and roughly 4 miles north of Hamilton City between river miles (RM) 205 and 206 on the Sacramento River. The existing HCPP and fish screening facility are located in a diversion channel that branches off of the Sacramento River near RM 206. The flow bifurcation through this diversion channel creates Montgomery Island. The diversion channel rejoins with the river near RM 205. Glenn-Colusa Irrigation District (GCID) diverts water for irrigated-agricultural production using the HCPP located on the right bank (south), midway along the length of Montgomery Island. The GCID diversion supplies water to 140,000 acres of farmland, over 20,000 acres of Federal wildlife refuges, and 40,000 acres of other lands and wetlands. Water diversions and deliveries by GCID are part of a larger water management system operated by the Bureau of Reclamation, California Department of Water Resources (DWR), and several irrigation districts throughout the upper Sacramento Valley.

The GF consists primarily of rock riprap that extends along 1,000 ft of the channel bed, and roughly 2,500 ft along either bank line of the river. In addition, the riprap is supplemented by three sheet pile cutoff walls that extend beyond either riverbank and provide protection against flanking of the structure. The crest of the structure is elevated approximately 4 ft above the channel bed, and the lower channel banks are slightly constricted to generate an increase in upstream water surface elevations. The structure has a constant downstream slope of 0.3 percent from the crest to the downstream end of the channel invert riprap, where it ties into the existing channel topography. The geometry of the structure creates a modified channel section that is designed to mimic the general characteristics of natural riffles along the Upper Sacramento River. For the design flow range of 7,000 to 20,000 cfs in the Sacramento River, upstream of the GCID diversion, the GF causes an increase in upstream water surface elevations over pre-project conditions. As flows increase above 40,000 cfs, the GF will "drown out" and cease to have any marked effect on river hydraulics.

3. PROJECT STATUS

Before construction was determined to be complete (prior to turnover of the project to the local sponsor), a number of issues were identified. These include scour holes and downstream bank erosion.

In June 2009, a Blue Ribbon Panel (BRP) of experts completed a report investigating, commenting, and providing recommendations to address the issues associated with the GF. Since that time, GCID and SPK have been working to address the GF problems. The BRP evaluations and recommendations regarding scouring and downstream bank erosion are summarized below.

Scour holes and further erosion have developed downstream of the sheet piles discussed above in the project information. The riprap slope revetment on the right river bank (east shore of Montgomery Island) immediately downstream of the GF has been partly undermined and fallen into the deep local scour hole. The local scour hole deepened significantly between 2003 and 2008 and given sufficient underlying depth of alluvial material, the hole could deepen considerably. Measures should be taken to at least partly refill and stabilize the downstream scour hole. The left overbank area should also be refilled to the extent judged necessary and stabilized against further scour. The right bank revetment immediately downstream of the GF should be restored in conjunction with remedial treatment of the adjacent deep scour hole.

An Architect-Engineer contract was issued to McMillen LLC (Boise, ID) in September 2011 for hydraulic data collection, analysis, repair option development and modeling (optional), and documentation. The report would support possible repairs of the GF. The work will be utilized to determine and document the following for the GF; existing gradient facility rock stability, gradation, and hydraulic roughness, existing and potential local scour immediately downstream of the gradient facility and in the left and right overbanks adjacent to the gradient facility and development of options and recommendations for corrective repairs to the gradient facility and scour holes.

An interim OMRR&R manual is currently being prepared to address the GF operation and maintenance procedures of the constructed project. The final OMRR&R manual will be prepared when restoration is completed and prior to turnover of the project to the local sponsor,

Plans and specifications, DDR and an environmental assessment are proposed to address the existing downstream scour hole as available construction funds allow. The analysis and design of the scour hole will be challenging. The Government is currently preparing a memo regarding some tools that may be helpful for the contractor to use during analysis and design of scour hole repairs.

4. WORK PRODUCTS

A. General. The primary document/products covered under this review plan are the Hydraulic Data Collection and Analysis, Analysis and Design Tools memo, interim OMRR&R manual and P&S/DDR. The specific review appendix for the environmental assessment will be added upon determination of availability of construction funding and the final OMRR&R manual review appendix will be added after completion of the construction of the work covered by the P&S/DDR and environmental assessment.

5. SCOPE OF REVIEW

A. General. The scope of this review plan will primarily focus on anticipated review activities for the Hydraulic Data Collection and Analysis, Analysis and Design Tools memo, interim OMRR&R manual and plans and specifications/DDR for the construction contract to address issues with the constructed project. This review plan and product specific review appendixes will be updated (including the EA and

completion of the final OMRR&R manual) to address more details of the review of other implementation documents as the schedule and funding of these documents is more clearly defined.

B. District Quality Control (DQC). DQC is an internal review process inherent in most products implemented within the COE. Generally the DQC is implemented during the development process as a check of adequacy for the work product. The DQC is carried out by staff familiar with the work product, but not responsible for the work product or managing the A-E contract which could include supervisors, team leaders, work leaders, designated individuals from qualified personnel to senior staff. The quality assurance team for the Project will be composed of PDT members, the local sponsor, and other professionals throughout the Sacramento district who are not PDT members.

C. Agency Technical Review (ATR). The ATR is managed outside of the home office which is responsible for the work product. The ATR is mandatory for implementation products on a case-by-case basis. The review team (ATRT) shall be made up of subject matter experts capable of reviewing a work product for adequacy, completeness, and with respect to matters pertaining to life, safety, and property. An ATR shall be applied toward all current and future products including the operation and maintenance manual and plans and specifications.

D. Safety Assurance Review (SAR)—Type II IEPR. The Water Resources Development Act of 2007 included two separate requirements for review by external experts. The first, Section 2034, required independent peer review of project studies under certain conditions. The second requirement, Section 2035, required a Safety Assurance Review (SAR) for design and construction activities for hurricane and storm damage reduction, and flood damage reduction projects which pose a hazard to life safety. The project is a submerged grade control structure with rirap. There is no flood control purpose or life safety function.

The District has determined there is no hazard to life safety and no SAR level review is required. Table 2 below is a summary of the status of the current and future documents needed for the project.

Table 2: Documents to be Reviewed and Level of Review Needed

Document	DQC	ATR	SAR[3]
Hydraulic Data Collection and Analysis (Appendix A)[1]	√	√	
Analysis and Design Tools memo	√	√	
Interim OMRR&R Manual (Appendix B)	√	√	
Plans and Specifications/DDR, Scour and Erosion Restoration (Appendix C)[2]	√	√	
Environmental Assessment. Scour and Erosion Restoration (additional specific review details to be added later)	√	√	
Final OMRR&R Manual (additional specific review details to be added later)	√	√	

[1] If the complexity of the analysis warrants an IRPR, Type I, this review plan will be revised to indicate IEPR review.
[2]It is anticipated that the plans and specifications will be prepared by architectural-engineer (A-E) contact
[3] No Type II IEPR review. No life safety issues for any work products.

E. Timing & Sequence of Reviews. The DQC review timing for the Hydraulic Data Collection and Analysis (under contract) is presented in Appendix A. The estimated DQC and ATR review timing for the Analysis and Design Tools memo are presented in Appendix B. The DQC and ATR review timing for the

OMRR&R manual (under preparation in-house) is presented in Appendix C. The estimated DQC and ATR review timing for the plans and specifications/DDR for the overbank and downstream erosion restoration are presented in Appendix D.

F. Model Certification. It is anticipated that existing certified models will be used for the hydraulic analysis. It is not anticipated that model certifications are required for the interim OMRR&R manual. It is currently anticipated that an existing certified hydraulic model will be used for the construction plans. If a model certification is required for the construction plans the documentation will be included in Appendix D.

G. Meeting Reports. Meeting reports will be prepared for significant meetings with the client and agencies for all work products. Any meeting, at which decisions are made, action items are assigned, or agreements reached must be documented. All actions will be noted in the meeting report.

H. Value Engineering Studies. The Corps' current policy requires that value engineering (VE) studies be performed on all USACE projects or project elements with a programmed cost of $1,000,000 or more unless a determination can be made that a study would not be cost effective. It is anticipated that the erosion repair construction contract will exceed $1,000,000. A VE study shall be performed and will include a comprehensive (M-CACES) cost estimate. The milestone is achieved on the date that the VE study is approved by the Sacramento District Chief of Engineering Division.

6. AGENCY TECHNICAL REVIEW PLAN

For the hydraulic analysis, interim OMRR&R manual and P&S/DDR the ATR is managed by the Regional Management Office (RMO). The MSC (South Pacific Division) will serve as also the RMO. The RMO will identify individuals to perform the ATR. The Sacramento District can provide suggestions on possible reviewers with experience in hydraulic design, river engineering, geotechnical and civil design. Prior to ATR, the hydraulic analysis, interim OMRR&R, P&S/DDR and Environmental Assessment will be reviewed by GCID, the PDT, DQC team and appropriate environmental agencies (included on schedule of reviews in Appendices B and C). The DQC review comments will be documented in DrChecks and available to the ATR reviewers. The sponsor comments will be documented and also available to the ATR team.

A. General. An ATR manager shall be designated for the ATR process for each work product. The proposed manager will have expertise in river engineering design and construction. The ATR leader shall provide the following.

(1) Information necessary to team members on the project, the schedule, and the information necessary to conduct a proper review.

(2) Setting up the communication with the PDT, for providing a summary of critical review comments, collecting grammatical and editorial comments from the ATR team.

(3) Ensuring that the ATR team has adequate funding to perform the review, facilitating the resolution of the comments, and certifying that the ATR has been conducted and resolved in accordance with policy.

B. Agency Technical Review Team (ATRT). The ATRT will be comprised of individuals that have not been involved in the development of the implementation documents and will be chosen based on expertise, experience, and/or skill. The members will roughly mirror the composition of the PDT and wherever possible, reside outside of the District Office (per EC Section 9(1) (a)). In general, the review

team members will each have a minimum of 10 years of experience and education in their respective discipline. A statement of qualifications is required for acceptance of review team members. A summary of qualifications for ATRT members is attached as Appendix E. To assure independence, the leader of the ATRT shall be outside the home MSC (SPD). The ATRT members will be identified by the ATRT leader at the time the review is conducted and will be presented in the specific review appendix**.** .

If other disciplines/functions are needed to be involved in the project, they shall have similar general experience and educational backgrounds.

C. Communication. The communication plan for the ATR is as follows.

(1) The District technical lead will notify the ATR leader when the document has been posted for review.

(2) The team will use DrChecks to document the ATR process. The technical lead will facilitate the creation of a project portfolio in the system which allows PDT and ATR member access. An electronic version of the plans and specifications, environmental assessment and the interim OMRR&R manual will be posted at DrChecks at least one business day prior to the comment period.

(3) PDT members and the ATR lead will notify the technical lead as to when comments in the system are final.

(4) A revised electronic version of the report and appendices with comments incorporated shall be posted in DrChecks. Hard copies or CD's will be mailed as necessary.

D. Review. ATRT responsibilities are as follows:

Reviewers shall review preliminary drawings and the scope of work to gain an understanding of the project. Comments on preliminary drawings and scope shall be submitted into DrChecks. Reviewer's shall pay particular attention to one's discipline but may also comment on other aspects as appropriate. Reviewers that do not have any significant comments pertaining to their assigned discipline shall provide a comment stating this. Grammatical and editorial comments shall be provided, particularly for the specification portion of the package submittal. However, these comments should not be submitted into DrChecks. Grammatical comments should be submitted to the ATR leader via electronic mail using email or the track changes feature in the MS Office compatible document or as a hard copy mark-up. The ATR leader shall provide these comments to the technical lead.

Review comments shall contain these principal elements.

(1) A clear statement of concern
(2) The basis for the concern, such as principle, policy, or guidance
(3) Significance for the concern
(4) Specific actions or recommendations to resolve the comment
(5) The "Critical" comment flag in DrChecks shall not be used unless the comment is discussed with the ATR leader first.

PDT responsibilities are as follows: Depending on the responsibility for the work effort, either the PDT or the A-E shall review comments provided by the ATRT in DrChecks and provide responses to each comment using "Concur, Non-Concur, or For Information." Concur responses shall state what action was taken and provide revised text from the report if applicable. Non-concur responses shall state the basis

for the disagreement or clarification of the concern and suggest actions to negotiate the closure of the comment. PDT members or the A-E shall contact ATRT members, either by telephone or email, to discuss any "Non-Concur" responses prior to submission.

E. Resolution. ATRT Reviewers shall back check PDT and/or A-E responses and either close the comment or attempt to resolve any disagreements. Telephone calls shall be used to resolve any conflicting comments and responses. **Face-to-face meetings to resolve comments are encouraged**

A reviewer may close a comment if the comment is addressed and resolved by the response, or if the reviewer determines that the comment was not a valid technical comment as a result of rebuttal, clarification, or additional information, or because the comment was advisory, primarily based on individual judgment or opinion, or editorial. If the reviewer and responder cannot resolve a comment, it should be brought to the attention of the ATR leader. If the ATR leader cannot resolve, the ATR leader and the PDT technical lead will attempt to resolve. ATRT members will keep the ATR leader informed of problematic comments. The vertical team will be informed of any unresolved comments, policy variations, or other issues that may cause them concern during HQ review. A comment may also be closed when it has been addressed or deferred to the policy compliance review process by HQUSACE.

F. Certification and Documentation. ATR certification is required for all implementation documents (hydraulic analysis report, interim and final OMRR&R, P&S/DDR and environmental assessment). Sample statement of Completion of Agency Technical Review is presented in Appendix F. This statement shall be completed and submitted upon completion of review of work products and all issues raised by the reviewers have been addressed to the review team's satisfaction. A summary report of all comments, responses and any significant decisions during the review process will be prepared and made available. It is also noted that the A-E is required to have all the design drawings stamped by a registered professional engineer.

7. PUBLIC REVIEW

The public will have the opportunity to review the Sacramento River Flood Protection Project, Glenn-Colusa Review Plan. Public dissemination of the document will be posted at the SPK web site, http://www.spk.usace.army.mil/organizations/cespk-pd/ReviewPlans.html, after the review plan has been finalized and approved by South Pacific Division. There will be no formal comment period and there will be no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. The public will be invited to review and submit comments on the plan as described on the web site.

8. REVIEW COSTS

The current estimated cost of the review of the Hydraulic Data Collection and Analysis is included in Appendix A. The current estimated cost of the review for the Analysis and Design Tools memo is included in Appendix B. The current estimated cost of the review for the interim OMRR&R manual is included in Appendix C. The current estimated cost of the review for the P&S/DDR is included in Appendix D. The review costs of any further future reviews will be included in the review specific appendices.

9. POINTS OF CONTACT

A. Project Delivery Team. The PDT is comprised of those individuals directly involved in the scoping and the review of the work products. Individual contact information and disciplines are presented in

Appendix G. All work products associated with this project will undergo seamless and peer review by the PDT for a determination of adequacy.

B. Vertical Team. The Vertical Team includes District management, Division Support Team (DST), and Regional Integration Team (RIT) staff. Currently Karen Berresford is the district support team lead for the vertical team. Her contact information is Karen.G.Berresford@usace.army.mil at 415-503-6557.

C. Review Plan Points of Contact. The Points of Contact for questions and comments to this Review Plan are as follows:

SPK Lead Point of Contact: Bill Fakes 916-557-6795
SPK Hydraulic Design Lead: Todd Rivas 916-557-7523
SPK PM: Tom Karvonen 916-557-7630
RMO Point of Contact: Boniface Bigornia 415-503-6556

9. APPROVALS AND CHECKLISTS

The PDT will carry out the Review Plan as described. The SPK lead will submit the Review Plan to the RMO for review and recommendation for approval. As per EC 1165-2-209, paragraph 9 (2) Other Work Products (for the Hydraulic Data Collection and Analysis Report, interim and final OMRR&R manual, plans and specifications and environmental assessment work), the MSC (SPD) will serve as the RMO. The Review Plan Checklists are included as Appendix G. After review and recommendation, the PDT District Technical Lead will forward the final Review Plan to the MSC for approval. An MSC approval letter is included in Appendix H (to be in the posted version of the RP per the EC). Upon MSC approval of the RP, the MSC will provide a copy of the signed MSC Approval Memo to its respective HQUSACE Regional Integration Team (RIT).

10. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original			
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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX A

HYDRAULIC DATA COLLECTION AND ANALYSIS REVIEW DETAILS

A. Background

The project is located in one of the most dynamic reaches of the Sacramento River with active river bend migration and relatively frequent bend cut offs. The river bend at USGS river mile 203 downstream of the Glenn-Colusa Irrigation District (GCID) intake facility experienced a cut-off during 1969 – 1970. This lowered the water surface for the GCID intake, impacting operations. Construction of a grade control facility (GF) about USGS river mile 206 was completed in November 2000. The GF was designed to mimic a natural riffle and consists of sloping rock –lined channel bed or rock rapids with three sheet pile cut-off walls.

Since construction a number of concerns have been noted including:

1) Rocks protruding near or above the surface of the water, causing boat navigation safety concerns
2) The protruding rocks, observations, and questions about the original hydraulic model indicate that the rock in the GF may not be stable
3) Scour holes developed immediately adjacent to the west bank downstream end of the GF and near the middle sheet pile in the left overbank area, jeopardizing the functional capability of the GF
4) An existing large mid-channel bar enlarged just downstream of the GF, contributing to left and west bank erosion in this area
5) Upstream river channel movement, particularly near RM 208, could jeopardize the function of the GF and GCID operations

A Blue Ribbon Panel (BRP) of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009. For this work product, data will be collected, processed, and analyzed to address these concerns and develop, recommend, and model corrective repair options.

While this task order is an agreement between the government and the contractor only, it should be noted that the government is coordinating the work with the project sponsor. The project sponsor actively participates in all reviews. The contractor is expected to provide submittals to the sponsor in accordance with Attachment 5 the submittal distribution list. In addition, the contractor is expected to fully address

any comments made by the sponsor when the government conducts reviews and back checks the comments.

The government reviews are also expected to include Agency Technical Review (ATR) reviews that are expected to be conducted simultaneously with District Quality Control (DQC). If Independent External Peer Review (IEPR) is needed, the contractor is expected to be available to discuss and respond to comments and issues that arise during IEPR.

B. Contractor Quality Control

The QC review plan for this product is presented in appendix J:

C. District Quality Control:

The DQC review team for this product is presented in Table A-1.

Table A-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Todd Rivas Lead Hydraulic Engineer SPK	Hydraulic Engineering	8 years hydraulic engineering experience	916-557-7523
Steve Maynord, Research Engineer, ERDC	Hydraulic Engineering, particularly riprap design and scour hole repair	Largely responsible for developing the current USACE riprap design guidance	601-634-3284

D. ATR Disciplines

ATR disciplines required are as follows: civil design, hydraulic design/river engineering, environmental, construction-operations and geosciences. The ATRT is presented in Table A-2 (to be updated upon nomination/ selection of ATRT members). Qualifications of the ATRT members are presented in Appendix E.

Table A-2: ATR Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review team leader (outside the home MSC)		
TBD	Hydraulic Design/ Geomorpholgy[1]		

[1] Sacramento District recommends Steven Abt for riprap design (970) 491-8203 and Dr. Chester Watson for fluvial geomorphology

E. Timeline and Costs

The estimated timeline and costs for the Hydraulic Data Collection and Analysis is presented in Table A-3 and A-4 below.

Table A-3: Review Timeline for DQC, and ATR Teams [1,2]

All Teams	Submittal	Team Required	Estimated Completion Date
DQC, ATR, and GCID	Draft Water Data Collection Report	DQC	March 2012
	Draft Final Water Data Collection Report	DQC/GCID	April 2012
	Final Water Data Collection Report	DQC/GCID	May 2012
	Draft Rock Data Collection Report	DQC	March 2012
	Draft Final Rock Data Collection Report	DQC/GCID	April 2012
	Final Rock Data Collection Report	DQC/GCID	May 2012
	Draft Hydraulic Model and Rock Stability Evaluation Report	DQC/ATR/GCID	August 2012
	Draft Final Hydraulic Model and Rock Stability Evaluation Report	DGC/ATR/GCID	September 2012
	Final Hydraulic Model and Rock Stability Evaluation Report	DQC/ATR/GCID	September 2012

[1] Option items to contract will be added to above timeline as exercised.
[2] Assumes Contract is modified to allow the contractor to complete the Draft Hydraulic Model and Rock Stability Evaluation Report without having the final rock data collected.

Table A-4 Estimated costs for DQC and ATR Teams

Review	#reviewers/total hours[1]	Approximate cost/hr	Totals ($)
Draft Water Data Collection Report	1 reviewers, 32 hrs	100	$3,200
Draft Final Water Data Collection Report	1 reviewers, 16 hrs	100	$1,600
Final Water Data Collection Report	1 reviewers, 0 hrs	100	$0
Draft Rock Data Collection Report	1 reviewers, 32 hrs	100	$3,200
Draft Final Rock Data Collection Report	1 reviewers, 16 hrs	100	$1,600
Final Rock Data Collection Report	1 reviewers, 0 hrs	100	$0
Draft Hydraulic Model and Rock Stability Evaluation Report	3 reviewers, 48 hrs	150	$7,200
Draft Final Hydraulic Model and Rock Stability Evaluation Report	3 reviewers, 24 hrs	150	$3,600
Final Hydraulic Model and Rock Stability Evaluation Report	3 reviewers, 0 hrs	150	$0
Total			$20,400

[1] Assumes 2 DQC reviewers (Todd Rivas and Steve Maynord) and 1 ATR reviewer. Lumped background information hours (assumed 8 hrs each) into 1st review for Steve Maynord and ATR reviewer (The Draft Analysis and Tools Memo). Assume 0 hrs for the Final document.

F. SAR

The District does not recommend SAR certification due to the lack of life threatening issues associated with the project.

G. Model Certification

If a hydraulic model is needed, it is anticipated an existing certified model will be used. If a model is proposed that will require certification, the requirements for model certification shall be followed and the process documented in an updated review plan.

H. Value Engineering Study.

No VE study required.

I. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.

Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Todd Rivas	SPK-Technical Lead	Lead Hydraulic Engineer	Sacramento District, US Army Corps of Engineers	916-557-7523
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567
George Robison, PhD, PE	McMillen LLC (Contractor)	Lead-point of contact		TBA

J. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original, Appendix A			
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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX B

ANALYSIS AND DESIGN TOOLS MEMO REVIEW DETAILS

A. Background

The project is located in one of the most dynamic reaches of the Sacramento River with active river bend migration and relatively frequent bend cut offs. The river bend at USGS river mile 203 downstream of the Glenn-Colusa Irrigation District (GCID) intake facility experienced a cut-off during 1969 – 1970. This lowered the water surface for the GCID intake, impacting operations. Construction of a grade control facility (GF) about USGS river mile 206 was completed in November 2000. The GF was designed to mimic a natural riffle and consists of sloping rock –lined channel bed or rock rapids with three sheet pile cut-off walls.

Since construction a number of concerns have been noted including:

1) Rocks protruding near or above the surface of the water, causing boat navigation safety concerns
2) The protruding rocks, observations, and questions about the original hydraulic model indicate that the rock in the GF may not be stable
3) Scour holes developed immediately adjacent to the west bank downstream end of the GF and near the middle sheet pile in the left overbank area, jeopardizing the functional capability of the GF
4) An existing large mid-channel bar enlarged just downstream of the GF, contributing to left and west bank erosion in this area
5) Upstream river channel movement, particularly near RM 208, could jeopardize the function of the GF and GCID operations

A Blue Ribbon Panel (BRP) of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009.

The analysis and design of the scour hole will be challenging. USACE is preparing a memo regarding some tools that may be helpful for the contractor to use during analysis and design of scour hole repairs. This memo and the tools willundergo DQC and ATR review to ensure these tools are of the highest quality and useful for future design and analysis.

B. Contractor Quality Control

The contractor will have an opportunity to comment on this document that is being prepared by the Governmnet . The contractor is not preparing this document.

C. District Quality Control:

The DQC review team for this product is presented in **Table B-1**.

Table B-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Steve Maynord, Research Engineer, ERDC	Hydraulic Engineering, particularly riprap design and scour hole repair	Largely responsible for developing the current USACE riprap design guidance	601-634-3284

D. ATR Disciplines

ATR disciplines required are as follows: hydraulic design/river engineering. The ATRT is presented in **Table B-2** (to be updated upon nomination/ selection of ATRT members). Qualifications of the ATRT members are presented in Appendix E.

Table B-2: ATR Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review team leader (outside the home MSC)		
TBD	Hydraulic Design/ Geomorpholgy		

E. Timeline and Costs

The estimated timeline and costs for the Hydraulic Data Collection and Analysis is presented in Table B-3 and B-4 below.

Table B-3: Review Timeline for DQC, and ATR Teams

All Teams	Submittal	Team Required	Estimated Completion Date
DQC, ATR, AE contractor, and GCID	Draft Analysis and Design Tools Report	DQC/ATR/AE Contractor/GCID	April 2012
	Draft Final Analysis and Design Tools Report	DQC/ATR/AE Contractor/GCID	May 2012
	Final Analysis and Design Tools Report	DQC/ATR/AE Contractor/GCID	June 2012

Table B-4 Estimated costs for DQC and ATR Teams

Review	#reviewers/total hours[2]	Approximate cost/hr	Totals ($)
Draft Analysis and Design Tools Report	3 reviewers, 48 hrs	150	$7,200
Draft Final Analysis and Design Tools Report	3 reviewers, 24 hrs	150	$3,600
Final Analysis and Design Tools Report	3 reviewers, 0 hrs	150	$0
Total			$10,800

Assumes 2 DQC reviewers (Todd Rivas and Steve Maynord) and 1 ATR reviewer. Lumped background information hours (assumed 8 hrs each) into 1st review for Steve Maynord and ATR reviewer (The Draft Analysis and Tools Memo). Assume 0 hrs for the Final document

F. SAR

The District does not recommend SAR certification due to the lack of life threatening issues associated with the project.

G. Model Certification

If a hydraulic model is needed, it is anticipated an existing certified model will be used. If a model is proposed that will require certification, the requirements for model certification shall be followed and the process documented in an updated review plan.

H. Value Engineering Study.

No VE study required.

I. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.
Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Todd Rivas	SPK-Technical Lead	Lead Hydraulic Engineer	Sacramento District, US Army Corps of Engineers	916-557-7523
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567
George Robison, PhD, PE	McMillen LLC (Contractor)	Lead-point of contact		TBA

J. REVIEW PLAN REVISIONS

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Original, Appendix B			
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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX C

INTERIM OMRR&R MANUAL REVIEW DETAILS

A. Background

The riverbed gradient facility (GF) was constructed in 2000 for the purpose of restoring the river hydraulic conditions in the vicinity of the existing Glenn-Colusa Irrigation District (GCID) intake facility to pre-1970 conditions. The local sponsor is the GCID. The GF is one of several components included in a comprehensive fish screen improvement project at the Hamilton City Pumping Plant (HCPP), which is located at the GCID intake facility. The specific objectives of the GF are to: (1) stabilize the local Sacramento River reach to reduce the effect of river gradient changes on screen performance, (2) increase water-surface elevations at the fish screening facility to provide adequate hydraulic gradient to operate a fish bypass system, and (3) stabilize water levels to increase the efficiency of pumping plant operations.

The GF consists primarily of rock riprap that extends along 1,000 ft of the channel bed, and roughly 2,500 ft along either bank line of the river. In addition, the riprap is supplemented by three sheet pile cutoff walls that extend beyond either riverbank and provide protection against flanking of the structure.

An interim OMRR&R manual is proposed to be prepared to address the GF operation and maintenance procedures of the constructed project. A final OMRR&R manual will be prepared following restoration of current GF issues and prior to turnover of the project to GCID. A separate appendix will be prepared for this review plan for the final OMRR&R.

B. District Quality Control

The DQC review team for this product is presented in **Table C-1**.

Table C-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Jim Berkland CESPK-ED-DB	Review Team Lead Coordinator/ Civil Engineer	40 years civil engineering experience	(916) 557-7268 James.L.Berkland@usace.army.mil
Kevin Hazelton CESPK-ED-GS-B	Geotechnical	TBA	(916) 557-7531 Kevin.J.Hazelton@usace.army.mil
Ryan Larson CESPK-CO-CR	Operations Branch	TBA	(916) 557-7568 Ryan.T.Larson2@usace.army.mil
Jeff Koschak CESPK-PD-RP-ENVR	Environmental	28 years environmental experience	(916) 557-6994 Jeff.A.Koschak@usace.army.mil
Harold Huff CESPK-	Hydraulic Design	48 years hydraulic design experience	(916) 557-6946 Harold.C.Huff@usace.army.mil

The draft Interim O&M Manual will also be coordinated with the District Safety Office concurrently with DQC.

C. ATR Disciplines

ATR disciplines required are as follows: civil design, hydraulic design/river engineering, environmental, construction-operations and geosciences. The ATRT is presented in Table C-2 (to be updated upon nomination/ selection of ATRT members). Qualifications of the ATRT members are presented in Appendix E.

Table C-2 ATRT

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review team leader (outside the home MSC)		
TBD	Geotechnical		
TBD	Environmental		
TBD	Operations Branch		
TBD	Hydraulic Design		

D. Timeline and Costs

(1) Timeline. The timeline and the sequence of work completion for the interim OMRR&R manual are shown in Table C-3. Reviews will not be concurrent so as to allow completion of reviews and comments prior to the follow-on review.

Table C-3: Review Timeline for DQC, and ATR Teams

All Teams	Submittal	Team Required	Estimated Completion Date
PDT, DQC, GCID, ATR	100% Interim O&M Review	PDT/DQC	May 2012
	100% Interim O&M Review- Sponsor	GCID	June 2012
	100% Interim O&M Backcheck	PDT/DQC/GCID	June 2012
	100% Interim O&M Review	Environmental/ Resource Agencies	July 2012
	Interim O&M Review	ATR	July 2012
	Interim O&M Backcheck	PDT/DQC/GCID/ATR	July 2012
	Review Certification		August 2012

(2) Costs. The estimated costs for the DQC and ATR review are shown below in Table C-4.

Table C-4 Estimated costs for DQC and ATR review

Review	#reviewers/total hours	Approximate cost/hr	Totals
100% Interim O&M DQC Review	6/48	125	6000
100% Interim O&M DQC Backcheck	6/12	125	1500
Interim O&M ATR Review	5/80	125	10000
Interim O&M ATR Backcheck	5/16	125	2000
		Total	19500

E. SAR

The District does not recommend the interim O&M manual for SAR certification due to the lack of life threatening issues associated with the project.

F. Value Engineering Study.

No VE study required.

G. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.

Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Bill Fakes	Technical Lead/RAO	Civil Engineer	Sacramento District, US Army Corps of Engineers	916-557-6795
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567

H. REVIEW PLAN REVISIONS

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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX D

PLANS AND SPECIFICATIONS/DESIGN DOCUMENTATION REPORT REVIEW DETAILS

A. Background

The riverbed gradient facility (GF) was constructed in 2000 for the purpose of restoring the river hydraulic conditions in the vicinity of the existing Glenn-Colusa Irrigation District (GCID) intake facility to pre-1970 conditions. The local sponsor is the GCID. The GF is one of several components included in a comprehensive fish screen improvement project at the Hamilton City Pumping Plant (HCPP), which is located at the GCID intake facility. The specific objectives of the GF are to: (1) stabilize the local Sacramento River reach to reduce the effect of river gradient changes on screen performance, (2) increase water-surface elevations at the fish screening facility to provide adequate hydraulic gradient to operate a fish bypass system, and (3) stabilize water levels to increase the efficiency of pumping plant operations.

The GF consists primarily of rock riprap that extends along 1,000 ft of the channel bed, and roughly 2,500 ft along either bank line of the river. In addition, the riprap is supplemented by three sheet pile cutoff walls that extend beyond either riverbank and provide protection against flanking of the structure.

Scour holes and further erosion have now developed downstream of the sheet piles. Many of these effects are likely the result of modeling uncertainties during design. The construction contract would address these site specific issues. Additional modeling will be performed to assist engineering judgments for the design.

It is anticipated a design contract will be awarded to prepare the plans and specifications and design documentation report (DDR). This appendix will be updated with the contractor's quality management and review plan upon award of the design contract. The A-E contract will include responsibility for development of construction requirements for work near sensitive environmental habitat. The environmental assessment will be prepared and coordinated at identification of availability of construction funds. A specific review appendix will be added later to this review plan for the environmental assessment.

B. Design Quality Control

The A-E quality management plan shall be inserted here or inserted as an appendix.

C. District Quality Control

The DQC review team for these products is presented in **Table D-1.** Additional concurrent reviews will be performed by the PDT to assure overall completeness and integrity of the design package (see Appendix G for roster**)**.

Table D-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Jim Berkland CESPK-ED-DB	Review Team Lead Coordinator/ Civil Engineer	40 years civil engineering experience	(916) 557-7268 James.L.Berkland@usace.army .mil
Harold Huff CESPK-	Hydraulic Design	48 years hydraulic design experience	(916) 557-6946 Harold.C.Huff@usace.army.mil
Kevin Hazelton CESPK-ED-GS-B	Geotechnical	TBA	(916) 557-7531 Kevin.J.Hazelton@usace.army. mil
Ryan Larson CESPK-CO-CR	Operations Branch	TBA	(916) 557-7568 Ryan.T.Larson2@usace.army. mil
To be added at time of award of procurement contract	Cost Engineering	TBA	

D. ATR Disciplines- Plans and Specifications

The ATRT will be comprised of persons with experience in hydraulic design/ river engineering, geotechnical, construction operations, cost engineering and civil design. The review team leader will be experienced in coordination of ATRT reviews. The ATRT is presented in **Table D-2**. Qualifications of the ATRT members are presented in Appendix E.

Table D-2 ATRT Disciplines

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review Team Lead Coordinator/ Civil Engineer	TBA	
TBD	Geotechnical	TBA	
TBD	Construction Operations Div.	TBA	
TBD	Hydraulic Design/ Geomorphology	TBA	
TBD	Environmental	TBA	
TBD	Cost Engineering	TBa	

E. Timeline and Costs

Timeline for the plans and specifications will be updated based on procurement contract requirements.

Table D-3: Review Timeline for DQC, and ATR Teams- Plans and Specifications/DDR

Per EC 415-1-11, a Biddability, Constructability, Operability and Environmental (BCOE) review will be conducted at the 100% review. It is anticipated a design charette will be held. Estimated completion dates to be revised following procurement award.

All Teams	Submittal	Team Required	Estimated Completion Date
DQC, ATR, GCID and BCOE	Plans and Specifications/DDR 60% Review	DQC/GCID	July 2012
	Plans and Specifications/DDR, 90% Review	DQC/ATR	September 2012
	Plans and Specifications/DDR, 100% Review	DQC/ATR/BCOE	November 2012
	Plans and Specifications/DDR Final Backcheck	DQC/ATR/BCOE	January 2013
	RTA Submittal		January 2013

Table D-4 Estimated costs for DQC and ATR Teams- Plans and Specifications/DDR

Review	#reviewers/total hours	Approximate cost/hr	Totals ($)
Plans and Specifications/DDR 60% DQC only	6/80	125	10000
Plans and Specifications/DDR, 90% DQC & ATR	12/144	125	18000
Plans and Specifications/DDR, 100% Review DQC & ATR	12/96	125	12000
Plans and Specifications/DDR Final Backcheck DQC & ATR	12/48	125	6000
Total			48000

F. SAR

The District does not recommend SAR certification due to the lack of life threatening issues associated with the project.

G. Model Certification

If a hydraulic model is needed, it is anticipated an existing certified model will be used. If a model is proposed that will require certification, the requirements for model certification shall be followed and the process documented in an updated review plan.

H. Value Engineering Study.

The Corps' current policy requires that value engineering (VE) studies be performed on all USACE projects or project elements with a programmed cost of $1,000,000 or more unless a determination can be made that a study would not be cost effective. A VE study shall be performed and will include a comprehensive (M-CACES) cost estimate. The milestone is achieved on the date that the VE study is approved by the Chief of Engineering Division SPK.

I. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.

Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Bill Fakes	SPK/RAO-Technical Lead	Civil Engineer	Sacramento District, US Army Corps of Engineers	916-557-6795
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567
To be inserted subsequent to award of procurement contract	Contractor - Point of contact			

J. REVIEW PLAN REVISIONS

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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX E

ATRT STATEMENT OF QUALIFICATIONS

To be completed for each ATRT member (use USACE resumes)

STAFF MEMBER RESUME – ATR

NAME, LOCATION, PHONE NUMBER, EMAIL

DISCIPLINE

GENERAL INFORMATION:

DESIGN EXPERIENCE

OTHER WORK RELATED EXPERIENCE

SPECIALIZED TRAINING

EDUCATION

PROFESSIONAL REGISTRATION/PROFESSIONAL ASSOCIATION MEMBER

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX F

STATEMENT OF AGENCY TECHNICAL REVIEW

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *work product*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks.

SIGNATURE
[Name] Date
ATR Team Leader
[Office Symbol or Name of AE Firm]

SIGNATURE
[Name] Date
Project Manager (home district)
[Office Symbol]

SIGNATURE
[Name] Date
Architect Engineer Project Manager [1]
[Company, location]

SIGNATURE
[Name] Date
Review Management Office Representative
[Office Symbol]

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:
[Describe the major technical concerns and their resolution]

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE
[Name] Date
Chief, Engineering Division (home district)
[Office Symbol]

Add appropriate additional signatures (Operations, Construction, AE principal for ATR solely conducted by AE, etc).

1 Only needed if some portion of the ATR was contracted

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX G

Project Delivery Team Roster

PDT Roster				
Name	**Discipline/Role**	**District/Agency**	**email**	**Phone**
Tom Karvonen	PM	Sacramento	Tom.d.karvonen@usace.army.mil	916) 557-7630
Todd Rivas	Hydraulic Engineer	Sacramento	Todd.m.rivas@usace.army.mi	916) 557-7523
Peter Valentine	Civil Engineer/Technical Lead	Sacramento	Peter.Valentine@usace.army.mil	916) 557-7523
Matt Davis	Environmental	Sacramento	Matthew.G.Davis@usace.army.mil	916) 557-6708
Bill Fakes	Civil Engineer	Sacramento	Billy.r.fakes@usace.army.mil	916-557-6795
Melissa Hallas	Planner	Sacramento	Melissa.J.Hallas@usace.army.mil	916-557-7774
Alarice Hansberry	Counsel	Sacramento	Alarice.R.Hansberry@usace.army.mil	916-557-7264
Anne Baker	Environmental Manager	Sacramento	Anne.E.Baker@usace.army.mil	916-557-7277
Virginia Rynk	Planner/Resource Manager	Sacramento	Virginia.K.Rynk@usace.army.mil	916-557-6735
Sandie Dunn	Project Manger	GCID	sdunn@somachlaw.com	916-469-3817

REVIEW PLAN
SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA
HAMILTON CITY, CALIFORNIA

APPENDIX H

Review Plan Checklists

Date: 16 April 2012

Originating District: Sacramento

Project/Study Title: Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California

PWI #:

District POC: Bill Fakes, 916-557-6795

PCX Reviewer: Not Applicable

Please fill out this checklist and submit with the draft Review Plan when coordinating with the appropriate RMO. For DQC, the District is the RMO; for ATR of Dam and Levee Safety Studies, the Risk Management Center is the RMO; and for non-Dam and Levee Safety projects and other work products, SPD is the RMO; for Type II IEPR, the Risk Management Center is the RMO. Any evaluation boxes checked 'No' indicate the RP possibly may not comply with EC 1165-2-209 and should be explained. Additional coordination and issue resolution may be required prior to MSC approval of the Review Plan.

REQUIREMENT	REFERENCE	EVALUATION
1. Is the Review Plan (RP) a stand-alone document?	EC 1165-2-209, Appendix B Para 4a	Yes ☒ No ☐
a. Does it include a cover page identifying it as a RP and listing the project/study title, originating district or office, and date of the plan?		a. Yes ☒ No ☐
b. Does it include a table of contents?		b. Yes ☒ No ☐
c. Is the purpose of the RP clearly stated and EC 1165-2-209 referenced?	EC 1165-2-209 Para 7a	c. Yes ☒ No ☐
d. Does it reference the Project Management Plan (PMP) of which the RP is a component including P2 Project #?	EC 1165-2-209 Para 7a (2)	d. Yes ☒ No ☐ No PMP, reference P2 project #.
e. Does it include a paragraph stating the title, subject, and purpose of the work product to be reviewed?	EC 1165-2-209 Appendix B Para 4a	e. Yes ☒ No ☐

f. Does it list the names and disciplines in the home district, MSC and RMO to whom inquiries about the plan may be directed?* **Note: It is highly recommended to put all team member names and contact information in an appendix for easy updating as team members change or the RP is updated.* .	EC 1165-2-209, Appendix B, Para 4a	f. Yes ☒ No ☐
2. Documentation of risk-informed decisions on which levels of review are appropriate.	EC 1165-2-209, Appendix B, Para 4b	Yes ☒ No ☐
a. Does it succinctly describe the three levels of peer review: District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR)?	EC 1165-2-209 7a	a.. Yes ☒ No ☐
b. Does it contain a summary of the CW implementation products required?	EC1165-2-209 Para 15	b. Yes ☒ No ☐
c. DQC is always required. The RP will need to address the following questions:	EC1165-2-209 Para 15a	
i. Does it state that DQC will be managed by the home district in accordance with the Major Subordinate Command (MSC) and district Quality Management Plans?	EC1165-2-209 Para 8a	i. Yes ☒ No ☐

ii. Does it list the DQC activities (for example, 30, 60, 90, BCOE reviews, etc)	EC 1165-2-209 Appendix B (1)	ii. Yes ☒ No ☐
iii. Does it list the review teams who will perform the DQC activities?	EC 1165-2-209 Appendix B,4g	iii. Yes ☒ No ☐
iv. Does it provide tasks and related resource, funding and schedule showing when the DQC activities will be performed?	EC 1165-2-209 Appendix B Para 4c	iv. Yes ☒ No ☐
d. Does it assume an ATR is required and if an ATR is not required does it provide a risk based decision of why it is not required? If an ATR is required the RP will need to address the following questions:	EC1165-2-209 Para 15a	
i. Does it identify the ATR District, MSC, and RMO points of contact?	EC 1165-2-209 Para 7a	i. Yes ☒ No ☐
ii. Does it identify the ATR lead from outside the home MSC?	EC 1165-2-209 Para 9c	ii. Yes ☒ No ☐
iii. Does it provide a succinct description of the primary disciplines or expertise needed for the review (not simply a list of disciplines)? If the reviewers are listed by name, does the RP describe the qualifications and years of relevant experience of the ATR team members?*	EC 1165-2-209 Appendix B 4g	iii. Yes ☒ No ☐
iv. Does it provide tasks and related resource, funding and schedule showing when the		

ATR activities will be performed?		iv. Yes ☒ No ☐
v. Does the RP address the requirement to document ATR comments using Dr Checks?	EC 1165-2-209 Appendix C Para 3e	v. Yes ☒ No ☐
e. Does it assume a Type II IEPR is required and if a Type II IEPR is not required does it provide a risk based decision of why it is not required including RMC/ MSC concurrence? If a Type II IEPR is required the RP will need to address the following questions: *The RP does not assume a Type I or II IEPR is required. Rationale included in RP.*	EC 1165-2-209 Para 7d (1)	e. Yes ☐ No ☒
i. Does it provide a defensible rationale for the decision on Type II IEPR?		
ii. Does it identify the Type II IEPR District, MSC, and RMO points of contact?		i. Yes ☒ No ☐
iii. Does it state that for a Type II IEPR, it will be contracted with an A/E contractor or arranged with another government agency to manage external to the Corps of Engineers?		ii. Yes ☐ No ☒
iv. Does it state for a Type II IEPR, that the selection of IEPR review panel members will be made up of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of expertise suitable for the review being conducted?	EC1165-2-209 Para 15a	iii. Yes ☐ No ☒ iv. Yes ☐ No ☒

v. Does it state for a Type II IEPR, that the selection of IEPR review panel members will be selected using the National Academy of Science (NAS) Policy which sets the standard for "independence" in the review process?	EC 1165-2-209 Para 7a	v. Yes ☐ No ☒
vi. If the Type II IEPR panel is established by USACE, has local (i.e. District) counsel reviewed the Type II IEPR execution for FACA requirements?	EC 1165-2-209 Appendix B Para 4a	vi. Yes ☐ No ☒
vii. Does it provide tasks and related resource, funding and schedule showing when the Type II IEPR activities will be performed?	EC 1165-2-209 Appendix B Para 4k (4)	vii. Yes ☐ No ☒
viii. Does the project address hurricane and storm risk management or flood risk management or any other aspects where Federal action is justified by life safety or significant threat to human life? *Is it likely? Yes* ☐ *No* ☒ *If yes, Type II IEPR must be addressed.*	EC 1165-2-209 Appendix B, Para 4k(1) & Appendix E, Para's 1a & 7	iii. Yes ☐ No ☒
ix. Does the RP address Type II IEPR factors? Factors to be considered include: • Does the project involve the use of innovative	EC 1165-2-209 Para 6b (4) and Para 10b	ix. Yes ☒ No ☐

materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent setting methods or models, or presents conclusions that are likely to change prevailing practices? • Does the project design require redundancy, resiliency and robustness • Does the project have unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems. *Is it likely? Yes* ☐ *No* ☒ *If yes, Type II IEPR must be addressed.* g. Does it address policy compliance and legal review? If no, does it provide a risk based decision of why it is not required?	EC1165-2-209 Appendix E, Para 7c(1) EC1165-2-209 Appendix E, Para 5a EC1165-2-209 Appendix E Para 2 EC 1165-2-209 Para 14	g. Yes ☒ No ☐
3. Does the RP present the tasks, timing, and sequence of the reviews (including deferrals)?	EC 1165-2-209, Appendix B, Para 4c	Yes ☒ No ☐
a. Does it provide and overall review schedule that shows timing and sequence of all reviews?	EC 1165-2-209, Appendix C, Para 3g	a. Yes ☒ No ☐

b. Does the review plan establish a milestone schedule aligned with the critical features of the project design and construction *No milestone schedule included as project construction is complete.*	EC 1165-2-209, Appendix E, Para 6c	b. Yes ☐ No ☒
4. Does the RP address engineering model certification requirements?	EC 1165-2-209, Appendix B, Para 4i	Yes ☒ No ☐
a. Does it list the models and data anticipated to be used in developing recommendations? b. Does it indicate the certification /approval status of those models and if certification or approval of any model(s) will be needed? c. If needed, does the RP propose the appropriate level of certification??? /approval for the model(s) and how it will be accomplished?		a. Yes ☐ No ☒ b. Yes ☐ No ☒ c. Yes ☐ No ☒
5. Does the RP explain how and when there will be opportunities for the public to comment on the study or project to be reviewed? *This is not a decision document, therefore no public review required. The public will be able to review the RP.*	EC 1165-2-209, Appendix B, Para 4d	Yes ☐ No ☒

a. Does it discuss posting the RP on the District website? b. Does it indicate the web address, and schedule and duration of the posting?		a. Yes ☒ No ☐ b. Yes ☒ No ☐
6. Does the RP explain when significant and relevant public comments will be provided to the reviewers before they conduct their review? *No public comments are to be solicited as the work products are not decision documents.*	EC 1165-2-209, Appendix B, Para 4e	Yes ☐ No ☒
a. Does it discuss the schedule of receiving public comments? b. Does it discuss the schedule of when significant comments will be provided to the reviewers?		a. Yes ☐ No ☒ b. Yes ☐ No ☒
7. Does the RP address whether the public, including scientific or professional societies, will be asked to nominate professional reviewers?* *No public societies will be solicited for review*.	EC 1165-2-209, Appendix B, Para 4h	Yes ☐ No ☒
a. If the public is asked to nominate professional reviewers then does the RP provide a description of the requirements and answer who, what, when, where, and how questions? * Typically the public will not be asked to nominate potential reviewers		a. Yes ☐ No ☒

8. Does the RP address expected in-kind contributions to be provided by the sponsor? *Sponsor to review Hydraulic Data Collection and Analysis Report and interim OMRR&R manual*	EC 1165-2-209, Appendix B, Para 4j	Yes ☒ No ☐
a. If expected in-kind contributions are to be provided by the sponsor, does the RP list the expected in-kind contributions to be provided by the sponsor?		a. Yes ☐ No ☒
9. Does the RP explain how the reviews will be documented?		Yes ☒ No ☐
a. Does the RP address the requirement to document ATR comments using Dr Checks and Type II IEPR published comments and responses pertaining to the design and construction activities summarized in a report reviewed and approved by the MSC and posted on the home district website?	EC 1165-2-209, Para 7d	a. Yes ☒ No ☐
b. Does the RP explain how the Type II IEPR will be documented in a Review Report? *No IEPR review anticipated at this time. If Hydraulic Analysis complexity warrants a Type I, this will be added to amended review plan.*		b. Yes ☐ No ☒
c. Does the RP document how written responses to the Type II IEPR Review Report will be prepared?	EC 1165-2-209 Appendix B Para 4k (14)	c. Yes ☐ No

d. Does the RP detail how the district/PCX/MSC and CECW-CP will disseminate the final Type II IEPR Review Report, USACE response, and all other materials related to the Type II IEPR on the internet?	EC 1165-2-209 Appendix B Para 4k (14) EC 1165-2-209 Appendix B Para 5	d. Yes ☐ No ☒
10. Has the approval memorandum been prepared and does it accompany the RP? *Approval memorandum to be prepared and to attached as Appendix H.*	EC 1165-2-209, Appendix B, Para 7	Yes ☒ No ☐

CESPD Supplemental Review Plan Checklist

Review Plan: Sacramento River Flood Protection Project, Glenn-Colusa Review Plan

Date of review:

Reviewed by:

References: CESPD R 1110-1-8, Appendix C, Planning; EC 1165-2-209, Civil Works Review Policy

Note: Any "No" answer requires explanation in the comment field.

	Item	Yes	No	Comment
1	Is there a Technical Review Strategy Session identified early in the study process? (See Appendix C paragraph 8.2,)	☐	☒	TRSS applies to decision documents.
2	Are potential Continuing Authority Program (CAP) "spinoffs" identified, along with the appropriate QCP identified for them?	☐	☒	These are flood protection features. No possible CAP spinoffs.
3	Are the review costs identified?	☒	☐	
	For District Quality Control (DCQ)?	☒	☐	
	ATR?	☒	☐	
	Independent External Peer Review (IEPR)?	☐	☒	IEPR not required
4	Does the RP identify seamless DQC technical review (8.4), including supervisory oversight of the technical products? (See Appendix C paragraph 8.5)	☒	☐	
5	Does the RP identify the recommended review comment content and structure? (See Appendix C paragraph 8.5.4)	☒	☐	
6	Does the RP encourage face-to-face resolution of issues between the PDT and reviewers? (See Appendix C paragraph 8.5.5)	☒	☐	
7	If issues remain, does the RP must identify an appropriate dispute resolution process? (See Appendix C paragraph 8.6)	☒	☐	
8	Does the RP require documentation of all significant decisions, and leave a clear audit trail? (See Appendix C paragraph 8.5.6)	☒	☐	
9	Does the RP identify all requirements for technical certifications? (See Appendix C paragraph 8.5.7)	☒	☐	
10	Does the RP identify the requirement that without-project hydrology will be certified by the Feasibility Scoping Meeting? (See Appendix C paragraph 8.5.8)	☐	☒	No, this section of the RP applies to Decision Documents
11	Does the RP fully address products developed by contractors? (See Appendix C paragraph 8.10)	☒	☐	Contractor to prepare P&S. Appendix B to include contractor QMP.
12	Is the need for a VE study identified, and incorporated into the review process, after the feasibility scoping meeting? (See Appendix C paragraph 8.11)	☒	☐	VE study identified for P&S effort (construction cost estimated to exceed $1 million)
13	Does the RP include a Feasibility Alternative Review Milestone, where CESPD buy-in to the recommended plan is obtained? (See Appendix C paragraph 12.1)	☐	☒	No, this section of the RP applies to Decision Documents
14	Does the RP identify the final public meeting milestone? (See Appendix C, Enclosure 1, SPD Milestones)	☐	☒	No, this section of the RP applies to Decision Documents
15	Does the RP identify the report approval process, and if there is a delegated approval authority?	☐	☒	No, this section of the RP applies to Decision Documents
16	Does the RP reference CESPD milestones, along with PGN milestones?	☐	☒	No, this section of the RP applies to Decision Documents

Revised 10May10

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX I

MSC Approval Letter

Final approval letter to be attached (in posted version of RP)

Draft letter below (from EC 1165-2-209):

Date:

Subject: Review Plan approval for the Sacramento River Flood Protection Project Glenn-Colusa, Hamilton City, California.

The attached Review Plan for the Hydraulic Data Collection and Analysis, Analysis and Design Tools Memo, Interim Operation, Maintenance Repair, Rehabilitation and Replacement Manual, and Plans and Specifications and Design Documentation Report for scour and erosion restoration has been prepared in accordance with EC 1165-2-209.

The Review Plan has been coordinated with the RMO (South Pacific Division), which is the lead office to execute this plan. For further information, contact the RMO at xxx-xxxxxxx.

The Review Plan does not include independent external peer review.

I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

MSC Commander Signature Block

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX J

CONTRACTOR QUALITY CONTROL PLAN

(EDITED TO INCLUDE ONLY RELEVANT DATA)

U.S. Army Corps of Engineers Sacramento District

HYDRAULIC DATA COLLECTION AND ANALYSIS GLENN-COLUSA IRRIGATION DISTRICT (GCID), CALIFORNIA

CONTRACTOR QUALITY CONTROL PLAN
NOVEMBER 18, 2011

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity.

1401 Shoreline Drive

Boise, ID 97302

TETRA TECH

TABLE OF CONTENTS

1. PROJECT BACKGROUND

The purpose of this project is to collect data regarding the condition of the Glenn-Colusa Gradient Facility (GF) and further evaluate the structure and its stability since the most recent construction in 2000. The project includes the collection and analysis of discharge, velocity, and water surface elevation data, as well as rock gradation and scour hole data. Furthermore, the project includes several optional tasks which, at the time of this writing, may or may not be included in the final scope of work. These optional tasks include 1) a meeting presentation, 2) development of GF repair options, 3) additional water data collection, 4) hydraulic analysis of existing conditions, 5) hydraulic analysis of GF repair options, and 6) preparation of a hydraulic appendix.

As stated in the scope of work, the project is located in one of the most dynamic reaches of the Sacramento River with active river bend migration and relatively frequent bend cut offs. The river bend between the historic USGS river miles (RM) 203 and 205, downstream of the Glenn-Colusa Irrigation District (GCID) intake facility, experienced a cut-off during 1969–1970. This lowered the water surface at the GCID intake, impacting operations. Construction of GF occurred at about USGS river mile 206 and was completed in November 2000. The GF was designed to mimic a natural riffle and consists of sloping rock –lined channel bed or rock rapids with three sheet pile cut-off walls.

The scope of work for the project lists a number of concerns with the GF since its construction, including:

1) Rocks protruding near or above the surface of the water, causing boat navigation safety concerns.
2) The presence of protruding rocks, in addition to other observations, as well as concerns regarding the verity of the original hydraulic model, indicates that the rock in the GF may not be stable.
3) Scour holes developed immediately adjacent to the west bank downstream end of the GF and near the middle sheet pile in the left overbank area, jeopardizing the functional capability of the GF.
4) The growth of a large mid-channel bar just downstream of the GF has contributed to left and right bank erosion in this area.
5) Upstream river channel movement, particularly near RM 208, could jeopardize the function of the GF and GCID operations**.**

A Blue Ribbon Panel (BRP) of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009. For the present task order, data will be collected, processed, and analyzed to address the concerns of the BRP, and to develop, recommend, and model corrective repair options.

As given in the Statement of Work (SOW), the design flow for the GF is between 7,000 and 20,000 cfs just upstream of the GCID intake channel. It is estimated that bankfull flow in the area occurs at about 110,000 cfs in some years under certain hydrologic conditions. The gages in the area do not account for the total discharge for high flow events that overtop the banks (i.e. the gages only measure in-channel discharge, not overbank discharge). At this time it is anticipated that model calibration will only occur for flows contained within the channel, and therefore within the design flow range of the GF.

The Hamilton City gage (operated by California Department of Water Resources [DWR] with some history as a USGS gage) is located near RM 199 by the Gianella Bridge at Hamilton City. It is anticipated that data from this gage will be used in support of any hydraulic model development with this task order along with data from two GCID staff gages located near the GF and other relevant data collected as part of this task.

Bathymetric data were collected for part of the reach in 2008 by Ayres and Associates. It is anticipated that this bathymetric data will be merged with the 2008 DWR LiDAR and, if necessary, other data sources to create the surface for any 2D models developed for this task order.

2. OBJECTIVES

As stated in the SOW, the objective of this Quality Control Plan (QCP) is to ensure that data collected for this project are of high quality. Specifically, this QCP will describe the quality control procedure adopted to meet this objective, as well as the Independent Technical Review (ITR) process adopted to ensure the highest quality of project deliverables. Additionally, this QCP will identify the roles and responsibilities of individuals participating in product delivery, QC and ITR, and note any special considerations regarding the quality of project deliverables.

3. NAME AND LOCATION OF THE CLIENT

The client for this project is:
U.S. Army Corps of Engineers
Sacramento District
CESPK-PM-C
1325 J Street
Sacramento, CA 95814

Technical Lead:
Mr. Todd Rivas
CESPK-ED-HD
1325 J Street
Sacramento, CA 95814-2922
(916) 557-7523
Todd.M.Rivas@usace.army.mil

4. PROJECT TASKS AND SCHEDULE

The project tasks are presented in detail in the Statement of Work (SOW), not attached. See Appendix A for project submittals.

5. PROJECT TEAM

The Project Team comprises professionals from both McMillen, LLC (McMillen) and Tetra Tech, Inc. (Tetra Tech). Each company has assigned a Technical Development Team (TDT) to the project. As the project lead, McMillen will perform project management, reduce and analyze data , and provide quality control for the actual data collection. The TDT for Tetra Tech will act as the local project coordinator, focusing on the collection of hydraulic data and the provision of technical services during the preparation of the Engineering Appendix. The Project Manager, George Robison, will coordinate with both TDTs in the fulfillment of the task order, and will facilitate seamless project implementation. The Data Collection Quality Control Team (DCQC) will ensure the proper collection and documentation of field data. The Independent Technical Reviewer will ensure the high quality of project deliverables prior to final submittal. The roles and years of experience of the Project Team are listed below. These roles are detailed further in the next section.

STAFF	ROLE	YEARS EXPERIENCE
McMillen Technical Development Team:		
George Robison, PhD, PE	Senior Hydraulic Engineer	27
Kevin Jensen, EIT	Junior Hydraulic Engineer	4
Meg Floyd	Technical Editor	8
Tetra Tech Technical Development Team:		
Mike Harvey, PhD, PG	Principal Geomorphologist	37
Dai Thomas, PE	Hydraulic Engineer	13
Mike Pierce, EIT	Hydraulic Engineer	4
Kyle Shour, EIT	Civil Engineer	1
Project Manager:		
George Robison, PhD, PE	Senior Hydraulic Engineer	27
Data Collection Quality Control (DCQC):		
George Robison, PhD, PE	Senior Hydraulic Engineer	27
Kevin Jensen, EIT	Junior Hydraulic Engineer	4
Independent Technical Review (ITR):		
Bill Fullerton, PE	Principal Hydraulic Engineer	30

6.QUALITY CONTROL PLAN

6.1 Quality Management Objectives

A primary objective and commitment of the Project Team is to produce high-quality products responsive to the client's needs. Systematic quality assurance and quality control is a key aspect of the company's management system. Our quality control program is based upon a team approach to ensure the most efficient use of staff resources and the highest levels of internal technical review. This QCP is an important tool for achieving these quality objectives. It defines the process to be used in the development of the project, with particular emphasis on QC and reviews.

The guiding principles of this QCP include the following:

1. Actively involve all elements of project management.
2. Ensure that quality control is an integral part of the project and not just an "end of job" review.
3. Consider quality objectives and standards as equal or superior to budget and schedule considerations in all project management decisions.
4. Ensure that the scope of work is technically complete and workable in consideration of budgetary and scheduling constraints.
5. Commit necessary resources to achieve the project objectives.
6. Ensure frequent communication on progress of the work and problems and accomplishments.
7. Provide periodic review of project performance related to the planned schedule and budget goals.

The primary objectives of the ITR are to ensure that:

1. The project meets the customer's scope, intent and quality objectives as defined in the SOW.
2. Formulation and evaluation of alternatives are consistent with applicable regulations and guidance.
3. Concepts and project costs are valid.
4. Recommended alternatives are feasible and will be safe, functional, constructible, environmentally sustainable, within the Federal interest, and economically justified according to policy.

5. All relevant engineering and scientific disciplines have been effectively integrated.
6. Appropriate computer models and methods of analysis were used and basic assumptions are valid and used for the intended purpose.
7. The source, amount, and level of detail of the data used in the analysis are appropriate for the complexity of the project.
8. The project complies with accepted practice within USACE.
9. Content is sufficiently complete for the current phase of the project and provides an adequate basis for future development effort.
10. Project documentation is appropriate and adequate for the project phase.

6.2 Data Collection Quality Control (DCQC)

The Data Collection Quality Control process is designed to ensure the delivery of high-quality hydraulic data according to scientifically defensible and statistically valid techniques. DCQC team members will be available, knowledgeable, and willing to offer guidance as any issues arise in the field. In particular, DCQC team members will be present and engaged in the data collection processes described in Tasks 3, 4 and O3 (see Table 1 above). Conversely, TDT members from Tetra Tech will be encouraged to seek agreement with the DCQC team throughout the data collection process, and indeed throughout the entire product delivery process, from procedural conceptualization to formal review. The DCQC will furnish TDT from Tetra Tech with feedback on an as-needed basis during the data collection process. To be clear, the first Task of DCQC is to insure all instruments remain calibrated and insure that the sample size and design is appropriate to address the issues in the SOW and any teaming TDT members for collection only occurs after this primary responsibility is done. Because of the nature of the equipment the TDT members do calibration while the DCQC insures that the calibration is current and the sampling design employed is reasonable and effective.

The following work products fall under the purview of the DCQC:

- Velocity, discharge and water surface elevation data
- GF gradation and downstream scour hole data

6.2.1 Data Collection Quality Control Guidelines

All field data will be collected according to accepted methods detailed in USGS WSP 2175, EM-1110-2-1003, EM-1110-1-1005 and the SOW. Furthermore, the methods of collection will conform to the health and safety requirements detailed in EM-385-1-1.

It is expected that the number of measurements of discharge and velocity will equal or exceed the number defined in the SOW. Also, it is anticipated that the number of water surface elevation measurements will equal or exceed the number of discharge measurements, and that this number of measurements will suffice to describe the water surface slope in the study focus area. However, the number of samples required to describe a rock size distribution, and to detect statistically significant changes is gradation across a high-flow season, while still optimizing the allocation of resources, requires a more detailed power analysis. Such an analysis is described in the paragraphs below.

6.2.2 Hypothesis Testing and Power Analysis of GF Gradation

Hypothesis testing is a procedure for inferring information about populations based on a finite collection of sampled data. The null hypothesis, H_o, typically posits whether a population parameter equals a specified value within a specified statistical significance level. In the case of the gradation of rip rap at the GF, the null hypothesis posits that there will be *no* statistically significant change in gradation over the course of the 2011-2012 high-flow season:

H_0: Gradation of GF before high flows and gradation of GF after high flows are the same.

Error can occur during the testing of a hypothesis due to the number of data points sampled. These errors generally come in two different forms: Type I and Type II. A Type I error occurs when the null hypothesis is rejected when it is in fact true, while a Type II error occurs when the null hypothesis is accepted (i.e. not rejected) when it is in fact false. The likelihood of a Type I error will be limited by adopting an appropriate level of significance, in this case $=0.05$. In order to minimize the likelihood of a Type II error, however, a power analysis must be conducted.

The power of a statistical test is the probability that the test will reject the null hypothesis when the null hypothesis is actually false. The ability of a test to reject a false hypothesis or accept a true hypothesis is a function of both the sample size and the effect size. The effect size is the predetermined magnitude of change at which change is said to be detected. Thus, an arbitrarily large sample size corresponds with an increased likelihood of correctly accepting or rejecting a hypothesis. However, if the effect size is too small, the test will define very subtle changes as statistically significant. This could lead to an unnecessary allocation of resources to treat an effect that is not substantive. Alternatively, if the effect size is too large, the test may overlook changes that are important to the GF, particularly as time goes on and undetected changes accumulate or otherwise alter the facility. It is therefore important to estimate the effect size as cautiously as possible.

One method of estimating the effect size, given a two-tailed t-test on the means of two independent populations, is given by the following equation:

$= {}_1 - {}_2 {}_1$ (Eq. 1)

where = effect size

= sample mean

$_1$ = sample standard deviation of group 1

The detection limit on the sample means, $_1 - {}_2$, can be calculated as a percentage of the change in the mean grain size from one data set to another. For instance, assuming an initial mean grain *weight* of 270 lbs. (x_1) and a minimum change of 5% in that weight for detection, the detection limit on the sample means would be 13.5 lbs. Substituting this detection limit into Equation 1 above, along with an assumed standard deviation of 153 lbs., gives an effect size of 0.083. The mean weight of the rip rap at the GF is taken from the GF design report (see Ayres Associates 1999, p.14-53). The standard deviation is calculated using the following method:

1. From the supplied distribution graph (see Ayres Associates 1999, p.14-54), locate the low-end line of the 3.0 ft riprap. This will represent the distribution.
2. Read off the weights of stones corresponding to every tenth percentile.
3. In a spreadsheet, create 100 cells representing 100 percent. Within every ten-percent bin, linearly interpolate between the two bounding values.
4. Determine the arithmetic mean of the 100 values. Check to see that is closely approximates the w_{50} given on the graph.
5. Calculate the standard deviation of the 100.

With the parameters above specified, and an assumed significance of $=0.05$ and power of $1 - =0.8$, a power analysis software program called G*Power was employed to estimate the number of samples required to minimize the likelihood of a Type II error (Faul *et al.* 2009). Results are summarized in Table 1 for different detection limits as percentages of weight change. From the table, at the 5% detection limit a data set of 4,036 samples would be needed. This seems an unreasonably high, and potentially costly,

sample size. Alternatively, at the 15% detection limit a data set of 450 samples would be needed, which is more reasonable, although the detection size seems rather large. As a compromise, therefore, a change detection of 10% will be adopted, and a concomitant sample size of at least 1,012 collected.

Power analysis results using different change detections.

In addition to the above, a stratification of morphological units across the GF will also be assumed, in order to conduct a power analysis for each. The stratification will consist of two units: GF riffles and GF pools. Riffles are designated as the high-elevation areas along the channel profile, from the apex to the inflection points on either side, while the pools are designated as the corresponding low-elevation areas. Unfortunately, there is no existing disambiguation of grain distribution between the riffles and pools of the gradient facility. Therefore, the same number of samples will be collected for each. These data sets will then be treated separately once the post-high-flow data have been collected.

6.3 Independent Technical Review (ITR)

Several of the tasks for this project require written reports that document the procedures, assumptions, engineering judgments, limitations, results, recommendations, and conclusions related to each task. Upon completion of each report, the McMillen and Tetra Tech TDTs will submit the report, along with any supporting materials (e.g. raw data, numerical model project files, GIS files and so on), to theIndependent Technical Reviewer (Reviewer) for detailed technical review. The Reviewer will document their comments and recommendations, utilizing the DrChecks$_{sm}$ module in ProjNet$_{sm}$ in accordance with ER 1110- 1-8159. Comments will be structured to give a clear statement of the concern, the basis of the concern and, when appropriate, the actions necessary to resolve the concern. Comments will cite appropriate references. The Project Team will evaluate and respond to each comment in DrChecks$_{sm}$. Responses will clearly state concurrence or non-concurrence with the comment. Concurrences shall include what the corrective action is and where and when it will be done. Non-concurrences shall include an explanation or proposed alternative action. All comments are to be resolved and back-checked in the DrChecks$_{sm}$ project record prior to ITR certification. Back checking of each formal ITR with successful resolution of all comments must occur prior to the final submittal.

Change Detection	**5%**	**10%**	**15%**
□ – □	13.5	27	40.5
Total sample size	4,036	1,012	450

6.3.1 Documents to be Formally Reviewed

An ITR of the following documents (with associated task identifier) will be performed:

- Water Data Collection Report (3)
- Rock Data Collection Memo (4)
- Hydraulic Model and Rock Stability Evaluation Report (5)
- Repair Option Development Memo (O2)
- Additional Water Data Collection Report (O3)
- Existing Conditions Hydraulic Analysis Memo (O4)
- With-Project Hydraulic Analysis Report (O5)
- Hydraulic Appendix (O6)

6.3.2 ITR Process

The Project Manager, acting as the Technical Development Team Leader (TDTL), will be the principal coordinator between the TDTs and the Reviewer. As each product is completed, copies will be provided by the TDTL to the Reviewer (i.e. the ITR). The Reviewer will review the product in detail and provide comments. The TDT members will revise the product accordingly. The written comments and responses for all ITRs will be maintained until the project is completed. The reviewer will not only evaluate the content of the report but will also review the data collection and design to ensure that it meets the expectations in the SOW.

6.3.3 Editorial Comments

Editorial comments and suggestions about minor issues will be made informally, in parallel with, but external to the official ITR process, in order to ensure that the ITR focuses on significant deficiencies. The following items will be handled informally:

- Spelling, grammar, and format of language
- Minor numerical errors, which do not affect the validity of results
- Other issues that have no bearing on a safer, more functional or more economical project
- Repetitive comments on the same subject where one comment is adequate.

6.3.4 Other Reviews

a. Methodology Review. Specific methodologies proposed for the execution of the SOW will be presented by the TDT to both the Reviewer (i.e. ITR) and the PM to ensure that methods and models applied are appropriate for the project and consistent with client requirements and policies.

b. Calculation Checking. Calculations performed by hand and calculator will be spot-checked. Formulas developed to perform calculations by spreadsheet or database will be checked, and the results from the spreadsheet or database spot-checked. Calculations performed by standard or routinely used computer programs will not be checked, but the appropriate use of the program will be verified (verification signified by no comment), the input data spot-checked, and the results evaluated for reasonableness.

c. Technical Oversight Reviews (Peer Review). Whenever a technical product is produced by an assistant under the technical direction of a senior technical specialist, the senior specialist will review the product prior to its submission for ITR.

d. Quality Control. The project team will perform the necessary quality control activities to ensure that the appropriate quality control monitoring activities are carried out and documented, but the project team will not conduct quality assurance reviews. The Corps of Engineers (COE) will perform quality assurance reviews, as they deem necessary.

6.3.5 Statement of Technical Review and ITR Certification

A statement of technical review signed by the appropriate Principal of the Firm will be provided for all final products and final documents. The statement will conform to ER 1110-1-12, Appendix E: A-E Contractor Statement of Technical Review.

6.4 Communications

Internal communications within the Project Team, and across TDTs will be conducted on a regular basis as the work is being performed. Extensive communications will be required between civil engineers, geomorphologists, and H&H engineers.

Formal communications with the Corps of Engineers will be done between the Project Manager, George Robison, and Tetra Tech's Principal Geomorphologist, Mike Harvey, and the COE Technical Lead, Todd

Rivas. Communications of a routine nature will be conducted between any of the parties as needed. Teleconference meetings will be held with the COE, McMillen and Tetra Tech for the purposes of discussing issues and providing status. Requests for modifications to the contract will be initiated by McMillen and submitted to the COE Technical Lead.

6.5 Partnering and Conflict Resolution Procedures

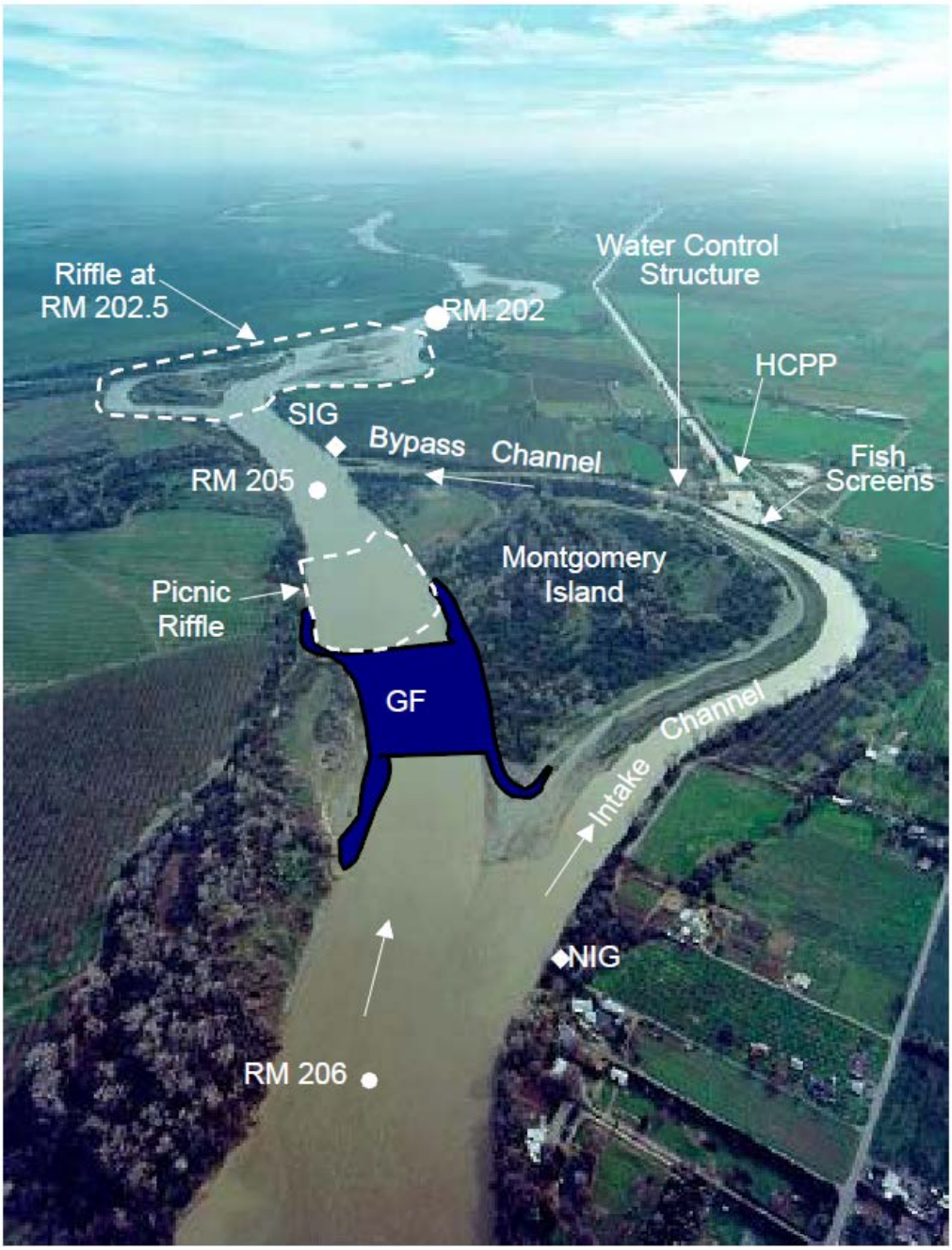
Routine questions and issues arising during the development of the project will be discussed and resolved, if possible, between the Project Manager, George Robison, Tetra Tech's Principal Geomorphologist, Mike Harvey, and the COE Technical Lead, Todd Rivas. Any issues that cannot be reconciled at this working level will be escalated to the appropriate levels between the three organizations. All team members coordinate within their respective organizations to determine the appropriate decision-makers to address the issues and will schedule a meeting between the decision-makers and their support staffs to address and resolve the issues.

7. REFERENCES

Ayres Associates, 1999. *Gradient Facility Project Report, Volume I: Riverbed Gradient Facility for the Sacramento River at the Glenn-Colusa Irrigation District (GCID) Intake, California*. Prepared for the U.S. Army Corps of Engineers, Sacramento District.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G., 2009. "Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses", in *Behavior Research Methods, 41*, 1149-1160.

Review Plan
SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA, Hamilton City, California



Prepared by:
U.S. Army Corps of Engineers, Sacramento District

Date:
24 January 2013
MSC Approval Date:
Last Revision Date:

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REVIEW PLAN
SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA
HAMILTON CITY, CALIFORNIA

APPENDICES

APPENDICES (cont'd)

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

Term	Definition
A-E	Architect-Engineer
ATR	Agency Technical Review
ATRT	Agency Technical Review Team
BCOE	Biddability, Constructability, Operability and Environmental
DDR	Design Documentation Report
EC	Engineering Circular
EM	Engineering Manual
COE	Corps of Engineers
DQC	District Quality Control
EA	Environmental Assessment
FRM	Flood Risk Management
HQ	Headquarters
IEPR	Independent External Peer Review
ITR	Independent Technical Review
ITRT	Independent Technical Review Team
MSC	Major Subordinate Command
NEPA	National Environmental Policy Act
NIG	North Island Gage
OMRR&R	Operation and Maintenance, Repair, Replacement and Rehabilitation
PDT	Project Delivery Team
P&S	Plans and Specifications
PM	Project Manager
PMP	Project Management Plan
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
RIT	Regional Integration Team
RMO	Review Management Office
RTS	Regional Technical Specialists

SIG	South Island Gage
SPD	South Pacific Division
SPK	Sacramento District
TBD	To be determined
USACE	U.S. Army Corps of Engineers
WRDA	Water Resources Development Act

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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA HAMILTON CITY, CALIFORNIA

1. PURPOSE AND REQUIREMENTS

A. Purpose. This document outlines the Review Plan for the Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California**,** P2 Project No. 105618. It includes the Hydraulic Data Collection and Analysis report, Analysis and Design Tools memo, the project Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) manual and project features as they relate to any future construction plans and specifications (P&S), design documentation report (DDR) and environmental assessment (EA) to address downstream erosion areas.

The project construction was completed in 2000; however, due to issues with the project, discussed in Section 3, turnover of the project has not been executed.

In addition to earlier post construction evaluations a Blue Ribbon Panel of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009. For the Hydraulic Data Collection and Analysis work product, data will be collected, processed, and analyzed to address these concerns and develop, recommend, and model corrective repair options.

An OMRR&R manual is currently being prepared for transfer of the project to the sponsor for maintenance and operation activities.

Upon notification construction funds are available the Corps of Engineers, Sacramento District, "the Government", will be preparing P&S for a downstream scour repair. The analysis and design of the scour hole will be challenging. The Government is currently preparing an Analysis and Design Tools memo for the contractor to use during analysis and design of scour hole repairs. The EA will be prepared upon notification that construction funding is to be available for downstream erosion repairs. The P&S will be amended, if necessary, to include any environmental considerations.

B. References.

(1) ER 1110-2-1150, Engineering and Design for Civil Works Projects, 31 Aug 1999

(2) ER 1110-1-12, Engineering and Design Quality Management, 21 Jul 2006

(3) WRDA 2007 H. R. 1495 Public Law 110-114, 8 Nov 2007 (Independent peer review/safety assurance review requirements)

(4) EC 1165-2-209, Civil Works Review Policy, 31 Jan 2010

(5) South Pacific Division Regulation (CESPD-R) 1110-1-8, Quality Management Plan (QMP), December 2002

(6) Sacramento District (CESPK) 01-B Quality Management Plan, Appendix A, Engineering Division Quality Manual, June 2007

C. Review Requirements. This review plan was developed in accordance with Engineering Circular (EC) *Civil Works Review Policy* 1165-2-209, dated 31 January 2010, which defines the procedures for ensuring the quality and credibility of U.S. Army Corps of Engineers (USACE) decision, implementation and operations and maintenance documents.EC 1165-2-209 outlines three requirements to the review process. These are a district quality control review (DQC), an agency technical review (ATR), and an independent external peer review (IEPR). Depending on which requirement is performed, the reviews will investigate the quality of workmanship which in itself minimizes the risk for failure.

(1) District Quality Control. DQC is the review of basic science and engineering work focused primarily on fulfilling the project quality requirements for the project. The DQC is managed in the Sacramento District (SPK) and may be conducted by in-house staff as long as the reviewers are not doing the work involved in the study, including contracted work that is being reviewed. Basic quality control tools include a Quality Management Plan providing for seamless reviews, quality checks and reviews; supervisory reviews; and Project Delivery Team (PDT) reviews. Additionally, the PDT is responsible for a complete review of all design and specification milestone packages in order to assure overall integrity, which could include changes and recommendations to design and specification submittal before approval of the ATR report by the District Commander. DQC efforts will include the necessary expertise to address compliance with published Corps policy. The district quality manuals will prescribe specific procedures for the conduct of DQC efforts including documentation requirements and maintenance of associated records for internal audits to check for proper DQC implementation. DQC is required for this project.

(2) Agency Technical Review. EC 1165-2-209 characterizes the ATR effort as an in-depth review managed within USACE, and conducted by a qualified team outside of the home district that is not involved in the day-to-day production of the design effort. The purpose of this review is to ensure the proper application of clearly established criteria, regulations, laws, codes, principles and professional practices. The ATR team reviews the various work products and assures that all the parts fit together in a coherent whole. For each ATR event, the ATR event shall review relevant DQC records and provide written comment in the ATR report as the apparent adequacy of the DQC effort. ATR teams will be comprised of senior USACE personnel (Regional Technical Specialists (RTS), subject matter experts, etc.) and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC (district). EC 1165-2-209 requires that DrChecks (https://www.projnet.org/projnet/) be used to document all ATR comments, responses, and associated resolution accomplished. The ATR team will be assembled by the District. The ATR Lead will be enlisted with MSC support.

At this level of review, any necessary National Environmental Policy Act (NEPA) documents and other environmental compliance products, or any other services provided by the local sponsor(s) directly related to the work products described in Paragraph 1A shall be reviewed by the ATR team.

The review plan outlines the proposed approach to meeting this requirement for the hydraulic analysis, the OMRR&R manual, plans and specifications, design documentation report (DDR), and environmental assessment. An ATR is required for all of the previously referenced implementation documents for the project.

(3) Independent External Peer Review (IEPR).

(a) Type I Independent External Peer Review (IEPR). Type I IEPR is conducted on project studies. It is of critical importance for those decision documents and supporting work products where there are public safety concerns, significant controversy, a high level of complexity, or significant economic, environmental and social effects to the nation. Type I IEPR is mandatory if any of the following are true:

(i) Significant threat to human life.

(ii) Where the estimated total cost of the project, including mitigation costs, is greater than $45 million.

(iii) Where the Governor of an affected State requests a peer review by independent experts; or

(iv) Where the Chief of Engineers determines that the project study is controversial due to significant public dispute over the size, nature, or effects of the project or the economic or environmental costs or benefits of the project.

(b) Type II IEPR Safety Assurance Review (SAR) Review. EC 1165-2-209 characterizes the IEPR effort as an external review process that was originally added to the existing Corps review process via EC 1105-2-408. The Project, while authorized under flood control does not provide any flood risk management. No residences or communities are threatened if the structure fails, so there is no life safety risk.

The District considered risks and risk triggers for Type I IEPR and Type II IEPR.

Type I IEPR is required for decision documents under most circumstances. This project does not involve the production of decision documents and there is no significant threat to human life.

Decision on Type I IEPR: The District considered these risks and determined that **Type I IEPR is not required.**

Type II IEPR (SAR). Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.

Any project addressing hurricane and storm risk management and **flood risk** management or any other project where Federal action is justified by **life safety** or the failure of the project would pose a **significant threat to human life.** This applies to new projects and to the major repair, rehabilitation, replacement, or modification of existing facilities (based on identified risks and threats).

Other Factors to consider for Type II IEPR (SAR) review of a project, or components of a project;

- The project involves the use of innovative materials or techniques where the engineering is based on novel methods, presents complex challenges for interpretations, contains precedent-setting methods or models, or presents conclusions that are likely to change prevailing practices
- The project design requires redundancy, resiliency, and robustness.
- The project has unique construction sequencing or a reduced or overlapping design and construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems.

The GF is a submerged grade control structure. It does not have a hurricane, storm risk management or flood control management function. The failure of the structure does not pose a significant threat to human life.

Decision on Type II IEPR: Based on the information and analysis provided in the preceding paragraphs of this review plan, the project covered under this plan is excluded from IEPR because it does not meet the mandatory IEPR triggers and does not warrant IEPR based on a risk-informed analysis. The District considered these risks and the District Chief of Engineering has determined that **Type II IEPR (SAR) is not required** considering the risks triggers.

(4) Policy and Legal Compliance Reviews. All decision documents will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority. There is no decision document required for the project OMRR&R document review or any future construction plans/environmental assessment so a formal policy and legal compliance review is not anticipated. The OMRR&R manual will be reviewed by SPK legal counsel from a DQC perspective only.

(5) Review Plan Approval and Posting. In order to ensure the Review Plan is in compliance with the principles of EC 1165-2-209 and the MSC's QMP, the Review Plan must be approved by the applicable MSC, in this case the Commander, South Pacific Division (SPD). Once the Review Plan is approved, the Sacramento District will post it to its district public website and notify SPD.

Table 1: Overall Summary of Reviews for the Sacramento River Flood Protection Project, Glenn-Colusa (Requirements As Noted in the Civil Works Review Policy, EC 1165-2-209).

Review Type	Acronym	Management	Applicable	Notes:
Review Plan Approval	RPA	-	Required	Approved by: MSC Commander
Public Review Plan Approval	-	MSC	Required	Posted only after Commander's approval
District Quality Control	DQC	SPK	Required	
Agency Technical Review	ATR	RMO	Required	
Safety Assurance Review	IEPR	HQUSACE	Not required	No life safety issues
Policy and Legal Compliance Review	PLCR	MSC, RMO, HQUSACE	Not Required	No decision documents
Planning Center of Expertise	FRM	FRM @ RMO	Not Required	Required for decision documents only
Certification of Agency Technical Review	Certification of ATR	MSC	Required	After all successful reviews are completed

2. PROJECT DESCRIPTION

A. Project Authority

The authorizations of the Project were as follows:

Energy and Water Development Act of 1990 (Public Law 101-514), Section 102.

> Sec. 102. The Sacramento River Flood Control Project, California, as authorized by the Flood Control Act of 1917, as amended, is further modified to direct the Secretary of the Army, acting through the Chief of Engineers, to proceed in fiscal year 1990 and in subsequent years as necessary with construction of riverbed gradient restoration structures in the vicinity of River Mile 206, Sacramento River, California, at an additional estimated cost of $6,000,000, generally in accordance with the plan contained in a report prepared by the Glenn-Colusa Irrigation District and the California Department of Fish and Game, dated December 1988. Local cost-sharing is to be obtained in accordance with the flood control requirements of the Water Resources Development Act of 1986.

Water Development and Resources Development Act of 1996 (Public Law 104-303), Section 301(b) (3).

> (3) GLENN-COLUSA, CALIFORNIA. - The project for flood control, Sacramento River, California, authorized by Section 2 of the act entitled "An act to provide for the control of the floods of the Mississippi River and of the Sacramento River, California, and for other purposes," approved March 1, 1917 (39 Stat. 949), and modified by Section 102 of the Energy and Water Development Appropriations Act, 1990 (103 Stat. 649), is

further modified to authorize the Secretary to carry out the portion of the project at Glenn-Colusa, California, at a total cost of $14.2 million.

Energy and Water Development and Appropriations Act of 1998 (Public Law 105-245).

That the flood control project for Sacramento River, Glenn-Colusa Irrigation District,

California, authorized by Section 2 of the Act entitled "An Act to provide for the control of floods of the Mississippi River and the Sacramento River, and for other purposes'', approved March 1, 1917 (39 Stat. 949), is modified to authorize the Secretary of the Army, acting through the Chief of Engineers, to construct the project at a total cost of $20,700,000 with an estimated first Federal cost of $15,570,000 and an estimated first non-Federal cost of $5,130,000:

Water Resources Development Act of 1999 (Public Law 106-53), Section 305, SACRAMENTO RIVER, GLENN-COLUSA, CALIFORNIA.

(a) IN GENERAL.—The project for flood control, Sacramento River, California, authorized by section 2 of the Act entitled ''An Act to provide for the control of the floods of the Mississippi River and of the Sacramento River, California, and for other purposes'', approved March 1, 1917 (39 Stat. 949), and modified by section 102 of the Energy and Water Development Appropriations Act, 1990 (103 Stat. 649), section 301(b)(3) of the Water Resources Development Act of 1996 (110 Stat. 3110), and title I of the Energy and Water Development Appropriations Act, 1999 (112 Stat. 1841), is further modified to authorize the Secretary—

(1) to carry out the portion of the project at Glenn-Colusa, California, at a total cost of $26,000,000, with an estimated Federal cost of $20,000,000 and an estimated non-Federal cost of $6,000,000; and

(2) to carry out bank stabilization work in the riverbed gradient facility, particularly in the vicinity of River Mile 208, if the Secretary determines that such work is necessary to protect the overall integrity of the project, on the condition that additional environmental review of the project is conducted.

B. Location and Descriptions

The riverbed gradient facility (GF), the Project, was constructed in 2000 for the purpose of restoring the river hydraulic conditions in the vicinity of the existing Glenn-Colusa Irrigation District (GCID) intake facility to pre-1970 conditions. The local sponsor is the GCID, 344 East Laurel Street, Willows, California 95988, and telephone (530) 934-8881. The GF is one of several components included in a comprehensive fish screen improvement project at the Hamilton City Pumping Plant (HCPP), which is located at the GCID intake facility. The specific objectives of the GF are to: (1) stabilize the local Sacramento River reach to reduce the effect of river gradient changes on screen performance, (2) increase water-surface elevations at the fish screening facility to provide adequate hydraulic gradient to operate a fish bypass system, and (3) stabilize water levels to increase the efficiency of pumping plant operations.

The project site is located in the Sacramento Valley Region of California, approximately 100 miles north of the city of Sacramento and roughly 4 miles north of Hamilton City between river miles (RM) 205 and 206 on the Sacramento River. The existing HCPP and fish screening facility are located in a diversion channel that branches off of the Sacramento River near RM 206. The flow bifurcation through this

diversion channel creates Montgomery Island. The diversion channel rejoins with the river near RM 205. Glenn-Colusa Irrigation District (GCID) diverts water for irrigated-agricultural production using the HCPP located on the right bank (south), midway along the length of Montgomery Island. The GCID diversion supplies water to 140,000 acres of farmland, over 20,000 acres of Federal wildlife refuges, and 40,000 acres of other lands and wetlands. Water diversions and deliveries by GCID are part of a larger water management system operated by the Bureau of Reclamation, California Department of Water Resources (DWR), and several irrigation districts throughout the upper Sacramento Valley.

The GF consists primarily of rock riprap that extends along 1,000 ft of the channel bed, and roughly 2,500 ft along either bank line of the river. In addition, the riprap is supplemented by three sheet pile cutoff walls that extend beyond either riverbank and provide protection against flanking of the structure. The crest of the structure is elevated approximately 4 ft above the channel bed, and the lower channel banks are slightly constricted to generate an increase in upstream water surface elevations. The structure has a constant downstream slope of 0.3 percent from the crest to the downstream end of the channel invert riprap, where it ties into the existing channel topography. The geometry of the structure creates a modified channel section that is designed to mimic the general characteristics of natural riffles along the Upper Sacramento River. For the design flow range of 7,000 to 20,000 cfs in the Sacramento River, upstream of the GCID diversion, the GF causes an increase in upstream water surface elevations over pre-project conditions. As flows increase above 40,000 cfs, the GF will "drown out" and cease to have any marked effect on river hydraulics.

3. PROJECT STATUS

Before construction was determined to be complete (prior to turnover of the project to the local sponsor), a number of issues were identified. These include scour holes and downstream bank erosion.

In June 2009, a Blue Ribbon Panel (BRP) of experts completed a report investigating, commenting, and providing recommendations to address the issues associated with the GF. Since that time, GCID and SPK have been working to address the GF problems. The BRP evaluations and recommendations regarding scouring and downstream bank erosion are summarized below.

Scour holes and further erosion have developed downstream of the sheet piles discussed above in the project information. The riprap slope revetment on the right river bank (east shore of Montgomery Island) immediately downstream of the GF has been partly undermined and fallen into the deep local scour hole. The local scour hole deepened significantly between 2003 and 2008 and given sufficient underlying depth of alluvial material, the hole could deepen considerably. Measures should be taken to at least partly refill and stabilize the downstream scour hole. The left overbank area should also be refilled to the extent judged necessary and stabilized against further scour. The right bank revetment immediately downstream of the GF should be restored in conjunction with remedial treatment of the adjacent deep scour hole.

An Architect-Engineer contract was issued to McMillen LLC (Boise, ID) in September 2011 for hydraulic data collection, analysis, repair option development and modeling (optional), and documentation. The report would support possible repairs of the GF. The work will be utilized to determine and document the following for the GF; existing gradient facility rock stability, gradation, and hydraulic roughness, existing and potential local scour immediately downstream of the gradient facility and in the left and right overbanks adjacent to the gradient facility and development of options and recommendations for corrective repairs to the gradient facility and scour holes.

An OMRR&R manual is currently being prepared to address the GF operation and maintenance procedures of the constructed project prior to turnover of the project to the local sponsor. An amended OMRR&R manual will be prepared if further construction is completed.,

Plans and specifications, DDR and an environmental assessment are proposed to address the existing downstream scour hole as available construction funds allow. The analysis and design of the scour hole will be challenging. The Government is currently preparing a memo regarding some tools that may be helpful for the contractor to use during analysis and design of scour hole repairs.

4. WORK PRODUCTS

A. General. The primary document/products covered under this review plan are the Hydraulic Data Collection and Analysis, Analysis and Design Tools memo, OMRR&R manual and P&S/DDR. The specific review appendix for the environmental assessment will be added upon determination of availability of construction funding and the amended OMRR&R manual review appendix will be added after completion of the construction of the work covered by the P&S/DDR and environmental assessment.

5. SCOPE OF REVIEW

A. General. The scope of this review plan will primarily focus on anticipated review activities for the Hydraulic Data Collection and Analysis, Analysis and Design Tools memo, OMRR&R manual and plans and specifications/DDR for the construction contract to address issues with the constructed project. This review plan and product specific review appendixes will be updated (including the EA and completion of the amended OMRR&R manual) to address more details of the review of other implementation documents as the schedule and funding of these documents is more clearly defined.

B. District Quality Control (DQC). DQC is an internal review process inherent in most products implemented within the COE. Generally the DQC is implemented during the development process as a check of adequacy for the work product. The DQC is carried out by staff familiar with the work product, but not responsible for the work product or managing the A-E contract which could include supervisors, team leaders, work leaders, designated individuals from qualified personnel to senior staff. The quality assurance team for the Project will be composed of PDT members, the local sponsor, and other professionals throughout the Sacramento district who are not PDT members.

C. Agency Technical Review (ATR). The ATR is managed outside of the home office which is responsible for the work product. The ATR is mandatory for implementation products on a case-by-case basis. The review team (ATRT) shall be made up of subject matter experts capable of reviewing a work product for adequacy, completeness, and with respect to matters pertaining to life, safety, and property. An ATR shall be applied toward all current and future products including the operation and maintenance manual and plans and specifications.

D. Safety Assurance Review (SAR)—Type II IEPR. The Water Resources Development Act of 2007 included two separate requirements for review by external experts. The first, Section 2034, required independent peer review of project studies under certain conditions. The second requirement, Section 2035, required a Safety Assurance Review (SAR) for design and construction activities for hurricane and storm damage reduction, and flood damage reduction projects which pose a hazard to life safety. The project is a submerged grade control structure with riprap. There is no flood control purpose or life safety function.

The District has determined there is no hazard to life safety and no SAR level review is required. Table 2 below is a summary of the status of the current and future documents needed for the project.

Table 2: Documents to be Reviewed and Level of Review Needed

Document	DQC	ATR	SAR[3]
Hydraulic Data Collection and Analysis (Appendix A)[1]	√	√	
Analysis and Design Tools memo (Appendix B)	√	√	
Interim OMRR&R Manual (Appendix C)	√	√	
Plans and Specifications/DDR, Scour and Erosion Restoration (Appendix D)[2]	√	√	
Environmental Assessment. Scour and Erosion Restoration (additional specific review details to be added later)	√	√	
Amended OMRR&R Manual (additional specific review details to be added later)	√	√	

[1] If the complexity of the analysis warrants an IRPR, Type I, this review plan will be revised to indicate IEPR review.
[2]It is anticipated that the plans and specifications will be prepared by architectural-engineer (A-E) contact
[3] No Type II IEPR review. No life safety issues for any work products.

E. Timing & Sequence of Reviews. The DQC review timing for the Hydraulic Data Collection and Analysis (under contract) is presented in Appendix A. The estimated DQC and ATR review timing for the Analysis and Design Tools memo are presented in Appendix B. The DQC and ATR review timing for the OMRR&R manual (under preparation in-house) is presented in Appendix C. The estimated DQC and ATR review timing for the plans and specifications/DDR for the overbank and downstream erosion restoration are presented in Appendix D.

F. Model Certification. It is anticipated that existing certified models will be used for the hydraulic analysis. For existing conditions hydraulic analysis the contractor shall use the Adaptive Hydraulic 2D model (ADH) developed by USACE or other software approved for 2D hydraulic modeling by USACE and mutually agreed upon. The model surface shall be prepared and the results post-processed using the Surface Modeling Software (SMS) 11.0 or other software approved by USACE and mutually agreed upon. It is not anticipated that model certifications are required for the OMRR&R manual. It is currently anticipated that an existing certified hydraulic model will be used for the construction plans. If a model certification is required for the construction plans the documentation will be included in Appendix D.

G. Meeting Reports. Meeting reports will be prepared for significant meetings with the client and agencies for all work products. Any meeting, at which decisions are made, action items are assigned, or agreements reached must be documented. All actions will be noted in the meeting report.

H. Value Engineering Studies. The Corps' current policy requires that value engineering (VE) studies be performed on all USACE projects or project elements with a programmed cost of $1,000,000 or more unless a determination can be made that a study would not be cost effective. It is anticipated that the erosion repair construction contract will exceed $1,000,000. A VE study shall be performed and will include a comprehensive (M-CACES) cost estimate. The milestone is achieved on the date that the VE study is approved by the Sacramento District Chief of Engineering Division.

6. AGENCY TECHNICAL REVIEW PLAN

For the hydraulic analysis, OMRR&R manual and future P&S/DDR the ATR is managed by the Review Management Office (RMO). The MSC (South Pacific Division) will serve as also the RMO. The RMO will identify individuals to perform the ATR. The Sacramento District can provide suggestions on possible reviewers with experience in hydraulic design, river engineering (i.e.,geomorphology), geotechnical and civil design. Prior to ATR, the hydraulic analysis, OMRR&R, P&S/DDR and Environmental Assessment will be reviewed by GCID, the PDT, DQC team and appropriate environmental agencies (included on schedule of reviews in Appendices B and C). The DQC review comments will be documented in DrChecks and available to the ATR reviewers. The sponsor comments will be documented and also available to the ATR team.

A. General. An ATR manager shall be designated for the ATR process for each work product. The proposed manager will have expertise in river engineering design and construction. The ATR leader shall provide the following.

(1) Information necessary to team members on the project, the schedule, and the information necessary to conduct a proper review.

(2) Setting up the communication with the PDT, for providing a summary of critical review comments, collecting grammatical and editorial comments from the ATR team.

(3) Ensuring that the ATR team has adequate funding to perform the review, facilitating the resolution of the comments, and certifying that the ATR has been conducted and resolved in accordance with policy.

B. Agency Technical Review Team (ATRT). The ATRT will be comprised of individuals that have not been involved in the development of the implementation documents and will be chosen based on expertise, experience, and/or skill. The members will roughly mirror the composition of the PDT and wherever possible, reside outside of the District Office (per EC Section 9(1) (a)). In general, the review team members will each have a minimum of 10 years of experience and education in their respective discipline. To assure independence, the leader of the ATRT shall be outside the home MSC (SPD). The ATRT members will be identified by the ATRT leader at the time the review is conducted and will be presented in the specific review appendix**.** .

If other disciplines/functions are needed to be involved in the project, they shall have similar general experience and educational backgrounds.

C. Communication. The communication plan for the ATR is as follows.

(1) The District technical lead will notify the ATR leader when the document has been posted for review.

(2) The team will use DrChecks to document the ATR process. The technical lead will facilitate the creation of a project portfolio in the system which allows PDT and ATR member access. An electronic version of the plans and specifications, environmental assessment and the interim OMRR&R manual will be posted at DrChecks at least one business day prior to the comment period.

(3) PDT members and the ATR lead will notify the technical lead as to when comments in the system are final.

(4) A revised electronic version of the report and appendices with comments incorporated shall be posted in DrChecks. Hard copies or CD's will be mailed as necessary.

D. Review. ATRT responsibilities are as follows:

Reviewers shall review preliminary drawings and the scope of work to gain an understanding of the project. Comments on preliminary drawings and scope shall be submitted into DrChecks. Reviewer's shall pay particular attention to one's discipline but may also comment on other aspects as appropriate. Reviewers that do not have any significant comments pertaining to their assigned discipline shall provide a comment stating this. Grammatical and editorial comments shall be provided, particularly for the specification portion of the package submittal. However, these comments should not be submitted into DrChecks. Grammatical comments should be submitted to the ATR leader via electronic mail using email or the track changes feature in the MS Office compatible document or as a hard copy mark-up. The ATR leader shall provide these comments to the technical lead.

Review comments shall contain these principal elements.

(1) A clear statement of concern
(2) The basis for the concern, such as principle, policy, or guidance
(3) Significance for the concern
(4) Specific actions or recommendations to resolve the comment
(5) The "Critical" comment flag in DrChecks shall not be used unless the comment is discussed with the ATR leader first.

PDT responsibilities are as follows: Depending on the responsibility for the work effort, either the PDT or the A-E shall review comments provided by the ATRT in DrChecks and provide responses to each comment using "Concur, Non-Concur, or For Information." Concur responses shall state what action was taken and provide revised text from the report if applicable. Non-concur responses shall state the basis for the disagreement or clarification of the concern and suggest actions to negotiate the closure of the comment. PDT members or the A-E shall contact ATRT members, either by telephone or email, to discuss any "Non-Concur" responses prior to submission.

E. Resolution. ATRT Reviewers shall back check PDT and/or A-E responses and either close the comment or attempt to resolve any disagreements. Telephone calls shall be used to resolve any conflicting comments and responses. **Face-to-face meetings to resolve comments are encouraged**

A reviewer may close a comment if the comment is addressed and resolved by the response, or if the reviewer determines that the comment was not a valid technical comment as a result of rebuttal, clarification, or additional information, or because the comment was advisory, primarily based on individual judgment or opinion, or editorial. If the reviewer and responder cannot resolve a comment, it should be brought to the attention of the ATR leader. If the ATR leader cannot resolve, the ATR leader and the PDT technical lead will attempt to resolve. ATRT members will keep the ATR leader informed of problematic comments. The vertical team will be informed of any unresolved comments, policy variations, or other issues that may cause them concern during HQ review. A comment may also be closed when it has been addressed or deferred to the policy compliance review process by HQUSACE.

F. Certification and Documentation. ATR certification is required for all implementation documents (hydraulic analysis report, OMRR&R, P&S/DDR and environmental assessment). Sample statement of Completion of Agency Technical Review is presented in Appendix E. This statement shall be completed and submitted upon completion of review of work products and all issues raised by the reviewers have

been addressed to the review team's satisfaction. A summary report of all comments, responses and any significant decisions during the review process will be prepared and made available. It is also noted that the A-E is required to have all the design drawings stamped by a registered professional engineer.

7. PUBLIC REVIEW

The public will have the opportunity to review the Sacramento River Flood Protection Project, Glenn-Colusa Review Plan. Public dissemination of the document will be posted at the SPK web site, http://www.spk.usace.army.mil/organizations/cespk-pd/ReviewPlans.html, after the review plan has been finalized and approved by South Pacific Division. There will be no formal comment period and there will be no set timeframe for the opportunity for public comment. If and when comments are received, the PDT will consider them and decide if revisions to the review plan are necessary. The public will be invited to review and submit comments on the plan as described on the web site.

8. REVIEW COSTS

The current estimated cost of the review of the Hydraulic Data Collection and Analysis is included in Appendix A. The current estimated cost of the review for the Analysis and Design Tools memo is included in Appendix B. The current estimated cost of the review for the OMRR&R manual is included in Appendix C. The current estimated cost of the review for the P&S/DDR is included in Appendix D. The review costs of any further future reviews will be included in the review specific appendices.

9. POINTS OF CONTACT

A. Project Delivery Team. The PDT is comprised of those individuals directly involved in the scoping and the review of the work products. Individual contact information and disciplines are presented in Appendix F. All work products associated with this project will undergo seamless and peer review by the PDT for a determination of adequacy.

B. Vertical Team. The Vertical Team includes District management, Division Support Team (DST), and Regional Integration Team (RIT) staff. Currently Karen Berresford is the district support team lead for the vertical team. Her contact information is Karen.G.Berresford@usace.army.mil at 415-503-6557.

C. Review Plan Points of Contact. The Points of Contact for questions and comments to this Review Plan are as follows:

SPK Lead Point of Contact: Bill Fakes 916-557-6795
SPK Hydraulic Design Lead: Todd Rivas 916-557-7523
SPK PM: Tom Karvonen 916-557-7630
RMO Point of Contact: Boniface Bigornia 415-503-6556

10. APPROVALS AND CHECKLISTS

The PDT will carry out the Review Plan as described. The SPK lead will submit the Review Plan to the RMO for review and recommendation for approval. As per EC 1165-2-209, paragraph 9 (2) Other Work Products (for the Hydraulic Data Collection and Analysis Report, OMRR&R manual, plans and specifications and environmental assessment work), the MSC (SPD) will serve as the RMO. The Review Plan Checklists are included as Appendix G. After review and recommendation, the PDT District Technical Lead will forward the final Review Plan to the MSC for approval. An MSC approval letter is included in Appendix H (to be in the posted version of the RP per the EC). Upon MSC approval of the

RP, the MSC will provide a copy of the signed MSC Approval Memo to its respective HQUSACE Regional Integration Team (RIT).

11. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original			
Revision 1			

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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX A

HYDRAULIC DATA COLLECTION AND ANALYSIS REVIEW DETAILS

A. Background

The project is located in one of the most dynamic reaches of the Sacramento River with active river bend migration and relatively frequent bend cut offs. The river bend at USGS river mile 203 downstream of the Glenn-Colusa Irrigation District (GCID) intake facility experienced a cut-off during 1969 – 1970. This lowered the water surface for the GCID intake, impacting operations. Construction of a grade control facility (GF) about USGS river mile 206 was completed in November 2000. The GF was designed to mimic a natural riffle and consists of sloping rock –lined channel bed or rock rapids with three sheet pile cut-off walls.

Since construction a number of concerns have been noted including:

1) Rocks protruding near or above the surface of the water, causing boat navigation safety concerns
2) The protruding rocks, observations, and questions about the original hydraulic model indicate that
3) the rock in the GF may not be stable
4) Scour holes developed immediately adjacent to the west bank downstream end of the GF and near the middle sheet pile in the left overbank area, jeopardizing the functional capability of the GF
5) An existing large mid-channel bar enlarged just downstream of the GF, contributing to left and west bank erosion in this area
6) Upstream river channel movement, particularly near RM 208, could jeopardize the function of the GF and GCID operations

A Blue Ribbon Panel (BRP) of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009. For this work product, data will be collected, processed, and analyzed to address these concerns and develop, recommend, and model corrective repair options.

While this task order is an agreement between the government and the contractor only, it should be noted that the government is coordinating the work with the project sponsor. The project sponsor actively participates in all reviews. The contractor is expected to provide submittals to the sponsor. In addition, the contractor is expected to fully address any comments made by the sponsor when the government conducts reviews and back checks the comments.

The government reviews are also expected to include Agency Technical Review (ATR) reviews that are expected to be conducted simultaneously with District Quality Control (DQC). If Independent External Peer Review (IEPR) is needed, the contractor is expected to be available to discuss and respond to comments and issues that arise during IEPR.

B. Contractor Quality Control

The QC review plan for this product is presented in appendix I:

C. District Quality Control:

The DQC review team for this product is presented in Table A-1.

Table A-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Todd Rivas Lead Hydraulic Engineer SPK	Hydraulic Engineering	8 years hydraulic engineering experience	916-557-7523
Steve Maynord, Research Engineer, ERDC	Hydraulic Engineering, particularly riprap design and scour hole repair	Largely responsible for developing the current USACE riprap design guidance	601-634-3284

D. ATR Disciplines

ATR disciplines required are as follows: civil design, hydraulic design/river engineering, environmental, construction-operations and geosciences. The ATRT is presented in Table A-2 (to be updated upon nomination/ selection of ATRT members). Qualifications of the ATRT members are presented in Appendix E.

Table A-2: ATR Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review team leader (outside the home MSC)	Minimum 10 years experience in hydraulic engineering	
TBD	Hydraulic Design/ Geomorpholgy[1]	Minimum 10 years experience USACE riprap design and hydraulic design geomorphology	

[1] Sacramento District recommends Steven Abt for riprap design (970) 491-8203 and Dr. Chester Watson for fluvial geomorphology

E. Timeline and Costs

The estimated timeline and costs for the Hydraulic Data Collection and Analysis is presented in Table A-3 and A-4 below.

Table A-3: Review Timeline for DQC, and ATR Teams [1,2]

All Teams	Submittal	Team Required	Estimated Completion Date
DQC, ATR, and GCID	Draft Water Data Collection Report	DQC	March 2012
	Draft Final Water Data Collection Report	DQC/GCID	April 2012
	Final Water Data Collection Report	DQC/GCID	May 2012
	Draft Rock Data Collection Report	DQC	March 2012
	Draft Final Rock Data Collection Report	DQC/GCID	April 2012
	Final Rock Data Collection Report	DQC/GCID	May 2012
	Draft Hydraulic Model and Rock Stability Evaluation Report	DQC/ATR/GCID	Suspended pending additional funding
	Draft Final Hydraulic Model and Rock Stability Evaluation Report	DGC/ATR/GCID	Suspended pending additional funding
	Final Hydraulic Model and Rock Stability Evaluation Report	DQC/ATR/GCID	Suspended pending additional funding

[1] Option items to contract will be added to above timeline as exercised.
[2] Assumes Contract is modified to allow the contractor to complete the Draft Hydraulic Model and Rock Stability Evaluation Report without having the final rock data collected.

Table A-4 Estimated costs for DQC and ATR Teams

Review	#reviewers/total hours[1]	Approximate cost/hr	Totals ($)
Draft Water Data Collection Report	1 reviewers, 32 hrs	100	$3,200
Draft Final Water Data Collection Report	1 reviewers, 16 hrs	100	$1,600
Final Water Data Collection Report	1 reviewers, 0 hrs	100	$0
Draft Rock Data Collection Report	1 reviewers, 32 hrs	100	$3,200
Draft Final Rock Data Collection Report	1 reviewers, 16 hrs	100	$1,600
Final Rock Data Collection Report	1 reviewers, 0 hrs	100	$0
Draft Hydraulic Model and Rock Stability Evaluation Report	3 reviewers, 48 hrs	150	$7,200
Draft Final Hydraulic Model and Rock Stability Evaluation Report	3 reviewers, 24 hrs	150	$3,600
Final Hydraulic Model and Rock Stability Evaluation Report	3 reviewers, 0 hrs	150	$0
Total			$20,400

[1] Assumes 2 DQC reviewers (Todd Rivas and Steve Maynord) and 1 ATR reviewer. Lumped background information hours (assumed 8 hrs each) into 1st review for Steve Maynord and ATR reviewer (The Draft Analysis and Tools Memo). Assume 0 hrs for the Final document.

F. SAR

The District does not recommend SAR certification due to the lack of life threatening issues associated with the project.

G. Model Certification

If a hydraulic model is needed, it is anticipated an existing certified model will be used. If a model is proposed that will require certification, the requirements for model certification shall be followed and the process documented in an updated review plan.

H. Value Engineering Study.

No VE study required.

I. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.

Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Todd Rivas	SPK-Technical Lead	Lead Hydraulic Engineer	Sacramento District, US Army Corps of Engineers	916-557-7523
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567
George Robison, PhD, PE	McMillen LLC (Contractor)	Lead-point of contact		

J. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original, Appendix A			
Revision 1			

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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX B

ANALYSIS AND DESIGN TOOLS MEMO REVIEW DETAILS

A. Background

The project is located in one of the most dynamic reaches of the Sacramento River with active river bend migration and relatively frequent bend cut offs. The river bend at USGS river mile 203 downstream of the Glenn-Colusa Irrigation District (GCID) intake facility experienced a cut-off during 1969 – 1970. This lowered the water surface for the GCID intake, impacting operations. Construction of a grade control facility (GF) about USGS river mile 206 was completed in November 2000. The GF was designed to mimic a natural riffle and consists of sloping rock –lined channel bed or rock rapids with three sheet pile cut-off walls.

Since construction a number of concerns have been noted including:

1) Rocks protruding near or above the surface of the water, causing boat navigation safety concerns
2) The protruding rocks, observations, and questions about the original hydraulic model indicate that the rock in the GF may not be stable
3) Scour holes developed immediately adjacent to the west bank downstream end of the GF and near the middle sheet pile in the left overbank area, jeopardizing the functional capability of the GF
4) An existing large mid-channel bar enlarged just downstream of the GF, contributing to left and west bank erosion in this area
5) Upstream river channel movement, particularly near RM 208, could jeopardize the function of the GF and GCID operations

A Blue Ribbon Panel (BRP) of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009.

The analysis and design of the scour hole will be challenging. USACE is preparing a memo regarding some tools that may be helpful for the contractor to use during analysis and design of scour hole repairs. This memo and the tools willundergo DQC and ATR review to ensure these tools are of the highest quality and useful for future design and analysis.

B. Contractor Quality Control

The contractor will have an opportunity to comment on this document that is being prepared by the Government. The contractor is not preparing this document.

C. District Quality Control:

The DQC review team for this product is presented in **Table B-1**.

Table B-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Steve Maynord, Research Engineer, ERDC	Hydraulic Engineering, particularly riprap design and scour hole repair	Largely responsible for developing the current USACE riprap design guidance	601-634-3284

D. ATR Disciplines

ATR disciplines required are as follows: hydraulic design/river engineering. The ATRT is presented in **Table B-2** (to be updated upon nomination/ selection of ATRT members). .

Table B-2: ATR Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review team leader (outside the home MSC)	Minimum 10 years experience in hydraulic engineering	
TBD	Hydraulic Design/ Geomorpholgy	Minimum 10 years experience USACE riprap design and hydraulic design geomorphology	

E. Timeline and Costs

The estimated timeline and costs for the Hydraulic Data Collection and Analysis is presented in Table B-3 and B-4 below.

Table B-3: Review Timeline for DQC, and ATR Teams

All Teams	Submittal	Team Required	Estimated Completion Date
DQC, ATR, AE contractor, and GCID	Draft Analysis and Design Tools Report	DQC/ATR/AE Contractor/GCID	April 2012
	Draft Final Analysis and Design Tools Report	DQC/ATR/AE Contractor/GCID	May 2012
	Final Analysis and Design Tools Report	DQC/ATR/AE Contractor/GCID	Suspended pending additional funding

Table B-4 Estimated costs for DQC and ATR Teams

Review	#reviewers/total hours[2]	Approximate cost/hr	Totals ($)
Draft Analysis and Design Tools Report	3 reviewers, 48 hrs	150	$7,200
Draft Final Analysis and Design Tools Report	3 reviewers, 24 hrs	150	$3,600
Final Analysis and Design Tools Report	3 reviewers, 0 hrs	150	$0
Total			$10,800

Assumes 2 DQC reviewers (Todd Rivas and Steve Maynord) and 1 ATR reviewer. Lumped background information hours (assumed 8 hrs each) into 1st review for Steve Maynord and ATR reviewer (The Draft Analysis and Tools Memo). Assume 0 hrs for the Final document

F. SAR

The District does not recommend SAR certification due to the lack of life threatening issues associated with the project.

G. Model Certification

If a hydraulic model is needed, it is anticipated an existing certified model will be used. If a model is proposed that will require certification, the requirements for model certification shall be followed and the process documented in an updated review plan.

H. Value Engineering Study.

No VE study required.

I. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.
Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Todd Rivas	SPK-Technical Lead	Lead Hydraulic Engineer	Sacramento District, US Army Corps of Engineers	916-557-7523
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567

George Robison, PhD, PE	McMillen LLC (Contractor)	Lead-point of contact		

J. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original, Appendix B			
Revision 1			

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX C

OMRR&R MANUAL REVIEW DETAILS

A. Background

The riverbed gradient facility (GF) was constructed in 2000 for the purpose of restoring the river hydraulic conditions in the vicinity of the existing Glenn-Colusa Irrigation District (GCID) intake facility to pre-1970 conditions. The local sponsor is the GCID. The GF is one of several components included in a comprehensive fish screen improvement project at the Hamilton City Pumping Plant (HCPP), which is located at the GCID intake facility. The specific objectives of the GF are to: (1) stabilize the local Sacramento River reach to reduce the effect of river gradient changes on screen performance, (2) increase water-surface elevations at the fish screening facility to provide adequate hydraulic gradient to operate a fish bypass system, and (3) stabilize water levels to increase the efficiency of pumping plant operations.

The GF consists primarily of rock riprap that extends along 1,000 ft of the channel bed, and roughly 2,500 ft along either bank line of the river. In addition, the riprap is supplemented by three sheet pile cutoff walls that extend beyond either riverbank and provide protection against flanking of the structure.

An OMRR&R manual is proposed to be prepared to address the GF operation and maintenance procedures of the constructed project prior to turnover of the project to the local sponsor . An amended MRR&R manual will be prepared if further construction is completed . A separate appendix will be prepared for this review plan for the amended OMRR&R.

B. District Quality Control

The DQC review team for this product is presented in **Table C-1**.

Table C-1: DQC Review Team [1]

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
Jim Berkland CESPK-ED-DB	Review Team Lead Coordinator/ Civil Engineer	40 years civil engineering experience	(916) 557-7268 James.L.Berkland@usace.army.mil
Anderson "Sonny" Macatumbas	Safety Office, CESPK	Safety Engineer	(916) 557-5315 anderson.macatumbas@us.army.mil
Moshen Tavana CESPK-CO-CR	Operations Branch	RAO, retired SPK Operations Branch	916-557-6732 Moshen.Tavana@usace.army.mil
Tanis Toland CESPK-PD-RP-ENVR	Environmental	Chief, Environmental Analysis Section, CESPK	(916) 557-6717 Tanis.J.Toland@usace.army.mil
Steve Maynord, Research Engineer, ERDC	Hydraulic Design	Largely responsible for developing the current USACE riprap design guidance	601-634-3284 Stephen.T.Maynord@usace.army.mil

[1] All work associated with the OMRR&R activities is currently anticipated to be conducted within existing project footprint and/or previously acquired easements. No new real estate activities required.

C. ATR Disciplines

ATR disciplines required are as follows: civil design, hydraulic design/river engineering, environmental, construction-operations and geosciences. The ATRT is presented in Table C-2 (to be updated upon nomination/ selection of ATRT members).

Table C-2 ATRT (to be assembled by CESPK with MSC support)

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review team leader (outside the home MSC)	Minimum 10 years experience in Operations, Civil Design or Hydraulic Engineering	
TBD	Geotechnical	Minimum 10 years experience in Geotechnical Engineering	

TBD	Environmental	Minimum 10 years experience in Environmental Sciences	
TBD	Operations Branch	Minimum 10 years experience in Operations and Construction	
TBD	Hydraulic Design/ Geomorphology	10 years experience USACE riprap design and hydraulic design geomorphology	

D. Timeline and Costs

(1) Timeline. The timeline and the sequence of work completion for the interim OMRR&R manual are shown in Table C-3. Reviews will not be concurrent so as to allow completion of reviews and comments prior to the follow-on review.

Table C-3: Review Timeline for DQC, and ATR Teams

All Teams	**Submittal**	**Team Required**	**Estimated Completion Date**
PDT, DQC, GCID, ATR	100% OMRR&R Review	PDT/DQC	July 2012
	100% OMRR&R Review- Sponsor	GCID	December 2012
	100% OMRR&R Backcheck	PDT/DQC/GCID	December 2012
	100% OMRR&R Review	Environmental/ Resource Agencies	December 2012
	OMRR&R Review	ATR	January 2013
	OMRR&R Backcheck	PDT/DQC/GCID/ATR	January 2013
	Review Certification		February 2013

(2) Costs. The estimated costs for the DQC and ATR review are shown below in Table C-4.

Table C-4 Estimated costs for DQC and ATR review

Review	#reviewers/total hours	Approximate cost/hr	Totals
100% OMRR&R DQC Review	6/48	125	6000
100% OMRR&R DQC Backcheck	6/12	125	1500
OMRR&R ATR Review	5/80	125	10000
OMRR&R ATR Backcheck	5/16	125	2000
		Total	19500

E. SAR

The District does not recommend the OMRR&R manual for SAR certification due to the lack of life threatening issues associated with the project.

F. Value Engineering Study.

No VE study required.

G. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.

Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Bill Fakes	Technical Lead/RAO	Civil Engineer	Sacramento District, US Army Corps of Engineers	916-557-6795
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567

H. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original, Appendix C			
Revision 1			

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX D

PLANS AND SPECIFICATIONS/DESIGN DOCUMENTATION REPORT REVIEW DETAILS

A. Background

The riverbed gradient facility (GF) was constructed in 2000 for the purpose of restoring the river hydraulic conditions in the vicinity of the existing Glenn-Colusa Irrigation District (GCID) intake facility to pre-1970 conditions. The local sponsor is the GCID. The GF is one of several components included in a comprehensive fish screen improvement project at the Hamilton City Pumping Plant (HCPP), which is located at the GCID intake facility. The specific objectives of the GF are to: (1) stabilize the local Sacramento River reach to reduce the effect of river gradient changes on screen performance, (2) increase water-surface elevations at the fish screening facility to provide adequate hydraulic gradient to operate a fish bypass system, and (3) stabilize water levels to increase the efficiency of pumping plant operations.

The GF consists primarily of rock riprap that extends along 1,000 ft of the channel bed, and roughly 2,500 ft along either bank line of the river. In addition, the riprap is supplemented by three sheet pile cutoff walls that extend beyond either riverbank and provide protection against flanking of the structure.

Scour holes and further erosion have now developed downstream of the sheet piles. Many of these effects are likely the result of modeling uncertainties during design. The construction contract would address these site specific issues. Additional modeling will be performed to assist engineering judgments for the design.

Upon notification of availability of construction funding it is anticipated a design contract will be awarded to prepare the plans and specifications and design documentation report (DDR). This appendix will be updated with the contractor's quality management and review plan upon award of the design contract. The A-E contract will include responsibility for development of construction requirements for work near sensitive environmental habitat. The environmental assessment will be prepared and coordinated at identification of availability of construction funds. A specific review appendix will be added later to this review plan for the environmental assessment.

B. Design Quality Control

The A-E quality management plan shall be inserted here or inserted as an appendix.

C. District Quality Control

The DQC review team for these products is presented in **Table D-1.** Additional concurrent reviews will be performed by the PDT to assure overall completeness and integrity of the design package (see Appendix G for roster**)**.

Table D-1: DQC Review Team

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review Team Lead Coordinator/ Civil Engineer	TBD	TBD
TBD	Hydraulic Design	TBD	TBD
TBD	Geotechnical	TBD	TBD
TBD	Operations Branch	TBD	TBD
TBD	Real Estate	TBD	TBD
To be added at time of award of procurement contract	Cost Engineering	TBA	TBD

It is currently anticipated that all work will be performed within the existing project footprint and easements; however, an RE DQC member will be assigned if additional real estate activities are required for construction access, etc.

D. ATR Disciplines- Plans and Specifications

The ATRT will be comprised of persons with experience in hydraulic design/ river engineering, geotechnical, construction operations, cost engineering and civil design. The review team leader will be experienced in coordination of ATRT reviews. The ATRT is presented in **Table D-2**. Qualifications of the ATRT members are presented in Appendix E.

Table D-2 ATRT Disciplines

Name/Title/ Organization	Review Responsibility	Experience	Phone/E-mail
TBD	Review Team Lead Coordinator/ Civil Engineer	Minimum 10 years experinece in Civil Design	
TBD	Geotechnical	Minimum 10 years experience in Geotechnical Engineering	
TBD	Construction Operations Div.	Minimum 10 years experience in Operations and Construction	
TBD	Hydraulic Design/ Geomorphology	10 years experience USACE riprap design and	

		hydraulic design geomorphology	
TBD	Environmental	Minimum 10 years experience in Environmental Sciences	
TBD	Real Estate	Minimum 10 years experience in USACE Real Estate	
TBD	Cost Engineering	Minimum 10 years experience in USACE Cost Engineering and MCACES	

It is currently anticipated that all work will be performed within the existing project footprint and easements; however, an RE ATR member will be assigned if additional real estate activities are required for construction access, etc.

E. Timeline and Costs

Timeline for the plans and specifications will be updated based on procurement contract requirements.

Table D-3: Review Timeline for DQC, and ATR Teams- Plans and Specifications/DDR

Per EC 415-1-11, a Biddability, Constructability, Operability and Environmental (BCOE) review will be conducted at the 100% review. It is anticipated a design charette will be held. Estimated completion dates to be revised following procurement award.

All Teams	**Submittal**	**Team Required**	**Estimated Completion Date**
DQC, ATR, GCID and BCOE	Plans and Specifications/DDR 60% Review	DQC/GCID	TBD/suspended pending additional funding
	Plans and Specifications/DDR, 90% Review	DQC/ATR	TBD
	Plans and Specifications/DDR, 100% Review	DQC/ATR/BCOE	TBD
	Plans and Specifications/DDR Final Backcheck	DQC/ATR/BCOE	TBD
	RTA Submittal		TBD

Table D-4 Estimated costs for DQC and ATR Teams- Plans and Specifications/DDR

Review	#reviewers/total hours	Approximate cost/hr	Totals ($)
Plans and Specifications/DDR 60% DQC only	6/80	125	10000
Plans and Specifications/DDR, 90% DQC & ATR	12/144	125	18000
Plans and Specifications/DDR, 100% Review DQC & ATR	12/96	125	12000
Plans and Specifications/DDR Final Backcheck DQC & ATR	12/48	125	6000
Total			48000

F. SAR

The District does not recommend SAR certification due to the lack of life threatening issues associated with the project.

G. Model Certification

If a hydraulic model is needed, it is anticipated an existing certified model will be used. If a model is proposed that will require certification, the requirements for model certification shall be followed and the process documented in an updated review plan.

H. Value Engineering Study.

The Corps' current policy requires that value engineering (VE) studies be performed on all USACE projects or project elements with a programmed cost of $1,000,000 or more unless a determination can be made that a study would not be cost effective. A VE study shall be performed and will include a comprehensive (M-CACES) cost estimate. The milestone is achieved on the date that the VE study is approved by the Chief of Engineering Division SPK.

I. Review Plan Points of Contact.

The Review Management Organization for ATR will be SPD unless noted otherwise.

Public questions and/or comments on this review plan can be directed to the following points of contact:

Contact	Role	Title	Office/District/Division	Phone
Bill Fakes	SPK/RAO-Technical Lead	Civil Engineer	Sacramento District, US Army Corps of Engineers	916-557-6795
Boniface Bigornia	RMO- Point of contact	Civil Engineer/Hydraulics	South Pacific Division, US Army Corps of Engineers	415-503-6567
To be inserted subsequent to award of procurement contract	Contractor - Point of contact			

J. REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number	Date Approved
Original, Appendix D			
Revision 1			

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REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX E

STATEMENT OF AGENCY TECHNICAL REVIEW

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the *work product*. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks.

SIGNATURE
[Name] Date
ATR Team Leader
[Office Symbol or Name of AE Firm]

SIGNATURE
[Name] Date
Project Manager (home district)
[Office Symbol]

SIGNATURE
[Name] Date
Architect Engineer Project Manager [1]
[Company, location]

SIGNATURE
[Name] Date
Review Management Office Representative
[Office Symbol]

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:
[Describe the major technical concerns and their resolution]

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE
[Name] Date
Chief, Engineering Division (home district)
[Office Symbol]

Add appropriate additional signatures (Operations, Construction, AE principal for ATR solely conducted by AE, etc).

1 Only needed if some portion of the ATR was contracted

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX F

Project Delivery Team Roster

PDT Roster				
Name	**Discipline/Role**	**District/Agency**	**email**	**Phone**
Tom Karvonen	PM	Sacramento	Tom.d.karvonen@usace.army.mil	916) 557-7630
Todd Rivas	Hydraulic Engineer	Sacramento	Todd.m.rivas@usace.army.mi	916) 557-7523
Peter Valentine	Civil Engineer/Technical Lead	Sacramento	Peter.Valentine@usace.army.mil	916) 557-7523
Matt Davis	Environmental	Sacramento	Matthew.G.Davis@usace.army.mil	916) 557-6708
Bill Fakes	Civil Engineer	Sacramento	Billy.r.fakes@usace.army.mil	916-557-6795
Melissa Hallas	Planner	Sacramento	Melissa.J.Hallas@usace.army.mil	916-557-7774
TBD[1]	Real Estate	Sacramento	TBD	TBD
Alarice Hansberry	Counsel	Sacramento	Alarice.R.Hansberry@usace.army.mil	916-557-7264
Anne Baker	Environmental Manager	Sacramento	Anne.E.Baker@usace.army.mil	916-557-7277
Virginia Rynk	Planner/Resource Manager	Sacramento	Virginia.K.Rynk@usace.army.mil	916-557-6735
Sandie Dunn	Project Manger	GCID	sdunn@somachlaw.com	916-469-3817

[1]**It is currently anticipated that all work for additional hydraulic analysis, OMRR&R activities and future P&S will be performed within the existing project footprint and easements; however, an RE PDT member will be assigned if additional real estate activities are required.**

REVIEW PLAN
SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA
HAMILTON CITY, CALIFORNIA

APPENDIX G

Review Plan Checklists

Date: 16 April 2012

Originating District: Sacramento

Project/Study Title: Sacramento River Flood Protection Project, Glenn-Colusa, Hamilton City, California

PWI #:

District POC: Bill Fakes, 916-557-6795

PCX Reviewer: Not Applicable

Please fill out this checklist and submit with the draft Review Plan when coordinating with the appropriate RMO. For DQC, the District is the RMO; for ATR of Dam and Levee Safety Studies, the Risk Management Center is the RMO; and for non-Dam and Levee Safety projects and other work products, SPD is the RMO; for Type II IEPR, the Risk Management Center is the RMO. Any evaluation boxes checked 'No' indicate the RP possibly may not comply with EC 1165-2-209 and should be explained. Additional coordination and issue resolution may be required prior to MSC approval of the Review Plan.

REQUIREMENT	REFERENCE	EVALUATION
1. Is the Review Plan (RP) a stand-alone document?	EC 1165-2-209, Appendix B Para 4a	Yes ☒ No ☐
a. Does it include a cover page identifying it as a RP and listing the project/study title, originating district or office, and date of the plan?		a. Yes ☒ No ☐
b. Does it include a table of contents?		b. Yes ☒ No ☐
c. Is the purpose of the RP clearly stated and EC 1165-2-209 referenced?	EC 1165-2-209 Para 7a	c. Yes ☒ No ☐
d. Does it reference the Project Management Plan (PMP) of which the RP is a component including P2 Project #?	EC 1165-2-209 Para 7a (2)	d. Yes ☒ No ☐ No PMP, reference P2 project #.
e. Does it include a paragraph stating the title, subject, and purpose of the work product to be reviewed?	EC 1165-2-209 Appendix B Para 4a	e. Yes ☒ No ☐

f. Does it list the names and disciplines in the home district, MSC and RMO to whom inquiries about the plan may be directed?* **Note: It is highly recommended to put all team member names and contact information in an appendix for easy updating as team members change or the RP is updated.* .	EC 1165-2-209, Appendix B, Para 4a	f. Yes ☒ No ☐
2. Documentation of risk-informed decisions on which levels of review are appropriate.	EC 1165-2-209, Appendix B, Para 4b	Yes ☒ No ☐
a. Does it succinctly describe the three levels of peer review: District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR)?	EC 1165-2-209 7a	a.. Yes ☒ No ☐
b. Does it contain a summary of the CW implementation products required?	EC1165-2-209 Para 15	b. Yes ☒ No ☐
c. DQC is always required. The RP will need to address the following questions:	EC1165-2-209 Para 15a	
i. Does it state that DQC will be managed by the home district in accordance with the Major Subordinate Command (MSC) and district Quality Management Plans?	EC1165-2-209 Para 8a	i. Yes ☒ No ☐

ii. Does it list the DQC activities (for example, 30, 60, 90, BCOE reviews, etc)	EC 1165-2-209 Appendix B (1)	ii. Yes ☒ No ☐
iii. Does it list the review teams who will perform the DQC activities?	EC 1165-2-209 Appendix B,4g	iii. Yes ☒ No ☐
iv. Does it provide tasks and related resource, funding and schedule showing when the DQC activities will be performed?	EC 1165-2-209 Appendix B Para 4c	iv. Yes ☒ No ☐
d. Does it assume an ATR is required and if an ATR is not required does it provide a risk based decision of why it is not required? If an ATR is required the RP will need to address the following questions:	EC1165-2-209 Para 15a	
i. Does it identify the ATR District, MSC, and RMO points of contact?	EC 1165-2-209 Para 7a	i. Yes ☒ No ☐
ii. Does it identify the ATR lead from outside the home MSC?	EC 1165-2-209 Para 9c	ii. Yes ☒ No ☐
iii. Does it provide a succinct description of the primary disciplines or expertise needed for the review (not simply a list of disciplines)? If the reviewers are listed by name, does the RP describe the qualifications and years of relevant experience of the ATR team members?*	EC 1165-2-209 Appendix B 4g	iii. Yes ☒ No ☐
iv. Does it provide tasks and related resource, funding and schedule showing when the ATR activities will be performed?		iv. Yes ☒ No ☐

v. Does the RP address the requirement to document ATR comments using Dr Checks?	EC 1165-2-209 Appendix C Para 3e	v. Yes ☒ No ☐
e. Does it assume a Type II IEPR is required and if a Type II IEPR is not required does it provide a risk based decision of why it is not required including RMC/ MSC concurrence? If a Type II IEPR is required the RP will need to address the following questions: *The RP does not assume a Type I or II IEPR is required. Rationale included in RP.*	EC 1165-2-209 Para 7d (1)	e. Yes ☐ No ☒
i. Does it provide a defensible rationale for the decision on Type II IEPR?		
ii. Does it identify the Type II IEPR District, MSC, and RMO points of contact?		i. Yes ☒ No ☐
iii. Does it state that for a Type II IEPR, it will be contracted with an A/E contractor or arranged with another government agency to manage external to the Corps of Engineers?		ii. Yes ☐ No ☒
iv. Does it state for a Type II IEPR, that the selection of IEPR review panel members will be made up of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of expertise suitable for the review being conducted?	EC1165-2-209 Para 15a	iii. Yes ☐ No ☒ iv. Yes ☐ No ☒

v. Does it state for a Type II IEPR, that the selection of IEPR review panel members will be selected using the National Academy of Science (NAS) Policy which sets the standard for "independence" in the review process?	EC 1165-2-209 Para 7a	v. Yes ☐ No ☒
vi. If the Type II IEPR panel is established by USACE, has local (i.e. District) counsel reviewed the Type II IEPR execution for FACA requirements?	EC 1165-2-209 Appendix B Para 4a	vi. Yes ☐ No ☒
vii. Does it provide tasks and related resource, funding and schedule showing when the Type II IEPR activities will be performed?	EC 1165-2-209 Appendix B Para 4k (4)	vii. Yes ☐ No ☒
viii. Does the project address hurricane and storm risk management or flood risk management or any other aspects where Federal action is justified by life safety or significant threat to human life? *Is it likely? Yes* ☐ *No* ☒ *If yes, Type II IEPR must be addressed.*	EC 1165-2-209 Appendix B, Para 4k(1) & Appendix E, Para's 1a & 7	iii. Yes ☐ No ☒
ix. Does the RP address Type II IEPR factors? Factors to be considered include: • Does the project involve the use of innovative materials or techniques where the engineering	EC 1165-2-209 Para 6b (4) and Para 10b	ix. Yes ☒ No ☐

is based on novel methods, presents complex challenges for interpretations, contains precedent setting methods or models, or presents conclusions that are likely to change prevailing practices? • Does the project design require redundancy, resiliency and robustness • Does the project have unique construction sequencing or a reduced or overlapping design construction schedule; for example, significant project features accomplished using the Design-Build or Early Contractor Involvement (ECI) delivery systems. *Is it likely? Yes* ☐ *No* ☒ *If yes, Type II IEPR must be addressed.* g. Does it address policy compliance and legal review? If no, does it provide a risk based decision of why it is not required?	EC1165-2-209 Appendix E, Para 7c(1) EC1165-2-209 Appendix E, Para 5a EC1165-2-209 Appendix E Para 2 EC 1165-2-209 Para 14	g. Yes ☒ No ☐
3. Does the RP present the tasks, timing, and sequence of the reviews (including deferrals)?	EC 1165-2-209, Appendix B, Para 4c	Yes ☒ No ☐
a. Does it provide and overall review schedule that shows timing and sequence of all reviews?	EC 1165-2-209, Appendix C, Para 3g	a. Yes ☒ No ☐

b. Does the review plan establish a milestone schedule aligned with the critical features of the project design and construction *No milestone schedule included as project construction is complete.*	EC 1165-2-209, Appendix E, Para 6c	b. Yes ☐ No ☒
4. Does the RP address engineering model certification requirements?	EC 1165-2-209, Appendix B, Para 4i	Yes ☒ No ☐
a. Does it list the models and data anticipated to be used in developing recommendations? b. Does it indicate the certification /approval status of those models and if certification or approval of any model(s) will be needed? c. If needed, does the RP propose the appropriate level of certification??? /approval for the model(s) and how it will be accomplished?		a. Yes ☐ No ☒ b. Yes ☐ No ☒ c. Yes ☐ No ☒
5. Does the RP explain how and when there will be opportunities for the public to comment on the study or project to be reviewed? *This is not a decision document, therefore no public review required. The public will be able to review the RP.*	EC 1165-2-209, Appendix B, Para 4d	Yes ☐ No ☒
a. Does it discuss posting the RP on the District website?		a. Yes ☒ No ☐

b. Does it indicate the web address, and schedule and duration of the posting?		b. Yes ☒ No ☐
6. Does the RP explain when significant and relevant public comments will be provided to the reviewers before they conduct their review? *No public comments are to be solicited as the work products are not decision documents.*	EC 1165-2-209, Appendix B, Para 4e	Yes ☐ No ☒
a. Does it discuss the schedule of receiving public comments? b. Does it discuss the schedule of when significant comments will be provided to the reviewers?		a. Yes ☐ No ☒ b. Yes ☐ No ☒
7. Does the RP address whether the public, including scientific or professional societies, will be asked to nominate professional reviewers?* *No public societies will be solicited for review*.	EC 1165-2-209, Appendix B, Para 4h	Yes ☐ No ☒
a. If the public is asked to nominate professional reviewers then does the RP provide a description of the requirements and answer who, what, when, where, and how questions? * Typically the public will not be asked to nominate potential reviewers		a. Yes ☐ No ☒
8. Does the RP address expected in-kind	EC 1165-2-209,	Yes ☒ No ☐

contributions to be provided by the sponsor? *Sponsor to review Hydraulic Data Collection and Analysis Report and interim OMRR&R manual*	Appendix B, Para 4j	
a. If expected in-kind contributions are to be provided by the sponsor, does the RP list the expected in-kind contributions to be provided by the sponsor?		a. Yes ☐ No ☒
9. Does the RP explain how the reviews will be documented?		Yes ☒ No ☐
a. Does the RP address the requirement to document ATR comments using Dr Checks and Type II IEPR published comments and responses pertaining to the design and construction activities summarized in a report reviewed and approved by the MSC and posted on the home district website?	EC 1165-2-209, Para 7d	a. Yes ☒ No ☐
b. Does the RP explain how the Type II IEPR will be documented in a Review Report? *No IEPR review anticipated at this time. If Hydraulic Analysis complexity warrants a Type I, this will be added to amended review plan.*		b. Yes ☐ No ☒
c. Does the RP document how written responses to the Type II IEPR Review Report will be prepared?	EC 1165-2-209 Appendix B Para 4k (14)	c. Yes ☐ No

d. Does the RP detail how the district/PCX/MSC and CECW-CP will disseminate the final Type II IEPR Review Report, USACE response, and all other materials related to the Type II IEPR on the internet?	EC 1165-2-209 Appendix B Para 4k (14) EC 1165-2-209 Appendix B Para 5	d. Yes ☐ No ☒
10. Has the approval memorandum been prepared and does it accompany the RP? *Approval memorandum to be prepared and to attached as Appendix H.*	EC 1165-2-209, Appendix B, Para 7	Yes ☒ No ☐

CESPD Supplemental Review Plan Checklist

Review Plan: Sacramento River Flood Protection Project, Glenn-Colusa Review Plan

Date of review:

Reviewed by:

References: CESPD R 1110-1-8, Appendix C, Planning; EC 1165-2-209, Civil Works Review Policy

Note: Any "No" answer requires explanation in the comment field.

	Item	Yes	No	Comment
1	Is there a Technical Review Strategy Session identified early in the study process? (See Appendix C paragraph 8.2,)	☐	☒	TRSS applies to decision documents.
2	Are potential Continuing Authority Program (CAP) "spinoffs" identified, along with the appropriate QCP identified for them?	☐	☒	These are flood protection features. No possible CAP spinoffs.
3	Are the review costs identified?	☒	☐	
	For District Quality Control (DCQ)?	☒	☐	
	ATR?	☒	☐	
	Independent External Peer Review (IEPR)?	☐	☒	IEPR not required
4	Does the RP identify seamless DQC technical review (8.4), including supervisory oversight of the technical products? (See Appendix C paragraph 8.5)	☒	☐	
5	Does the RP identify the recommended review comment content and structure? (See Appendix C paragraph 8.5.4)	☒	☐	
6	Does the RP encourage face-to-face resolution of issues between the PDT and reviewers? (See Appendix C paragraph 8.5.5)	☒	☐	
7	If issues remain, does the RP must identify an appropriate dispute resolution process? (See Appendix C paragraph 8.6)	☒	☐	
8	Does the RP require documentation of all significant decisions, and leave a clear audit trail? (See Appendix C paragraph 8.5.6)	☒	☐	
9	Does the RP identify all requirements for technical certifications? (See Appendix C paragraph 8.5.7)	☒	☐	
10	Does the RP identify the requirement that without-project hydrology will be certified by the Feasibility Scoping Meeting? (See Appendix C paragraph 8.5.8)	☐	☒	No, this section of the RP applies to Decision Documents
11	Does the RP fully address products developed by contractors? (See Appendix C paragraph 8.10)	☒	☐	Contractor to prepare P&S. Appendix B to include contractor QMP.
12	Is the need for a VE study identified, and incorporated into the review process, after the feasibility scoping meeting? (See Appendix C paragraph 8.11)	☒	☐	VE study identified for P&S effort (construction cost estimated to exceed $1 million)
13	Does the RP include a Feasibility Alternative Review Milestone, where CESPD buy-in to the recommended plan is obtained? (See Appendix C paragraph 12.1)	☐	☒	No, this section of the RP applies to Decision Documents
14	Does the RP identify the final public meeting milestone? (See Appendix C, Enclosure 1, SPD Milestones)	☐	☒	No, this section of the RP applies to Decision Documents
15	Does the RP identify the report approval process, and if there is a delegated approval authority?	☐	☒	No, this section of the RP applies to Decision Documents
16	Does the RP reference CESPD milestones, along with PGN milestones?	☐	☒	No, this section of the RP applies to Decision Documents

Revised 10May10

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX H

MSC Approval Letter

Final approval letter to be attached (in posted version of RP)

Draft letter below (from EC 1165-2-209):

Date:

Subject: Review Plan approval for the Sacramento River Flood Protection Project Glenn-Colusa, Hamilton City, California, P2 Project No. 105618

The attached Review Plan for the Sacramento River Flood Protection Project Glenn-Colusa, Gradient Facility, at Hamilton City, California has been prepared in accordance with EC 1165-2-209.

The Review Plan has been coordinated with the RMO (South Pacific Division), which is the lead office to execute this plan. For further information, contact the RMO at xxx-xxxxxxx.

The Review Plan does not include independent external peer review.

I hereby approve this Review Plan, which is subject to change as circumstances require, consistent with study development under the Project Management Business Process. Subsequent revisions to this Review Plan or its execution will require new written approval from this office.

MSC Commander Signature Block

REVIEW PLAN

SACRAMENTO RIVER FLOOD PROTECTION PROJECT, GLENN-COLUSA

HAMILTON CITY, CALIFORNIA

APPENDIX I

CONTRACTOR QUALITY CONTROL PLAN

(EDITED TO INCLUDE ONLY RELEVANT DATA)

U.S. Army Corps of Engineers Sacramento District

HYDRAULIC DATA COLLECTION AND ANALYSIS GLENN-COLUSA IRRIGATION DISTRICT (GCID), CALIFORNIA

CONTRACTOR QUALITY CONTROL PLAN
NOVEMBER 18, 2011

McMILLEN, LLC
DESIGN with Vision. BUILD with Integrity.

1401 Shoreline Drive

Boise, ID 97302

TETRA TECH

TABLE OF CONTENTS

1. PROJECT BACKGROUND

The purpose of this project is to collect data regarding the condition of the Glenn-Colusa Gradient Facility (GF) and further evaluate the structure and its stability since the most recent construction in 2000. The project includes the collection and analysis of discharge, velocity, and water surface elevation data, as well as rock gradation and scour hole data. Furthermore, the project includes several optional tasks which, at the time of this writing, may or may not be included in the final scope of work. These optional tasks include 1) a meeting presentation, 2) development of GF repair options, 3) additional water data collection, 4) hydraulic analysis of existing conditions, 5) hydraulic analysis of GF repair options, and 6) preparation of a hydraulic appendix.

As stated in the scope of work, the project is located in one of the most dynamic reaches of the Sacramento River with active river bend migration and relatively frequent bend cut offs. The river bend between the historic USGS river miles (RM) 203 and 205, downstream of the Glenn-Colusa Irrigation District (GCID) intake facility, experienced a cut-off during 1969–1970. This lowered the water surface at the GCID intake, impacting operations. Construction of GF occurred at about USGS river mile 206 and was completed in November 2000. The GF was designed to mimic a natural riffle and consists of sloping rock –lined channel bed or rock rapids with three sheet pile cut-off walls.

The scope of work for the project lists a number of concerns with the GF since its construction, including:

1) Rocks protruding near or above the surface of the water, causing boat navigation safety concerns.
2) The presence of protruding rocks, in addition to other observations, as well as concerns regarding the verity of the original hydraulic model, indicates that the rock in the GF may not be stable.
3) Scour holes developed immediately adjacent to the west bank downstream end of the GF and near the middle sheet pile in the left overbank area, jeopardizing the functional capability of the GF.
4) The growth of a large mid-channel bar just downstream of the GF has contributed to left and right bank erosion in this area.
5) Upstream river channel movement, particularly near RM 208, could jeopardize the function of the GF and GCID operations**.**

A Blue Ribbon Panel (BRP) of experts was tasked with investigating, commenting, and providing recommendations on the gradient facility issues. The team's report was completed in June 2009. For the present task order, data will be collected, processed, and analyzed to address the concerns of the BRP, and to develop, recommend, and model corrective repair options.

As given in the Statement of Work (SOW), the design flow for the GF is between 7,000 and 20,000 cfs just upstream of the GCID intake channel. It is estimated that bankfull flow in the area occurs at about 110,000 cfs in some years under certain hydrologic conditions. The gages in the area do not account for the total discharge for high flow events that overtop the banks (i.e. the gages only measure in-channel discharge, not overbank discharge). At this time it is anticipated that model calibration will only occur for flows contained within the channel, and therefore within the design flow range of the GF.

The Hamilton City gage (operated by California Department of Water Resources [DWR] with some history as a USGS gage) is located near RM 199 by the Gianella Bridge at Hamilton City. It is anticipated that data from this gage will be used in support of any hydraulic model development with this task order along with data from two GCID staff gages located near the GF and other relevant data collected as part of this task.

Bathymetric data were collected for part of the reach in 2008 by Ayres and Associates. It is anticipated that this bathymetric data will be merged with the 2008 DWR LiDAR and, if necessary, other data sources to create the surface for any 2D models developed for this task order.

2. OBJECTIVES

As stated in the SOW, the objective of this Quality Control Plan (QCP) is to ensure that data collected for this project are of high quality. Specifically, this QCP will describe the quality control procedure adopted to meet this objective, as well as the Independent Technical Review (ITR) process adopted to ensure the highest quality of project deliverables. Additionally, this QCP will identify the roles and responsibilities of individuals participating in product delivery, QC and ITR, and note any special considerations regarding the quality of project deliverables.

3. NAME AND LOCATION OF THE CLIENT

The client for this project is:
U.S. Army Corps of Engineers
Sacramento District
CESPK-PM-C
1325 J Street
Sacramento, CA 95814

Technical Lead:
Mr. Todd Rivas
CESPK-ED-HD
1325 J Street
Sacramento, CA 95814-2922
(916) 557-7523
Todd.M.Rivas@usace.army.mil

4. PROJECT TASKS AND SCHEDULE

The project tasks are presented in detail in the Statement of Work (SOW), not attached. See Appendix A for project submittals.

5. PROJECT TEAM

The Project Team comprises professionals from both McMillen, LLC (McMillen) and Tetra Tech, Inc. (Tetra Tech). Each company has assigned a Technical Development Team (TDT) to the project. As the project lead, McMillen will perform project management, reduce and analyze data , and provide quality control for the actual data collection. The TDT for Tetra Tech will act as the local project coordinator, focusing on the collection of hydraulic data and the provision of technical services during the preparation of the Engineering Appendix. The Project Manager, George Robison, will coordinate with both TDTs in the fulfillment of the task order, and will facilitate seamless project implementation. The Data Collection Quality Control Team (DCQC) will ensure the proper collection and documentation of field data. The Independent Technical Reviewer will ensure the high quality of project deliverables prior to final submittal. The roles and years of experience of the Project Team are listed below. These roles are detailed further in the next section.

STAFF	ROLE	YEARS EXPERIENCE
McMillen Technical Development Team:		
George Robison, PhD, PE	Senior Hydraulic Engineer	27
Kevin Jensen, EIT	Junior Hydraulic Engineer	4
Meg Floyd	Technical Editor	8
Tetra Tech Technical Development Team:		
Mike Harvey, PhD, PG	Principal Geomorphologist	37
Dai Thomas, PE	Hydraulic Engineer	13
Mike Pierce, EIT	Hydraulic Engineer	4
Kyle Shour, EIT	Civil Engineer	1
Project Manager:		
George Robison, PhD, PE	Senior Hydraulic Engineer	27
Data Collection Quality Control (DCQC):		
George Robison, PhD, PE	Senior Hydraulic Engineer	27
Kevin Jensen, EIT	Junior Hydraulic Engineer	4
Independent Technical Review (ITR):		
Bill Fullerton, PE	Principal Hydraulic Engineer	30

6.QUALITY CONTROL PLAN

6.1 Quality Management Objectives

A primary objective and commitment of the Project Team is to produce high-quality products responsive to the client's needs. Systematic quality assurance and quality control is a key aspect of the company's management system. Our quality control program is based upon a team approach to ensure the most efficient use of staff resources and the highest levels of internal technical review. This QCP is an important tool for achieving these quality objectives. It defines the process to be used in the development of the project, with particular emphasis on QC and reviews.

The guiding principles of this QCP include the following:

1. Actively involve all elements of project management.
2. Ensure that quality control is an integral part of the project and not just an "end of job" review.
3. Consider quality objectives and standards as equal or superior to budget and schedule considerations in all project management decisions.
4. Ensure that the scope of work is technically complete and workable in consideration of budgetary and scheduling constraints.
5. Commit necessary resources to achieve the project objectives.
6. Ensure frequent communication on progress of the work and problems and accomplishments.
7. Provide periodic review of project performance related to the planned schedule and budget goals.

The primary objectives of the ITR are to ensure that:

1. The project meets the customer's scope, intent and quality objectives as defined in the SOW.
2. Formulation and evaluation of alternatives are consistent with applicable regulations and guidance.
3. Concepts and project costs are valid.
4. Recommended alternatives are feasible and will be safe, functional, constructible, environmentally sustainable, within the Federal interest, and economically justified according to policy.

5. All relevant engineering and scientific disciplines have been effectively integrated.
6. Appropriate computer models and methods of analysis were used and basic assumptions are valid and used for the intended purpose.
7. The source, amount, and level of detail of the data used in the analysis are appropriate for the complexity of the project.
8. The project complies with accepted practice within USACE.
9. Content is sufficiently complete for the current phase of the project and provides an adequate basis for future development effort.
10. Project documentation is appropriate and adequate for the project phase.

6.2 Data Collection Quality Control (DCQC)

The Data Collection Quality Control process is designed to ensure the delivery of high-quality hydraulic data according to scientifically defensible and statistically valid techniques. DCQC team members will be available, knowledgeable, and willing to offer guidance as any issues arise in the field. In particular, DCQC team members will be present and engaged in the data collection processes described in Tasks 3, 4 and O3 (see Table 1 above). Conversely, TDT members from Tetra Tech will be encouraged to seek agreement with the DCQC team throughout the data collection process, and indeed throughout the entire product delivery process, from procedural conceptualization to formal review. The DCQC will furnish TDT from Tetra Tech with feedback on an as-needed basis during the data collection process. To be clear, the first Task of DCQC is to insure all instruments remain calibrated and insure that the sample size and design is appropriate to address the issues in the SOW and any teaming TDT members for collection only occurs after this primary responsibility is done. Because of the nature of the equipment the TDT members do calibration while the DCQC insures that the calibration is current and the sampling design employed is reasonable and effective.

The following work products fall under the purview of the DCQC:

- Velocity, discharge and water surface elevation data
- GF gradation and downstream scour hole data

6.2.1 Data Collection Quality Control Guidelines

All field data will be collected according to accepted methods detailed in USGS WSP 2175, EM-1110-2-1003, EM-1110-1-1005 and the SOW. Furthermore, the methods of collection will conform to the health and safety requirements detailed in EM-385-1-1.

It is expected that the number of measurements of discharge and velocity will equal or exceed the number defined in the SOW. Also, it is anticipated that the number of water surface elevation measurements will equal or exceed the number of discharge measurements, and that this number of measurements will suffice to describe the water surface slope in the study focus area. However, the number of samples required to describe a rock size distribution, and to detect statistically significant changes is gradation across a high-flow season, while still optimizing the allocation of resources, requires a more detailed power analysis. Such an analysis is described in the paragraphs below.

6.2.2 Hypothesis Testing and Power Analysis of GF Gradation

Hypothesis testing is a procedure for inferring information about populations based on a finite collection of sampled data. The null hypothesis, H_o, typically posits whether a population parameter equals a specified value within a specified statistical significance level. In the case of the gradation of rip rap at the GF, the null hypothesis posits that there will be *no* statistically significant change in gradation over the course of the 2011-2012 high-flow season:

H_0: Gradation of GF before high flows and gradation of GF after high flows are the same.

Error can occur during the testing of a hypothesis due to the number of data points sampled. These errors generally come in two different forms: Type I and Type II. A Type I error occurs when the null hypothesis is rejected when it is in fact true, while a Type II error occurs when the null hypothesis is accepted (i.e. not rejected) when it is in fact false. The likelihood of a Type I error will be limited by adopting an appropriate level of significance, in this case $\alpha=0.05$. In order to minimize the likelihood of a Type II error, however, a power analysis must be conducted.

The power of a statistical test is the probability that the test will reject the null hypothesis when the null hypothesis is actually false. The ability of a test to reject a false hypothesis or accept a true hypothesis is a function of both the sample size and the effect size. The effect size is the predetermined magnitude of change at which change is said to be detected. Thus, an arbitrarily large sample size corresponds with an increased likelihood of correctly accepting or rejecting a hypothesis. However, if the effect size is too small, the test will define very subtle changes as statistically significant. This could lead to an unnecessary allocation of resources to treat an effect that is not substantive. Alternatively, if the effect size is too large, the test may overlook changes that are important to the GF, particularly as time goes on and undetected changes accumulate or otherwise alter the facility. It is therefore important to estimate the effect size as cautiously as possible.

One method of estimating the effect size, given a two-tailed t-test on the means of two independent populations, is given by the following equation:

$$d=\bar{x}_1-\bar{x}_2 s_1 \quad \text{(Eq. 1)}$$

where d = effect size
$\bar{x}$ = sample mean
s_1 = sample standard deviation of group 1

The detection limit on the sample means, $\bar{x}_1-\bar{x}_2$, can be calculated as a percentage of the change in the mean grain size from one data set to another. For instance, assuming an initial mean grain *weight* of 270 lbs. (x_1) and a minimum change of 5% in that weight for detection, the detection limit on the sample means would be 13.5 lbs. Substituting this detection limit into Equation 1 above, along with an assumed standard deviation of 153 lbs., gives an effect size of 0.083. The mean weight of the rip rap at the GF is taken from the GF design report (see Ayres Associates 1999, p.14-53). The standard deviation is calculated using the following method:
1. From the supplied distribution graph (see Ayres Associates 1999, p.14-54), locate the low-end line of the 3.0 ft riprap. This will represent the distribution.
2. Read off the weights of stones corresponding to every tenth percentile.
3. In a spreadsheet, create 100 cells representing 100 percent. Within every ten-percent bin, linearly interpolate between the two bounding values.
4. Determine the arithmetic mean of the 100 values. Check to see that is closely approximates the w_{50} given on the graph.
5. Calculate the standard deviation of the 100.

With the parameters above specified, and an assumed significance of $\alpha=0.05$ and power of $1-\beta=0.8$, a power analysis software program called G*Power was employed to estimate the number of samples required to minimize the likelihood of a Type II error (Faul *et al.* 2009). Results are summarized in Table 1 for different detection limits as percentages of weight change. From the table, at the 5% detection limit a data set of 4,036 samples would be needed. This seems an unreasonably high, and potentially costly,

sample size. Alternatively, at the 15% detection limit a data set of 450 samples would be needed, which is more reasonable, although the detection size seems rather large. As a compromise, therefore, a change detection of 10% will be adopted, and a concomitant sample size of at least 1,012 collected.

Power analysis results using different change detections.

In addition to the above, a stratification of morphological units across the GF will also be assumed, in order to conduct a power analysis for each. The stratification will consist of two units: GF riffles and GF pools. Riffles are designated as the high-elevation areas along the channel profile, from the apex to the inflection points on either side, while the pools are designated as the corresponding low-elevation areas. Unfortunately, there is no existing disambiguation of grain distribution between the riffles and pools of the gradient facility. Therefore, the same number of samples will be collected for each. These data sets will then be treated separately once the post-high-flow data have been collected.

6.3 Independent Technical Review (ITR)

Several of the tasks for this project require written reports that document the procedures, assumptions, engineering judgments, limitations, results, recommendations, and conclusions related to each task. Upon completion of each report, the McMillen and Tetra Tech TDTs will submit the report, along with any supporting materials (e.g. raw data, numerical model project files, GIS files and so on), to theIndependent Technical Reviewer (Reviewer) for detailed technical review. The Reviewer will document their comments and recommendations, utilizing the DrChecks$_{sm}$ module in ProjNet$_{sm}$ in accordance with ER 1110- 1-8159. Comments will be structured to give a clear statement of the concern, the basis of the concern and, when appropriate, the actions necessary to resolve the concern. Comments will cite appropriate references. The Project Team will evaluate and respond to each comment in DrChecks$_{sm}$. Responses will clearly state concurrence or non-concurrence with the comment. Concurrences shall include what the corrective action is and where and when it will be done. Non-concurrences shall include an explanation or proposed alternative action. All comments are to be resolved and back-checked in the DrChecks$_{sm}$ project record prior to ITR certification. Back checking of each formal ITR with successful resolution of all comments must occur prior to the final submittal.

Change Detection	**5%**	**10%**	**15%**
$x_1 - x_2$	13.5	27	40.5
Total sample size	4,036	1,012	450

6.3.1 Documents to be Formally Reviewed

An ITR of the following documents (with associated task identifier) will be performed:

- Water Data Collection Report (3)
- Rock Data Collection Memo (4)
- Hydraulic Model and Rock Stability Evaluation Report (5)
- Repair Option Development Memo (O2)
- Additional Water Data Collection Report (O3)
- Existing Conditions Hydraulic Analysis Memo (O4)
- With-Project Hydraulic Analysis Report (O5)
- Hydraulic Appendix (O6)

6.3.2 ITR Process

The Project Manager, acting as the Technical Development Team Leader (TDTL), will be the principal coordinator between the TDTs and the Reviewer. As each product is completed, copies will be provided by the TDTL to the Reviewer (i.e. the ITR). The Reviewer will review the product in detail and provide comments. The TDT members will revise the product accordingly. The written comments and responses for all ITRs will be maintained until the project is completed. The reviewer will not only evaluate the content of the report but will also review the data collection and design to ensure that it meets the expectations in the SOW.

6.3.3 Editorial Comments

Editorial comments and suggestions about minor issues will be made informally, in parallel with, but external to the official ITR process, in order to ensure that the ITR focuses on significant deficiencies. The following items will be handled informally:

- Spelling, grammar, and format of language
- Minor numerical errors, which do not affect the validity of results
- Other issues that have no bearing on a safer, more functional or more economical project
- Repetitive comments on the same subject where one comment is adequate.

6.3.4 Other Reviews

a. Methodology Review. Specific methodologies proposed for the execution of the SOW will be presented by the TDT to both the Reviewer (i.e. ITR) and the PM to ensure that methods and models applied are appropriate for the project and consistent with client requirements and policies.

b. Calculation Checking. Calculations performed by hand and calculator will be spot-checked. Formulas developed to perform calculations by spreadsheet or database will be checked, and the results from the spreadsheet or database spot-checked. Calculations performed by standard or routinely used computer programs will not be checked, but the appropriate use of the program will be verified (verification signified by no comment), the input data spot-checked, and the results evaluated for reasonableness.

c. Technical Oversight Reviews (Peer Review). Whenever a technical product is produced by an assistant under the technical direction of a senior technical specialist, the senior specialist will review the product prior to its submission for ITR.

d. Quality Control. The project team will perform the necessary quality control activities to ensure that the appropriate quality control monitoring activities are carried out and documented, but the project team will not conduct quality assurance reviews. The Corps of Engineers (COE) will perform quality assurance reviews, as they deem necessary.

6.3.5 Statement of Technical Review and ITR Certification

A statement of technical review signed by the appropriate Principal of the Firm will be provided for all final products and final documents. The statement will conform to ER 1110-1-12, Appendix E: A-E Contractor Statement of Technical Review.

6.4 Communications

Internal communications within the Project Team, and across TDTs will be conducted on a regular basis as the work is being performed. Extensive communications will be required between civil engineers, geomorphologists, and H&H engineers.

Formal communications with the Corps of Engineers will be done between the Project Manager, George Robison, and Tetra Tech's Principal Geomorphologist, Mike Harvey, and the COE Technical Lead, Todd

Rivas. Communications of a routine nature will be conducted between any of the parties as needed. Teleconference meetings will be held with the COE, McMillen and Tetra Tech for the purposes of discussing issues and providing status. Requests for modifications to the contract will be initiated by McMillen and submitted to the COE Technical Lead.

6.5 Partnering and Conflict Resolution Procedures

Routine questions and issues arising during the development of the project will be discussed and resolved, if possible, between the Project Manager, George Robison, Tetra Tech's Principal Geomorphologist, Mike Harvey, and the COE Technical Lead, Todd Rivas. Any issues that cannot be reconciled at this working level will be escalated to the appropriate levels between the three organizations. All team members coordinate within their respective organizations to determine the appropriate decision-makers to address the issues and will schedule a meeting between the decision-makers and their support staffs to address and resolve the issues.

7. REFERENCES

Ayres Associates, 1999. *Gradient Facility Project Report, Volume I: Riverbed Gradient Facility for the Sacramento River at the Glenn-Colusa Irrigation District (GCID) Intake, California*. Prepared for the U.S. Army Corps of Engineers, Sacramento District.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G., 2009. "Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses", in *Behavior Research Methods, 41*, 1149-1160.