PRRIP CHOKEPOINT PROJECT MEMORANDUM

DATE: August 21, 2023 **ACE PROJECT NO.:** NEHW05.01

TO: Seth Turner, PPRIP Executive Director's Office (EDO)
Chokepoint Planning Workgroup

FROM: Michelle Martin, PE, Anderson Consulting Engineers, Inc.
Brian Murphy, PhD, PE, River Works Ltd

SUBJECT: North Platte River Chokepoint Review of Documents and Previous Alternatives

The Platte River Recovery Implementation Program (PRRIP or Program) continues efforts to achieve and maintain hydraulic capacity of 3,000 cfs on the North Platte River below minor flood stage of 6.0 feet as defined by the national Weather Service (NWS) at the North Platte River at North Platte (06693000) gage adjacent to the Highway 83 bridge. The Program selected Anderson Consulting Engineers Inc. (ACE) to conduct the current North Platte River Chokepoint Engineering Service Project in May of 2023. The EDO has defined the project goal as identifying and screening alternative solutions to increase hydraulic capacity through the Chokepoint and/or provide delivery of flows downstream of the Chokepoint through other systems.

The purpose of this memo is to provide the EDO and the Chokepoint Planning Workgroup with a summary of initial efforts completed by the ACE team as part of the first project task order. This memo also includes an initial listing of alternatives previously considered to address limited hydraulic capacity at the Chokepoint as well as a short list of alternatives that are proposed for further investigation. The lists were developed as a starting point for identifying and screening alternatives.

As part of the first task order the ACE team developed a project charter, conducted a comprehensive review of previous studies and documents related to the North Platte River Chokepoint, and formulated a listing of all alternatives previously considered. The project charter summarizes the North Platte Chokepoint Project goals, objectives, strategies, and constraints as developed by the PRRIP Executive Director's Office (EDO) and the Anderson Consulting Engineers (ACE) team. A copy of the project charter is included in Attachment A. All available documents related to the North Platte River Chokepoint, as referenced in Attachment B, were reviewed by the ACE team. The purpose of the document review was to familiarize team members with the North Platte River, previous Program studies and documents related to the Chokepoint, and the history of alternative development.

A complete listing of alternatives that appear in previous studies was compiled and is shown in Table 1. Information provided for each alternative in Table 1 includes a brief description, noted benefits to capacity and/or flood control, reasons for elimination, and the reference study. Alternatives were grouped into eight categories including: implemented project, sediment management, channel modification/ construction, flow bypass, vegetation control, flood control, flood easements/property buyouts, and new alternatives. For each alternative the table also notes a scaled level of evaluation (from 0 to 4), if the alternative is not feasible, if the solution is independent of other alternatives, if there is an increase in

hydraulic capacity, and if flooding is improved. More detailed information related to most alternatives can be found in the North Platte Choke Point Summary Memo (PPRIP EDO September 2012), and North Platte Chokepoint Alternatives Memo (PPRIP EDO 2021).

The full listing provided in Table 1 was reviewed and discussed by the EDO and ACE project team resulting in the development of a short list of alternatives that are proposed for further investigation as part of the current project. The short list identifies a total of nine alternatives as shown in Table 2. Note that none of the alternatives listed under the flood control or flood easements/property buyouts categories were moved to the short list. Alternatives in both these categories were not advanced because increased conveyance capacity could only be achieved by raising minor flood stage or intentionally exceeding minor flood stage. The former was already pursued by the Program without success and the latter would violate Program policy. Bridge widening alternatives, which could include widening of the bridge itself or just the channel underneath, were also eliminated. Prior analyses indicate that bridge widening would provide a limited and unsustainable increase in conveyance capacity through the Chokepoint reach and may actually increase sediment deposition due to reduced velocity and sediment transport capacity associated with wider channel cross sections.

The lists provided in Table 1 and 2 are intended to facilitate initial discussions with the Chokepoint Planning Workgroup regarding alternative identification and screening. Workgroup input on the full alternatives list shown in Table 1 is requested relative to its completeness. Additional input regarding alternatives identified (or not identified) on the short list in Table 2 is also requested to help scope and guide the next phase of the project.

Table 1 North Platte River Chokepoint Alternatives 2005 - 2023

Line No.	Alternative	Description	Capacity and/or Flood Control Benefit	Reason for Elimination	Reference	Prior Level of Evaluation (0-4)*	Feasible?	Stand Alone Solution?	Increases Hydraulic Capacity?	Improves Flooding?	Short List Alt No. **
Implemented Projects											
1	Re-activation of State Channel	Re-activation of the "State Channel" upstream of primary flooding area, restored berm	-Successful at flood proofing to the north		EDO 2012	4				Yes	
2	North River Road / Whitehorse Creek Drainage	Install culverts along N River Rd to improve drainage	- Successful flood proofing project		EDO 2012	4				Yes	
3	Revise Flood Stage	Request that NWS revise flood stage after flood control improvements.* (This was explored after the 2020 flow test, NWS did not agree to modify and redefined flooding at 6.0 feet)	- Raising flood stage from 6.0 ft to 6.5 ft would increase available conveyance capacity below flood stage by about 800 cfs	- Unsuccessful implementation per decision of NWS	SEH 2008/EDO 2020	4	No				
4	Chemical Phragmites Treatment	Annual spraying from Lake McConaughy to Columbus coordinated by Platte Valley Weed Management Area	- Prevents further propagation of vegetation and reduction in hydraulic capacity	- Required annually - Minimal increase in hydraulic capacity, because root balls remain in place	EDO 2012	4					
5	Chemical/Mechanical Phragmites Treatment	Spraying of all vegetation along 50-100 ft swaths of riverbanks and island perimeters Fall 2021. Attempted to follow with disking in Spring 2022, but were unable to secure landowner permissions to facilitate adequate site access.	- Prevents further propagation of vegetation and reduction in hydraulic capacity - Does not required USACE permit	- Property access - Required annually	WAC Meeting Minutes Oct 2021, Feb 2022, May 2022	4					
Category: Sediment Management											
6	Dredging	No description / evaluation	Unknown	Unknown	J.F Sato 2005	1					Alt 1
7		Periodic dredging in main channel 5 miles up and downstream of HWY 83.	- High likelihood of increased capacity - Best alternative modeled provides ~5 years of hydraulic capacity - Known results of lowered channel bottom and water surface elevation	- High cost (best alternative ~$1.6M) - Repeated maintenance required - Permitting difficulty (e.g., 404 permit) - Sediment disposal issues	EDO 2012	2		Yes	Yes	Yes	
8		Dredging downstream of HWY 83	- High likelihood of increased capacity	- Permitting - Repeated maintenance required - Sediment disposal issues	ACE 2015	3		Yes	Yes	Yes	
9		Dredging from just upstream of HWY 83 to Tri-County to excavate pilot channel down to pre-Tri County Div Dam profile.	- Increase hydraulic capacity/ sed transport capacity - Restores equilibrium slope - Reduces dredging at TCCDD	- Permitting - Sustainability - Cost - Sediment disposal issues	River Design Group, Inc. 2023	2		Yes	Yes	Yes	
10	Install Sediment Collectors	Sediment collection system (Streamside Systems) - Fountain Creek demonstration project in Pueblo, CO is an example.	- Potentially sustainable	- Unknown results for untested technology / scale - High cost (~$800k for demonstration project) - Permitting difficulty (e.g., 404 permit) - Sediment disposal issues	EDO 2012	2	No				
11	Induce Headcut at Tri-County Diversion	Induce a headcut by opening TCD gates to sluice sediments or by increasing dredging upstream of diversion. Also dredging plus bypass of sediment. (Mentioned but never advanced)	- Increase hydraulic capacity/ sed transport capacity - Increase time between dredging	- Unknown results and uncertainty of impacts - Permitting - Repeated maintenance required - Sediment disposal issues	HDR/Tetra Tech 2011	1					
12	Modification to Tri County Diversion	Modification to Dam to allow for sediment passage.	- Potential to promote sediment transport - Sediment passage could provide downstream benefit - Potential to reduce time between dredging upstream	- Impacts to diversion operations - Permitting - Sediment passage could have impacts downstream - Sediment disposal issues	River Design Group, Inc. 2023	2					Alt 2

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** See Table 2

Line No.	Alternative	Description	Capacity and/or Flood Control Benefit	Reason for Elimination	Reference	Prior Level of Evaluation (0-4)*	Feasible?	Stand Alone Solution?	Increases Hydraulic Capacity?	Improves Flooding?	Short List Alt No. **
Category: Channel Modification / Construction											
13	Sand Bar/Island Removal above HWY 83	Remove sand bar located ~1.5 miles upstream of HWY 83.	- Removal would widen channel - would keep more flow in main channel and reduce overbank flooding	- Island could reform - Not stand alone solution - Local impacts	J.F Sato 2005	2					Alt 3
14		Refinement of JF Sato Alt			SEH 2008	2					
15		Removal of Vegetation and Widening at Sand Bar / Island			ACE 2015	3					
16	Wetland enhancement project to connect State Channel to Dishman property	No description / evaluation	Unknown	Unknown	SEH 2009/2010	1					
17	Spur Dikes / Jetties / Bendway Weirs	Natural spur dikes to increase flow to underutilized channels around island to keep channels open (No evaluation)	- Aid in removal of sand bars	- Permitting - Require maintenance and can lose effectiveness over time	SEH 2009/2010	1					Alt 4
18		Narrowing channel width throughout, using jetties or weirs, to a uniform width equivalent to width at current restrictions	- Sustainable option to achieve uniform sediment transport and minimize deposition	- Can increase resistance to flow and water levels - No increase in hydraulic capacity	EDO 2012	2					
19		Low profile bendway weirs placed downstream of HWY 83 to increase transport capacity during low flows.	- Sustainable option to increase sediment transport capacity - Creates compound channel geometry to promote transport during moderate flows - 1D Sediment modeling indicated potential for effectiveness - Could be adaptively managed for performance/longevity	- Periodic dredging may be necessary to maintain hydraulic capacity - Can raise water surface elevations if not designed correctly - Permitting	ACE 2015	3					
20	Channel Widening	Widening channel at current restrictions to make channel width uniform	- Increase in hydraulic capacity	- Prevents further decreases in capacity, but may not increase capacity - Landowner access required to modify channel width - Permitting difficulty (e.g., 404 permit)	EDO 2012	2					Alt 3
21		Widening of channel to 350 feet upstream of HWY 83 w/ channel excavation to create uniform channel slope.	- Has potential to be effective when included with other alternatives (e.g. dredging, jetties)	- Increase in hydraulic capacity not sustainable without other measures - Not effective as stand alone alternative	ACE 2015	3					
22		Increase channel width to improve hydraulic capacity	- Increase in hydraulic capacity	- Not sustainable without other measures - Not effective as stand alone alternative	River Design Group, Inc. 2023	2					
23	Widen Bridge Crossings	Remove South Bank Deposition at UPRR and Sandpit. Removal of sediment deposition on south bank just upstream of UPRR Bridge towards sand pit lakes.	-Increases capacity at UPRR bridge and upstream approx. 3,800 feet.	- No impact at HWY 83 - Coordination with UPRR and sand pit pond owners - Sediment disposal issues	HDR/Tetra Tech 2011	2	No				
24		Widening bridges at Hwy 83, UPRR, Hwy 30 to increase hydraulic capacity	- Reduce local backwater areas at constrictions	- Net overall increase in deposition - Not sustainable	EDO 2012	2	No				
25	Widen at HWY 83	Widening at HWY83 Bridge to increase hydraulic capacity (evaluation assumed removal of bridge)	- Lower water surface elevations	- 1D Sediment modeling indicated little to no increase in hydraulic capacity with bridge removal - Decreases sediment transport capacity	ACE 2015	3	No				
26	Widen Bridge Crossings	Widen bridge crossings to increase hydraulic capacity	- Localized increase in hydraulic capacity	- Increase in hydraulic capacity not sustainable without other measures - Not effective as stand alone alternative - Expensive	River Design Group, Inc. 2023	2	No				

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** See Table 2

Line No.	Alternative	Description	Capacity and/or Flood Control Benefit	Reason for Elimination	Reference	Prior Level of Evaluation (0-4)*	Feasible?	Stand Alone Solution?	Increases Hydraulic Capacity?	Improves Flooding?	Short List Alt No. **
Category: Flow Bypass											
27	Revise diversion operations	No description / evaluation	Unknown	Unknown	J.F Sato 2005	1					
28	Interconnect NPPDs Sutherland Canal and Central's Main Supply Canal (aka Tri-County Canal).	No description / evaluation	- Existing infrastructure and low cost (yet to be determined)	- Low capacity - High seepage loss - Limited operation outside of irrigation season	J.F Sato 2005	1	No				
29	Canal Modification between NPPD and TCCDD	Consolidation of CNPPID diversions and construction of canal connections.	- Avoids flood stage concerns	- Not feasible due to interference w/ NPPID hydro power operations '- requires modification to irrigation/hydropower ops	River Design Group, Inc. 2023	2	No				
30	Flow Bypass using existing facilities	North Platte to South Platte Diversion.	- Existing infrastructure and low cost - Relatively low cost (yet to be determined) - Higher capacity than option without canal improvements	- Low capacity (<200 cfs) - High seepage loss (~40% of NPR diversion) - Limited operation outside of irrigation season	EDO 2012 (June)	2	No				
31	Flow Bypass using existing facilities	Keith-Lincoln Canal (KLC), Suburban Irrigation Canal (SID), and Platte Valley Canal (PVID).	- Existing infrastructure and low cost (yet to be determined)	- Low capacity (<100 cfs) - High seepage loss - Limited operation outside of irrigation season	ACE 2016	2	No				
32	Construct New Canal for Bypass	Construct new canals parallel to or upside PPVID/North Platte Canal or SID/Suburban Canal	- Flexibility in return timing/capacities to NPR - Avoids flood stage concerns - Avoids modifications to existing water supply infrastructure	- Land acquisition and easements - Expensive - Excavation costs - Requires land acquisition and numerous road, rail, and siphon crossings.	ACE 2016	2		Yes	Yes	Yes	Alt 5
33	Existing Storage in CNPPIDs System	Storage in Jeffery and Johnson Lakes. Additional program water storage in CNPPID system, with SDHF release to make up for capacity shortfall in North Platte.	- Flexibility in reservoir and return capacities - Benefits to CNPPID and PRRIP	- Additional storage volume may be needed to avoid adverse impacts of rapid drawdown on Jeffrey and Johnson lakes. - Initially determined to be undesirable by CNPPID.	EDO 2012 (June)	2	No		Yes		
34	Sutherland East Reservoir	New Sutherland East Reservoir	- Flexibility in reservoir and return capacities - Benefits to TPNRD, PRRIP, and NPPD	- High cost - Delayed project completion (>5 years) - Permitting	EDO 2012 (Sept.)	2	No				
35	Storage in Existing Sutherland Reservoir	Divert water using Korty or Keystone Diversions, with new return to South Platte.	- Existing infrastructure and low cost - Higher capacity than option without canal improvements	- Concerns with system losses / timing - Not reasonable for NPPD	EDO 2012	2	No				
36	NPPD siphon bypass at South Platte River	Bypass using NPPD's Keystone Diversion, with the addition of a bypass just before or after the Paxton Siphon to the SPR. There is approximately 40 feet of head at this location (NPPD 2012), which could be used to gravity feed water to the South Platte River via a pipeline installed immediately above or below the Paxton Siphon.	- Up to ~1,700 cfs capacity at South Platte River	- Would require hydro-bypass agreement - Capacity constraints on delivering water to this point on the Sutherland Canal, i.e., unreliable surplus capacity (years when chokepoint capacity is actually a constraint on EA water delivery, Sutherland Canal is already going to be full due to preferential routing)	EDO 2012	2	No				
37	Pipeline from NPR to South Platte River	Small-diameter pipeline to carry water along north-south alignment from NPR to SPR	- No limits on operating schedule	- Limited capacity (<25 cfs) - High cost - Infeasible based on number of headgate diversion wells needed to divert from NPR, and pump water over divide from SPR to NPR.	EDO 2012	2	No				

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** See Table 2

Line No.	Alternative	Description	Capacity and/or Flood Control Benefit	Reason for Elimination	Reference	Prior Level of Evaluation (0-4)*	Feasible?	Stand Alone Solution?	Increases Hydraulic Capacity?	Improves Flooding?	Short List Alt No. **
Category: Vegetation Control											
38	Chemical Phragmites Treatment	Annual spraying	- Prevents further propagation of vegetation and reduction in hydraulic capacity	- Required annually - Minimal increase in hydraulic capacity, because root balls remain in place	J.F Sato 2005	2					Alt 6
39		Refinement of JF Sato Alt			SEH 2008	2					
40	Chemical/Mechanical Phragmites Treatment	Spraying in the fall with shredding only in areas with immediate need for flow improvement. Spraying upstream and downstream of HWY 83.	- Prevents further propagation of vegetation and reduction in hydraulic capacity - Does not required USACE permit	- Property access - Required annually	SEH 2009/2010	4					
41	Mechanical Phragmites Treatment	Chopping and disking	- May break up existing root balls, and facilitate sediment flushing - Relatively inexpensive - Slows rate hydraulic capacity reduction - Does not required USACE permit	- Higher cost than spraying alone - Access issues for heavy machinery in the floodplain - Potential 404 permitting requirements - Annual maintenance required - Not a standalone fix - Does not increase capacity	EDO 2012	4					
42	Vegetation Removal	Overall vegetation removal concept	- Prevents further propagation of vegetation and reduction in hydraulic capacity - Does not required USACE permit	- Removal alone has marginal effects on water surface elevations	River Design Group, Inc. 2023	2					
Category: Flood Control											
43	Open and Extend State Channel	Open State Channel and extend to connect to main floodplain	- Provide local flood relief along North River Rd - Redirect flow back to main channel	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	J.F Sato 2005	2	No			Yes	
44	Open South Channel	Open 800 feet of channel to connect road ditch along Washboard Road to another ditch to convey flow to main channel.	- Provide local flood relief - Redirect flow to main channel	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	J.F Sato 2005	2	No			Yes	
45	Remove Abandoned detour road and construct ditch to main channel	Remove the old detour road upstream of HW83 and construct a ditch from the south channel to the main channel of the river.	- Remove constriction/obstruction in river - Provide connection of south ditch to main channel to promote flow conveyance	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	J.F Sato 2005	2	No			Yes	
46	Box Culvert and Enlargement of Overbank Floodplain North of HWY83	Box culvert north of HWY 83 Bridge combined with vegetation removal and enlargement of overbank floodplain channels.	- Provide local flood relief - Redirect flow to main channel	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	HDR/Tetra Tech 2011	2	No			Yes	
47	Re-activate North Bank Channel downstream of HWY 83	Restore channels connection to main channel and match river invert to create additional conveyance during low and high flows.	- Provide local flood relief - Redirect flow to main channel	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	HDR/Tetra Tech 2011	2	No			Yes	
48	Construct Road Ditch along Washboard Road	Construct a road ditch along west side of Washboard Rd. Culvert/headwall installation under existing drives.	- Provide local flood relief - Redirect flow to main channel	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	J.F Sato 2005	2	No			Yes	
49	Increase width of North Channel	Increase width of North Channel	- Provide local flood relief - Redirect flow to main channel	- Minimal impact on overall hydraulic capacity - Would violate minor flood stage and conflict with Program policy	SEH 2009/2010	2	No			Yes	
50	Gravel Pond Outlet Project	Construction of an outlet for gravel pond located just east of HWY83 to reduce flooding. Project includes an outlet and pump/lift station.	- Improve drainage of ground and surface water in primary flood area	- Cost benefit not feasible - Minimal impact to hydraulic capacity - Topography may limit ability to drain pond during NPR high flows	EDO 2012	2					
51	Levee/Berm	Floodproof-Type Berm at Cody Park. Earthen "levee" along the bank at Cody Park ~1/2mile in length.	- Would protect Cody Park at high flows	- Ineffective at reducing flood impacts up to 3,000 cfs	HDR/Tetra Tech 2011	2	No				
52		Construct dikes to protect properties (No description/eval)	Unknown	Unknown	J.F Sato 2005	1					
53		Levee along the south bank of the NPR to protect Cody Park, similar to that installed summer 2011 by FEMA	- Would protect Cody Park at high flows (i.e., greater than 6,000 cfs)	- No flood protection at Program flow of up to 3,000 cfs	EDO 2012	2	No			Yes	
54		Levee along the north bank of the NPR to protect area south of N River Road that is typically flooded at flows above minor flood stage	- Would minimize flooding related to surface flows overtopping channel banks	- Could increase ground water flooding as a result of increased river stage - Difficulty permitting levees within NPR floodway - High profile levee likely unacceptable to residents - Would violate minor flood stage and conflict with Program policy	EDO 2012	2	No			Yes	

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** See Table 2

Line No.	Alternative	Description	Capacity and/or Flood Control Benefit	Reason for Elimination	Reference	Prior Level of Evaluation (0-4)*	Feasible?	Stand Alone Solution?	Increases Hydraulic Capacity?	Improves Flooding?	Short List Alt No. **
Category: Flood Easements / Property Buyouts											
55	Flood Easements	No description / evaluation	Unknown	Unknown	SEH 2009/2010	1					
56		Property Inundation Compensation Alternative (flood easements). Flood easement for properties impacted. 28 parcels identified, no insurable structures, two secondary building. Total area ~87 acres.	- May not require any additional alternatives - One time fee, no long term costs	- Intentional violation of flood stage conflicts with Program policy and CNPPID's FERC license requirements. - Most property owners unwilling to participate - Conflicts with Programs 'willing seller' policy - Impacted areas may change over time	ACE 2015/2016	2	No				
57	Property Buyouts	No description / evaluation	Unknown	Unknown	J.F Sato 2005	1					
58		Buyouts and easements with minimal impact of floodproofing projects		- Not enough willing seller area to justify increased flood stage - Likely politically unacceptable until other options exhausted and SDHF deemed essential - High cost with uncertain results	EDO 2012	2	No				
59		Buyout of affected properties based on flood inundation. Total assessed value in 2012 was ~$2.8M, with additional costs likely ~$3.4M.	- Smaller area needed because of flood-proofing - May justify an increase in minor flood stage to 6.5 feet (2,400 cfs)	- Not enough willing seller area to justify increased flood stage - High cost with uncertain results	EDO 2012	2	No				
New Alternatives											
60	South Platte Storage	Develop Storage on the South Platte River to Provide 3,000 cfs at Confluence. Exchange of flows from North Platte to South Platte at a ratio would be required.				0					Alt 7
61	Buyout Existing Irrigation District Infrastructure	Buyout of irrigation district canals - PVID/North Platte Canal or SID/Suburban Canal. Irrigation would be converted from surface to groundwater with groundwater recharge to mitigate impacts.				0					Alt 8
62	Reduce/Control Upstream Sediment Sources	Identify and reduce upstream sediment sources between Lake McConaughy and HWY 83.				0					Alt 9

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** See Table 2

Table 2 North Platte River Chokepoint Alternatives Short List

Alt No.	Alt Type	Alternative	Description	Prior Level of Evaluation (0-4)*	Evaluation Tasks
Alternatives					
1	Sediment Management	Dredging	Dredging in main channel. Extents could be from upstream of HWY83 to Tri-County Canal Diversion.	3	- Geomorphic Evaluation - Hydraulic / Sediment Transport Modeling - Determine Dredging Extents, Volume, Frequency - Permitting Requirements - Disposal Plan - Engineering/Dredging Costs and Permitting
2	Sediment Management	Modification to Tri County Diversion	Modification to Dam to allow for sediment passage.	2	- Geomorphic Evaluation - Hydraulic / Sediment Transport Modeling - Identify Design Constraints Related to Tri-County Operations - Determine Benefit to Hydraulic Capacity at HWY 83 - Evaluate Downstream Impacts of Sediment Passage - Engineering/Construction Costs and Permitting
3	Channel Modification/ Construction	Channel Widening and/or Sand Bar/Island Removal	Widening of channel in strategic locations to increase hydraulic capacity. Removal of vegetation and widening at Sand Bar / Islands	3	- Geomorphic Evaluation - Identify Potential Locations - Hydraulic / Sediment Transport Modeling - Evaluate as Benefit to Other Alternatives - Engineering/Dredging Costs and Permitting
4	Channel Modification/ Construction	Spur Dikes/Jetties/ Bendway Weirs	Low profile bendway weirs placed downstream of HWY 83 to increase transport capacity during low flows.	3	- Geomorphic Evaluation - Determine Potential Locations - Hydraulic / Sediment Transport Modeling - Evaluate as Benefit to Other Alternatives - Engineering/Dredging Costs and Permitting
5	Flow Bypass	Construct New Canal for Bypass	Construct new canals parallel to or upside PPVID/North Platte Canal or SID/Suburban Canal	2	- Assess Feasibility of New Canal or Upsizing of Existing - Determine Required Canal Capacity to Bypass Chokepoint - Canal Sizing (new or upsized) - Evaluate Land Acquisition/Easements and Crossing Requirements - Engineering/Construction Costs
6	Vegetation Control	Chemical/Mechanical Phragmites Treatment	Spraying in the fall with shredding in areas with immediate need for flow improvement.	4	- Geomorphic Assessment - Evaluate Impact of Vegetation on Capacity and Transport - Hydraulic / Sediment Transport Modeling - Identify Benefits of Vegetation Control/Removal

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Alt No.	Alt Type	Alternative	Description	Prior Level of Evaluation (0-4)*	Evaluation Tasks
New Alternatives					
7	Flow Bypass	South Platte Storage	Develop Storage on the South Platte River to Provide 3,000 cfs at Confluence. Exchange of flows from North Platte to South Platte at a ratio would be required.	0	- Determine Storage Volume Required to Deliver 3,000 cfs at Confluence - Assess and Account for Flow Exchange from NP to SP - Identify Potential Storage Locations (New or Existing) - Evaluate Land Acquisition/Easements - Engineering/Construction Costs
8	Flow Bypass	Buyout Existing Irrigation District Infrastructure	Buyout of irrigation district canals - PVID/North Platte Canal or SID/Suburban Canal. Irrigation would be converted from surface to groundwater with groundwater recharge to mitigate impacts.	0	- Determine Capacity of Existing Canals - Explore Potential for Buyout of Irrigation District Infrastructure - Evaluate Groundwater Recharge Requirements and Costs to Offset Conversion of Irrigation from Surface to Groundwater - Identify Long Term O&M Plan/Cost
9	Sediment Management	Reduce/Control Upstream Sediment Sources	Identify and reduce upstream sediment sources between Lake McConaughy and HWY 83.	0	- Geomorphic Assessment from Lake McConaughy to HWY 83 - Identify Sediment Sources / Develop Sediment Budget - Identify Locations Where Sediment Sources Might be Controlled - Determine Feasibility of Reduction in Upstream Sediment Sources

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Attachment A

PRRIP CHOKEPOINT PROJECT MEMORANDUM

DATE:	August 18, 2023	**ACE PROJECT NO.:**	NEHW05.01
TO:	Seth Turner, PPRIP Executive Director's Office		
FROM:	Michelle Martin, PE, Anderson Consulting Engineers, Inc.		
	Brian Murphy, PhD, PE, River Works Ltd		
SUBJECT:	North Platte Chokepoint Project Charter		

This memorandum describes the North Platte chokepoint project charter. The charter summarizes the PPRIP North Platte chokepoint Project goals, objectives, strategies, and constraints as developed by the PRRIP Executive Director's Office (EDO) and the Anderson Consulting Engineers (ACE) team. It also provides clarity to everyone involved in the project about what will be accomplished and sets expectations for all stakeholders so that everyone is working towards meeting the project goal.

Background

The Platte River Recovery Implementation Program (Program) initiated on January 1, 2007 between the states of Nebraska, Wyoming, and Colorado and the Department of the Interior to address endangered species issues in the central and lower Platte River basin. Program "target species" include the whooping crane, piping plover, interior least tern (now de-listed), and pallid sturgeon.

Project Reach

The project reach includes the lower 10 miles of the North Platte River extending from the Tri-County Canal Diversion on the Platte River to approximately 5.5 miles upstream of State Highway 83.

Platte River Recovery Implementation Program Objective

The Addendum to the Program Document for the First Increment Extension specifies the following water management objectives related to the North Platte chokepoint:

- Aggressively continue to implement channel conveyance improvements at North Platte chokepoint through efforts directed toward achieving and maintaining at least 3,000 cfs conveyance capacity while remaining below flood stage, with additional capacity developed as practicably achievable with available resources.
- Implement water releases including short-duration high flows (SDHF) and target flows once Program water projects are operational and chokepoint conveyance issues are resolved.
- The Program will continue to evaluate the efficacy of available Program water and chokepoint capacity through time to ensure Program water meets its intended purposes.

Problem Statement

Minor flood stage for the North Platte chokepoint, as defined by the National Weather Service (NWS) for the North Platte River at North Platte gage (06693000), is 6.0 feet. Average discharge capacity at this minor flood stage is estimated to be about 1,760 cfs based on the current Nebraska Department of Natural

Resources rating curve and shift measurements since July 2020. Limited hydraulic capacity through the chokepoint is a constraint on the ability to deliver water from the Lake McConaughy EA to the Program's Associated Habitat Reach (AHR) on the central Platte River downstream between Lexington and Chapman, Nebraska.

Project Goal

The EDO defined the project goal as identifying and screening alternative solutions to increase hydraulic capacity through the chokepoint and/or provide delivery of flows downstream of the chokepoint through other systems. Any new alternatives the ACE team develops will maintain delivery of a total peak flow of 3,000 cfs to the Program's AHR on the central Platte River without exceeding minor flood stage of 6.0 feet on the North Platte River as defined by and measured at the gage at the State Highway 83 bridge.

Project Objectives and Strategies

1. Identify, screen, and rank past and potential new alternatives to improve conveyance capacity and reduce flood risk through the North Platte chokepoint reach.
2. Update and calibrate baseline models.
3. Conduct detailed hydraulic and/or sediment transport modeling as needed to evaluate the effectiveness of selected alternatives at achieving and maintaining gains in conveyance capacity through the North Platte chokepoint.
4. Complete assessment of permitting requirements, estimated costs, and implementation timeline for selected alternatives.

Objective	Strategy
1. Identify, screen, and rank past and potential new alternatives to improve conveyance capacity and reduce flood risk through the North Platte chokepoint reach.	Review all previous studies and alternatives provided by the EDO.
	Develop a listing and brief description of all previous alternatives, refinement of pervious alternatives, and new alternatives.
	Collaborate with the EDO and Chokepoint Planning Workgroup to review and screen alternatives list. The list will be reduced to the most feasible alternatives identified for further evaluation.
	Develop decision criteria for alternative selection (e.g. performance, cost, permitting, long term O&M, timeline, social impacts, etc.)
	Utilize a multi criteria decision analysis (MCDA) process to rank and select alternatives.
2. Update and calibrate baseline models.	Utilize best available topography (2020 LiDAR) to update the existing HEC-RAS 1D hydraulic model of the study reach.
	Utilize best available topography (2017/2020 LiDAR) to develop an existing 2D hydraulic model of the entire study reach using SRH-2D. Information from the previously developed 2D HEC-RAS model will be leveraged.
3. Conduct detailed hydraulic and/or sediment transport modeling as needed to evaluate the effectiveness of selected alternatives at achieving and maintaining gains in conveyance capacity through the North Platte chokepoint.	Perform a robust geomorphic assessment that clearly identifies the physical processes of river function and response.
	Develop a 2D hydraulic model using SRH-2D, leveraging the baseline data and models, to determine hydraulic capacity and floodplain inundation for each alternative.
	Use the SRH 2D model to characterize the depth and velocity fields across a range of expected flows, and to predict the location and magnitude of changes in channel morphology for each recommended alternative.
	Improve the calibration/validation process by comparing model output to high-resolution surface velocities computed from UAV imagery using large-scale particle image velocimetry techniques
4. Complete assessment of permitting requirements, estimated costs, and implementation timeline for selected alternatives.	Build upon previous vegetation studies and data collected though the Program's vegetation monitoring program to evaluate each alternative, permitting implications and permitting strategies
	Develop rough order of magnitude (ROM) planning-level capital cost estimates and O&M costs for new alternatives and update cost estimates (capital, O&M) for previous alternatives (if available).
	Prepare a milestone schedule for the top three ranked alternatives that considers current permitting and procurement timelines.

Project Considerations/Constraints

- Alternative solutions will not exceed NWS minor flood stage of 6.0 feet at the North Platte River at North Platte Gage (06693000) at the State Highway 83 bridge.
- Alternatives will not include modification to minor flood stage as defined by the NWS.
- Alternatives shall not adversely impact private properties. If unavoidable impacts to private properties are identified, mitigation will be included as part of alternative development.
- Alternatives will not adversely impact or disrupt any irrigation and/or hydro-power generation operations.
- Long-term O&M costs will be considered for all alternatives.
- Alternatives will not exceed a capital cost of $15 million.

Attachment B
North Platte River Chokepoint Reference List

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