Thunder Basin Phase II
Lance and Lightning Creek
Final Watershed Study Results

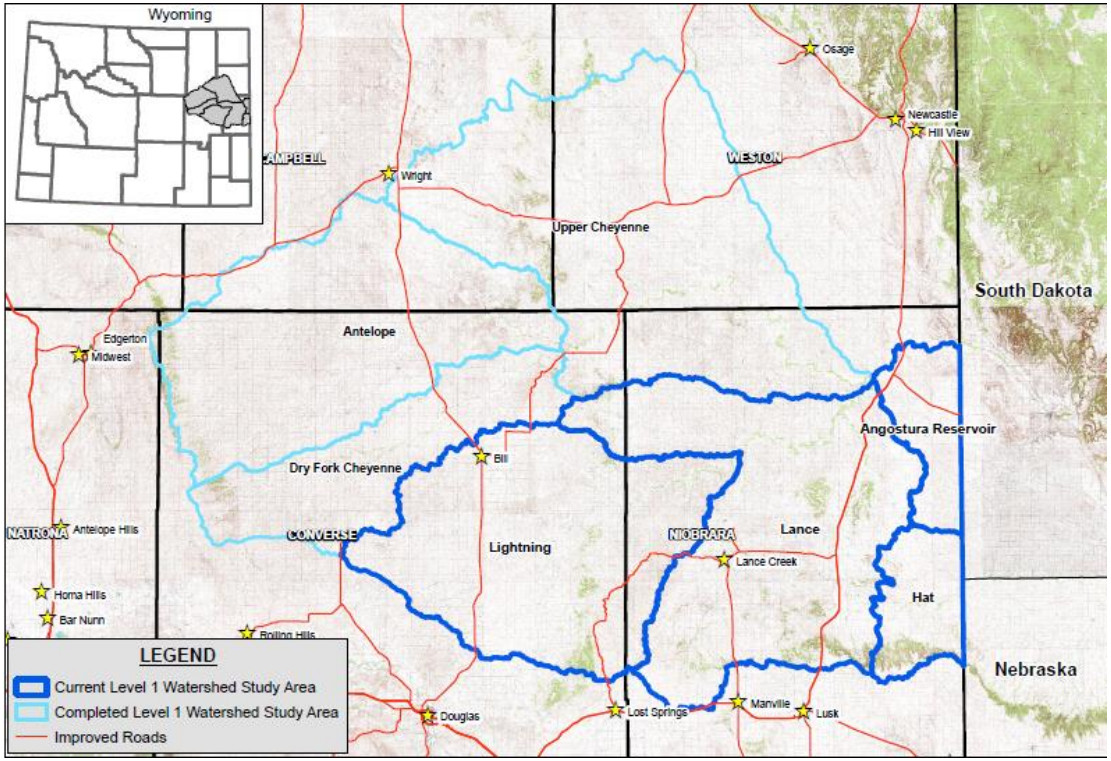
Completed - September 14, 2011

OLSSON ASSOCIATES

Wyoming Water Development Commission

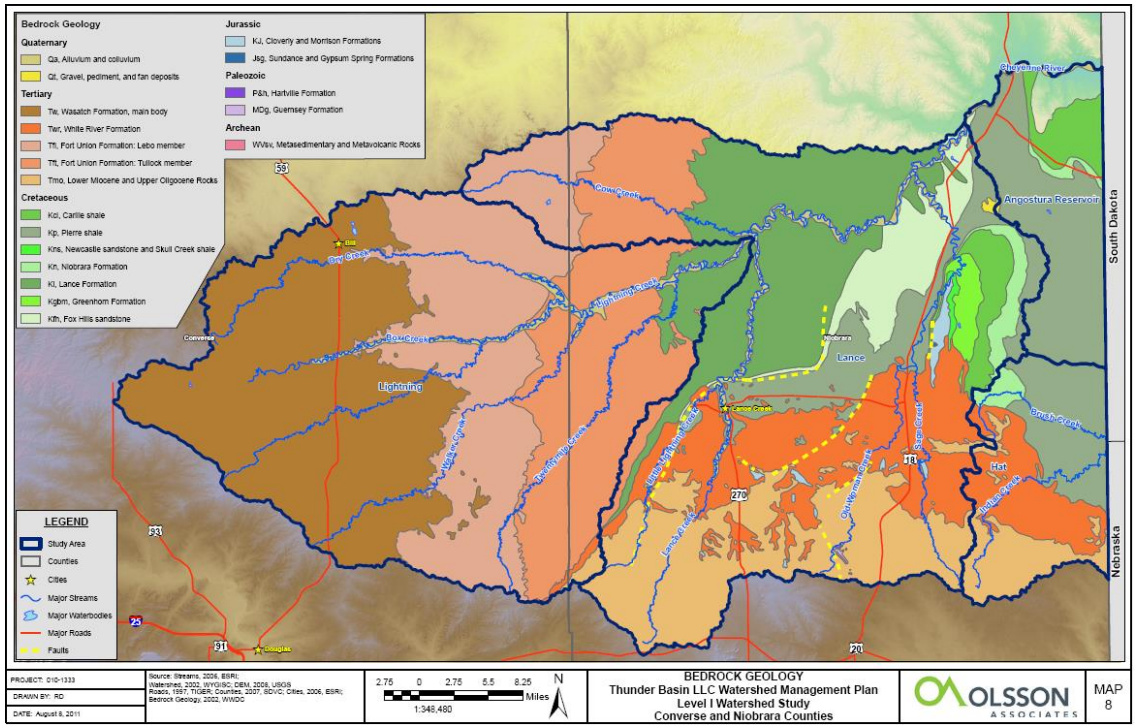
Project Meeting Outline

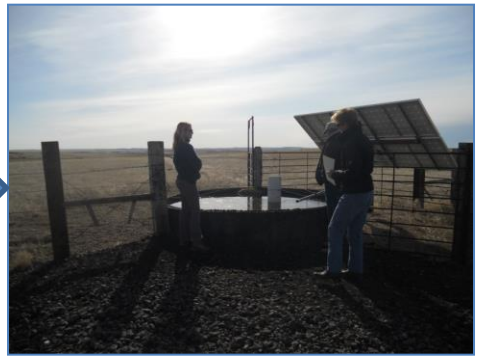
- Thunder Basin II Watershed Study Project Goals
- Project Approach
- Summary of Proposed Improvements
  - Well Development
  - Irrigation Improvements
  - Water Storage (Dams)
- Financial Analysis
- What's next?



Project Goals

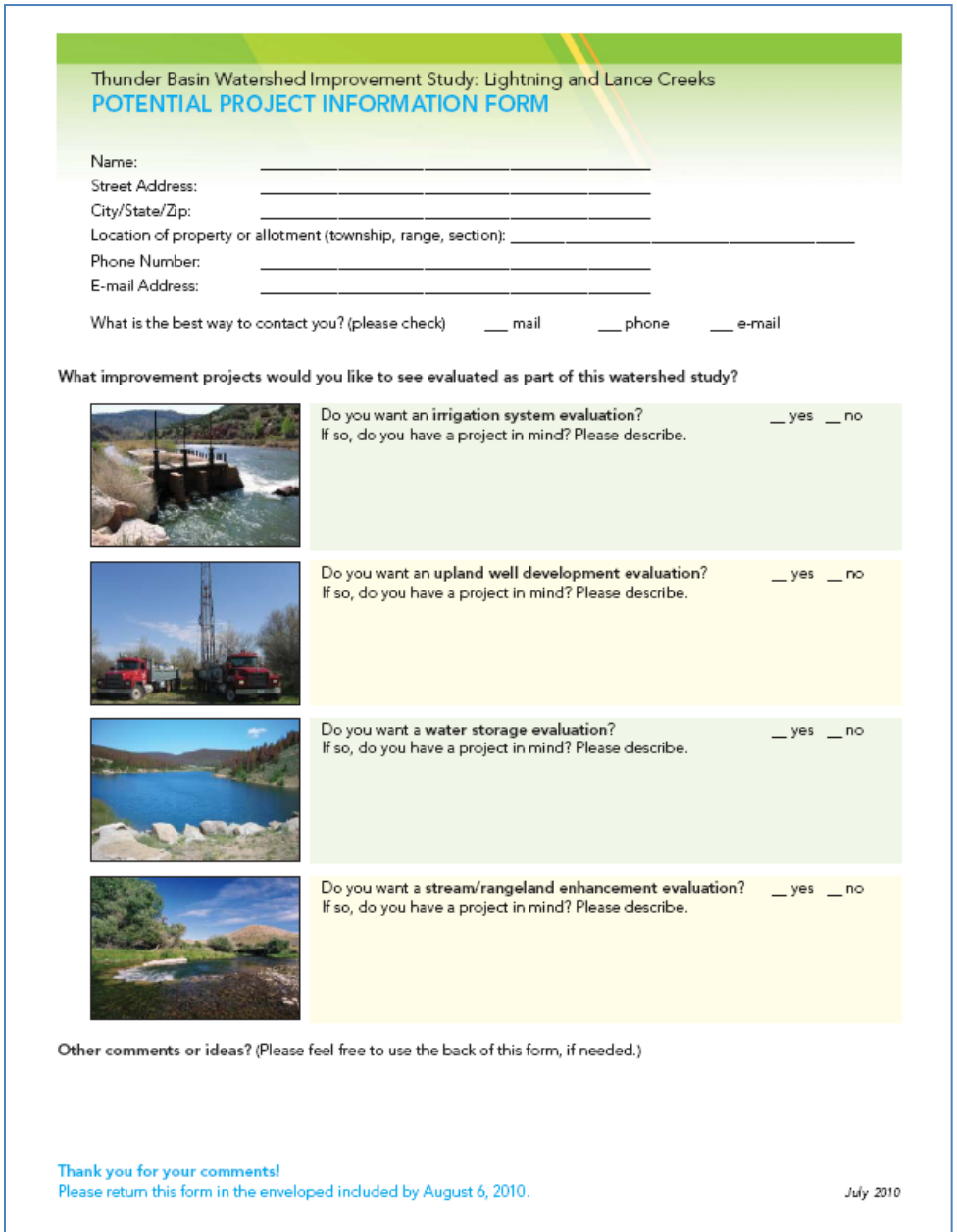
- Collect available information
- Document and map conditions
- Identify project improvements
- Develop and analyze costs for improvements





Project Approach

- Background Information Review
- Meetings and Mailings
- Inventory and Description
- Watershed Management and Rehabilitation Plan
  - Based on a holistic approach to watershed management



Thunder Basin Watershed Improvement Study: Lightning and Lance Creeks

POTENTIAL PROJECT INFORMATION FORM

Name: _____

Street Address: _____

City/State/Zip: _____

Location of property or allotment (township, range, section): _____

Phone Number: _____

E-mail Address: _____

What is the best way to contact you? (please check) ___ mail ___ phone ___ e-mail

What improvement projects would you like to see evaluated as part of this watershed study?

Do you want an **irrigation system evaluation**? __ yes __ no
If so, do you have a project in mind? Please describe.

Do you want an **upland well development evaluation**? __ yes __ no
If so, do you have a project in mind? Please describe.

Do you want a **water storage evaluation**? __ yes __ no
If so, do you have a project in mind? Please describe.

Do you want a **stream/rangeland enhancement evaluation**? __ yes __ no
If so, do you have a project in mind? Please describe.

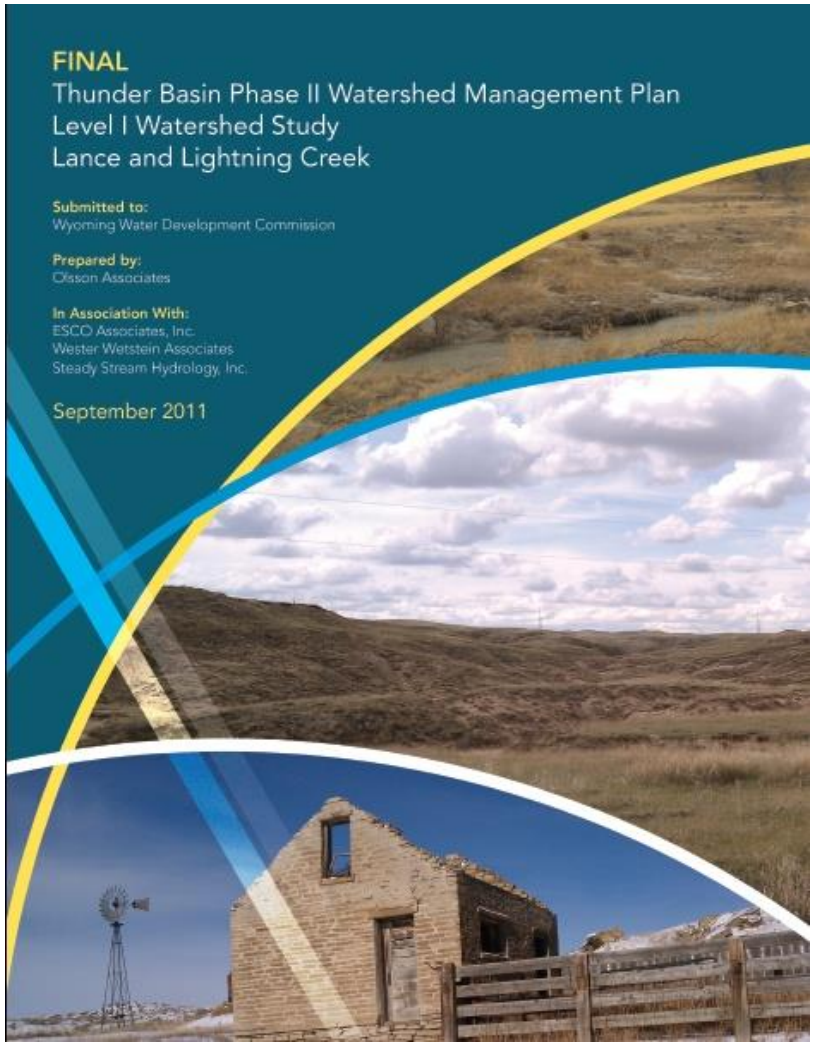
Other comments or ideas? (Please feel free to use the back of this form, if needed.)

Thank you for your comments!
Please return this form in the enveloped included by August 6, 2010.

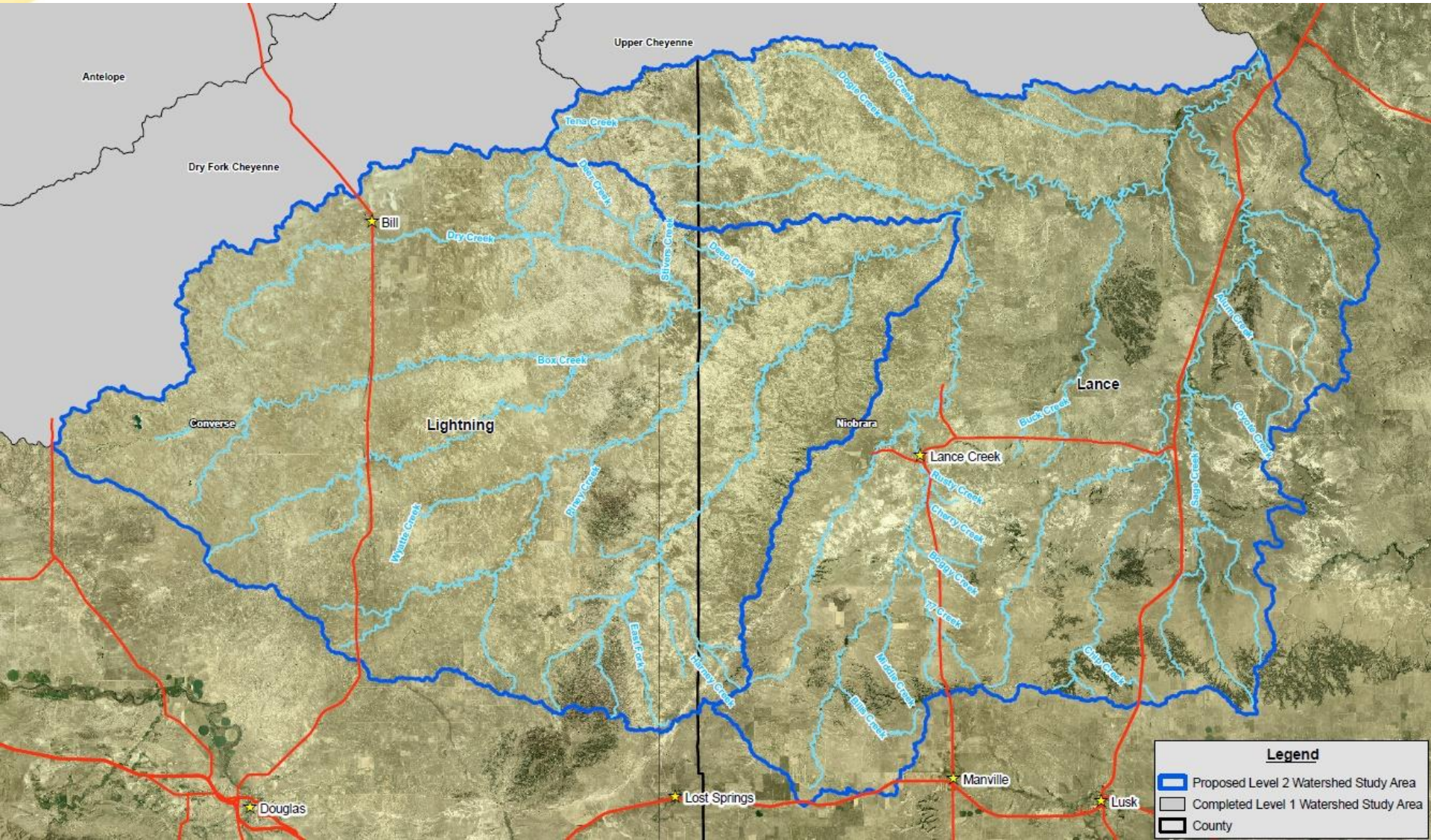
July 2010

Study Report Description

1. Introduction
2. Watershed Description
3. Watershed Inventory
4. **Watershed Management and Rehabilitation Plan**
5. Cost Estimates
6. Permits
7. **Economic Analysis/Project Financing**
8. **Conclusions/Recommendations**



Watershed Description and Inventory



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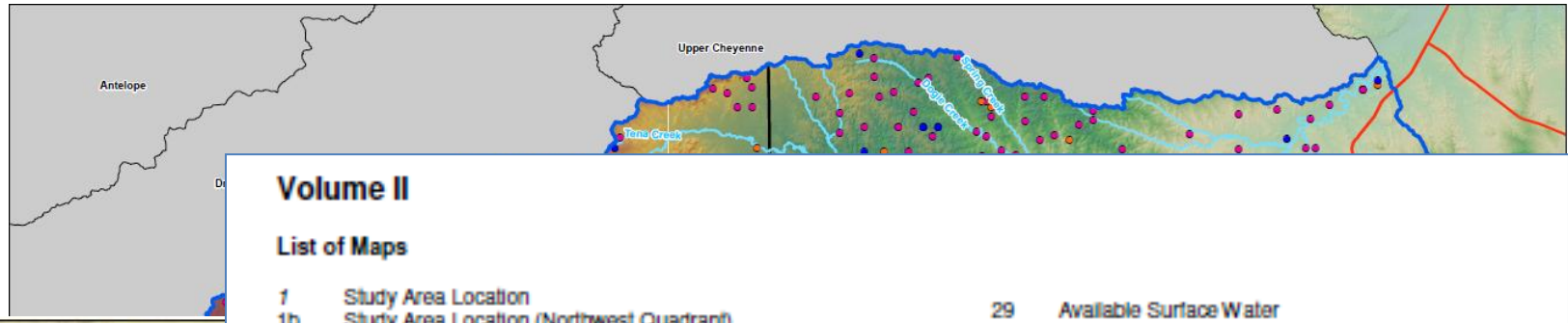

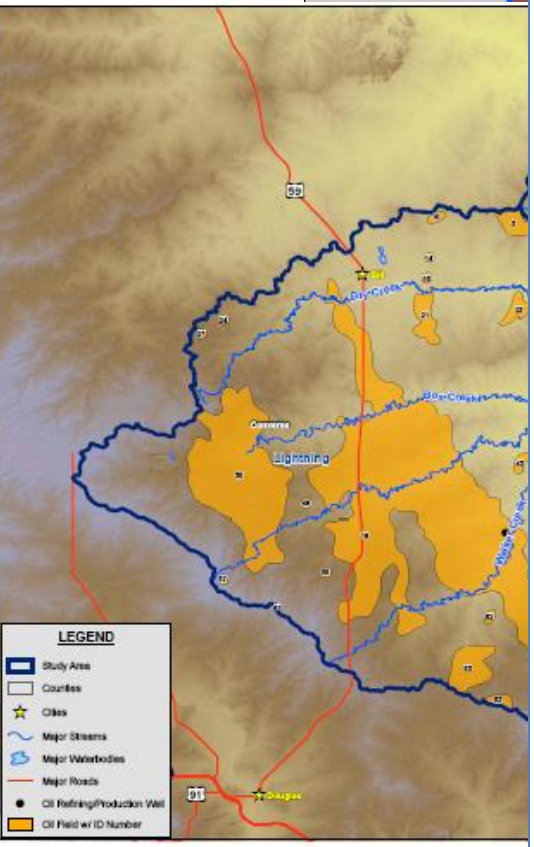

Volume II

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1d Study Area Location (Southwest Quadrant)
1e Study Area Location (Southeast Quadrant)
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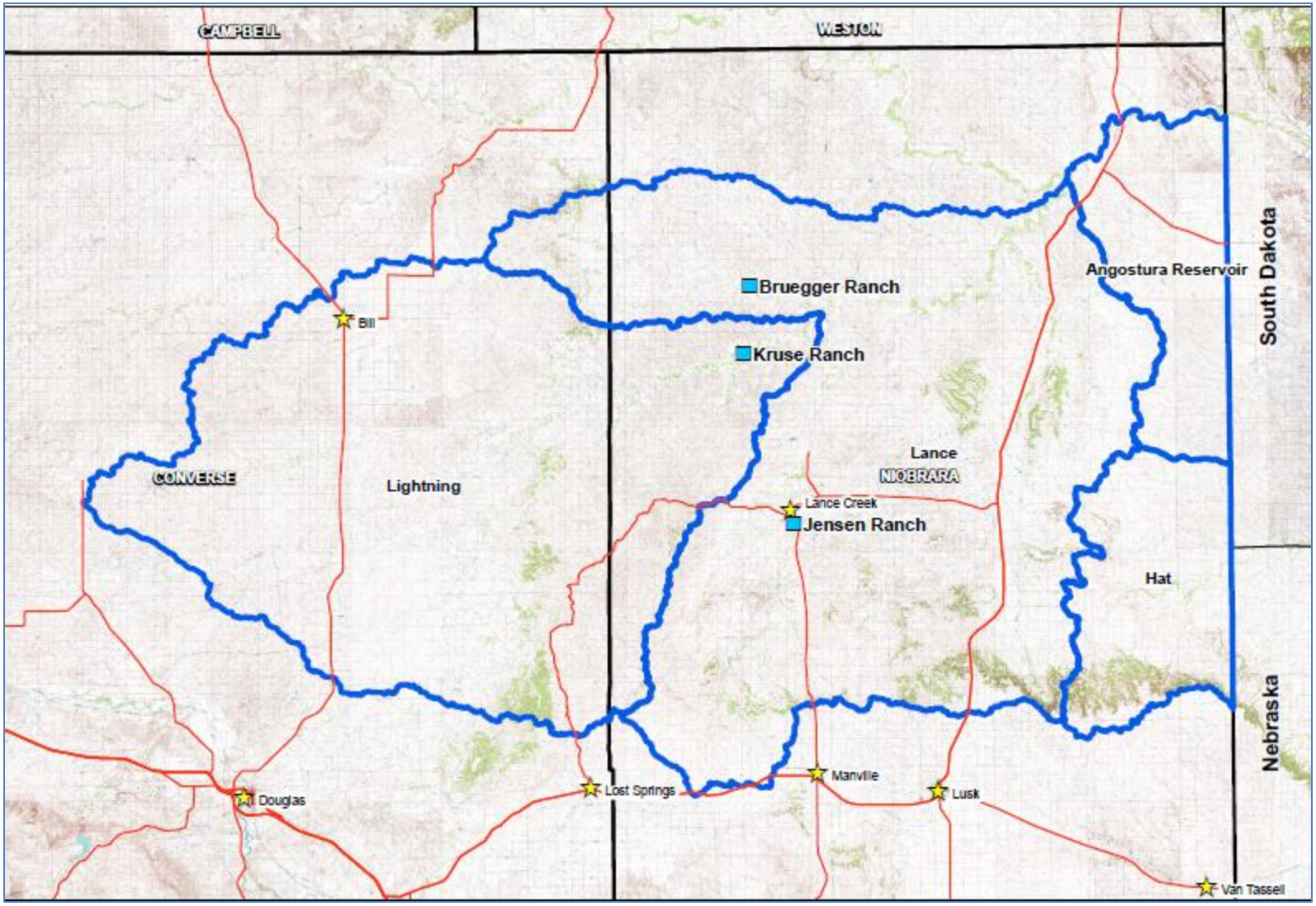
Watershed Management and Rehabilitation Plan

Use information obtained from published reports, government databases, and local landowners to evaluate water resources and potential for future development.

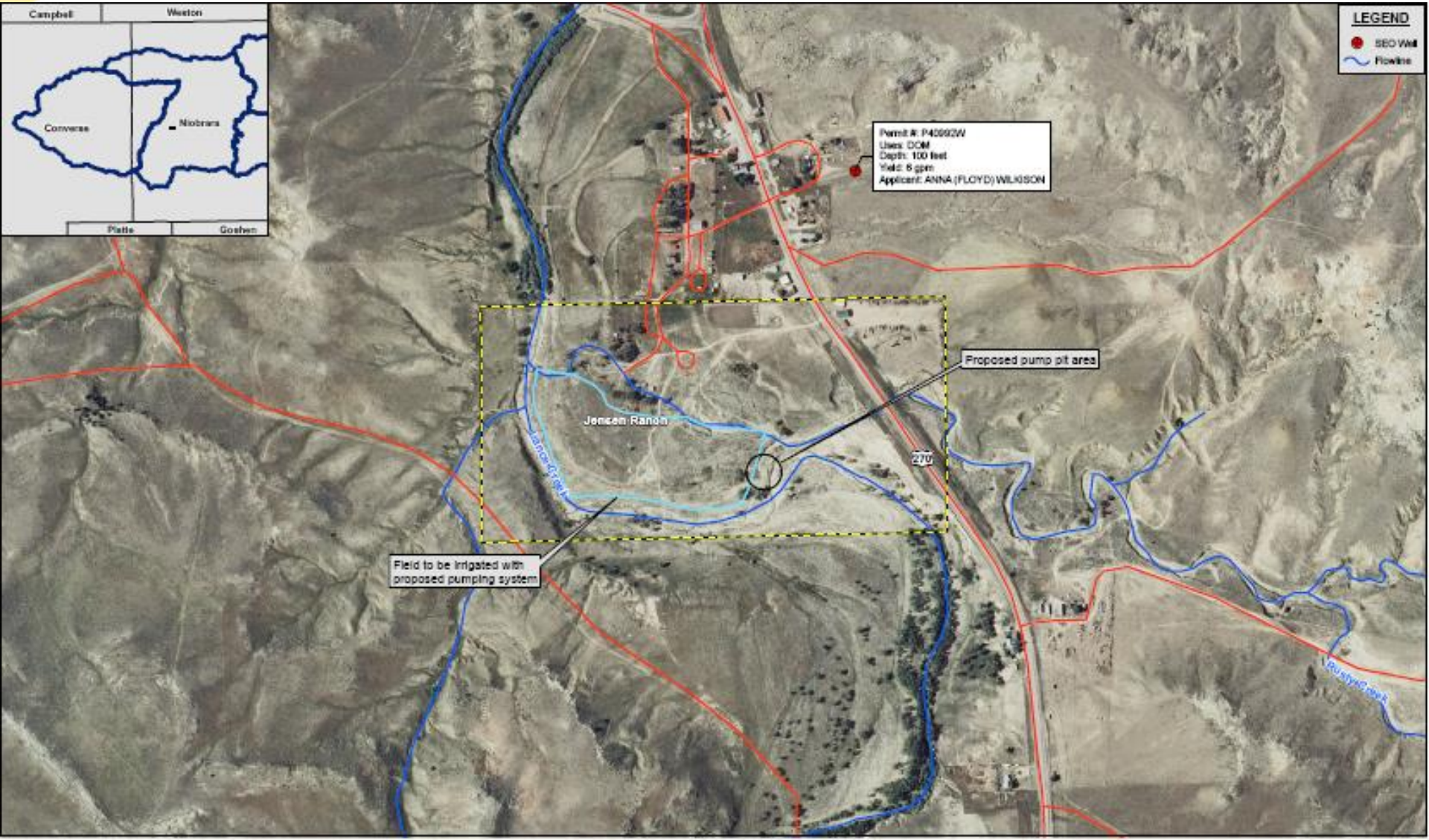
This Includes:

- ✓ Inventory the existing wells, irrigation systems and dams in the watershed
- ✓ Description of existing water resources
- ✓ Evaluations for rehabilitating and/or replacing existing improvements
- ✓ Recommendations for new improvements
- ✓ Prepare cost estimates

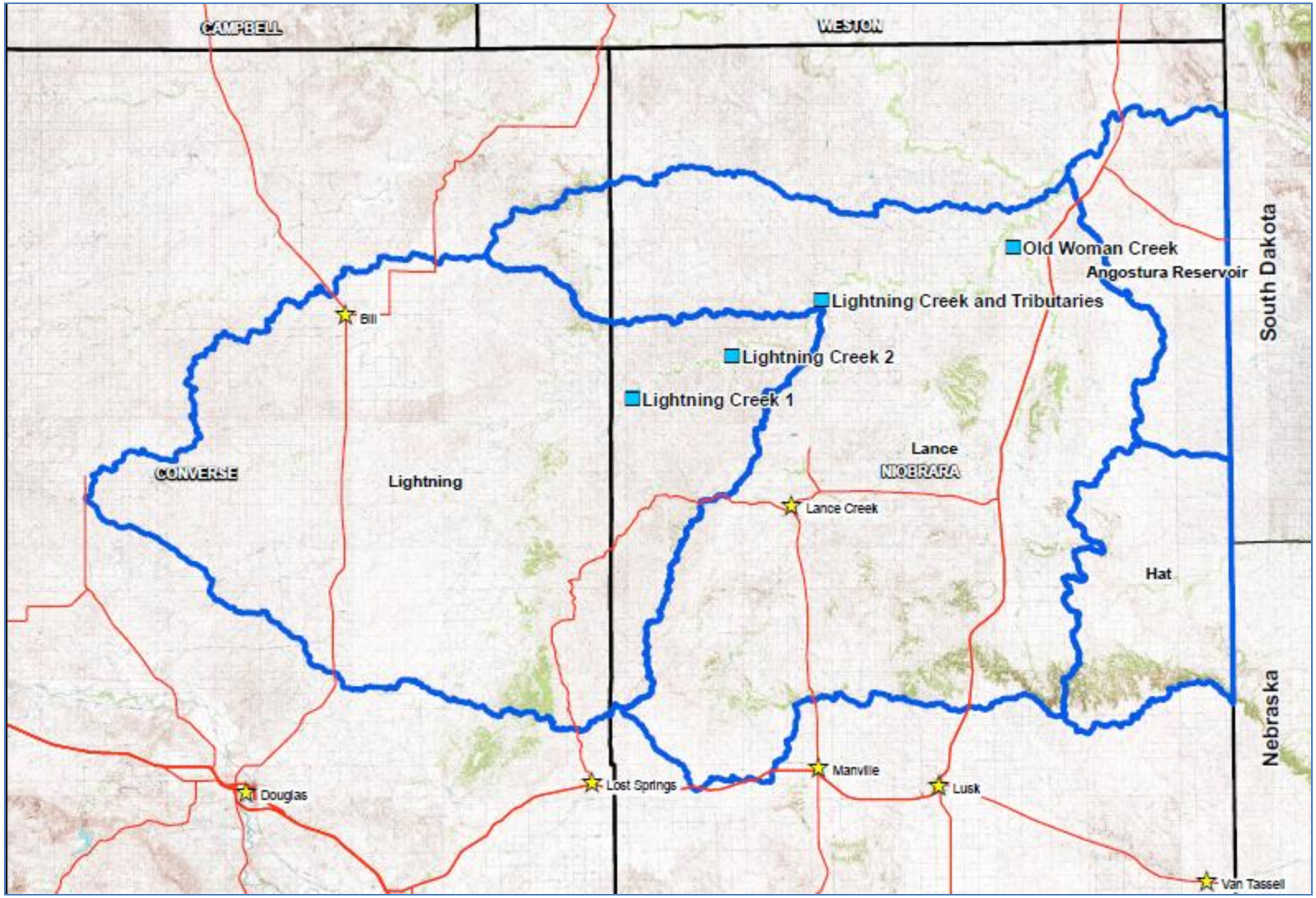
Proposed Irrigation Improvement Projects



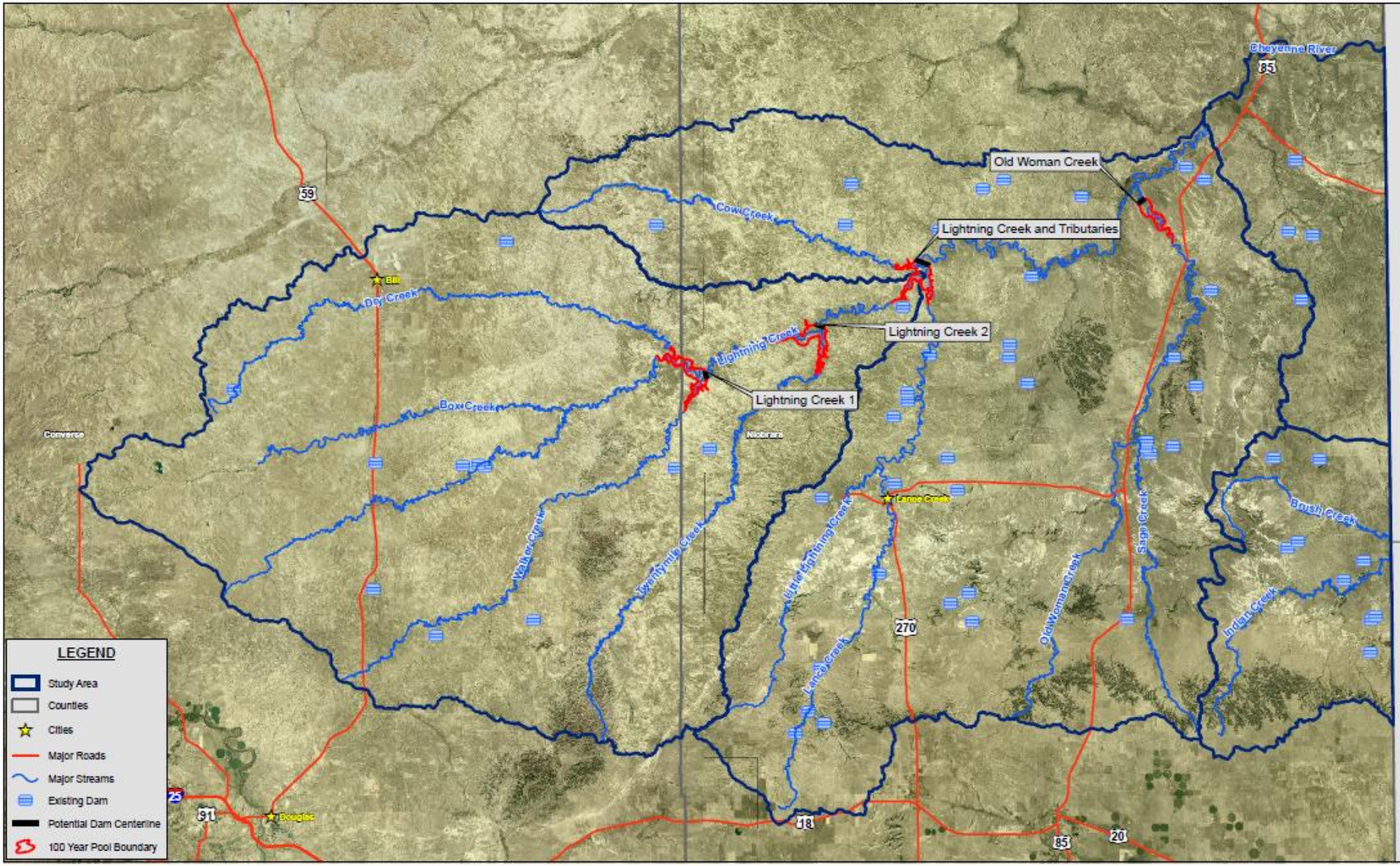
Jensen Ranch Irrigation Improvement



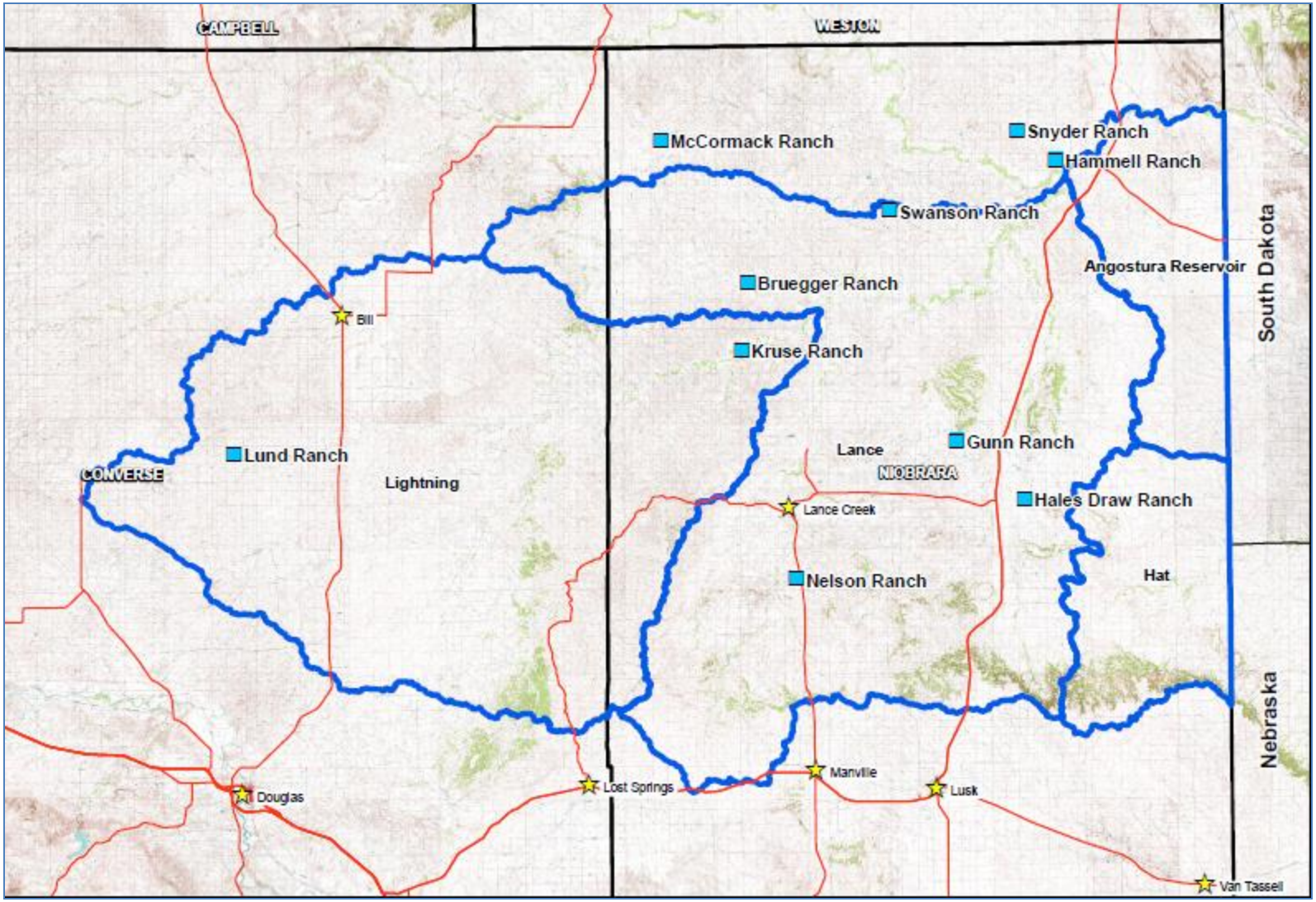
Large Water Storage Projects



Identified Potential Account III Sites

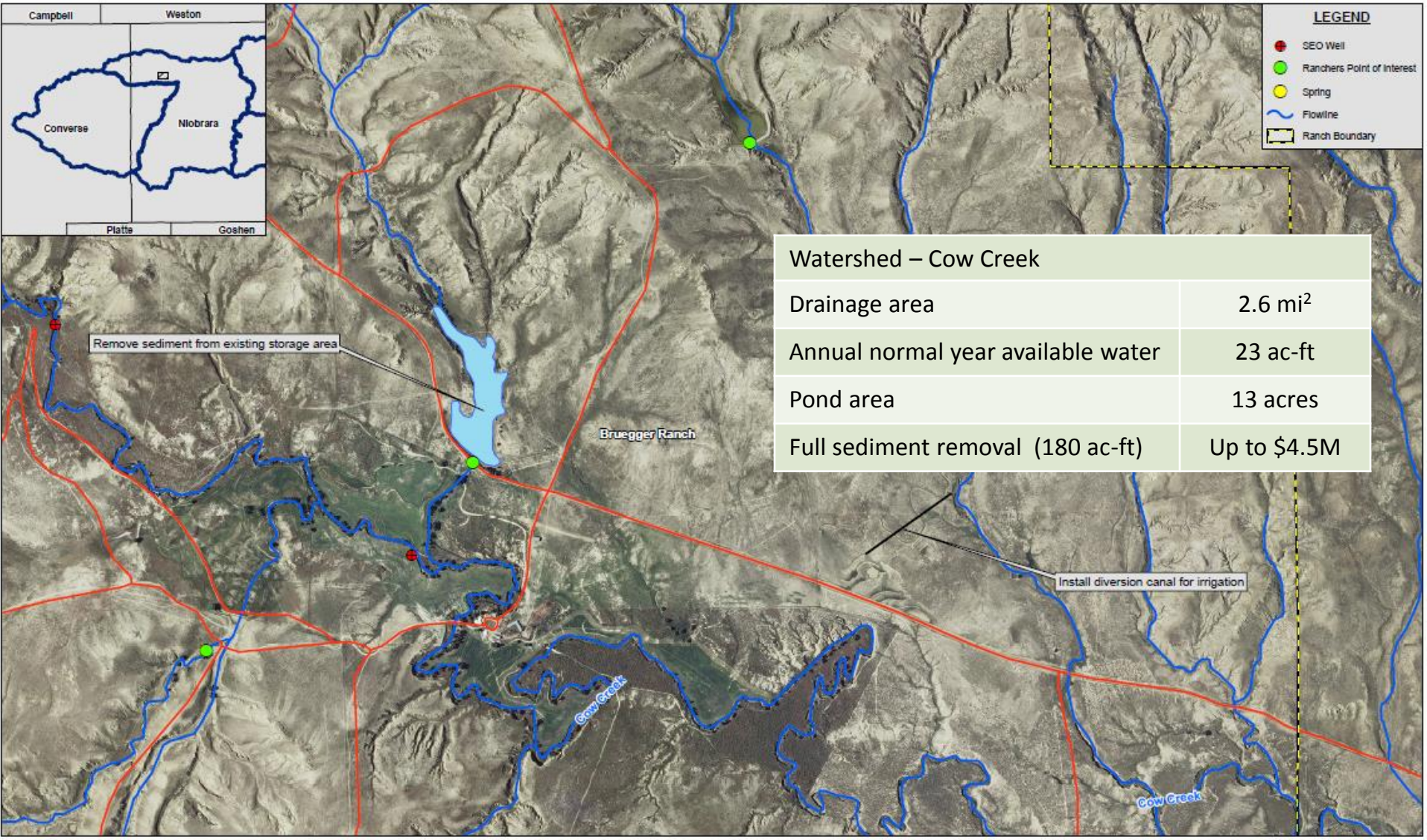


Smaller Water Storage Projects



Bruegger

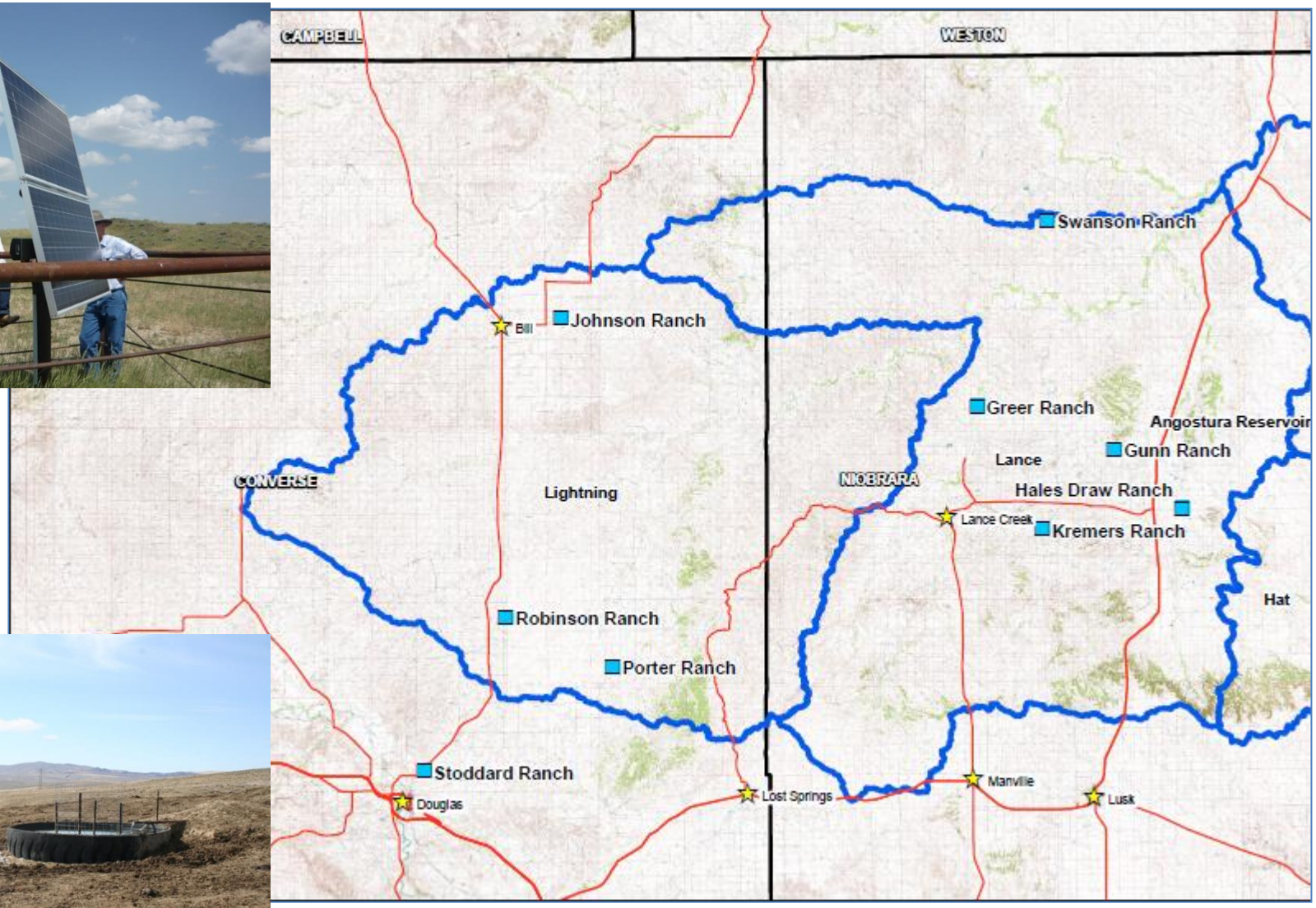
- Rehabilitate existing pond



Watershed – Cow Creek	
Drainage area	2.6 mi^2
Annual normal year available water	23 ac-ft
Pond area	13 acres
Full sediment removal (180 ac-ft)	Up to $4.5M

Stream/Wetland Improvements

Proposed Groundwater Projects



Irrigation Project Cost Estimates

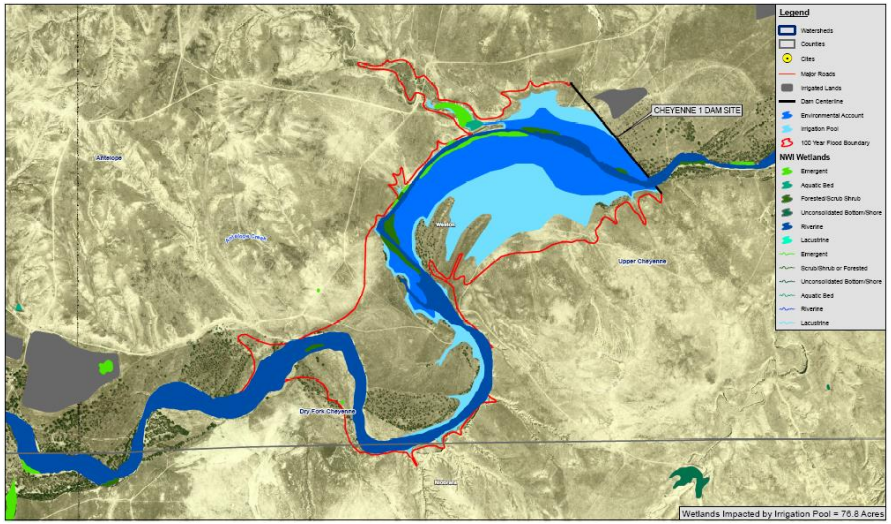
Project Number	Ranch Name	Description	Units	Quantity	Unit Cost	Total Cost
1	Bruegger	Construct spreader dikes	Foot	300	$30/ft	$9,000
2	Jensen	Install centrifugal pump	Each	1	10,000	$10,000
3	Kruse	Improve berms on N side of Lightning Creek for hay fields	Foot	600	$10/ft	$6,000

Groundwater Project Cost Estimates

Project Number	Ranch Name	Water Well	Solar Power	Pipeline Length (feet)	Pasture Fencing	Storage Tank	Stock Tanks	Site Prep	Estimated Cost
1	Greer	0	1	0	0	0	0	[illegible]	$6,500
2	Gunn	1	1	0	0	1	[illegible]	[illegible]	$22,500
3	Hales Draw	1	1	0	0	0	[illegible]	1	$12,660
4	Johnson North	0	0	13107	0	1	3	0	$44,214
5	Johnson South	1	1	10548	0	0	3	1	$41,996
6	Kremers A	1	1	3158	0	0	1	1	$20,236
7	Kremers B	0	0	15370	0	1	6	0	$42,760
8	Kremers C	1	1	1965	0	0	1	1	$17,850
9	Kremers D	0	1	13633	0	1	4	0	$45,386
10	Kremers E	0	1	9844	0	0	3	0	$31,408
11	Porter	1	1	0	0	1	1	1	$20,120
12	Robinson East	1	1	0	0	1	1	1	$44,900
13	Robinson West	1	1	0	0	1	1	[illegible]	$44,900
14	Robinson South	1	1	0	0	1	[illegible]	1	$44,900
15	Stoddard A	1	1	0	0	1	1	1	$44,900
16	Stoddard B	1	1	0	0	1	1	1	$44,900
17	Stoddard C	1	1	0	0	1	1	1	$44,900
18	Swanson	1	1	0	0	0	0	1	$12,460

Surface Water Project Cost Estimates
Large Projects

Dam Site	Irrigation Storage, ac-ft	Cost, $	Total Storage Life, years	Annual Cost/ac-ft of storage
Lightning Creek 1	3,588	$26,300,000	57	$129
Lightning Creek 2	5,176	$60,000,000	57	$203
Lightning Creek and Tributaries	3,482	$35,200,000	57	$177
Old Woman Creek	1,622	$31,000,000	57	$335



Surface Water Project Cost Estimates Smaller Projects

Project Number	Ranch Name	Project Description	Estimated Cost
1	Bruegger	Pond rehabilitation – removal of sediment (maximum volume removed)	$4,500,000
2	Gunn Ranch	New dam and outlet structure	$24,300
3	Hales Draw	New dam and outlet structure	$92,600
4	Hammell	Relocation of existing dam plus outlet structure	$28,600
5	Kruse	Rebuild dam plus outlet structure	$97,100
6	Kruse	Pond rehabilitation – removal of sediment	$528,500
7	Kruse	New dam and outlet structure	$187,100
8	Lund	New dam on realigned road and outlet structure	$458,700
9	McCormack	New dam and outlet structure	$17,000
10	McCormack	New dam and outlet structure	$50,700
11	McCormack	New dam and outlet structure	$29,400
12	Nelson	New dam and outlet structure	$26,800
13	Snyder	New dam and outlet structure	$49,900
14	Swanson	New dam and outlet structure	$1,073,000

Costing and Financial Analysis

Table 5.1-1 Irrigation Cost Estimate with Cost per Acre Served

Rehabilitation Item Number	Description	Acres serviced	Revenue per acre	Rehabilitation cost	Cost per acre serviced	Annual cost per acre
Cheyenne Watershed (Black Thunder Creek) Improvements						
1	Replace Head gate and re-grade ditches	67	30	$53,275	$795	$53
2	Re-grade ditch 3	65	30	$6,315	$97	$7
Cheyenne Watershed (Cheyenne River) Improvements						
3	Replace Head gate and re-grade ditches	87	30	$38,825	$446	$30
Antelope Creek Watershed Improvements						
4	Construct Spreader dikes	19	30	$14,700	$774	$52
Dry Fork Cheyenne Watershed Improvements						
5	Install Headgate and re-grade ditch	70	30	$53,000	$757	$51
6	Build Dike and re-grade ditch	47	30	$55,285	$1,176	$79

Note: Annual cost per acre was determined using a 3% interest rate and calculated over a 20 year period.

Cost per Acre

Sponsor's Ability to Pay

Table 7.4-4 Summary of Ability to Pay for Irrigation Improvement Project Alternatives - 50% Grant

Alternative	Level III Project Costs	Sponsor's Share of Project Costs	Sponsor's Annual Payment	Sponsor's Maximum Ability to Pay	Sponsor's Percentage Ability to Pay
Cheyenne Watershed (Black Thunder Creek) Improvements					
Stroh Ranch - Replace headgate, diversion, and regrade ditches	$53,275	$26,638	$1,241	$131	10.6%
Stroh Ranch - Re-grade ditch 3	$6,315	$3,158	$147	$127	86.4%
Cheyenne Watershed (Cheyenne River) Improvements					
Harshbarger Ranch - Replace Head gate and re-grade ditches	$38,825	$19,413	$905	$170	18.8%
Antelope Creek Watershed Improvements					
Turner Ranch - Construct Spreader dikes	$14,700	$7,350	$343	$37	10.8%
Dry Fork Cheyenne Watershed Improvements					
Pellatz Ranch - Install headgate and regrade ditch	$53,000	$25,000	$1,165	$137	11.8%
Pellatz Ranch - Build dike and regrade ditch	$55,285	$27,643	$1,288	$92	7.1%

Economic Analysis/Project Financing Large Dam Projects

Alternative	Level III Project Costs (Low Cost Estimate)	Sponsor's Share of Project Costs	Sponsor's Annual Payment	Sponsor's Maximum Ability to Pay	Sponsor's Percentage Ability to Pay
Lightning 1	$24,000,000	$ 6,000,000.00	$ 279,600.00	$ 35,650.00	12.8%
Lightning 2	$53,000,000	$ 13,250,000.00	$ 617,450.00	$ 51,450.00	8.3%
Lightning and Tribs	$32,000,000	$ 8,000,000.00	$ 372,800.00	$ 34,550.00	9.3%
Lance South Trib	$28,000,000	$ 7,000,000.00	$ 326,200.00	$ 16,100.00	4.9%

Economic Analysis/Project Financing Small Dam Projects

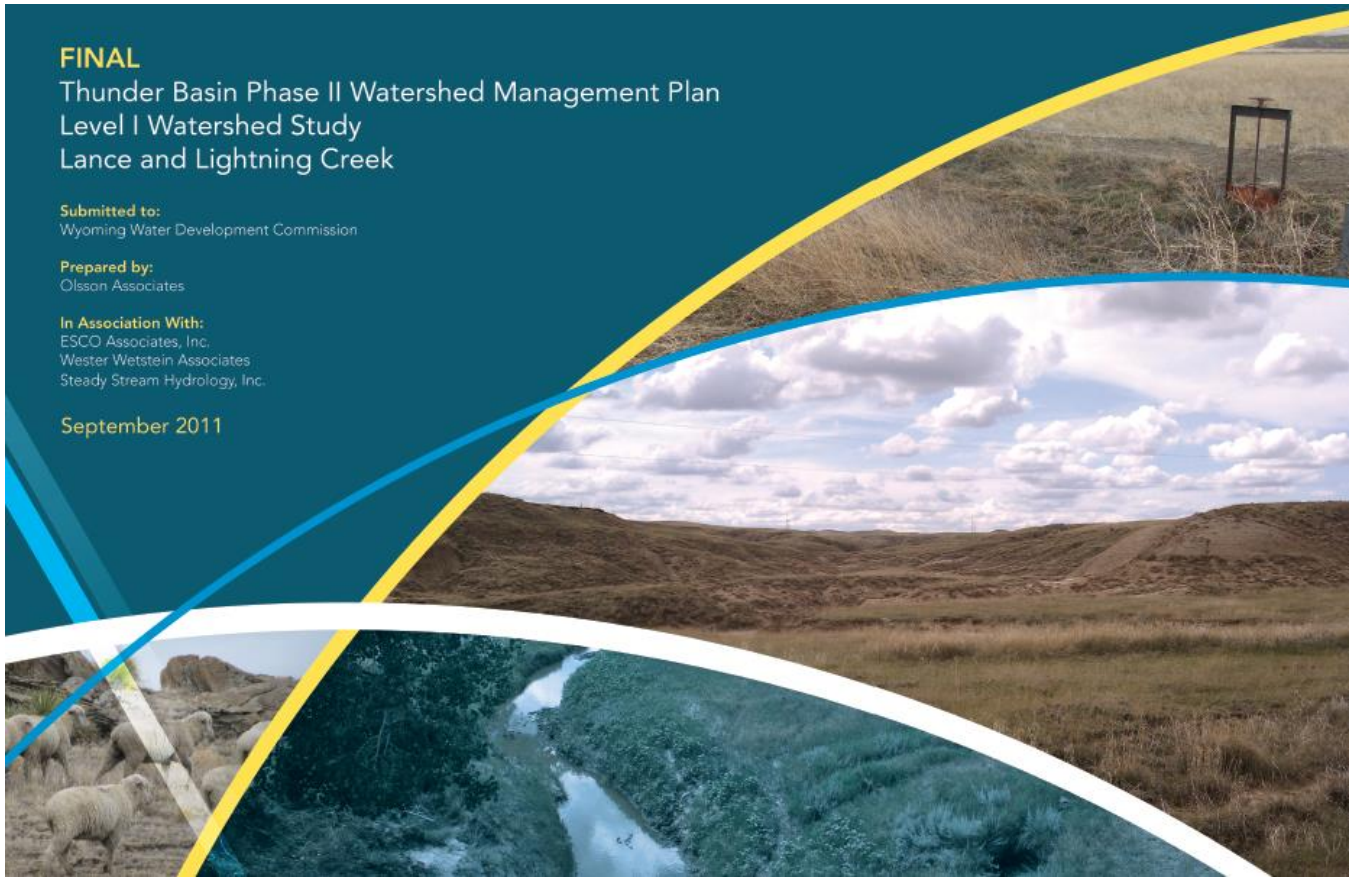
Alternative	Level III Project Costs	Sponsor's Share of Project Costs	Sponsor's Annual Payment	Sponsor's Maximum Ability to Pay	Sponsor's Percentage Ability to Pay
Hammell Improvements					
New storage area/dam to replace existing dam	$ 24,872.00	$ 12,436.00	$ 579.52	$ 198.50	34.3%
Hereford / Hales Draw Ranch Improvements					
New storage area/dam	$ 80,556.00	$ 55,556.00	$ 2,588.91	$ 725.00	28.0%
Krein / Gunn Ranch Improvements					
New storage area/dam	$ 21,136.00	$ 10,568.00	$ 492.47	$ 30.00	6.1%
Kruse Improvements					
New storage area/dam where previous one was breached	$ 93,163.00	$ 68,163.00	$ 3,176.40	$ 169.00	5.3%
McCormack / Lone Crow Ranch Improvements					
New storage area/dam	$ 14,438.00	$ 7,219.00	$ 336.41	$ 30.00	8.9%
New storage area/dam	$ 44,048.00	$ 22,024.00	$ 1,026.32	$ 218.50	21.3%
New storage area/dam	$ 25,566.00	$ 12,783.00	$ 595.69	$ 49.50	8.3%
Nelson Improvements					
New storage area/dam	$ 23,310.00	$ 11,655.00	$ 543.12	$ 10.00	1.8%
Snyder Improvements					
New storage area/dam	$ 43,379.00	$ 21,689.50	$ 1,010.73	$ 89.50	8.9%

Economic Analysis/Project Financing Groundwater Improvement Projects

Alternative	Number of New Stock Tanks	Assume 25 Head Per New Stock Tank	Head of Cattle to Benefit From Well	Level III Project Costs	Sponsor's Share of Project Costs	Sponsor's Annual Payment	Sponsor's Maximum Ability to Pay	Sponsor's Percentage Ability to Pay
Livestock Watering - Pasture Rotation Improvement								
Greer	0	0	100	$ 6,500.00	$ 3,250.00	$ 151.45	$ 1,830.00	1208.3%
Gunn	1	25	100	$ 22,500.00	$ 11,250.00	$ 524.25	$ 1,830.00	349.1%
Hales Draw	1	25	100	$ 12,660.00	$ 6,330.00	$ 294.98	$ 1,830.00	620.4%
Johnson North	3	75	100	$ 44,214.00	$ 22,107.00	$ 1,030.19	$ 1,830.00	177.6%
Johnson North	3	75	100	$ 41,996.00	$ 20,998.00	$ 978.51	$ 1,830.00	187.0%
Kremers A	1	25	100	$ 20,236.00	$ 10,118.00	$ 471.50	$ 1,830.00	388.1%
Kremers B	6	125	125	$ 42,760.00	$ 21,380.00	$ 996.31	$ 1,830.00	183.7%
Kremers C	1	25	100	$ 17,850.00	$ 8,925.00	$ 415.91	$ 1,830.00	440.0%
Kremers D	4	100	100	$ 45,386.00	$ 22,693.00	$ 1,057.49	$ 1,830.00	173.1%
Kremers E	3	75	100	$ 31,408.00	$ 15,704.00	$ 731.81	$ 1,830.00	250.1%
Porter	1	25	100	$ 20,120.00	$ 10,060.00	$ 468.80	$ 1,830.00	390.4%
Robinson East	1	25	100	$ 44,900.00	$ 22,450.00	$ 1,046.17	$ 1,830.00	174.9%
Robinson South	1	25	100	$ 44,900.00	$ 22,450.00	$ 1,046.17	$ 1,830.00	174.9%
Robinson West	1	25	100	$ 44,900.00	$ 22,450.00	$ 1,046.17	$ 1,830.00	174.9%
Stoddard A	1	75	100	$ 44,900.00	$ 22,450.00	$ 1,046.17	$ 1,830.00	174.9%
Stoddard B	1	75	100	$ 44,900.00	$ 22,450.00	$ 1,046.17	$ 1,830.00	174.9%
Stoddard C	1	75	100	$ 44,900.00	$ 22,450.00	$ 1,046.17	$ 1,830.00	174.9%
Swanson	0	0	100	$ 12,460.00	$ 6,230.00	$ 290.32	$ 1,830.00	630.3%

What is next?

- For us →Final Report Submittal
- For you →Project selection and grant application



Questions?