TO: GOVERNANCE COMMITTEE (GC)

FROM: EXECUTIVE DIRECTOR'S OFFICE (ED OFFICE)

SUBJECT: SUMMARY OF PROPOSED PILOT FOR GROUNDWATER PUMPING TO INCREASE EFFICIENCY OF PHELPS COUNTY CANAL RECHARGE PROJECT

DATE: MAY 22, 2015

I. INTRODUCTION

The Platte River Recovery Implementation Program (Program) is evaluating a potential groundwater pumping pilot project to retime its portion of the Phelps County Canal Groundwater Recharge project water accretions. The Program would pump recharged water in the aquifer directly to the river during shortages to U.S. Fish and Wildlife Service (USFWS) target flows to increase the groundwater recharge project score[1]. The Phelps County Canal Groundwater Recharge project is a Water Action Plan (WAP) project that has been operational since 2011 and utilizes excess flows in the Central Nebraska Public Power and Irrigation District's (CNPPID) system.

The ED Office is proposing to initiate a groundwater pumping pilot project under the Phelps County Canal in 2015 (or 2016, pending permit approvals), and is requesting feedback from the GC. Specifically, the ED Office is requesting the GC approve implementation of a pilot project beginning in the summer of 2015. This groundwater pumping concept was initially discussed at the August 2014 Water Advisory Committee (WAC)[2] meeting and further discussed at the February and May 2015 WAC meetings. At the May 2015 meeting, the WAC members motioned to recommend the pilot project to the GC and all members were in favor. None of the WAC members voiced objections. This memorandum outlines the pilot project concept and preliminary score and cost estimates. The memorandum was completed with support from Hahn Water Resources, LLC (Special Advisor to the ED Office in hydrogeology).

II. BACKGROUND

The GC accepted a score for the Phelps County Canal Groundwater Recharge project at the December 2013 meeting, based on the Program's 50% interest in the project under the temporary agreements with the CNPPID. The draft permanent water service agreement with the CNPPID is for a Program interest of 75% of the project, which equates to a score for the Program of 2,700 acre-feet per year (AFY). The pilot groundwater pumping project is intended to increase the score of the recharge project by capturing recharged water and more efficiently using it for Program benefits. Recharged water will be pumped from the aquifer during USFWS target flow shortages and delivered to the river to receive Program score credit. Since accretions from the

[1] A project score is in reference to the Program's First Increment objective of reducing shortages to USFWS target flows by an average of 130,000 to 150,000 AF per year. The score is considered the project's yield routed to Grand Island and credited during shortages to USFWS target flows.

[2] The ED Office provided a memo to the WAC dated 7/30/2014 entitled, "Potential Groundwater Pumping to Increase Efficiency of the Phelps County Canal Recharge Project." This is available upon request.

Phelps County Canal Groundwater Recharge project cannot be controlled currently, approximately half of the recharged water accretes to the river during excess months and does not result in score credit for the Program. The pilot project would allow the Program to pump recharged water from the aquifer to a nearby drain that flows directly to the Platte River for immediate yield in the river. This will allow delivery of recharged water more quickly to the river and the ability for the Program to control a portion and return it to the river during shortages.

III. PILOT PROJECT OVERVIEW

The pilot project would entail the construction of one well on the Program's Cook tract between the Phelps County Canal and the Platte River, at the approximate location shown in **Figures 1 and 2**. The well would be constructed at a location that meets required well spacing rules in the Tri-Basin Natural Resources District (TBNRD). Pumped groundwater would be discharged into the nearby North Phelps County Ditch (drain), where it would flow as surface water directly to the Platte River. Water would be pumped from the well at 1,000 gallons per minute (or less) during shortages to USFWS target flows only, for score credit; the well would not pump during excess flow periods. The pumping season would be March through November; however, the volume and frequency of pumping would be dependent on recharge accretions at the river, to ensure the Program is not creating monthly net depletions from pumping operations. The Program can also monitor base flow in the drain throughout the operating season using the DL6 gage station, which is equipped with a continuous recorder (see Figure 2). Drain level information could assist the Program in developing operation plans.

The ED Office evaluated various well locations that would be able to capture recharged water from the Phelps County Canal. The well location (shown in Figure 2) was selected as the preferred option for the pilot project for the following reasons:

- Located on Program land, which will make it easier to construct a well and operate it; location is between the canal (where recharge occurs) and the river
- Well distance from the drain, river, canal and Morse wetland is appropriate (to avoid directly dewatering any of these); well is in close proximity to power lines and access roads; location adheres to TBNRD well spacing requirements from other wells
- North Phelps County Ditch runs through Program land and discharges into a main channel of the Platte River; DL6 drain level readings show water moving through the drain during the majority of the period of record since 2011

After the pilot is conducted in 2015/2016, the ED Office intends to compile data regarding groundwater levels, drain levels, pumping volumes and estimated scores and provide the information to the WAC. The groundwater pumping project could be expanded in the future, if supported by the WAC and GC.

Accounting and Depletions into the Future

The Program would pump less groundwater than the volume recharged for the Program in the Phelps County Canal; therefore, recharge accretions would replace groundwater pumping depletions. Since the recharge accretions will continue through the First Increment and beyond, groundwater pumping depletions will be replaced into the future as well. The ED Office can develop more detailed analyses and monthly accounting sheets to track accretions and depletions

of the combined projects. Based on the rate of return flows from recharge from previous years, a proposed maximum volume of water to be pumped in a given month could be calculated. If there are times when it appears there could be a net monthly deficit at the river due to pumping operations, the Program could curtail pumping volumes. There are no anticipated net monthly depletions at the river for the 2015/2016 pilot project, as the Program will limit pumping based on the available recharge accretions.

IV. PRELIMINARY SCORE

The projected score is approximately 130-270 acre-feet (AF) for the pilot project, based on preliminary estimates by the ED Office utilizing the OpStudy 1947-1994 hydrology. The score is based on the net increase in the score for the Phelps County Canal recharge project when groundwater pumping is added to the score model; therefore, it takes into account lagged recharge accretions, direct pumping deliveries to the river for score credit and lagged groundwater depletions. The net increase in the combined project score is attributed to the pilot project. In total, the combined project score would be approximately 2,830 AFY to 2,970 AFY (2,700 AFY for the groundwater recharge project and 130-270 AFY for the pilot project). The score analysis will be presented to the Scoring Subcommittee and GC to assign a final score.

V. COST ESTIMATE

The cost estimate for one well is approximately $63,000 in the first year (2015 or 2016) and includes the construction of the production well, flowmeter and recorder, construction of two monitoring wells plus instrumentation, piping to the ditch, power line costs, maintenance costs and pumping costs for one year. Ongoing costs for maintenance and pumping are estimated at approximately $6,000. The cost per AF of score ranges from approximately $45-$95, based on 10 years of operations. Other WAP projects range from approximately $40 to over $300 per AF of score at Grand Island.

VI. PERMITTING

The ED Office will work with the TBNRD, the Nebraska Department of Natural Resources (NDNR) and any other agencies for required permitting. It is anticipated the Program will obtain a well permit and potentially a discharge permit (or obtain written determination that a discharge permit is not required). The Program may also revise the groundwater recharge permit for the Phelps County Canal Groundwater Recharge project.

VII. CONCLUSIONS

The pilot project will allow the Program to test the groundwater pumping concept and monitor groundwater and drain levels, without significant investment. Based on the preliminary cost and score projections, the cost per AF of score is relatively inexpensive and competitive with other WAP projects. Construction and permitting of the project should be relatively straightforward and allow the Program to deliver water to the river in 2015 or 2016, pending permit approvals. The concept of groundwater pumping could be expanded in the future if it is successful, and potentially applied to other groundwater recharge projects the Program may develop over time. The WAC supports this pilot and recommends the GC approve implementation of this project.

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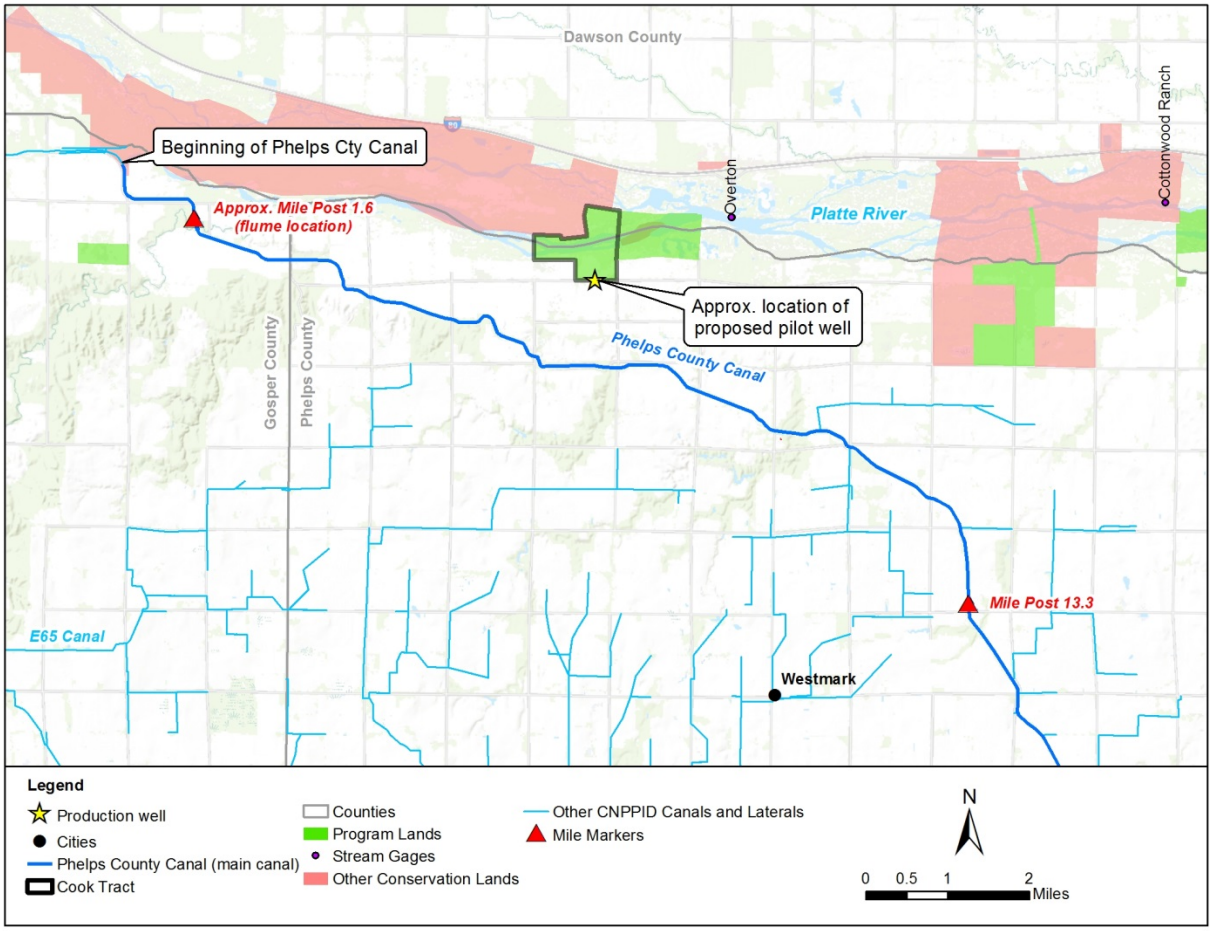

Figure 1. Pilot project and Phelps County Canal recharge location map.

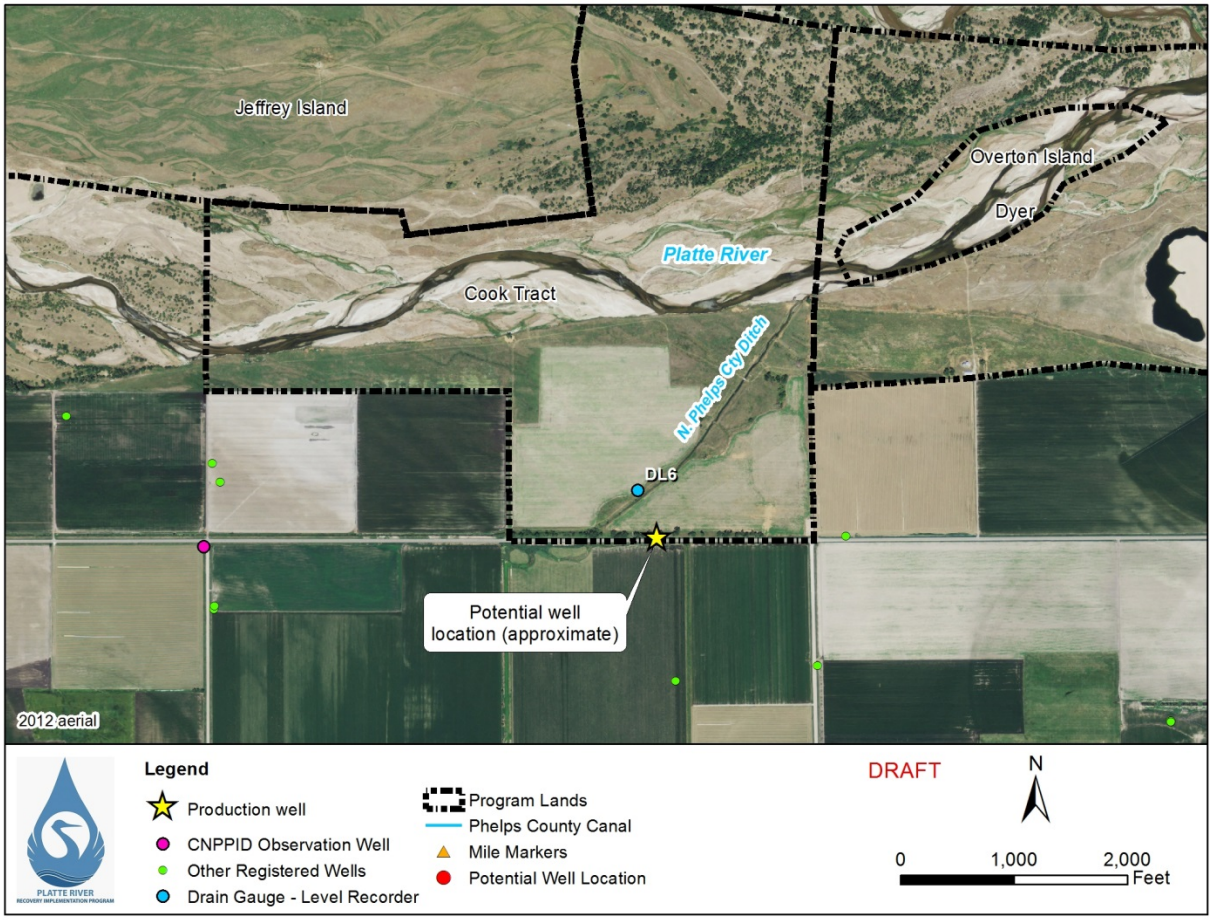

Figure 2. Pilot project vicinity map.