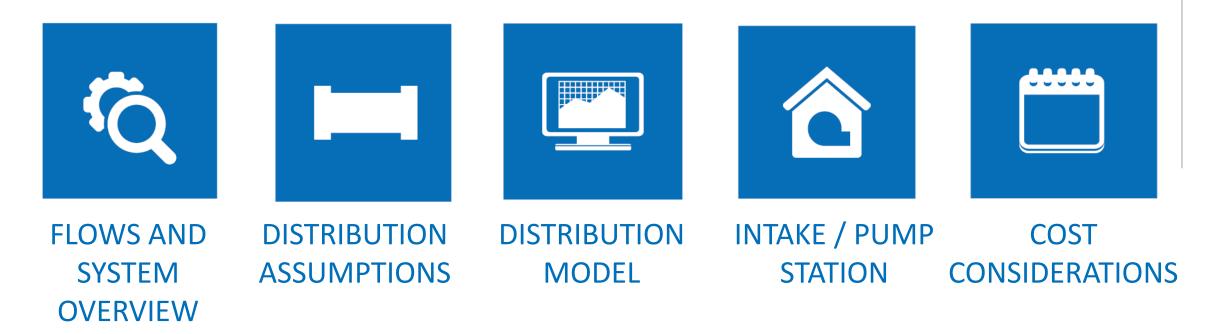
FALLON FLATS IRRIGATION PROJECT

November 29, 2021

Presented by:



TOPICS OF DISCUSSION







- Irrigable Acres: 15,200 Acres
- Application Rate: 8 gpm/acre (0.42in/day)
- Run time: 24 hr/day
- Irrigation Season: 145 Days (April 15 to Sept 7)
- Split up into four initial flow rates based on the % of the system that would operate at one time

Pivot Operations	GPM	CFS
100%	121,610	270.9
50%	60,805	135.5
33%	40,537	90.3
25%	30,403	67.7



Instantaneous Pivots Operations

50% Pivots

33% Pivots

38,447 acre feet/year 24,02

24,029 acre feet/year

- Estimated Based on a 145-day Irrigation Season
- Point of Withdrawal needs to be in Prairie County



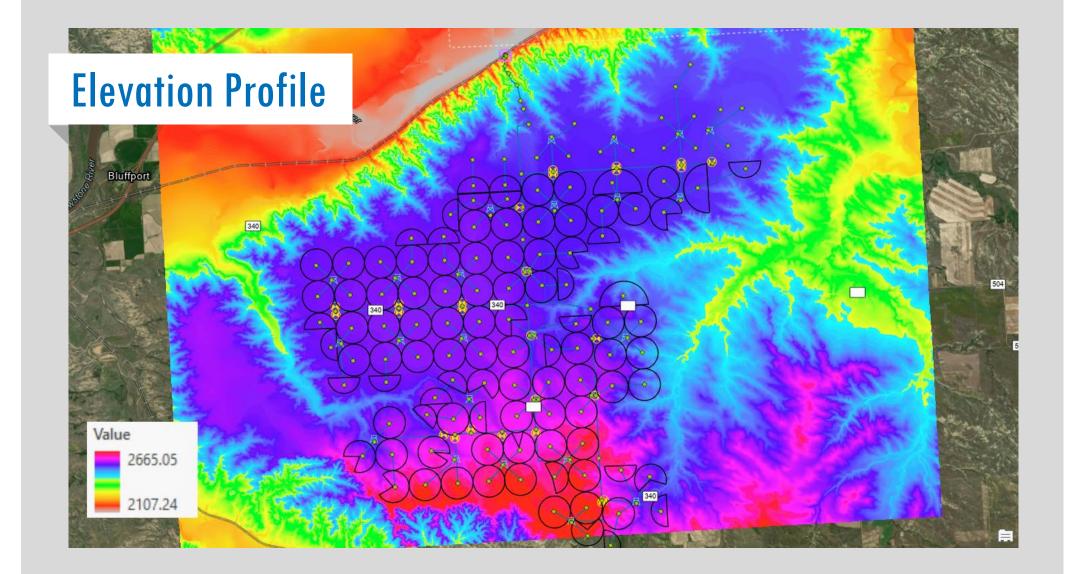
Key Hydraulic Modeling Assumptions

- Water pumped out of the river at essentially the same rate as the system is running at which is maintained by automated controls
- Pond size not significant in water delivery
- Three inches of evaporation per week assumed from Ponds
- Scenario 3 excludes ponds and assumes direct connection to pivots

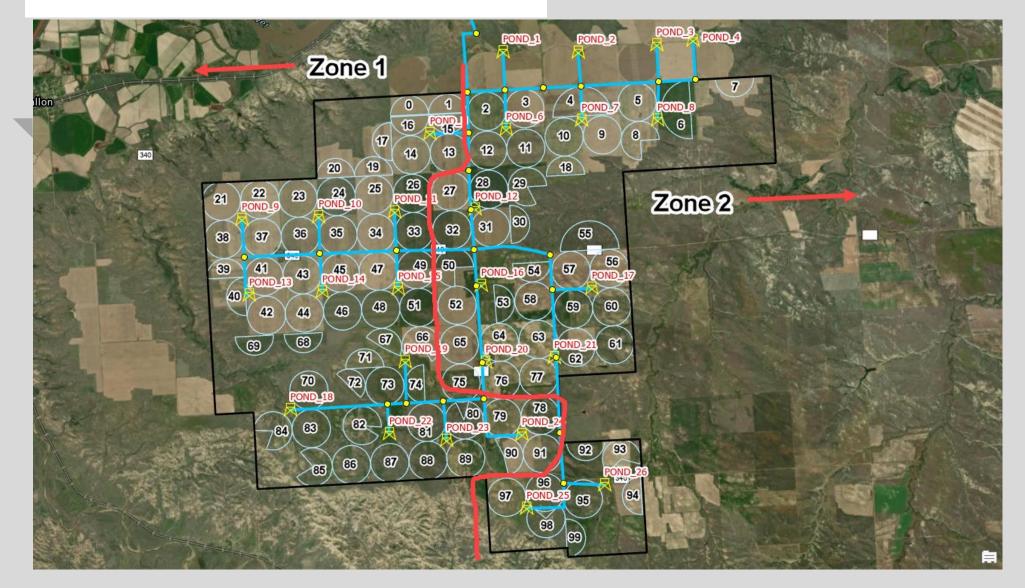


Key Hydraulic Modeling Assumptions

- Operations for both scenarios is:
 - 50% of the pivots irrigated at 8 gpm/acre (based on circular pivot area) for one-day to one-week intervals, then alternating with the other 50% at the selected time interval.
- Additional flow capacity allowed for leakage, and inefficiencies with automated controls.



Pivot Zone Operations Concept





SCENARIO 1

Larger Pipes and Smaller HP Pumps

SCENARIO 2

Larger HP Pumps and Smaller Pipes

 Both scenarios evaluated effect on pond sizes, operational approaches (zonal flows), and pond fill rates

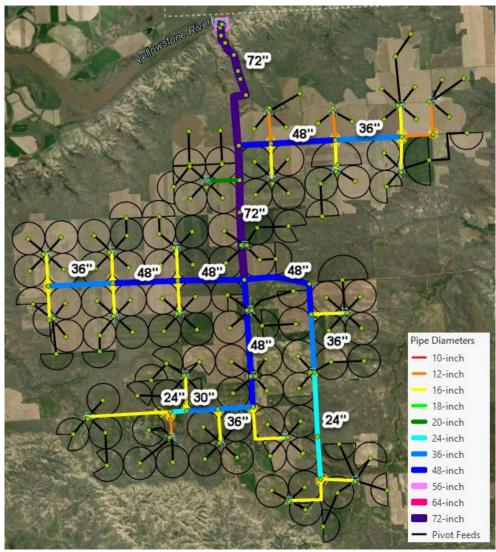


SCENARIO 3

Smaller Pipes and Larger HP Pumps

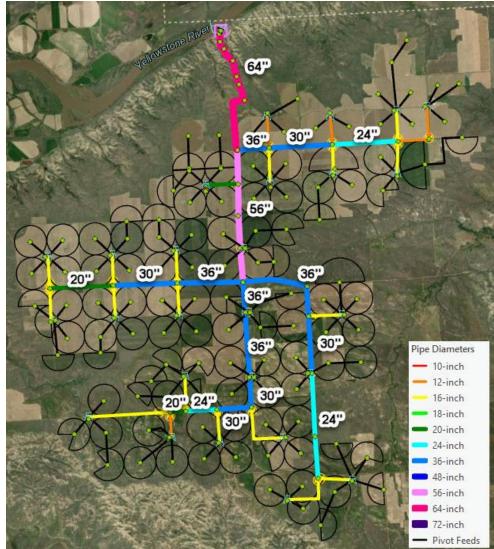
- Assumes direct connection to pivots for operation, operational approaches (zonal flows), and pivot rotation
- Different pump station location upstream of Haidle Intake
- Longer pipeline distance to Fallon Flats

SCENARIO 1 LARGER PIPES AND SMALLER PUMPS



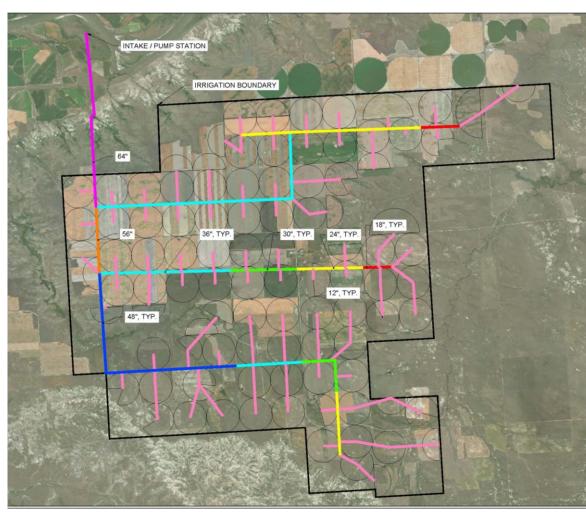
Pipe Size (inches)	Pipe Length (feet)
72	21,957
48	36,622
36	18,130
30	2,571
24	10,010
20	2,977
16	54,232
12	12,302

SCENARIO 2 LARGER PUMPS AND SMALLER PIPES



Pipe Size (inches)	Pipe Length (feet)
64	11,342
54	10,889
36	23,600
30	20,532
24	16,637
20	7,313
16	54,106
12	3,544

SCENARIO 3 – UPSTREAM INTAKE LARGER PUMPS AND SMALLER PIPES



Pipe Size (inches)	Pipe Length (feet)		
64	14,195		
54	5,330		
48	18,752		
36	37,055		
30	10,511		
24	24,964		
18	5,743		
12	159,907		



FLOW SCENARIO NUMBERS

Scenario	Pivot Operations	Total Head (ft)	No. of Pumps	Total GPM	Total CFS	Total HP
1, Large pipe	50%	625	3	60,000	133.7	12,000
1, Large pipe	33%	625	3	37,500	83.6	7,500
2, Small pipe	50%	725	3	60,000	133.7	15,000
2, Small pipe	33%	725	3	37,500	83.6	9,000
3, Small pipe	50%	625	3	60,000	133.7	12,000
3, Small pipe	33%	625	3	37,500	83.6	7,500

Scenario 1, 2 and 3 are looked at with 50% or 33% of the pivots running at a time

PUMP STATION LOCATIONS AND ROUTING



- Pump Station Location Alternatives
- Route 1
 - Shortest
 - Road Access
 - Permitting Benefits
 - Site Concerns
- Route 3
 - Longest
 - Access Concerns
 - More Permitting
- Same Pumping Requirements





- Alternative 4
 - Longer overall
 - Easier Road Access
 - Permitting Benefits
 - Easier Construction
- Same Pumping Requirements

PUMP STATION LOCATIONS AND ROUTING



- FEMA has no flood data for the area
- All routes have practically the same elevation gain
- The first 400 ft. of elevation gain takes about 55-64% of the pumping power

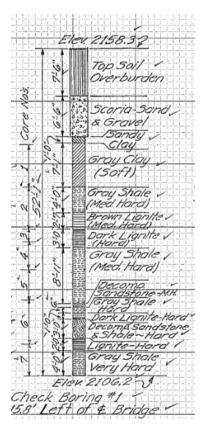




- BLM owned land will add permitting difficulty with ESA
- FEMA has no flood data for the area
- Similar elevation gain to Scenarios 1 and 2
- The first 400 ft. of elevation gain takes about 55-64% of the pumping power







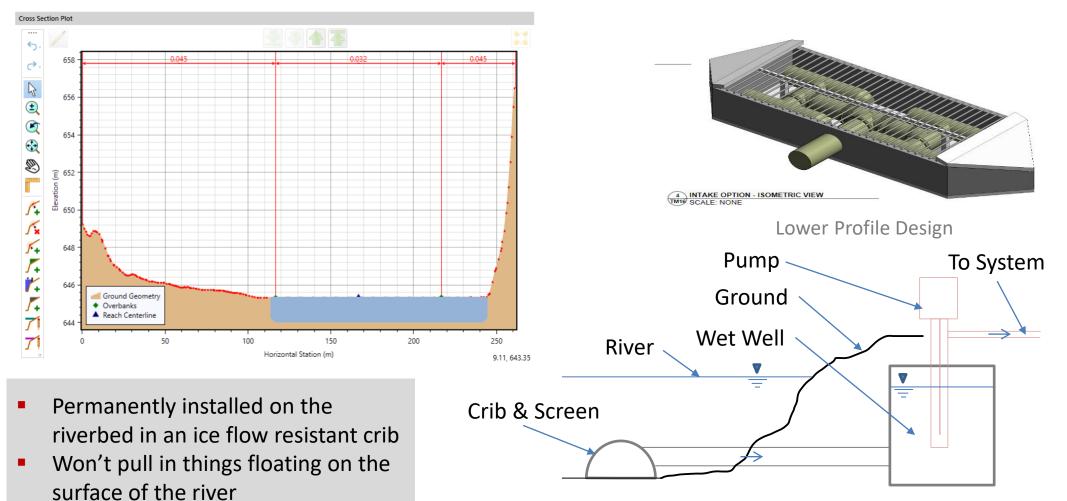
River Conditions

- The Cross Section is looking upstream at the Yellowstone Rive Bridge north of Fallon
- The River is wider here than at the proposed intake location
- A depth of 10' or more is expected at the proposed intake location
- Sandstones and Shales are common in the area
- The Montana State Library / Yellowstone River
 Conservation District says that the south bank in the area is confined by sandstone

MDT Bridge Cross Section



RIVER INTAKE SCENARIOS 1 & 2 PROPOSED CONCEPT





Pump Station Preliminary Design/ Concepts

- Wet well pump station
- Raised wet well pump station

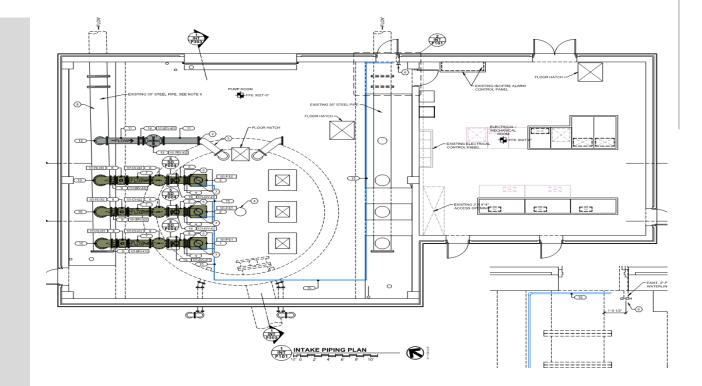


35 MGD Wet Well Pump Station Chester, MT



Pump Station Layout

- Pump house on wet well caisson
- Separate electrical rooms
- O&M benefits (bridge cranes, roof access, automation

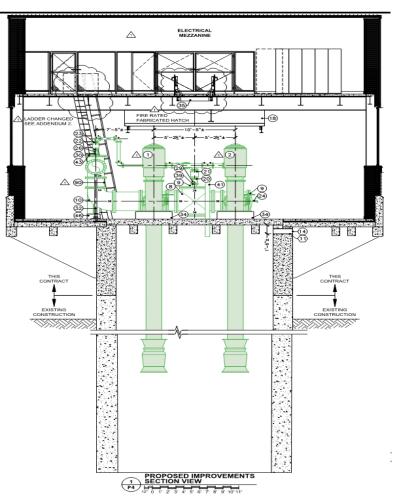


Wet Well Pump Station Layout



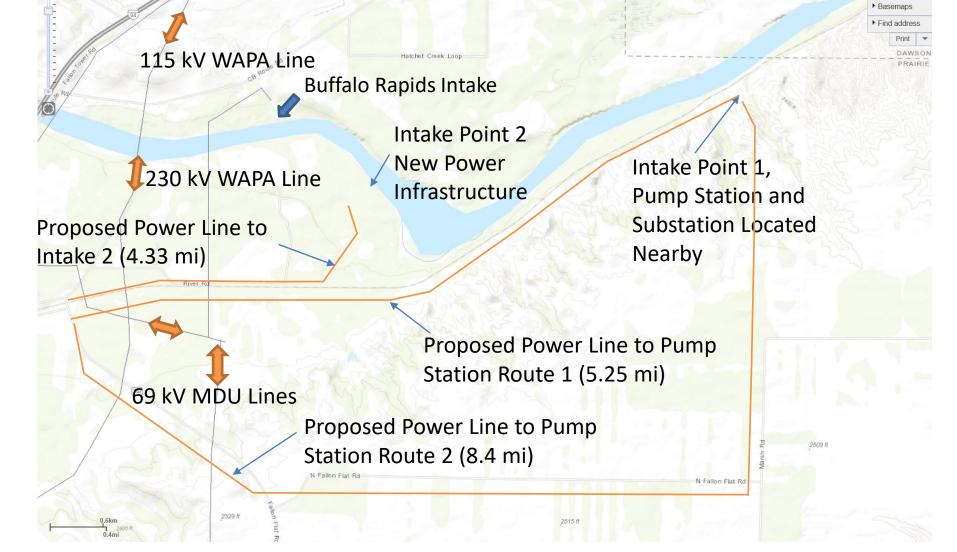
Pump Station Layout

- Pump house on wet well caisson
- Raised electrical rooms
- Reduced footprint



Flood Protected Wet Well Pump Station – Bismarck HCW

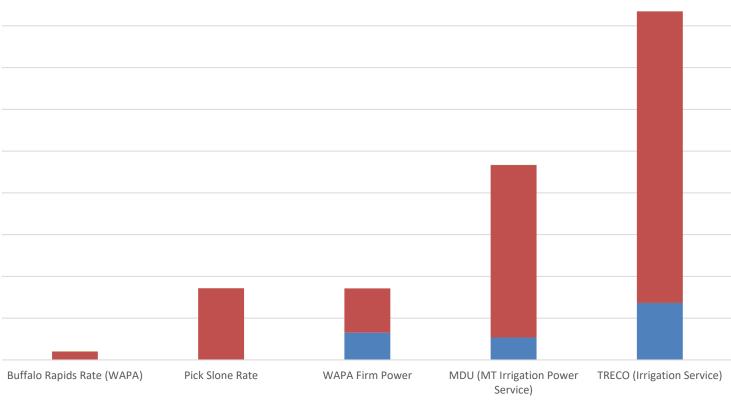
ELECTRICAL SITE OVERVIEW



Layers/Legend



Total Annual Electric Cost Comparison (133.7 CFS)



- All scenarios are similar for annual cost
- Scenarios 1 & 3 become more significant in operation cost savings without WAPA Firm Power contract
- If a low-cost contract could be negotiated it would result in substantial long-term savings



COST ESTIMATE

- Preliminary Cost Estimate Range
 - Scenario 1 = \$96-135M
 - Scenario 2 = \$85-120M
 - Scenario 3 = \$79-114M
- On farm vs off farm
- Formation of new irrigation district
- O&M costs will vary based on power consumption per scenario

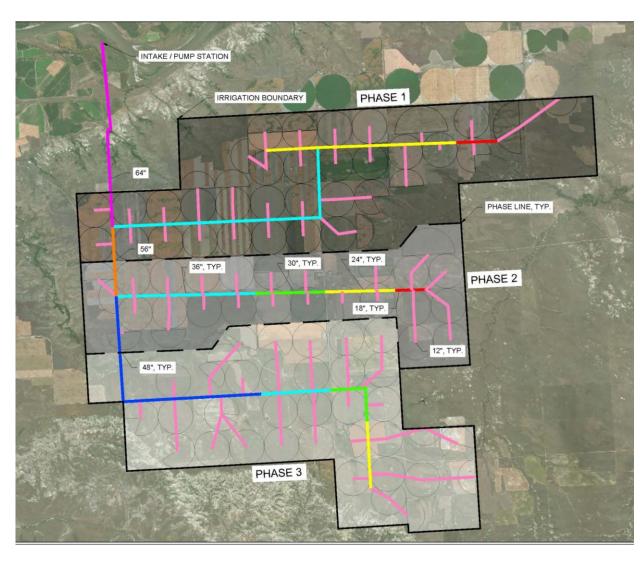
A Mobilization Insurance, Bonds, Mobilization, Insurance, Bonds, Mobilization, Insurance, Bonds, Mobilization, A velosition Rover Initiale Struct, b. Site Work, Dewatering Initaka, A. C. Pump Station and Well (86 d. Pumps (12,250 total hg) e. Process Piping, Valves, Surge C f. WAPA Electrical Subdation g. Pump Electrical Subdation g. Pump Electrical Subdation g. Pump Electrical Subdation f. Dientace Power Line Delivery Subdati Improvements a. 72: Steel Pipeline d. 30" Steel Pipeline d. 10" Improvements d. Contocytual Lower Controls Dy Subdati Improvements d. Contingency <u>Contingency Contingency Contingency Subdatal Lower Controls Dy Subdatal Lower Controls SU Subdatal Lower Contendence Subdatal Lowe</u>					
Insurance, Bonds, Mobilization, Association of the second	ESCRIPTION	QUANTITY	UNIT	UNIT COST	SUBTOTAL
An av Water Intake & Pump Station An Unprovements A 'ellowatore River Intake Struct. Sile Vice Intake Struct. Sile Vice Intake Struct. Sile Vice Intake Struct. Sile Vice Intake Struct. An of the Struct Struct. A				10%	\$8,369,317
1.0 Improvements a. Yellowstone River Intake Struct. b. Sile Work, Dewatering Intake, A c. Pump Station and Wet Wet (66 d. Pump, 12,230 total hy) a. Process Piping, 21,230 total hy) a. Process Piping, 21,230 total hy b. Dewith See Power, Line Delivery b. Devise Power, Line Delivery c. 47: Steel Power Net c. 101 Improvements c. 0. Center Protots b. Supply Pords c. Instrumentation and Controls S5 Subtotal Improvements c. Units Reservents c. Order Net c. Genetwork c. 0. Methode Net				10%	36,369,31
a. Yelevastore River Initiae Structure b. Sile Work, Dewatering Initiak, A. c. Purop Station and Wet Wet (66 d. Purop 2 (22.50 total hrg) a. Process Piping, 2 Valves, Surgo f. WAPA Electrical Substation a. Purop Electrical Equipment h. <u>Overhead Power Inno Dulvery</u> Subtical Improvements a. 72" Steel Pipeline d. 30"	n				
b. Sile Work, Deventing Intake, A. c. Pump Station and Web (66 d. Pumps (12,350 total hg) e. Process Pipling, Valves, Surge C f. WAPA Electrical Substation g. Pump Electrical Equipment b. Overhaad Power Line Delivery Subtatal Improvements a. 27: Statel Pipelin d. 39: Statel Pipelin d. 30: Statel Pipelin d. 30: State d. 10: Improvements d. Construction Costs Subtatal Lower Costingencies Subtatal Coster/octots d. Unprovements d. Unity Examents d. Unity Examents d. Busing Examents d. Busing Examents d. Busing Examents					40.040.00
C. Pump Station and Vet Wel (6) G. Pump (2,250 total hrs) Process Fiping, valves, Surger I. VAPA Electrical Substation Pump Electrical Equipment Pump Electrical Equipment Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deverting Deve		1	LS	\$3,640,000 \$850,000	\$3,640,00 \$850,00
d. Pumps (12,250 lotal hp) e. Process Pping, Valves, Surge C i. WAPA Electrical Equipment g. Pump Electrical Equipment b. Overhaad Power Line Delivery. Subtation Subtation a. T7 Steel Ppelne b. Improvements a. T7 Steel Ppelne b. 307 Steel Ppelne c. 307 Steel Ppelne c. 307 Steel Ppelne d. 307 VC Ppelne f. 127 PVC Ppelne f. 127 PVC Ppelne g. Center Prots Subtati Improvements c. Instrumentation and Controls S Subtati Lower Contringences Subtati Lower Controls Costs 10 Improvements a. Unity Examents b. Design & CM c. Order Lower Controls Costs		1	LS	\$10,640,869	\$10.640.86
e. Process Piping, Valves, Surger f. WAPA Electrical Substation (f. WAPA Electrical Substation (h. <u>Overhead Power Inno Delvery</u> Subtotal Improvements a. 72 Steel Pipetine Above Groun b. 72 Steel Pipetine Above Groun b. 72 Steel Pipetine (d. 36 Steel Pipetine (d. 37 Steel Pipetine (d. 38 Steel Pip		1	LS	\$3,345,566	\$3,345,56
 I. WAPA Electrical Substation Pump Lectrical Equipment <u>Overhaad Power Line Delivery</u>. Subtatal Improvements a. 77 Stel Pipeline I.0 Improvements a. 77 Stel Pipeline b. 30° Stel Pipeline c. 30° Stel Pipeline d. 15° PVC Pipeline d. 15° PVC Pipeline d. 16° PVC Pipeline <lid. 16°="" <="" pipeline<="" pvc="" td=""><td>Control</td><td>1</td><td>%</td><td>30%</td><td>\$1,003,67</td></lid.>	Control	1	%	30%	\$1,003,67
A. Overhead Power Line Delivery Subtical Improvements A. T7 Steel Pipeline Adove Groun b. 77 Steel Pipeline Adove Groun b. 72 Steel Pipeline Adove Groun b. 72 Steel Pipeline d. 35 Steel Pipeline d. 35 Steel Pipeline d. 37 Steel Subtotal Improvements B. Supply Ponds d. Instruction Costis Subtotal Improvements Subtotal Lowel Contingencies Subtotal Construction Costis Subtotal - Construction Costis Hon-Construction Costis J. Dimprovements d. Uity Examents b. Design & CM c. Gedechnical		1	LS	\$5,573,788	\$5,573,78
Subtotal improvements Subtotal improvements a. 72: Steel Pipeline Alove Groun b. 72: Steel Pipeline Alove Groun b. 72: Steel Pipeline Alove Groun c. 47: Steel Pipeline d. 36: Steel Pipeline d. 36: Steel Pipeline d. 36: Steel Pipeline d. 37: Steel Pipeline d.		1	%	35%	\$4,895,25
Pipelines I.0 Improvements a. 72' Steel Pipeline Above Groun b. 72' Steel Pipeline Above Groun b. 72' Steel Pipeline d. 33' Steel Pipeline d. 33' Steel Pipeline d. 34' Steel Pipeline d. 35'	(44,352	LF	\$44	\$1,933,68
1.0 Improvements a. 72' Steel Pipeline Above Groun b.72' Steel Pipeline c. 43' Steel Pipeline c. 43' Steel Pipeline d. 33' Steel Pipeline d. 33' Steel Pipeline d. 31' Steel Pipeline d. 21' PiVO Pipeline d. 20' Steel					\$31,882,82
a. 72" Steel Pipetine Above Groun b. 72" Steel Pipetine c. 44" Steel Pipetine c. 43" Steel Pipetine c. 30" Steel Pipetine c. 30" Steel Pipetine c. 30" Steel Pipetine f. 24" PVC Pipetine f. 12" PVC Pipetine f. 12" PVC Pipetine f. 12" PVC Pipetine f. 13" PVC Pipetine f. 14" PVC Pipetine f. 15" PVC Pipetine f. 5" Subtotal Improvements f. Contingency Conceptual Level Contrid space Subtotal - Construction Costs f. Non-Construction Costs f. Unprovements h. Ultipit Jeaments					
b. 72' Steel Pipeline c. 44' Steel Pipeline d. 33' Steel Pipeline d. 33' Steel Pipeline d. 33' Steel Pipeline f. 24' PVC Pipeline f. 24' PVC Pipeline f. 15' PVC Pipeline f. 15' PVC Pipeline f. 15' PVC Pipeline d. 10' PVC Pipeline f. 12' PVC Pipeline d. 10' PVC Pipeline f. 12' PVC Pipeline f. 12' PVC Pipeline f. 12' PVC Pipeline f. 12' PVC Pipeline d. 12' PVC Pipeline f. 12' PVC Pipeline d. 12' PVC Pipeline f. 2' P					
c. 44° Steel Pipeline d. 30° Steel Pipeline d. 30° Steel Pipeline d. 30° Steel Pipeline d. 21° PVC Pipeline d. 21° PVC Pipeline d. 12° PVC Pipeline d. 12° PVC Pipeline d. 12° PVC Pipeline d. 20° Subtotal improvements d. O Improvements d. O Improvements d. Conter Pivots d. Subtotal improvements d. Context Pivots d. Subtotal improvements d. Subtotal improvements d. Subtotal improvements d. Subtotal improvements d. Dongraphic descents d. Dongraphic descents d. Unit generation d. Unit generation d. Unit generation d. Genetechnical	nd	8,870	LF	\$800	\$7,096,32
d. 38" Steel Pipeline d. 38" Steel Pipeline d. 39" Steel Pipeline d. 21" PVC Pipeline d. 21" CPC Pipeline		13,087	LF	\$735	\$9,618,65
e. 30° Steel Pipeline f. 24° PVC Pipeline g. 21° PVC Pipeline g. 21° PVC Pipeline f. 15° PVC Pipeline f. 15° PVC Pipeline f. 12° PVC Pipeline Guttore Pivots subtotal improvements conter Pivots Subtotal improvements Gonceptual Level Contingence Gonceptual Level Contingences Subtotal - Construction Costs Non-Construction Costs Onents Gonceptual Level Contingences Gonceptual Level Contingences Subtotal - Construction Costs Domage & CM Gonceptual Level Contingences Gonceptual Level Contingences Subtotal - Construction Costs Domage & CM Gonceptual Level Contents		36,622	LF	\$351 \$291	\$12,854,32
f. 24° PVC Pipeline g. 21° PVC Pipeline h. 15° PVC Pipeline h. 15° PVC Pipeline h. 12° PVC Pipeline deterministry		18,130 2.571	LF	\$291	\$5,275,83 \$552,76
9, 21° PVC Pipetine h, 15° PVC Pipetine 1, 12° PVC Pipetine Subtrait Improvements a. Center Pivots b. Supply Ponds c. Instrumentation and Controls Sy Subtrait Improvements <u>Subtrait Improvements</u> <u>Subtrait Level Contingencies</u> <u>Subtrait Level Contingencies</u>		10,010	LF	\$72	\$720.72
h. 15" PVC Pipeline h. 15" PVC Pipeline Subtotal Improvements or Center Prots b. Supply Ponds c. Centre Prots b. Supply Ponds c. Instrumentation and Controls Sy Subtotal Improvements Subtotal Construction Costs Subtotal - Construction Costs Non-Construction Costs b. Design & CM c. Getechnical		2.977	LF	\$69	\$205,41
Subtotal Improvements Verot system Subtotal Improvements Contret Pivots Supply Ponds Contreteration and Controls Sy Subtotal Improvements Conceptual Level Contingencies Subtotal - Construction Costs Non-Construction Costs Non-Construction Costs Design & CM Contechnical		54,232	LF	\$34	\$1,843,88
Pivot system		12,302	LF	\$18	\$221,43 \$38,389,34
1.0 Improvements a. Center Pivots b. Sizejky Pords c. Instrumentation and Controls Sy Subtotal Improvements Subtotal - Construction Costs Mon-Construction Costs 1.0 Improvements a. Utility Eastements b. Design & CM c. Getechnical			_		\$30,369,34
B. Center Pivots B. Supply Ponds C. Instrumentation and Controls Sy Subtotal Improvements Conceptual Level Contingencies Subtotal - Construction Costs Non-Construction Costs D. Improvements B. Design & CM C. Getechnical					
b. Supply Pands c. Instrumentation and Controls Sy. Subtotal Improvements Conceptual Level Contingencies Subtotal - Construction Costs Non-Construction Costs 1.0 Improvements a. Uility Exements b. Design & CM c. Getechnical		99	200		\$12.375.00
c. instrumentation and Controls Sy Subtolal Improvements Conceptual Level Contingencies Subtolal - Construction Costs Non-Construction Costs Non-Construction Costs D. Improvements a. Uility Examents b. Design & CM c. Geotechnical		26	Each	\$125,000 \$25,000	\$650,00
Contingency Conceptual Level Contingencies Subtotal - Construction Costs Non-Construction Costs 1.0 Improvements a. Uility Examents b. Design & CM c. Getechnical	System	99	Each	\$4,000	\$396.00
Conceptual Level Contingencies Subtotal - Construction Costs . Non-Construction Costs 1.0 Improvements a. Utility Easements b. Design & CM c. Geotechnical					\$13,421,00
Subtotal - Construction Costs Non-Construction Costs 1.0 Improvements a. Utility Easements b. Design & CM c. Geotechnical					
Non-Construction Costs Unity Easements Design & CM Gedechnical	es (30%)			30%	\$25,107,95
1.0 Improvements a. Utility Easements b. Design & CM c. Geotechnical					\$117,170,43
a. Utility Easements b. Design & CM c. Geotechnical					
 b. Design & CM c. Geotechnical 					
c. Geotechnical		30.08	MI	\$8,000	\$240,60
		1	LS	16%	\$14,729,997.9
	ninistrative / Water District Formation / Legal	1	LS	0.5%	\$460,312.4 \$1.841.249.7
Subtotal Improvements	ministrative / Water District Formation / Legal		69	2.70	\$17,272,16
Total Probable Project C	Costs				\$134,400.000

DRAFT

RFORMANCE ENGINEERING



SCENARIO 3 – PHASING PLAN



Project Phase	Irrigable Acres (ac)		
1	5,800		
2	4,200		
3	5,200		



SCENARIO 3 - PHASING

- Phase I Preliminary Cost Estimate Range
 - W/Pivots = \$64.4M
 - W/O Pivots = \$47.6M
- Intake & Pump Station Costs Slight Reduction - \$18.8M
- Parallel 48-inch Mainlines Reduce Phase I Cost \$5M
- Large contingency included due to feasibility level analysis \$12.2M

Fallon Flats Irrigation Feasibility Study Preliminary Opinion of Probable Construction Costs

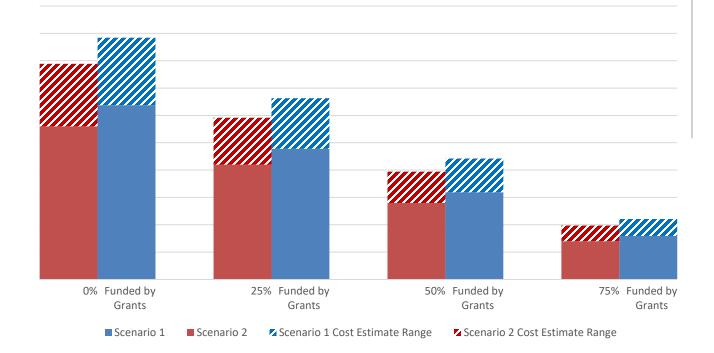
Scenario 3 - Phase I

Item No.	Description	Estimated	Unit	Unit Price	Total Price
. Mobilization		Quanitity	-	1	
	Insurance, Bonds, Mobilization, Travel, Subsistence, Etc.	T	· .	10%	\$4 058,155
	CONTRACTOR AND A CONTRACTOR AND CONTRACTOR AND A CONTRACTOR AN A CONTRACTOR AND A CONTRACT A CONTRACTOR AND A CONTRACTOR A	1	. ÷	1076	\$4,050,155
	take & Pump Station		1		
a	Yellowstone River Intake Canal (86MGD)	1	LS	\$250,000	\$250,000
b	Site Work, Dewatering Intake, and Access Road	1	LS	\$559,000	\$550,000
c	Pump Station and Wet Well (86 MGD) (2000 sqft Footprint)	1	LS	\$7,000,000	\$7,000,000
d	Pumps (Phase I Only)	1	LS	\$1,500,000	\$1,500,000
9	Process Pioing, Valves, Surge Control	1	LS	\$1,000,000	\$1,000,000
I	WAPA Electrical Substation	1	LS	\$5.573,789	\$5,573,788
g	Pump Electrical Equipment	1	LS	\$2,000,000	\$2,000,000
h		22,900	LF	\$44	\$1,007,600
	Subtotal Improvement				\$19,891
Pipelines					
a	64" Steel Pipeline	14,195	LF	\$699	\$9,922,305
b	36" PVC Pipeline	20,400	LF	\$250	\$5,100,000
c	24" PVC Pipeline	14,000	LF	\$72	\$1,008,000
d	18" PVC Pipeline	3,100	LF	\$55	\$170,500
e	12" PVC Piceline	47,520	LF	\$18	\$855,360
	Subtotal Improvement				\$17.056,165
). Pivot System					
a	Center Pivots	36	Ea	\$125,000	\$4,500,000
b	Insturmentation and Controls System	36	Ea	\$4,000	\$144,000
	Subtotal Improvement				\$4,644,000
Contingency					
	Conceptual Level Contingencies (30%)	8	30%		\$12,174,466
	Subtotal - Construction Costs			•	\$56,814,174
Non-Construc	tion Costs				
a	Utility Easoments	19	MI	\$8,000	\$150,326
b	Design C&M	1	LS	16%	\$6,493,048
e	Geotechnical	1	LS	0.50%	\$179,688
d	Environmental Permitting / Administrative / Water District Formation / Legal	1	LS	2%	\$811,631
	Subtotal Non-Construction Costs				\$7,634,693
otal Probable Project	Costs				\$64,448,8
otal Probable Project	Costs (w/Proots and Contingencies Removed)				\$47,630,4
•	-				
sitmated Total Cost R	ange			\$47.6	to \$64.4 Mill



Impacts of Potential Grant Funding on Estimated Capital Cost

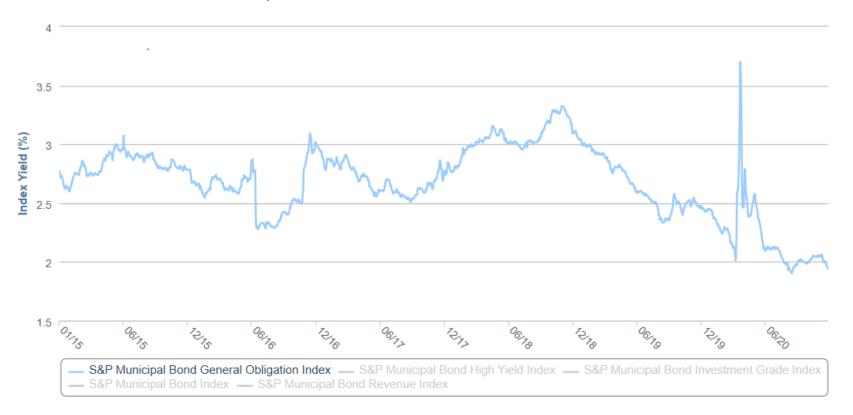
- Funding Programs
 - Private bonds
 - BOR (Electrical)
 - USDA-RD (low-cost loans)
 - RRGL (Planning from the state of MT)
 - Federal-Water Resources Development Act
 - New Market Tax Credits





BOND RATES

S&P Municipal Bond Index From 2015 to Present



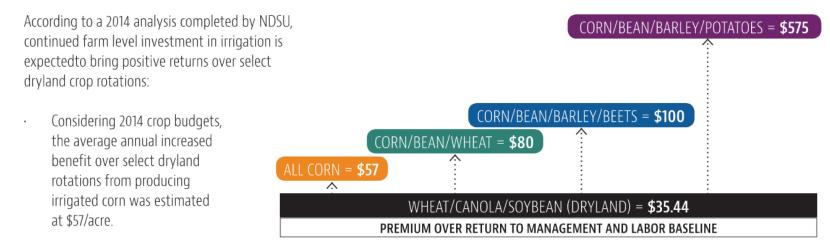


- An Irrigation project in ND
- 51,700 acers of land are authorized for irrigation form the McClusky Canal
- A study on the regional economic effects was done by AE2S & NDSU
 - Increased crop revenue
 - Other regional economic benefits

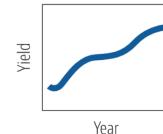




NDSU STUDY RESULTS SHOW BENEFITS OF IRRIGATION



Applying this increased return over the entire authorized acreage along the canal, local producers would have seen a combined increase in crop sales of \$18.4M.



CHANGES IN GROSS REVENUE - ALL CORN ROTATION						
	\$3.00/Bushel	\$3.50/Bushel	\$4.00/Bushel			
140 Bushels	-\$140.00	-\$70.00	\$0.00			
160 Bushels	-\$80.00	\$0.00	\$80.00*			
180 Bushels	-\$20.00	\$70.00	\$160.00			
200 Bushels	\$40.00	\$140.00	\$240.00			

Examples of Changes in Yield and Price Variability



- A system that can supply 133.7 CFS could be built on the site
- Site logistics = substantial capital cost
- Phasing possible but does not provide significant cost reduction initially
- Electricity rate has substantial impact on the operating costs
- O&M Cost \$105/ac
- Capital Cost Range \$7,400-\$9,000/acre