Memo - DRAFT

To: Lance Eckhart

From: Tony Winkel

Date: February 8, 2013

Re: Forks Dam Storm Water Detention/Groundwater Recharge

INTRODUCTION

This memo explores the possibility of installing a managed gate on the Mojave River Forks Dam Outlet to capture storm water for enhanced groundwater recharge. Potential benefits of Forks Dam Recharge Water Impoundment Project are:

* Locally sourced “free” water
* Revenue source for MWA
* Conservation of lost storm water
* State funding
* Enhanced flood control
* Riparian habitat restoration
* Discounted water to disadvantaged communities
* Low maintenance and management costs

BACKGROUND

The Mojave River Forks Dam serves as a flood control structure to attenuate peak flood flow. This is accomplished by impounding and delaying the release of storm water from infrequent, large storm events. The delayed release of water from the Dam allows for a maximum of 23,500 cfs (~1 acre-feet every 2 seconds) to flow out through the outlet structure at the base of the Dam. The maximum flood-design of the Dam is 154,000 acre-feet over 3 days (MWA, 2011) and the total storage capacity of the Dam is approximately 90,000 acre-feet. (Army Corp., 1985)

BENIFITS

In 1985 The Army Corps of Engineers proposed modifications to the Forks Dam to increase groundwater infiltration. They projected an annual increase of infiltrated water to be up to 3,760 acre-feet per year. (Army Corp., 1985) This estimate is based on modeling for unmanaged design alterations to the Dam’s outlet structure. Active management of impounded storm water combined with other measures (i.e. river channel sand berms) should further increase the infiltration potential of storm water.

Since the completion of the Dam in 1971, only an approximate one-third (at most) of the Dam’s Storage capacity has been filled. This only occurs during infrequent storms on the average of every 6 years. During these wet years, storm flows at the Afton Gage are quite variable. The average of theses storm flows is approximately 41,000 acre-feet. The other five (5) “dry” years average 125 acre feet of storm flow at the Afton Gage. (MWA, 2013)

Surface water that leaves Afton is essentially lost for beneficial use. This water ends up evaporating in Soda and Silver Playa Lakes. Even “nature” cannot make much use this water because standing water in these (dry) lakes is so rare and unreliable. Further, recharge potential of surface water past Harvard Road in Newberry Springs is significantly hindered due to Manix Clay Beds. (Figure 3 –Todd, 2013) Therefore, any storm water that flows past Harvard Road is lost to beneficial use. (NOTE: base flow in riparian areas downstream of Harvard Road is considered separate from storm flow.) Storm water could be impounded behind the Forks Dam and released more slowly than what occurs under current conditions to allow a higher total volume of water to infiltrate.

The economic value of lost storm water is considerable. In a hypothetical scenario banked surplus storm water could be assigned a discounted value (compared to State Project Water) of $200 per acre foot. (Lance Eckhart, MWA, personal communication, February 6, 2013) The value of average lost storm water (41,000 acre-feet once every 6 years) is 8.2 million dollars.

The State of California would support the project. The Recycled Water Policy (State Water Resources Control Board Resolution No. 2009-0011) states that “the State Water Board will also request priority funding for storm water recharge projects that augment local water supplies.” ((11)(a)) – CWRCB, 2013) The Policy also sets aggressive goals for storm water recharge. A project such as this one would help the State meet these goals.

In addition, this project could potentially decrease flood damage along the Mojave River corridor. Hardscape development in the Alto area has created significant potential for urban storm water runoff into the Mojave River. This was observed in December 2010 when peak storm flows at the Narrows Gage significantly exceeded flows at the Forks Dam. (MWA, 2011) Impounding water behind the Dam for slow release later would further reduce peak flooding downstream even when significant rainfall occurs below the Dam’s watershed.

Proper policy and management of impounded storm water behind the Forks Dam would facilitate numerous other potential benefits. For example, a portion of the saved water could be dedicated to environmental concerns such as riparian restoration through elevated groundwater levels. Elevated groundwater levels would be of particular benefit to places such as Camp Cady and contribute to a reversal of the loss of historical riparian habitat documented by Todd (2013).

Banked storm water could be sold at a lower cost than State Project Water to stakeholders . This project benefit could be included into the IRWMP update and designated for disadvantaged communities by providing lower-cost water to them.

This project would have a minimal one-time capital improvement cost (gates, SCADA, management plan), minimal management cost (monitoring, operation, and maintenance) but potential huge gains in boosting local water supplies

DRAWBACKS

First and foremost, is this project really feasible? The quantities used in this memo are very rough “back of the envelope” values and a detailed study would have to be performed to evaluate if this project would be feasible.

It is anticipated that environmental and other government agency permitting would be a significant hurdle in this project.

An extensive management strategy would be required for success of this project. This project would require long-term ongoing monitoring, study, and management adjustments. In addition, existing and future projects could be affected. For example there would be potential adjustments to the R3 Management Plan. One such adjustment could be the addition of an off-river ASR component to the project through existing R3 infrastructure in order to “make room” for infiltrating impounded storm water.

Perhaps the most difficult hurdle to overcome would be political resistance to such a project from downstream stakeholders. There are many water interests in the downstream portions of the project area (Centro and Baja) that would undoubtedly resist this project. It is anticipated that the long-term effect of this project would actually benefit these interests. However, this would need to be convincingly shown as part of the feasibility study. This and consensus based policies and management practices could be implemented to offset the perceived “losses” to the downstream interests. For example a detailed hydrologic study might generate “lost recharge” values as a percentage of impounded/recharged water. This offset value could then be delivered through existing MWA recharge facilities.

Perhaps the most important consideration for this project is that of flood control. Because of the threat to loss of life and property from large storm events active management would have to ensure that the integrity of the Forks Dam’s original flood control intent is maintained. Weather patterns would have to be closely monitored to ensure that under no circumstances the reservoir behind the Dam would be full or partially full when a maximum-design-storm event occurs. Either the reservoir would have to be drained in advance or modifications that appropriately increase flood control capacity would have to be implemented as part of this project. (Army Corp.,1985) For example, at maximum outflow capacity of 23,500 cfs a full reservoir of approximately 90,000 acre-feet (Army Corp., 1985) could be completely drained in 2 days. Additional considerations such as pre wetting of the riverbed would also need to be considered.

There are many other logistical considerations that this project would have to address. One such consideration that would need to be included in the management plan would be the inundation of CA Highway 173. Solutions such as relocating the road or limiting impounding activities to prevent inundation would need to be addressed. Such details would be hammered out in the management plan.

SUMMARY

A managed gate on the Mojave River Forks Dam Outlet could be used to capture storm water for enhanced groundwater recharge. There are many potential benefits for using the Forks Dam to impound storm water for aquifer recharge. These benefits are locally sourced “free” water revenue, conservation of storm water, state funding, flood control, riparian restoration, discounted water to disadvantaged communities, and low maintenance costs.

REFERENCES

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