



March 19, 2014

Attention: Imported Water Committee

Bay Delta Conservation Plan Infrastructure Review – Response to letter from BDCP Engineering Team (Information).

Purpose

Provide information regarding the issues raised in a letter from the BDCP Engineering team presented to Chair Saxod on February 27, 2014.

Background

Over much of the last year, Water Authority staff has provided the Board, through the Imported Water Committee, information and analysis on key issues relating to the Bay Delta Conservation Plan. On January 9, 2014, staff reviewed with the Committee the status of the BDCP's infrastructure design, cost and schedule, and the methodology staff would use when reviewing the project. Staff's review was presented to the Committee on February 13, 2014. The purpose of staff's review was to identify risks that may adversely impact the project schedule and budget.

At the February 27, 2014 Imported Water Committee meeting, a BDCP representative delivered a letter from Mr. Charles R. Gardner Jr. (Attachment A) that raised several concerns with staff's review of the BDCP infrastructure. Staff was directed to return to the Committee at its March meeting to provide information regarding the concerns raised in Mr. Gardner's letter.

Discussion

Staff prepared a detailed response to Mr. Gardner (Attachment B) which is summarized below.

Mr. Gardner expressed disappointment that staff identified flaws in the BDCP infrastructure design. Water Authority staff did not identify any flaws in the BDCP's engineering approach to the proposed infrastructure. After reviewing the BDCP Conceptual Engineering Report (CER), the project geotechnical report, and the draft EIR/EIS, staff identified a variety of risks that could adversely impact the BDCP's cost and schedule if not effectively managed during the design and construction of the project. Those risks include: lack of geotechnical information; property acquisition; tunnel excavation method; power requirements; access and utility conflicts; project delivery method; and the availability of specialized tunnel boring machines, steel liners (Mr. Gardner has clarified steel liners are not needed), adequate borrow material, specialized contractors, and technical experts.

Communications between staff and the BDCP Engineering Team have been professional. The goal of both groups was to better understand the proposed infrastructure and engineering assumptions. Staff's review presented on February 13, 2014, is largely based upon published BDCP documents. The balance of the review is based upon staff's professional experience and judgment.

Mr. Gardner's letter identified nine specific issues and staff's response is summarized below.

1. *Will groundwater leak into the tunnel?* Staff described the gasketed pre-cast concrete segment method to the Board. The design's goal will be to minimize groundwater intrusion.
2. *Will having more than one power provider add complexity to the project?* Staff noted, as did the CER, that two supply sources would cost more.
3. *Will natural gas seep into the tunnel?* Mr. Gardner's letter provides information on the nature of natural gas wells not contained in the CER. The potential to encounter active or inactive gas wells is correctly identified as a risk to the project's cost and schedule.
4. *Will the high groundwater table cause the empty tunnel to float?* Staff reported during responses to Board member questions that the next phase of tunnel design would need to address this issue. We believe this to be a low probability risk.
5. *Will the tunnel need a steel liner?* The CER is not clear that the tunnels will be unlined. Staff appreciates the additional information that steel liners will not be used, and looks forward to reviewing additional information on how the tunnels will perform using just the pre-cast concrete segmented liner.
6. *Will the forebay be drained?* Staff appreciates the clarification on the operating characteristics of the intermediate forebay.
7. *Several of the activities in the construction schedule have no float.* Staff is aware that items with zero float are on the project's critical path, however, items with fixed dates are not typically used at this stage of a project. As a result staff is unable to determine if the schedule is realistic.
8. *Is the cost estimate realistic given the range of -25% to +50%?* Staff relied upon CER Chapter 8 which states "*The estimate of direct construction cost is based on a 10% engineering design level and has an expected accuracy range of +50% to -25%, per the cost estimating classification system developed by the Association for the Advancement of Cost Estimating (2011).*" If the BDCP Engineering Team has additional information not contained in the documents released for public comment which improves the estimated accuracy to a range of +30 percent to -20 percent, staff welcomes the opportunity to review it. Otherwise, it is staff's opinion that increasing the project contingency from 36 percent to 50 percent seems prudent and in line with the accuracy of the estimate as noted in the CER.
9. *TBM equipment and staffing availability.* Mr. Gardner's letter provides additional clarification not included in the CER regarding the staging of construction contracts and the impact on the availability of tunnel boring machines and qualified operators. Staff welcomes the opportunity to review this additional information and how it impacts the project's schedule.

Our conclusion is the proposed BDCP infrastructure has many inherent risks to the schedule and budget that need to be closely monitored and addressed during the design and construction phases in order to successfully deliver the project.

Prepared by: Gary Bousquet, Engineering Manager

Prepared by: William J. Rose, Director of Engineering

Reviewed by: Frank Belock, Jr., Deputy General Manager

Imported Water Committee

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Attachments:

- A. February 26, 2014 Letter from Mr. Charles R. Gardner Jr., CEO Hallmark Group
- B. March 13, 2014 Letter from William J. Rose to Mr. Charles R. Gardner

SDCWA Imported Water Committee
c/o Chair Elsa Saxod
4677 Overland Avenue
San Diego, CA 92123

February 26, 2014

Dear Chair Saxod,

The Hallmark Group has been retained by the California Department of Water Resources as the Program Manager for the BDCP. Part of the duties include coordination of consultants and stakeholders with DWR efforts to better inform the project. In furtherance of that duty, we submit the following.

On February 13, 2014, this Committee heard a presentation on infrastructure and engineering related to the Bay Delta Conservation Plan. The DWR team of engineers responsible for the design concepts associated with CM1 would like to provide the Committee with additional information that may be helpful in future deliberations. The team would also like to convey its desire to continue working with the SDCWA engineering team in an open, transparent and productive manner.

By way of background, it will be helpful to review some of the work to date:

- On August 21, 2013, the CM1 team was contacted by representatives from the SDCWA requesting a review of the engineering concepts developed for CM1.
- A conference call was arranged on September 17, 2013, for the SDCWA engineering team to speak with the CM1 team. Prior to the meeting, it was mutually understood this was engineer-to-engineer exchange with the express purpose of better informing the SDCWA team of the design concepts and to inform the CM1 team of any challenges identified by the SDCWA engineers. A list of the initial discussion topics is attached to this letter.
- As expected for a project of this magnitude, one of the main areas of concern for the CM1 engineers is cost containment. Although the design concepts had been reviewed by multiple agencies and consultants, further review by the SDCWA was welcomed and comments that could better inform cost control were encouraged.
- Over the following months a number of conference calls were held between the two parties. The calls were collaborative and informative. Various questions were asked and answered by the CM1 team. A list of questions asked by the SDCWA team, and the answers provided, is also attached to this letter. The conversations were wide ranging from the approach to estimating, to geotechnical studies and project delivery. For example, there was agreement that CM1 could benefit from the use of alternative delivery methods besides traditional design-bid-build. The

SDCWA provided their perspective on topics like insurance programs and Project Labor Agreements. No fatal flaws were identified during the months of information exchange and there was little debate over the approach to CM1 design.

It was both a surprise and a disappointment when the CM1 team learned of the perceived flaws identified by the SDCWA engineers at the committee meeting on February 13, 2014. Given the transparent and collegial nature of the meetings, there was an expectation these types of issues would have followed the meeting protocol and been discussed engineer-to-engineer to determine validity.

In particular, the claim that the tunnels would float to the surface if emptied of water was unexpected. The tunnel design concepts have been reviewed by engineers from DWR, USBR, URS, MWD, Jacobs Associates, CH2M Hill, CDM and 5RMK. None of the engineers identified the floating tunnel as an issue. In the spirit of cooperation, it would seem a fundamental issue of this magnitude would have been brought to the attention of the CM1 team.

The engineering behind CM1 has been a serious and well-considered effort. By continuing to apply critical thinking, anticipated risks can be better managed, costs can be better contained, and CM1 design can be improved.

The CM1 team welcomes the opportunity to work further with the SDCWA engineering team on these and other engineering related topics. In the spirit of collegial critical thinking, the CM1 team hopes to continue to benefit from the experience and expertise of the SDCWA engineers.

If additional questions arise, it may be a more productive use of the Committee's time for the CM1 team to work with the SDCWA engineers to respond to questions within the established format. In closing, the CM1 team would like to specifically address some of the issues raised at the February 13, 2014, committee meeting:

1. Will groundwater leak into the tunnel?

ANS: The project team has developed several concepts to utilize the existing proven one pass segmental liner to minimize any infiltration or exfiltration of water from the tunnels to acceptable levels. Leakage into the tunnel is prevented by the use of high performance gaskets at segment joints and precast concrete of high durability. Since the maximum external water head is approximately 150 ft, gaskets capable of sealing the joint are commonly available. Leakage in and out of the tunnel can be successfully mitigated through proper design of gaskets and concrete segments. The concept of sealing the tunnel to minimize infiltration or exfiltration of groundwater will be further examined in preliminary design.

2. Will having more than one power provider add complexity to the project?

ANS: The fact that there are three potential power providers in the Delta will require DWR to coordinate with all three of these entities. The project team is currently, and simultaneously pursuing studies/agreements with all three potential power providers within the area to ensure the temporary power needs of the project will be met in a timely manner, and that permanent power needs are secured in a timely and cost effective manner.

3. Will natural gas seep into the tunnel?

ANS: There are gas wells in the vicinity of the proposed tunnel alignment, both active and inactive wells. However, natural gas fields are typically not in existence at the tunnel depth of 150 ft. These gas deposits are typically found at depths of several thousand feet below the ground surface. If by some chance, natural gas is present at these shallow locations around the tunnel, the gas can be kept out of the tunnels by the gaskets and the concrete segments. See answer for question 1 above. The concept of sealing the tunnel to minimize infiltration of natural gas will be further examined in preliminary design. Additionally, the tunnel equipment and working conditions will most likely be configured for the OSHA classification of "potentially gassy" conditions as a further safety precaution.

4. Will the high groundwater table cause the empty tunnel to float?

ANS: Given that the tunnel is buried at 150 ft below ground, the soil overburden, its cohesive confinement and weight of the tunnel liner will be greater than the buoyant force on the empty tunnel. A properly designed tunnel will not float under all load conditions.

5. Will the tunnel need a steel liner?

ANS: A steel liner inside the concrete liner was studied during the early phases of the project and determined to be unnecessary. The bolted-gasketed concrete segmental liner will handle both external ground/hydrostatic loads and internal hydraulic pressures. Adding an additional steel liner (two-pass system) will complicate construction, increase costs and extend the construction schedule. The two-pass system was ruled out in the study phase because of cost and schedule concerns. The single pass system was also reviewed and approved by a technical panel of experts.

6. Will the forebay be drained? Will it be able to keep the tunnels filled with water?

ANS: The inlet and outlet structures at the forebay will be designed to keep the Intermediate Forebay within its proper operating levels during all anticipated operational conditions.

7. Several activities in the construction schedule have no float.

ANS: Those activities are considered to be part of critical path for completion of the project.

8. Is the cost estimate realistic given the range of -25% to +50%?

ANS: The cost estimate is realistic based on the current project definition of 10% and as defined by the Association for the Advancement of Cost Estimating International (AACEI) Recommended Practice No. 17R-97. The conceptual engineering report provides the necessary detail to establish a project definition of 10%. This project definition level establishes an estimate accuracy between +30% to -20% which is less than the current contingency of 36 %. It is also realistic based on the bottom up Class 3 Estimate prepared by 5RMK (A Class 3 Estimate is defined as being prepared from design documentation 10% to 40% complete). 5RMK assembled the estimate using the same approach that a contractor would bidding the construction and with a similar level of detail. 5RMK recommended a 35 % contingency which is also less than the CM1 contingency.

9. TBM equipment and staffing availability

ANS: There are now at least four major TBM manufacturers with multiple manufacturing sites on a worldwide basis to meet the EPB TBM equipment needs. The plan is to stagger the award of

the construction contracts on roughly six-month intervals over a multi-year period of time, and with the belief that the TBM manufacturers will be able to keep up with equipment needs. Due to the contract-value size of the anticipated tunnel construction projects, it is anticipated that both US and International tunnel contractors will compete for the tunneling projects. Consequently, experienced TBM operators will be brought to the Delta area from not only the US, but also from international locations to supplement the local labor forces as necessary. There is expected to be sufficient availability of TBM operators to run the equipment.

The engineering team appreciates the Committee's consideration of the CM1 design concepts and looks forward to continuing collaboration with the SDCWA. Please feel free to contact me directly with any additional questions.

Sincerely,

Charles R. Gardner Jr.

BDCP Program Manager
CEO Hallmark Group Capital Program Management
cgardner@hgcpm.com

Q&A BETWEEN SDCWA AND CM1 TEAM

SDCWA QUESTIONS TO CM1 TEAM – DISCUSSED 9/17/13

Construction Contract Structure

1. Are there considerations for using local/regional contractors/suppliers?
2. If broken into multiple contracts, how many? Are there enough available contractors to perform this work?
3. Is bonding capacity being considered relative to the size of construction contracts?
4. Is there going to be a Project Labor Agreement – has that been considered in the cost estimate? For example, PLA administration.

Technical

1. Looking at maps of the alignment changes, it appears the optimized alignment is longer, yet it is stated as 5 miles shorter. Discuss reduction in length.
2. Discuss logic behind change from pumping to gravity: Why was pumping through a smaller pipe considered earlier if the alignment allows for gravity?
3. Tunnels: With the reduction of launch/retrieval locations (August 15, 2013, DWR Press Release), what is the overall plan for tunnel construction? Considering:
 - a. What type of tunneling machines?
 - b. How many?
 - c. Manufacturer location?
 - d. Ventilation?
 - e. Electrical requirements?
 - f. Muck disposal strategy?
4. Discuss geotechnical observations/information relative to tunneling strategy, e.g. machine type anticipated, risk for harder/softer ground, tunnel gasses, water infiltration.

Cost Considerations

1. Discuss logic behind soft costs. For example, design and construction management relative to construction costs.
2. Discuss logic behind contingency allowances relative to current level of design.
3. Discuss risk factors considered.
4. Normalized Costs: What is logic behind percentage factors?
5. Construction management costs are estimated at about 15% of construction costs. Has the plan for the number of contracts been factored into this number? For example, administering one large contract typically is less costly than administering 5 smaller ones.

Q&A BETWEEN SDCWA AND CM1 TEAM

ANSWERS PROVIDED TO SDCWA QUESTIONS VIA EMAIL 10/8/13

SDCWA Question: Also, as a follow up to our conference call with the Engineering Team, since you were running into gas wells were you able to use well logs from the drilling done for gas production in the area to help you better characterize the geology?

CM1 Team Answer: No, the geology was characterized based on a limited number of borings along the alignment, Delta Risk Management Strategy report database, previous levee studies and other studies near the project area. Well log database from the Division of Oil, Gas and Geothermal Resources was used to identify well locations that may impact the alignment.

SDCWA Question: We were wondering about the use of 35% contingency with the limited number of borings along the alignment.

CM1 Team Answer: The 35% contingency was originally established by URS and later validated independently by the cost estimating consulting firm of 5RMK in preparing the Class 3 Estimate. We concur with you in identifying the lack of borings and geotechnical information as a primary risk issue for this tunnel project. The geotechnical issues were also identified at our risk workshop. The panel of experts that participated in the risk workshop evaluated maximum cost of geotechnical and differing site condition risks at approximately \$1.5 billion for all facilities which leaves approximately \$1.7 billion contingency for all other unforeseen program items. As the program moves forward we are planning on having an extensive geotechnical program to thoroughly characterize existing conditions and to better define the use of contingency.

Q&A BETWEEN SDCWA AND CM1 TEAM

ANSWERS PROVIDED TO SDCWA QUESTIONS VIA EMAIL 2/12/14

SDCWA Question: What is the level of the estimate prepared for the preferred alternative and the other alternatives examined in the environmental documents?

CM1 Team Answer: Conceptual Engineering Reports (CERs) were prepared for the East, West and Pipeline Tunnel and an Option Description Report for the Separate Corridors. Based on the information contained in the CERs, estimating consultant 5RMK was requested to prepare a bottom up Class 3 estimate (as defined by the Association for the Advancement of Cost Estimating International (AACEI) Recommended Practice No. 17R-97) for the East, West and Pipeline Tunnel alternatives, and DWR prepared a Class 5 estimate for the Separate Corridors alternative. For determining the contingency a project definition average of 7.5% was used. Based on this level of project definition a 36% contingency was deemed appropriate. Independently 5RMK recommended a 35% contingency. The more conservative contingency was used.

SDCWA Question: How was the overall contingency of 36% established?

CM1 Team Answer: See response above.

SDCWA Question: How was project soft costs established as 15% of the project cost?

CM1 Team Answer: The 15% of the projects cost for PM/CM/Eng is consistent with amounts that are budgeted for these activities on large programs. However, the \$1.919 billion PM/CM/Eng budget was based on a resource loaded project schedule that includes the systematic staffing of the DHCCP organization, identification and rollout of the various Request for Qualifications and selection of various consultants required to program manage, acquire property, obtain permits, design, and manage the construction and commissioning of the required facilities.

SDCWA Question: Were any additional geotechnical studies done when the twin tunnel alignment was recently changed?

CM1 Team Answer: No additional geotechnical field studies have been done due to the difficulty of gaining access to private property. However, geotechnical and tunneling consultants with experience in the Delta have reviewed the new alignment and did not see any fatal flaws, but do recommend further studies.

SDCWA Question: Has the project team established the extent of the geotechnical work that will support preliminary and then final project design?

CM1 Team Answer: Yes, the project team has developed a preliminary geotechnical investigation plan that identifies all geotechnical work required on the program through final design. However, it is expected that plan will be adjusted once the geotechnical consultant and various feature design consultants are hired.



San Diego County Water Authority

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March 17, 2014

Mr. Charles R. Gardner, Jr.
Chief Executive Officer
Hallmark Group Capital Program Management
1901 Royal Oaks Drive, Suite 200
Sacramento, CA 95815

MEMBER AGENCIES

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Vista Irrigation District

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Municipal Water District

OTHER REPRESENTATIVE

County of San Diego

RE: San Diego County Water Authority Review of Bay Delta Conservation Plan
(BDCP) Infrastructure

Dear Mr. Gardner:

On behalf of the Water Authority I am responding to your letter, dated February 26, 2014, presented to the Water Authority Board of Directors' Imported Water Committee on February 27, 2014.

Over much of the last year, Water Authority staff has been providing its Board of Directors, through the Imported Water Committee, information and analysis on key issues relating to the Bay Delta Conservation Plan. On January 9, 2014, staff reviewed with the Committee the BDCP's infrastructure design, cost, and schedule and the methodology we would use to review those items. The results of staff's review were presented to the Committee on February 13, 2014. (See copy of Board memo enclosed.)

Beginning in September 2013, we began a dialog with you to better understand the infrastructure and engineering assumptions in the BDCP infrastructure. Those communications have been professional and direct and we appreciate the opportunity to discuss the project with the design team. Your team also provided information, such as the Conceptual Engineering Report and a project geotechnical report, which do not appear to have been widely distributed. However, we have made it consistently clear that our objective in obtaining information from the design team was to present a more complete picture of the BDCP infrastructure to our Board. While our discussions were "engineer to engineer," our purpose for the discussions was made clear from the beginning. I sincerely hope we can continue discussions regarding this project that has such far reaching impacts on all Californians. The Water Authority stands ready to provide any assistance or advice we can from our experience in large infrastructure projects to help the BDCP develop the best infrastructure plan possible.

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A public agency providing a safe and reliable water supply to the San Diego region

Mr. Charles R. Gardner, Jr.
March 17, 2014
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To that end, I can say unequivocally, that Water Authority staff has never indicated that the proposed BDCP infrastructure has any flaws. Instead, recognizing the BDCP is only at a 10 percent design level, we have identified a number of project risks that, if not addressed during design and construction, could severely and negatively impact the project's schedule and dramatically increase its cost. Those risks include: lack of geotechnical information; property acquisition; tunnel excavation method; power requirements; access and utility conflicts; project delivery method; and the availability of specialized tunnel boring machines, steel liners (since determined by BDCP as unneeded), adequate borrow material, specialized contractors, and technical experts. If we have made any errors in our interpretation of these project risks we urge you to provide us additional information. I encourage you to review the Water Authority's BDCP portion of our webpage, www.sdcwa.org/bdcp, and review our Board memos and presentations regarding our review of the BDCP infrastructure. Please note most of the risks we identified are discussed at length in the Conceptual Engineering Report, and our February 7, 2014 memo to the Board footnotes where each of those risks are located within the CER.

The February 26, 2014, letter raised nine specific issues that I will address.

1. *Will groundwater leak into the tunnel?* Staff recognizes that groundwater infiltrating the tunnel is an issue to be addressed during further phases of design. Staff described the gasketed pre-cast concrete segment method to the Board and the design's goal will be to minimize groundwater intrusion.
2. *Will having more than one power provider add complexity to the project?* Staff noted the Conceptual Engineering Report (CER) indicates the engineering team has not made a final decision whether to use one or two power supply sources to key BDCP facilities. Staff noted, as did the CER, that two supply sources would cost more.
3. *Will natural gas seep into the tunnel?* The CER identified the presence of natural gas wells as risk to the project. Your letter provided information on the nature of those gas wells not contained in the CER. The potential to encounter active or inactive gas wells is correctly identified as a risk to the project's cost and schedule, and staff is encouraged the BDCP Engineering team will address this risk during future design phases.
4. *Will the high groundwater table cause the empty tunnel to float?* Staff reported during responses to Board member questions that the next phase of tunnel design would need to address this issue. We believe this to be a low probability risk.
5. *Will the tunnel need a steel liner?* Section 11.2.6 of the CER does not say whether a steel liner will be necessary in addition to the pre-cast concrete gasketed segment liner. Also, Section 11.6, page 11-17, indicates the need for further evaluation to determine if a secondary lining or membrane is necessary. Appendix E also discusses tunnel liners, at length, without concluding that a liner is not needed. Staff appreciates the additional information that BDCP has since determined steel liners will not be used and looks forward to reviewing additional

Mr. Charles R. Gardner, Jr.
March 17, 2014
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information on how the tunnels will perform using only the pre-cast concrete segmented liner.

6. *Will the forebay be drained?* Staff appreciates the clarification on the operating characteristics of the intermediate forebay.
7. *Several of the activities in the construction schedule have no float.* While we understand that items with zero float are “critical path” items, we also understand activities with fixed dates are not typically used in a project schedule this early in a project’s life. Additionally, without access to supporting schedule logic, we are unable to determine if the schedule is realistic. We welcome the opportunity to review more detailed schedule information.
8. *Is the cost estimate realistic given the range of -25% to +50%?* Staff relied upon Chapter 8 of the CER which states “*The estimate of direct construction cost is based on a 10% engineering design level and has an expected accuracy range of +50% to -24%, per the cost estimating classification system developed by the Association for the Advancement of Cost Estimating (2011).*” If the BDCP Engineering Team has additional information not contained in the documents released for public comment that improves the estimated accuracy to a range of +30 percent to -20 percent, staff welcomes the opportunity to review it. Otherwise, it is our opinion that increasing the project contingency from 36 percent to 50 percent seems prudent and entirely consistent with the accuracy of the estimate as noted in the CER.
9. *TBM equipment and staffing availability.* Your letter provides additional clarification not included in the CER regarding the staging of construction contracts and the impact on the availability of tunnel boring machines and qualified operators. Staging of construction contracts does not appear to be included in the project schedule (CER Appendix C) and staff looks forward to reviewing this additional information and how it impacts the project’s schedule.

It is our intent to provide our Board an unbiased review of the best information available on the proposed BDCP infrastructure, and we appreciate the clarifications you have provided. We also welcome your continuing input during that process.

Sincerely,



William J. Rose
Director of Engineering

WJR:cs/bb
By Electronic and Regular Mail
Enclosure