AGENDA

IDAHO WATER RESOURCE BOARD

Aquifer Stabilization Committee Meeting No. 3-24
Thursday, September 5, 2024
1:00 p.m. (MT) / Noon (PT)

Water Center
Conference Rooms 602 C & D
322 E. Front St.
BOISE

Livestream available at https://www.youtube.com/@iwrb

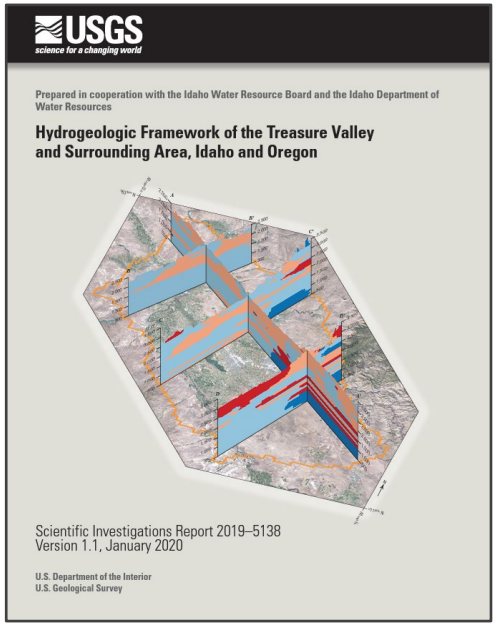
1. Introductions and Attendance
2. Treasure Valley Managed Recharge Modeling Scenarios
3. ESPA Managed Recharge Project Update
4. ESPA Managed Recharge New Projects*
5. Other Items
6. Adjourn

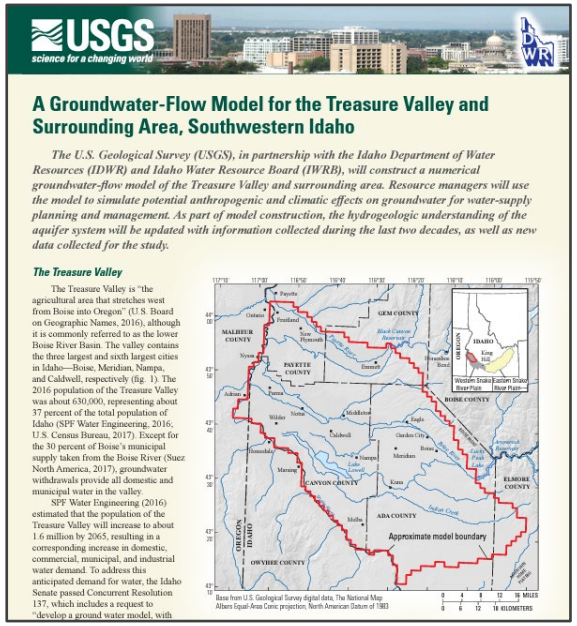
Committee Members: Chair Dean Stevenson, Al Barker, Brian Olmstead, and Pat McMahon.

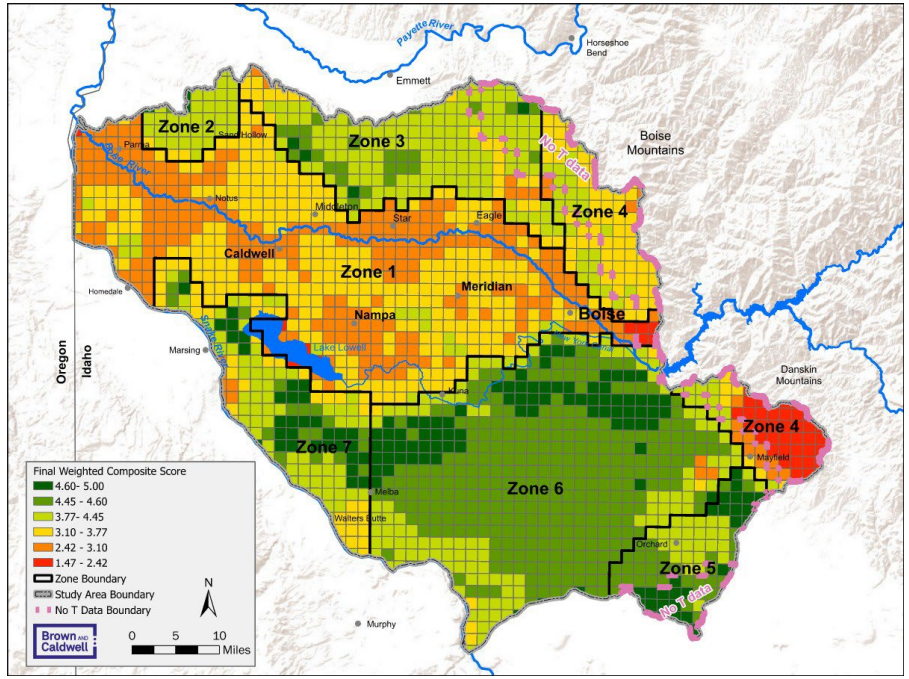
* Action Item: A vote regarding this item may be made at this meeting. Identifying an item as an action item on the agenda does not require a vote to be taken on the item.

Americans with Disabilities
The meeting will be held in person and online. If you require special accommodations to attend, participate in, or understand the meeting, please make advance arrangements by contacting Department staff by email jennifer.strange@idwr.idaho.gov or by phone at (208) 287-4800.

Treasure Valley Model Recharge Scenarios







Presented by Mike McVay, P.E., P.G.
Idaho Water Resource Board Aquifer Stabilization Committee
September 5, 2024

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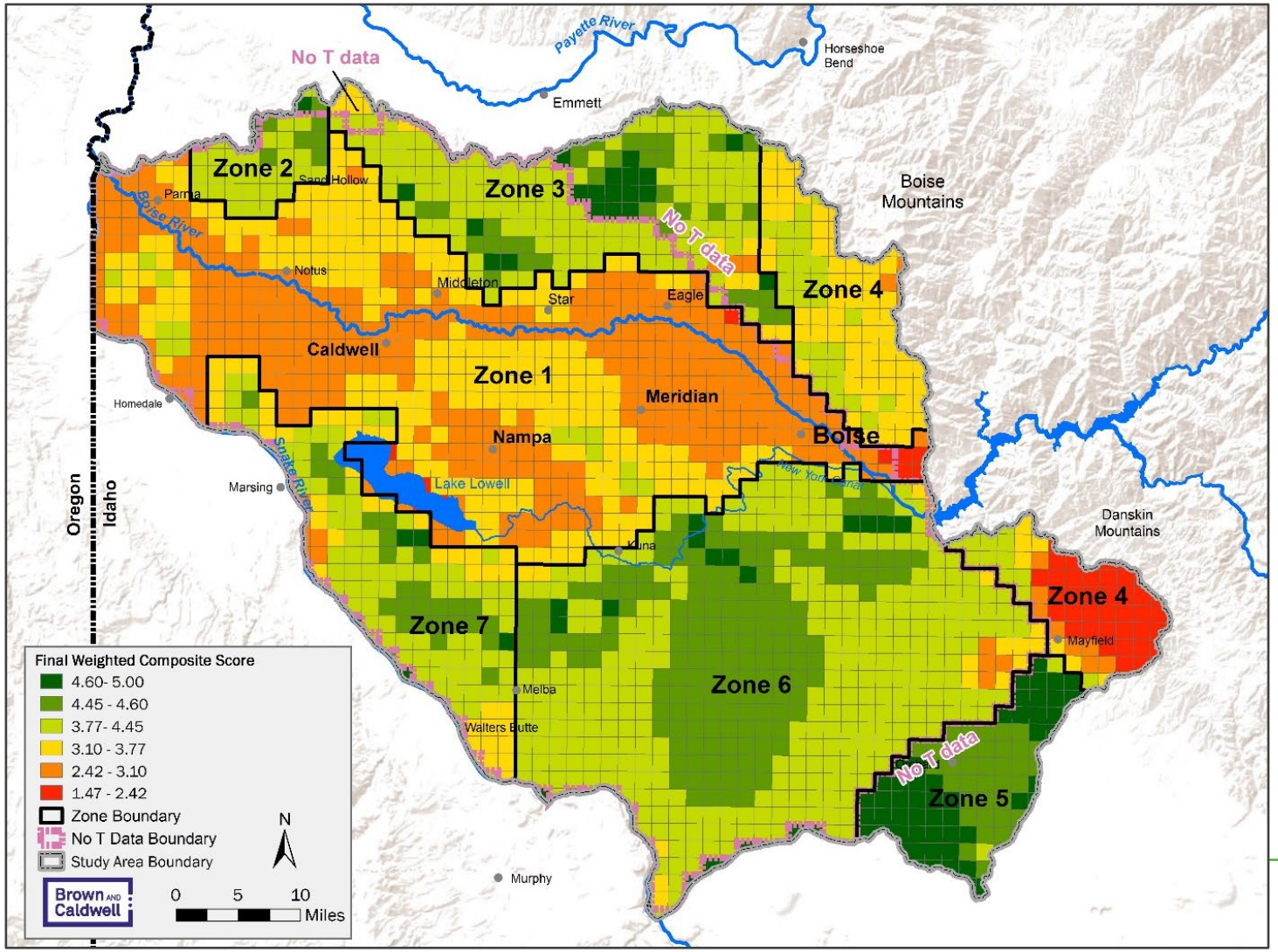
Treasure Valley Modeling Efforts

- June 2017 – IDWR/IWRB collaboration with the USGS to construct a new transient groundwater model started
  - IWRB funded, 5-year project
  - USGS built upon the steady-state TVHP model
  - IDWR chaired MTAC for stakeholder input and data sharing
- January 2020 – Hydrogeologic framework completed, USGS
- March 2020 – Recharge feasibility study completed, Brown & Caldwell
- January 2023 – TV groundwater flow model completed, USGS
- May 2023 – Begin recharge scenario work w/ new TV model, B&C
- May 2024 – B&C recharge final scenario modeling report complete

2020 MAR Feasibility Study



- GIS-based model with composite scores based on:
  - ✓Depth to water
  - ✓Aquifer T
  - ✓Land slope
  - ✓Surface geology
  - ✓Land use
  - ✓Surface water
  - ✓Contaminated sites
  - ✓Flood risk

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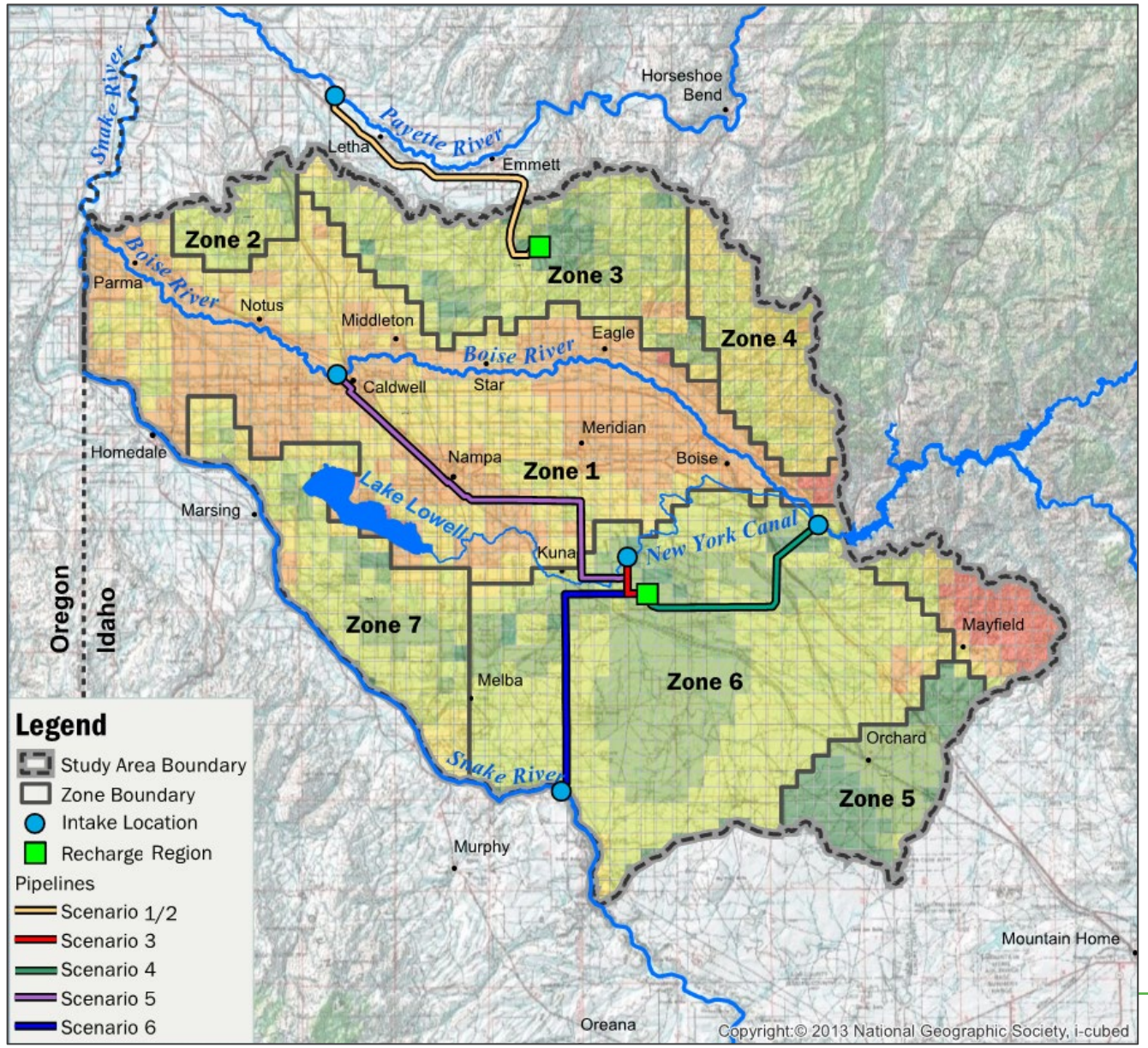

2020 MAR Feasibility Scenario Focus

Boise River water to Zone 6

- Scenario 3 – NY Canal, existing infrastructure
- Scenario 4 – New pipeline
- Scenario 5 – New pipeline

Snake River water to Zone 6

- Scenario 6 - New pipeline

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2023 MAR Scenarios

Main Components

1. Update 2020 GIS layers.
2. Run 8 aquifer recharge scenarios
    1. Same 6 scenarios as 2020 Study
    2. Additional scenario for SE Boise
    3. Additional scenario for Lake Lowell
3. Reporting
    - Effects on gw levels, river flow, drain discharge, and aquifer interactions due to simulated recharge

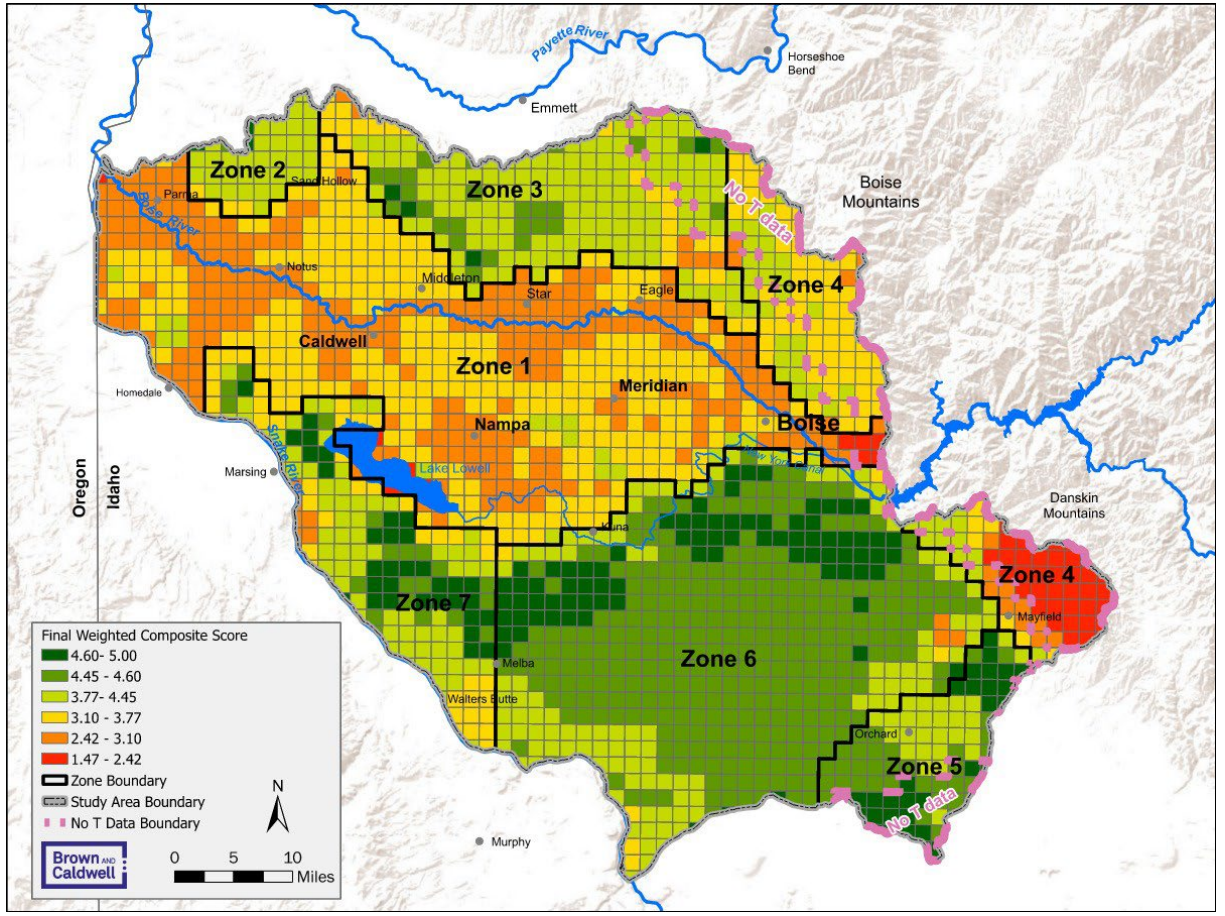
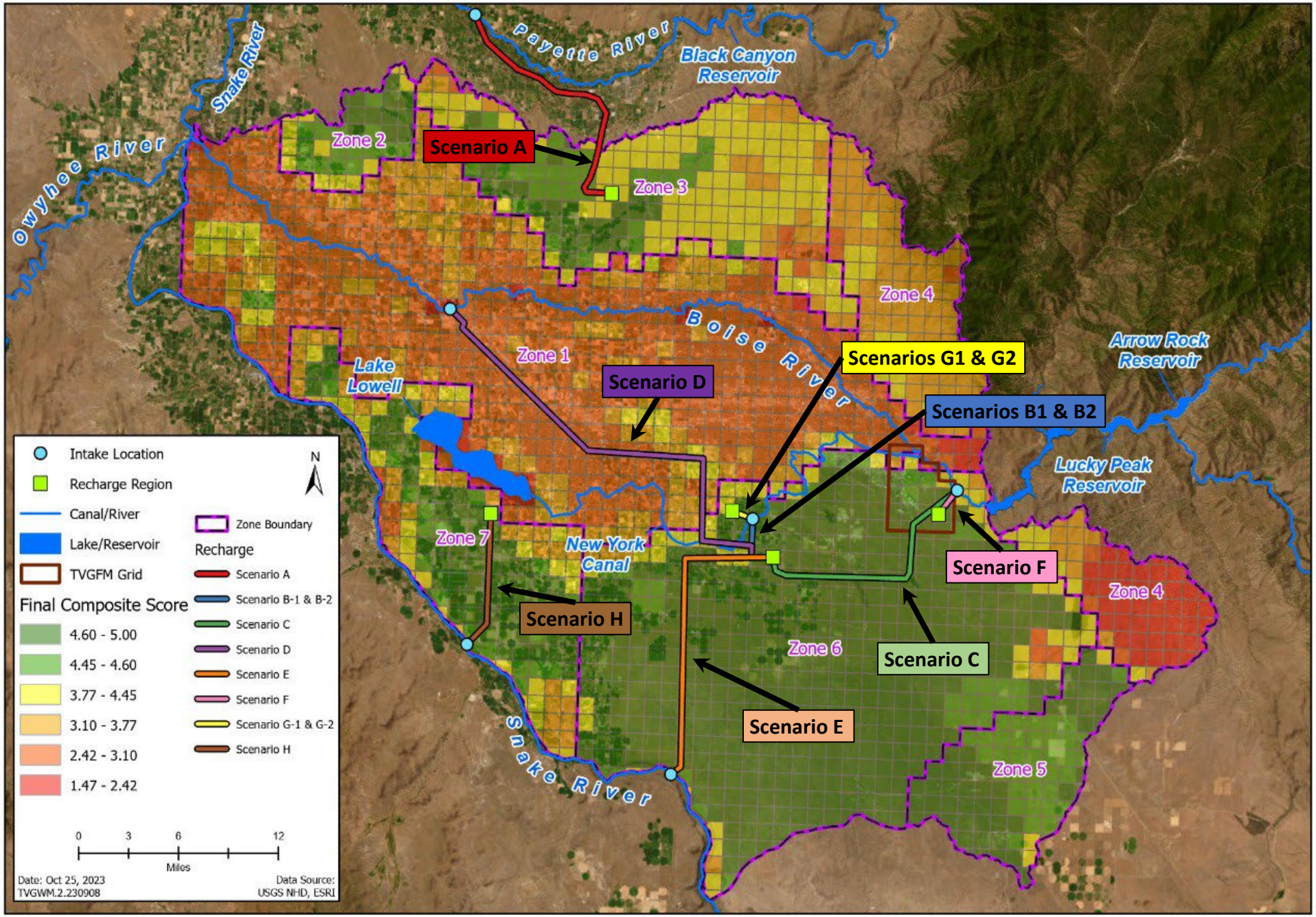


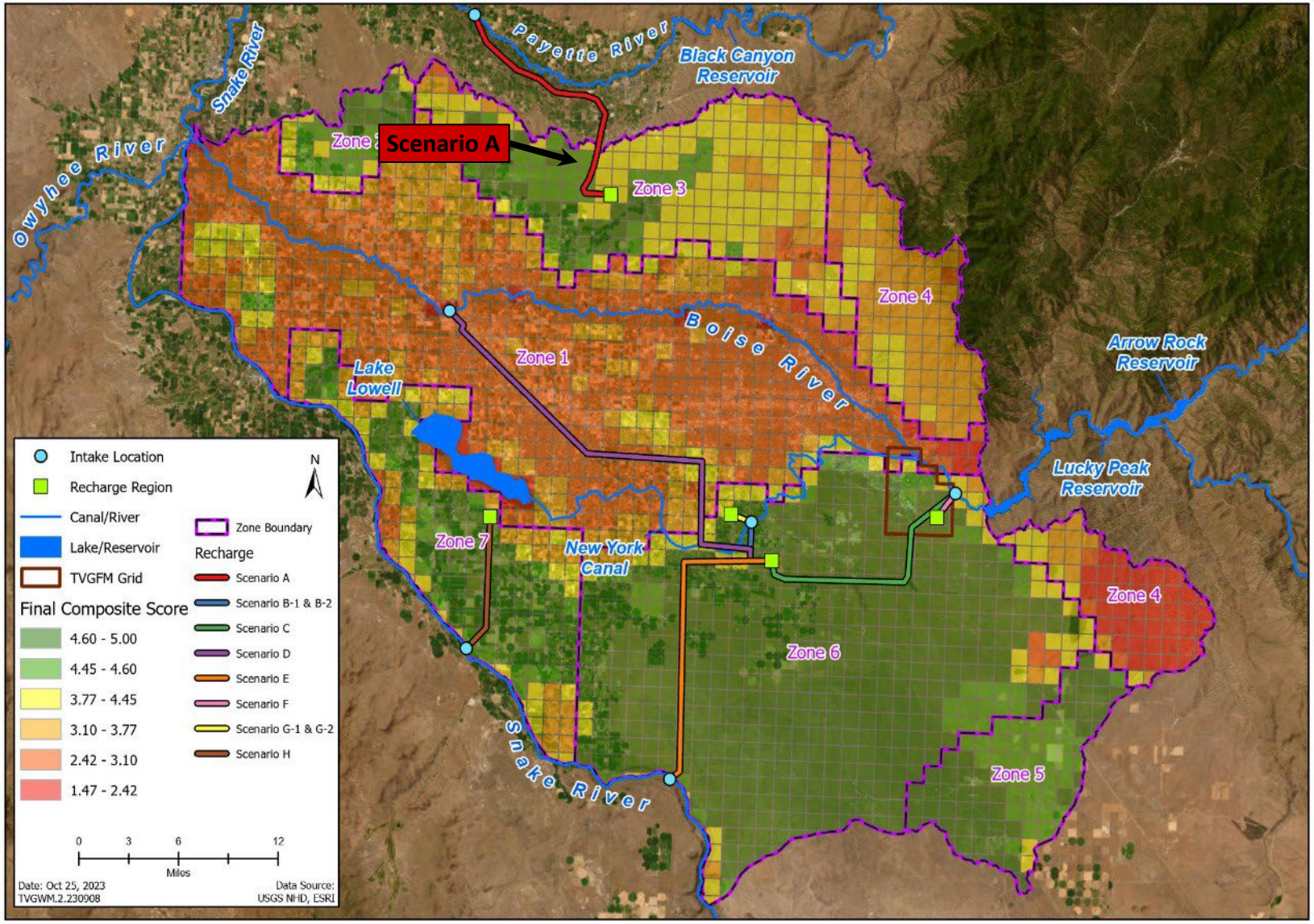
Table 2. Recharge Scenario Description Summary

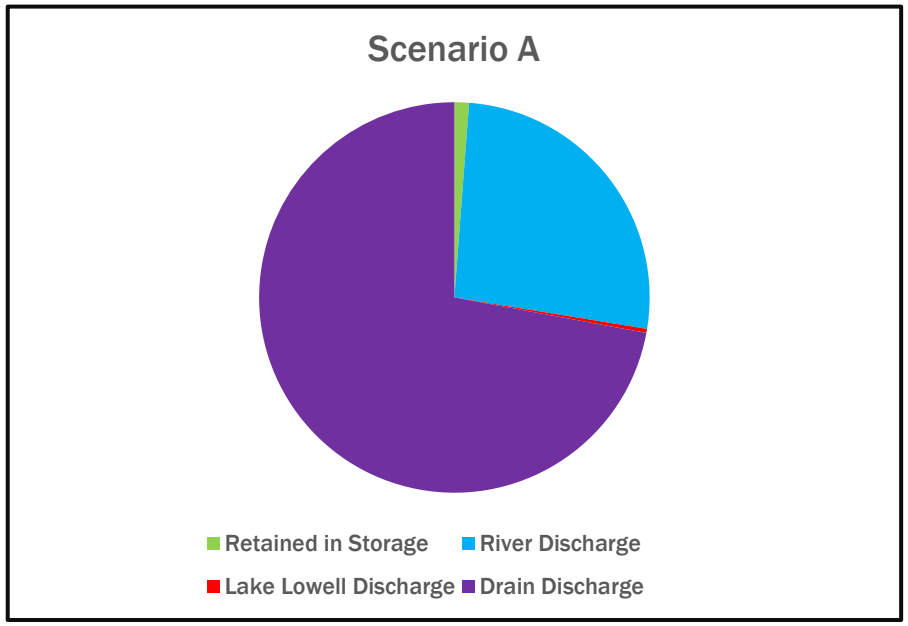
Scenario	Water Source/Intake Location	Recharge Water Volume (Annual KAF)	Period of Water Availability	Pumped Flow Rate (cfs)	Recharge Location
A	Payette River (below Letha)	72	Jan 1–Dec 31	100	Zone 3
B-1	Boise River/New York Canal	48	Sep 1–Apr 30	100	Zone 6
B-2	Boise River/New York Canal	18	Apr 1–Sep 30	50	
C	Boise River (below Diversion Dam)	48	Sep 1–Apr 30	100	
D	Boise River (near Caldwell)	72	Jan 1–Dec 31	100	
E	Snake River (below Murphy)	54	Nov 1–Jul 31	100	
F	Boise River (below Diversion Dam)	48	Sep 1–Apr 30	100	SEBGWMA
G-1	Boise River/New York Canal	48	Sep 1–Apr 30	100	Hubbard Reservoir
G-2	Boise River/New York Canal	18	Apr 1–Sep 30	50	
H	Snake River (below Murphy)	54	Nov 1–Jul 31	100	Lake Lowell



2023 TV Model MAR Scenarios

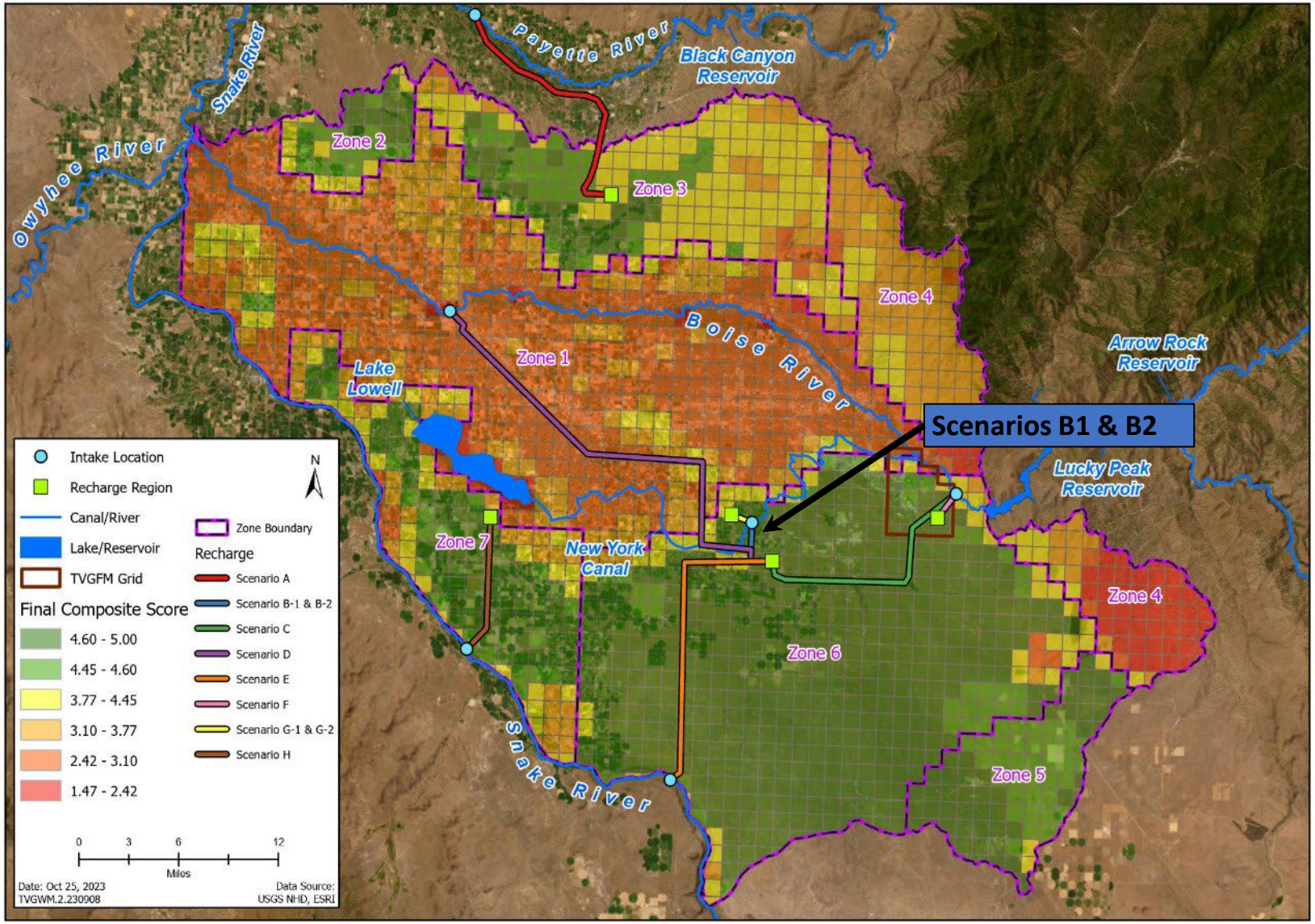
- Scenario A:
  Payette River below Letha
- Scenarios B1 and B2:
  New York Canal
- Scenario C:
  Boise River below Diversion Dam
- Scenario D:
  Boise River near Caldwell
- Scenario E:
  Snake River above Warrens
- Scenario F:
  Boise River to SEBGWMA
- Scenarios G1 and G2:
  New York Canal to Hubbard Reservoir

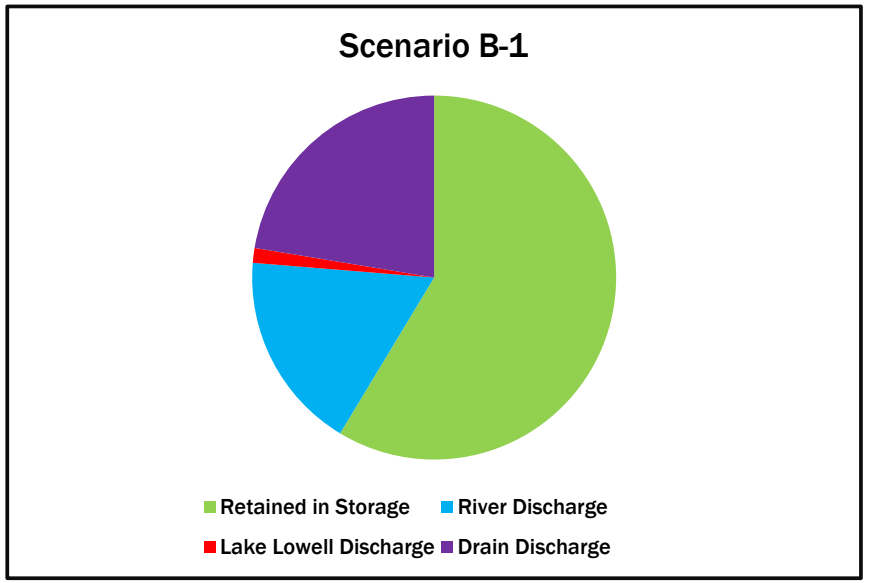


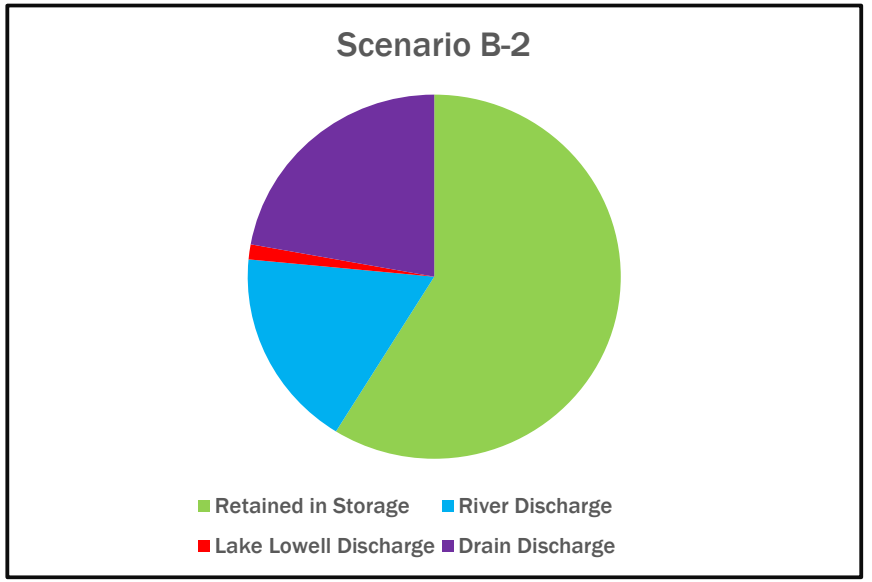


Scenario A:
Payette River below Letha to Zone 3.

Modeled year-round at a recharge location in an intermediately-ranked area. Extreme water-level mounding above land surface (8,339 ft) indicates the site cannot accept the modeled volume of water. Only scenario with appreciable discharge to the Payette River.

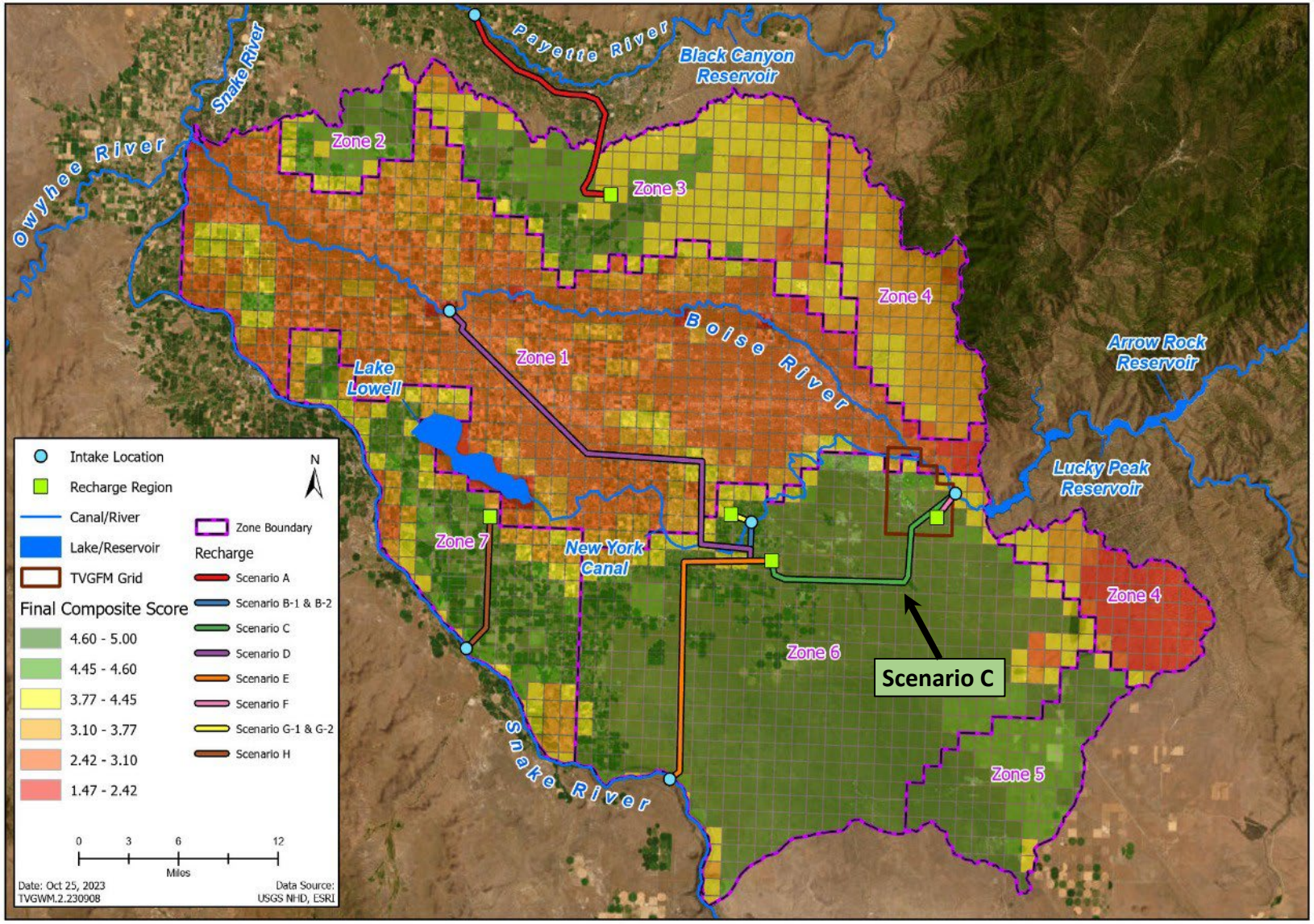


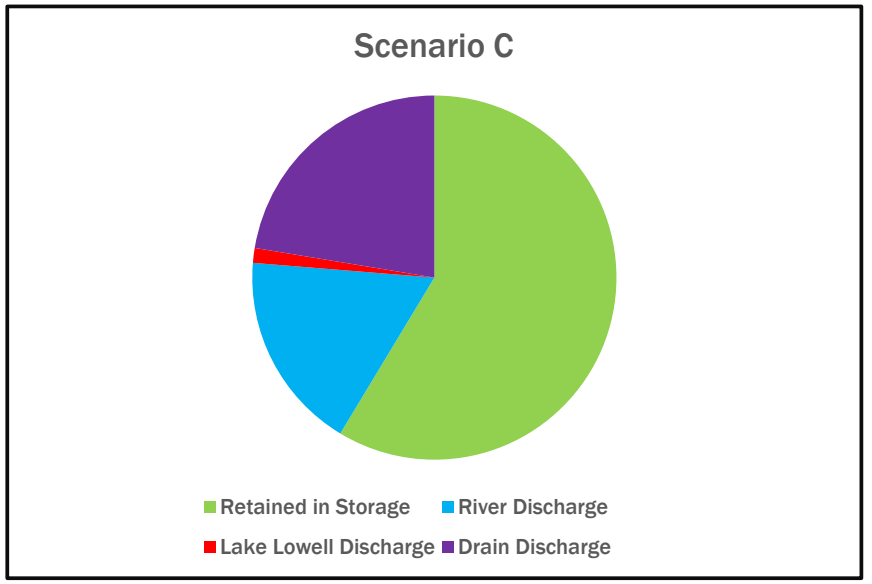




Modeled non-irrigation season (B1) and irrigation season (B2) at a recharge site located in a favorably-ranked recharge area, diverted from the New York Canal.

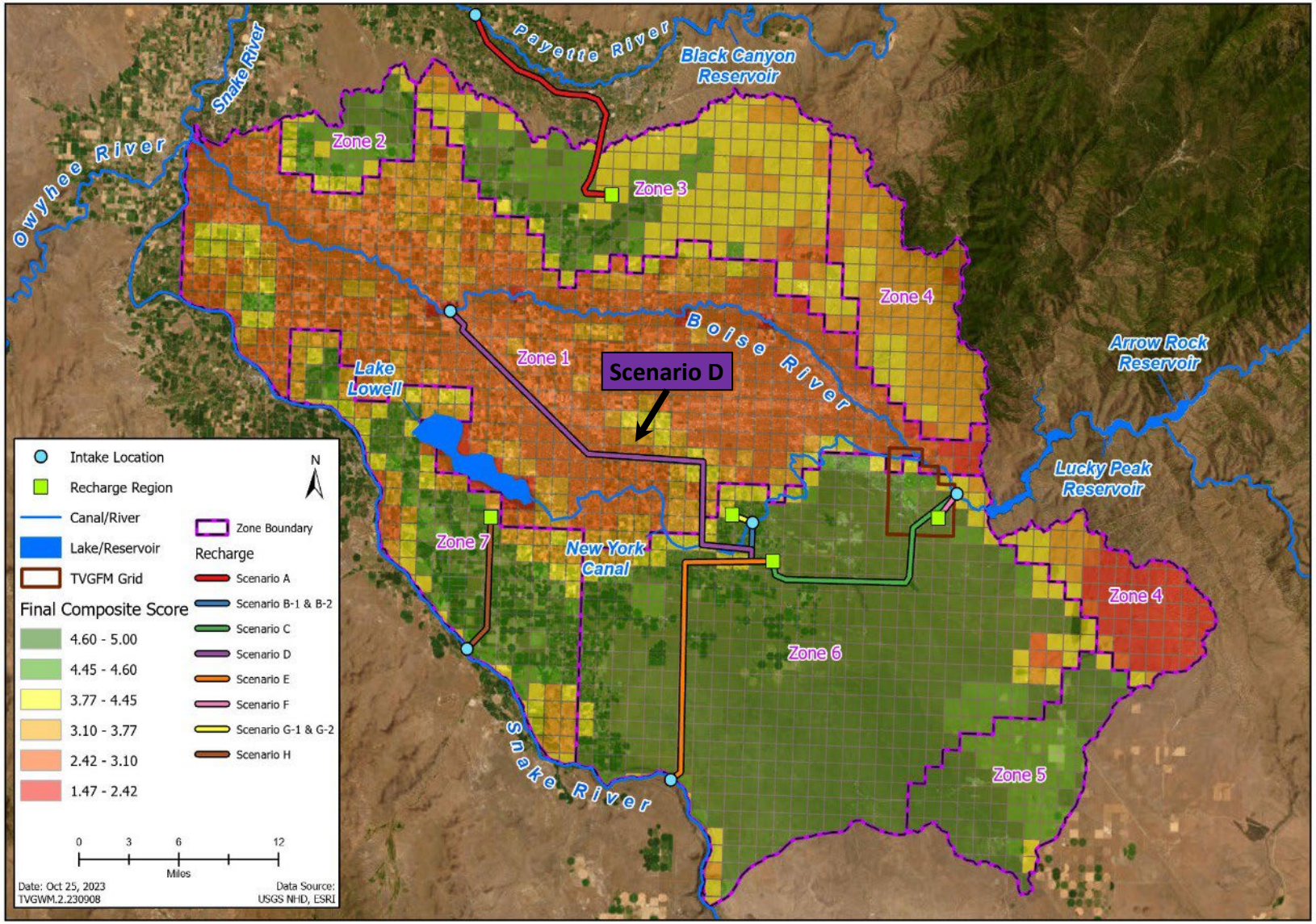
Scenarios B1 and B2: New York Canal to Zone 6

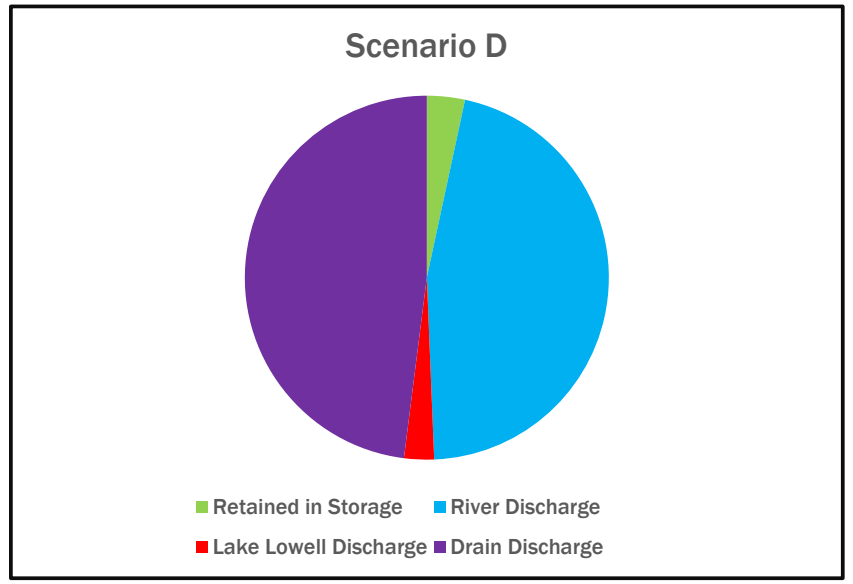




Scenario C:
Boise River below Diversion Dam to Zone 6.

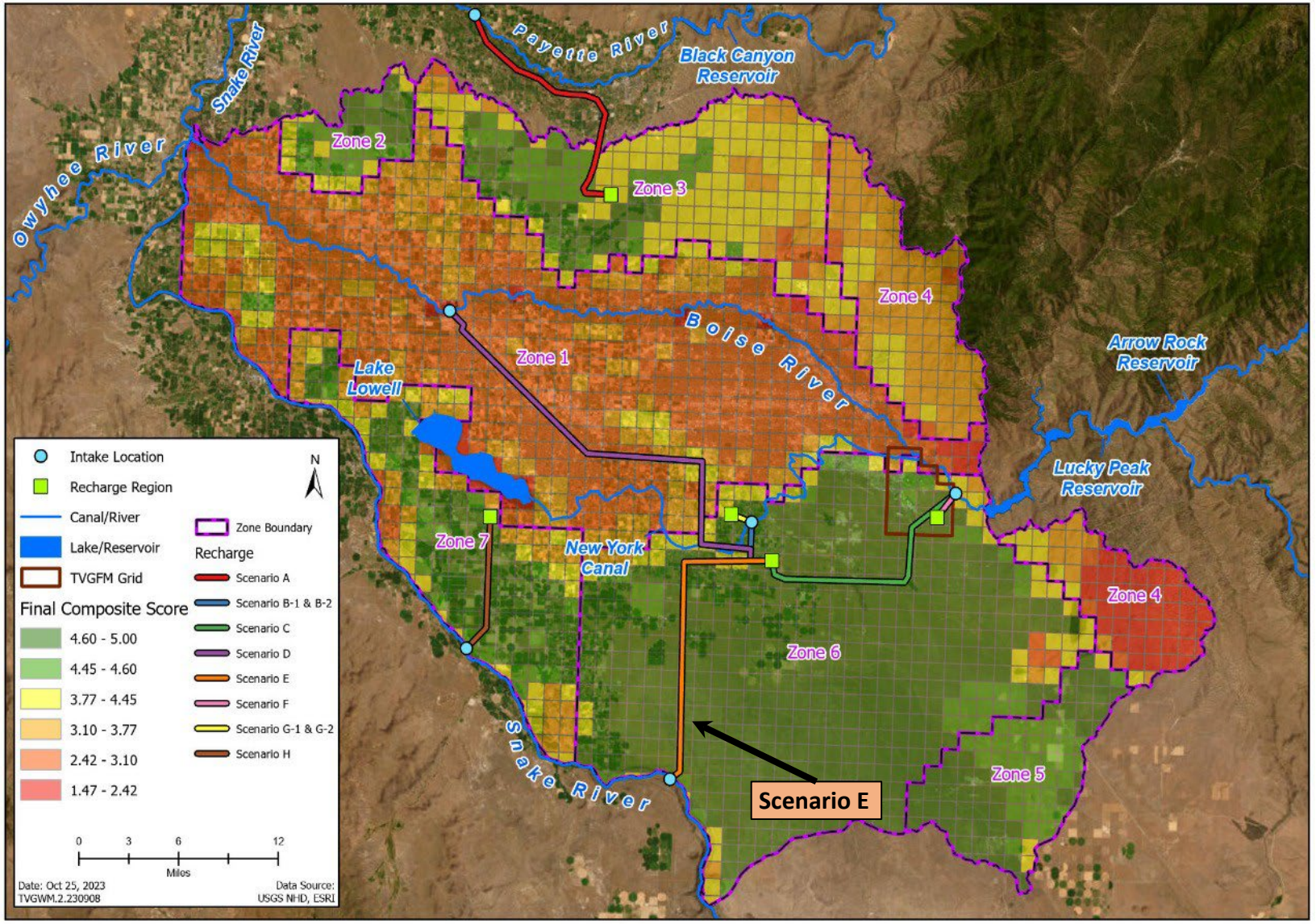
Modeled non-irrigation season at the same recharge location as scenarios B1 and B2, but from a diversion location on the Boise River below the Diversion Dam.

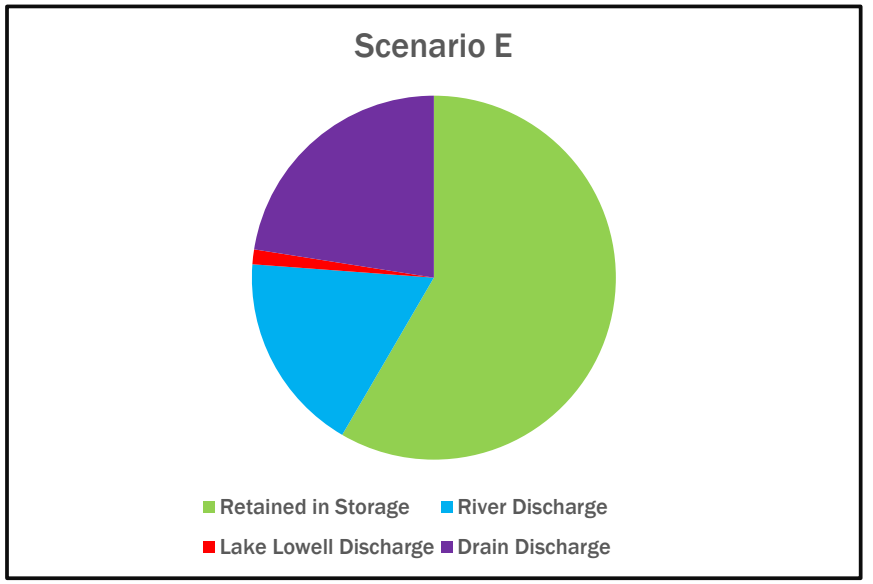




Scenario D:
Boise River near Caldwell to Zone 6.

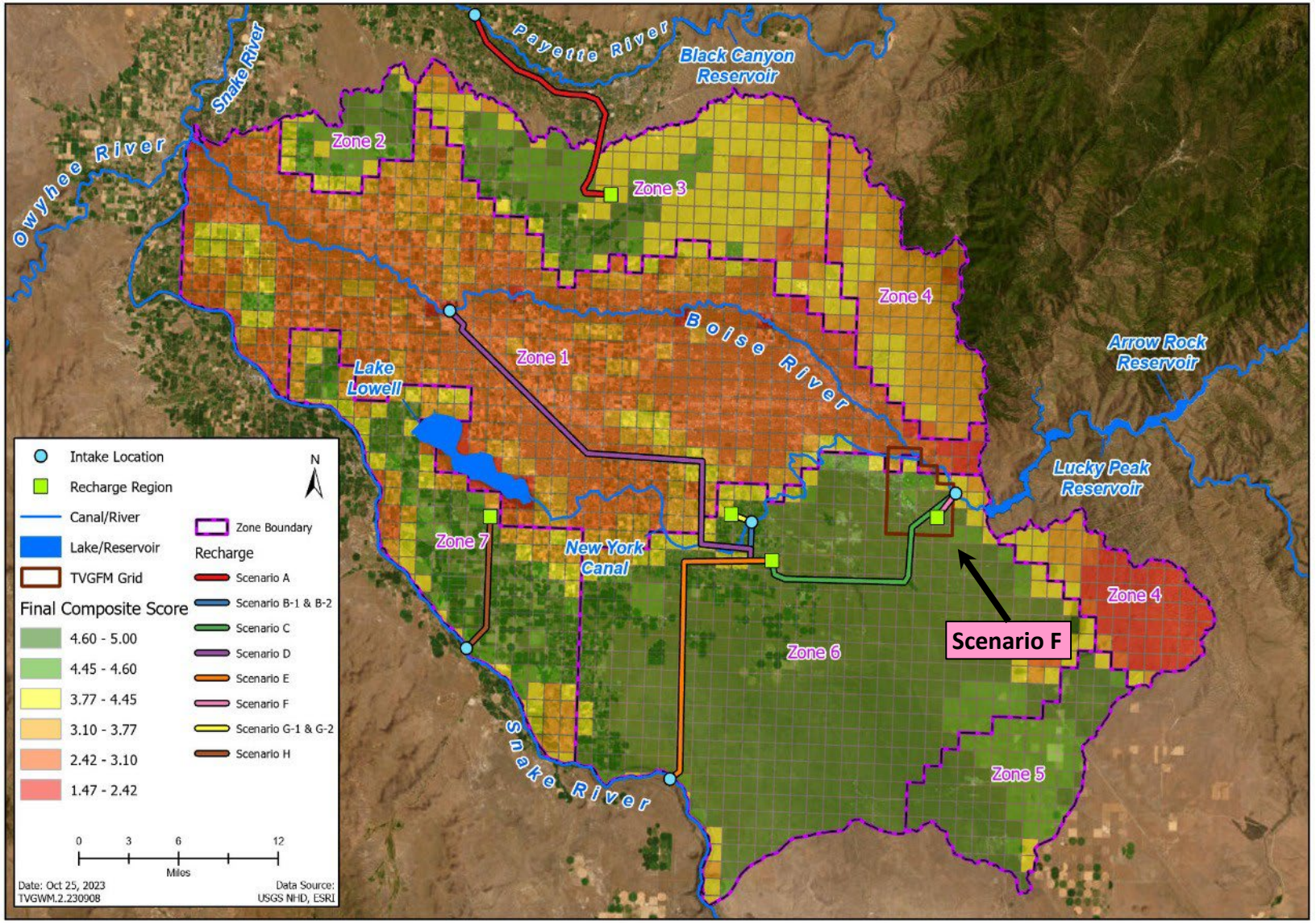
Modeled as year-round recharge at the same favorably-ranked recharge location as scenarios B1,B2, and C, but from a different diversion location on the Boise River located near Caldwell. However, unlike Scenarios B1, B2, and C, recharge is continuous, and water levels do not recede during off times. Because the water levels remain elevated, the additional recharge can only discharge to surface water.

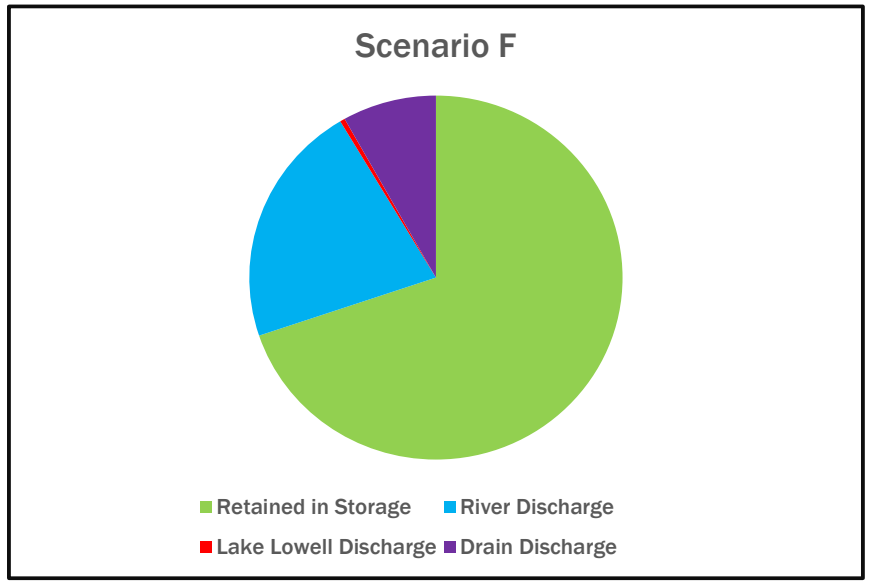




Scenario E:
Snake River above Warrens to Zone 6.

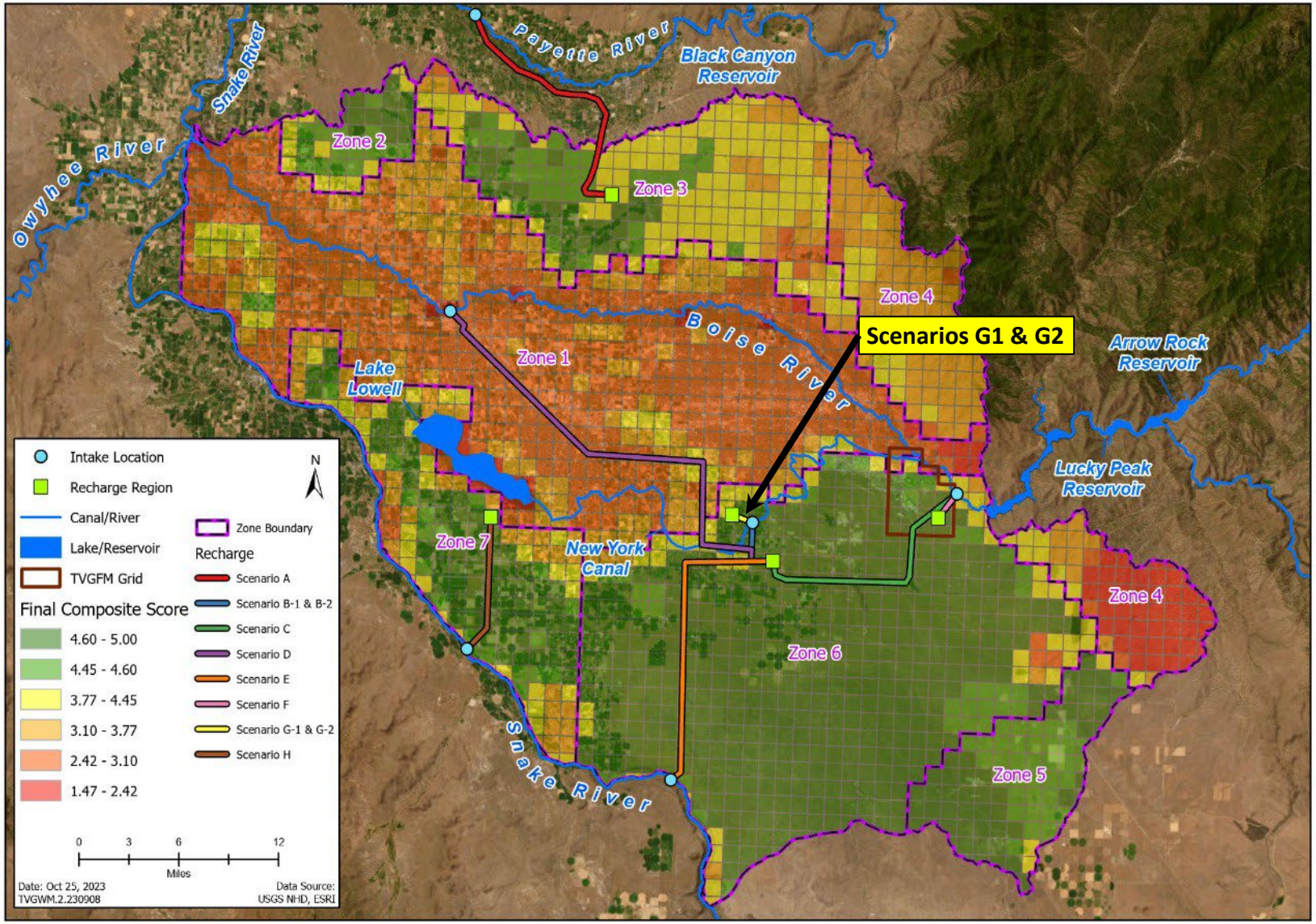
Modeled non-irrigation season at the same recharge location as scenarios B1, B2, C, and D but from a diversion location on the Snake River. Note that the responses to recharge are very similar to Scenarios B1, B2, and C.

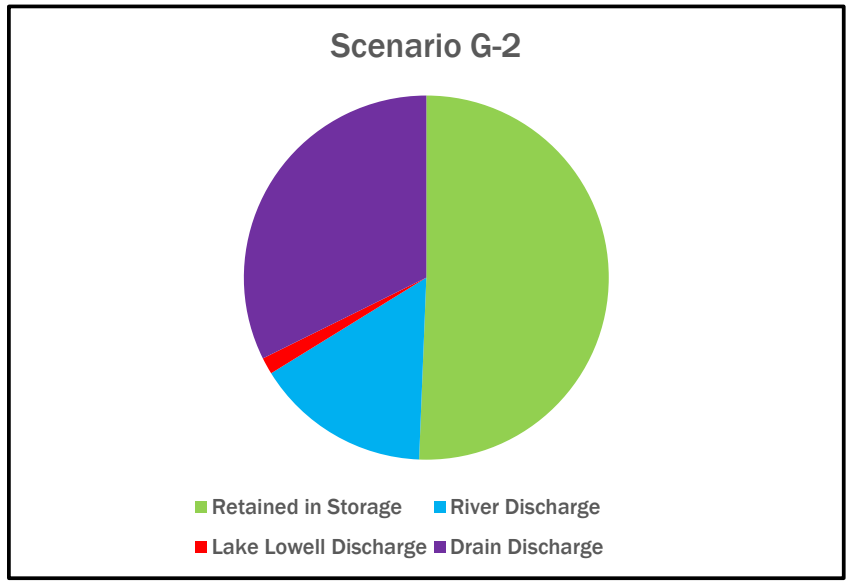


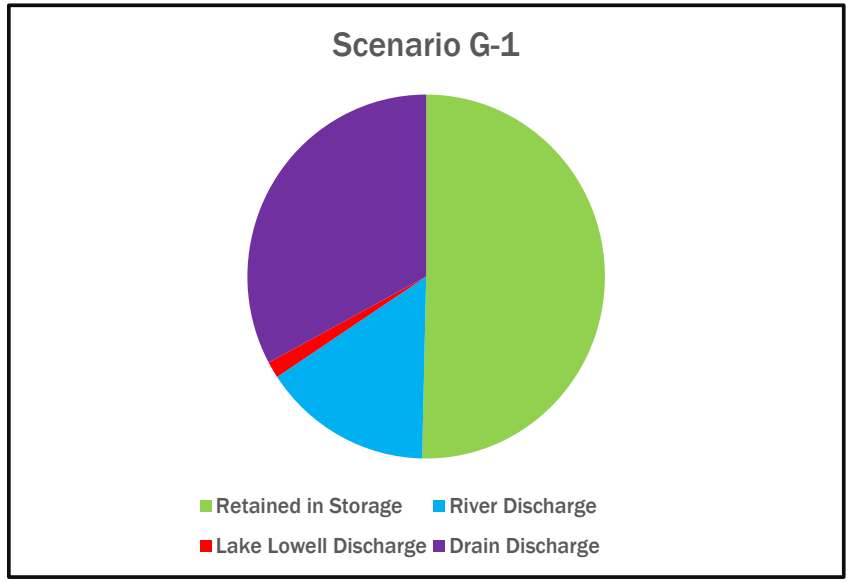


Scenario F:
Boise River to SEBGWMA.

Modeled non-irrigation season at a recharge location in the Southeast Boise Groundwater Management Area from a diversion location on the Boise River below the Diversion Dam. This scenario resulted in the highest aquifer retention.

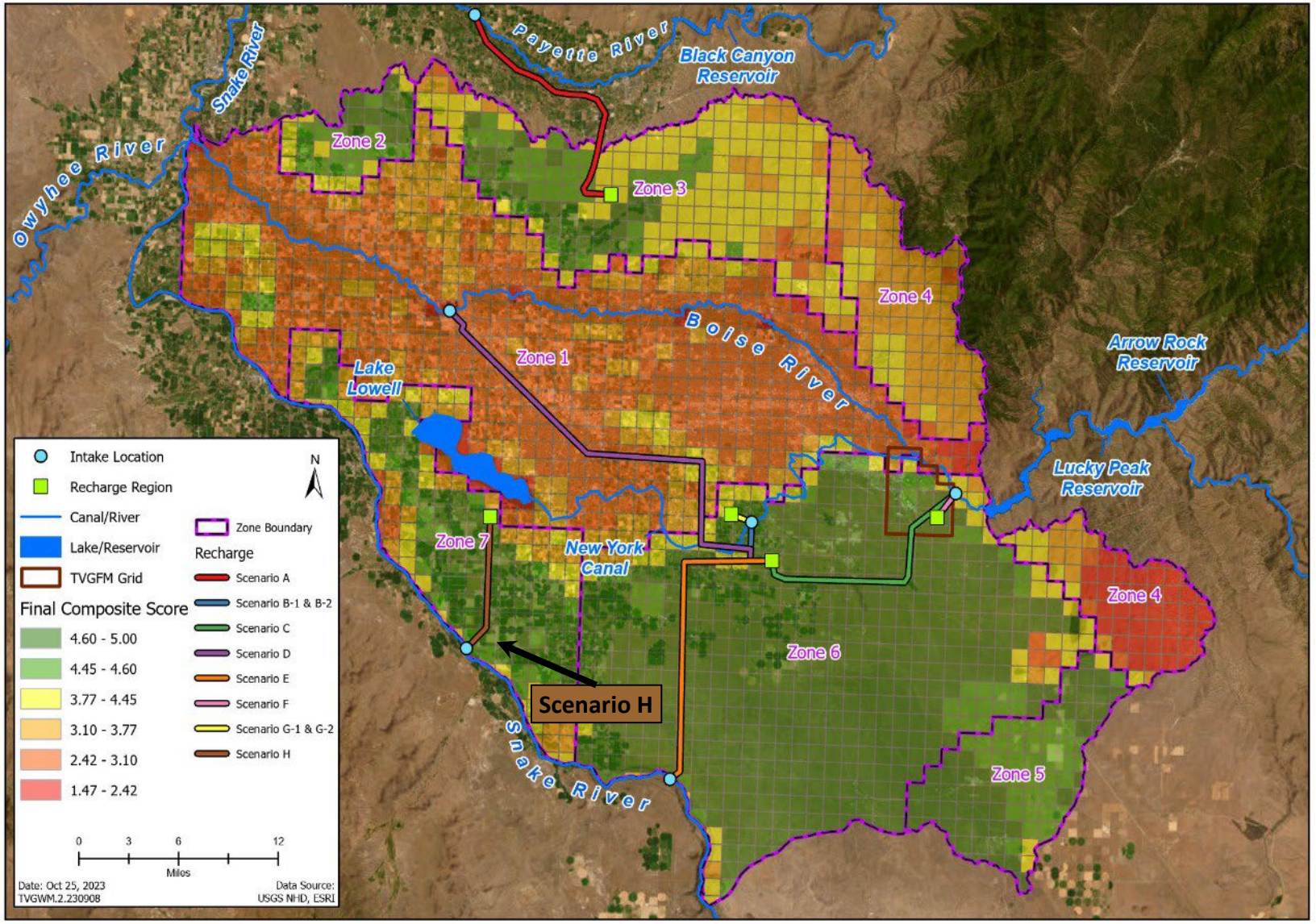


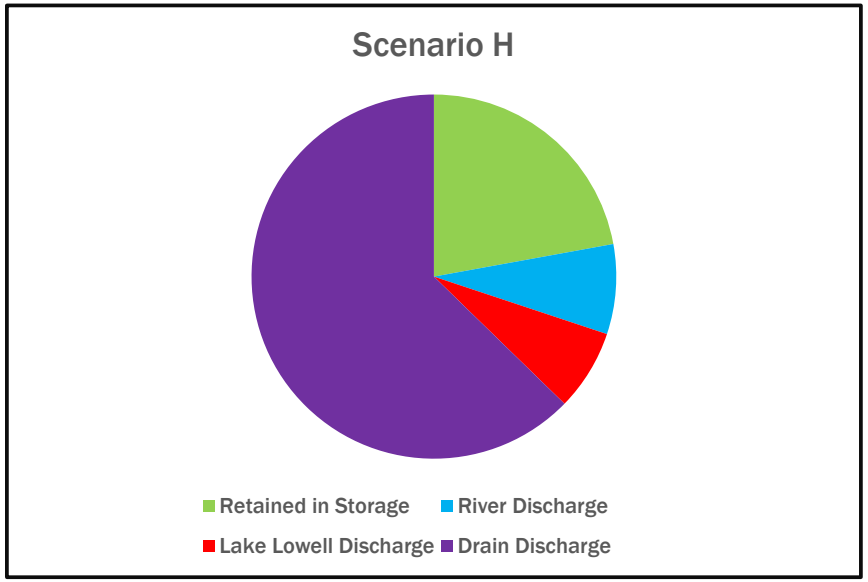




Modeled non-irrigation season (G1) and irrigation season with a reduced recharge rate (G2) at the same recharge site located at Hubbard Reservoir. Both scenarios result in water-level mounding above land surface (220 and 127 ft) which indicates this site cannot accept the modeled volumes of water.

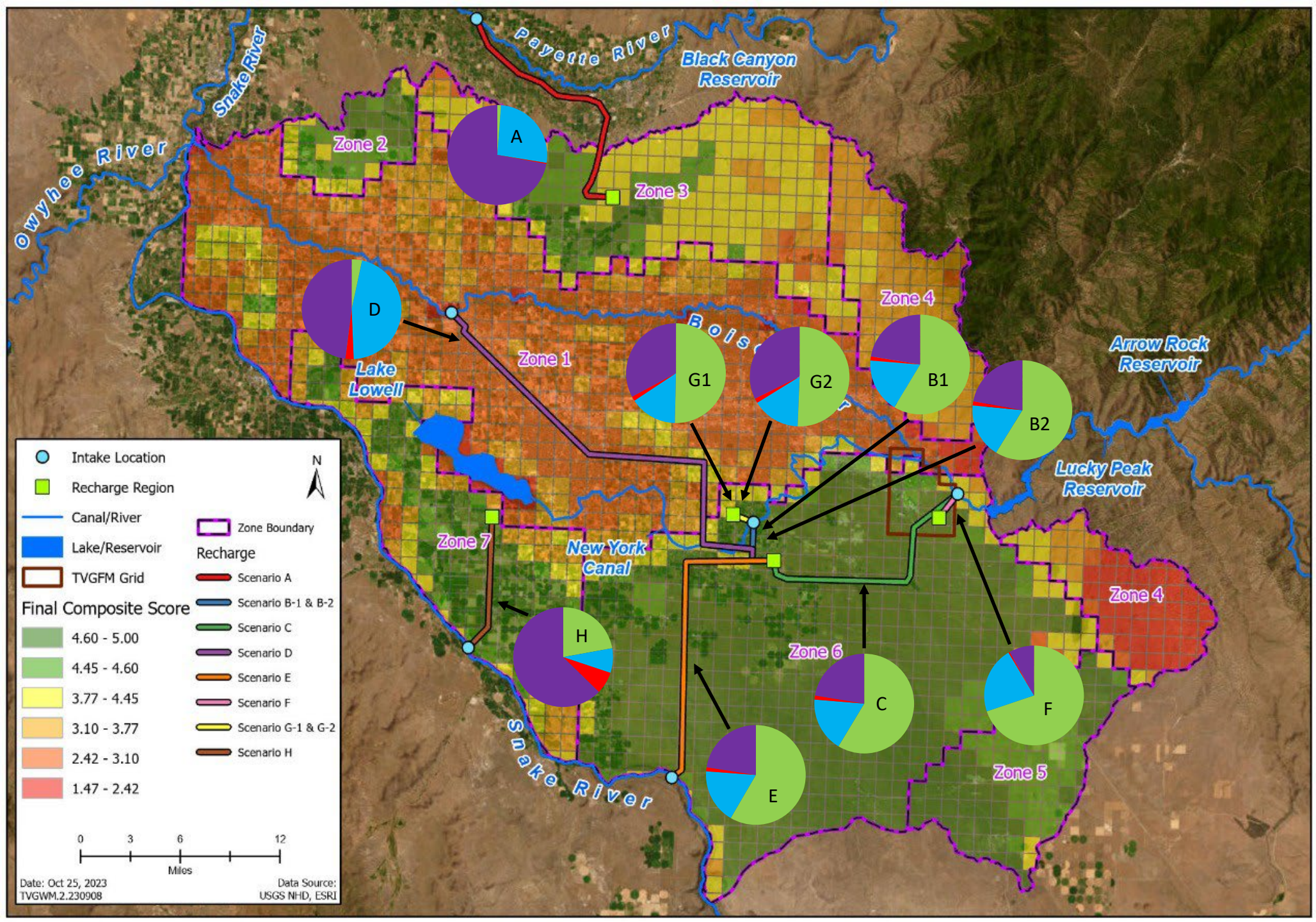
Scenarios G1 and G2: New York Canal to Hubbard Reservoir





Scenario H:
Snake River to Lake Lowell.

Modeled year-round at a recharge location in an intermediately-ranked area. Water-level mounding above land surface (122 ft) indicates the site cannot accept the modeled volume of water. This scenario resulted in the most discharge to Lake Lowell.

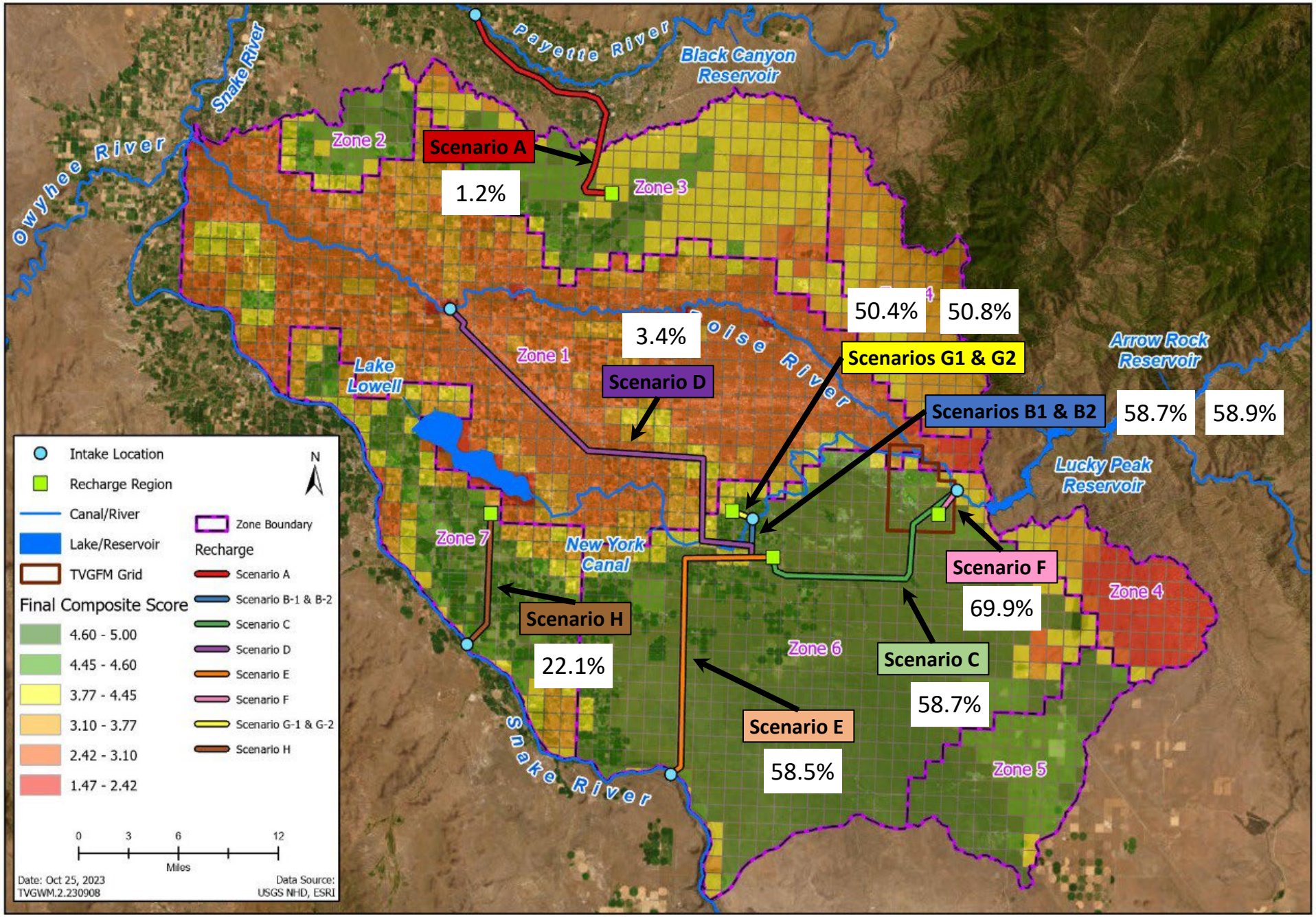


Retained in Storage

River Discharge

Lake Lowell Discharge

Drain Discharge



MAR Recharge Rank

Scenario	Percent of Recharge
F	69.9
B2	58.9
B1	58.7
C	58.7
E	58.5
G2	50.8
G1	50.4
H	22.1
D	3.4
A	1.2


Questions?

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Recharge Project Overviews

Completed, Ongoing, Proposed, and Future Plans

A conversation facilitated by

Cooper Fritz – IWRB Aquifer Recharge Program Coordinator

9/5/2024

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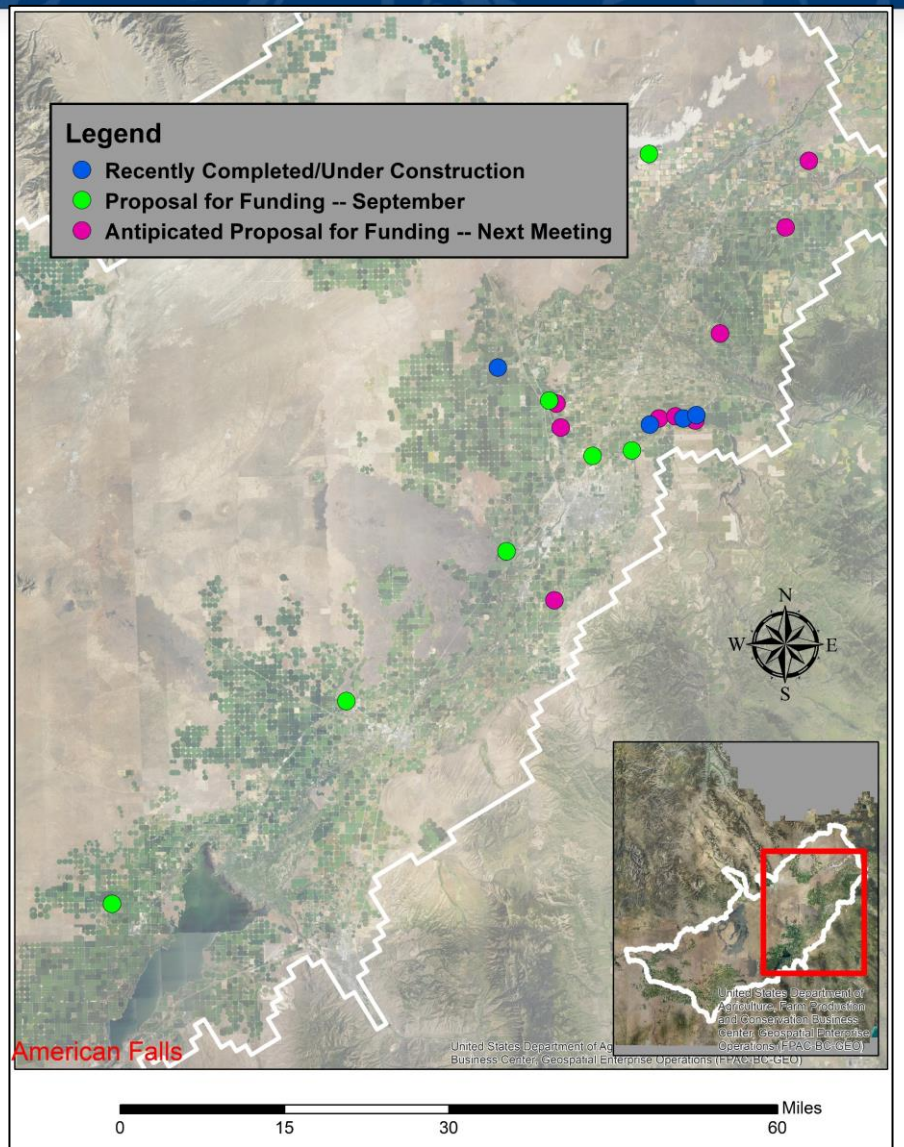
Recharge in various locations returns to different river reaches at different times.



A geographically diverse network is essential to maximize these returns.

Water Quality Overview

- Recharge must not harm aquifer water quality.
- 196 Surface Water Quality Samples.
  - Examines many constituents at parts per million (mg/L) or billion (ug/L).
  - No MCLs exceed.
  - Except bacteria (TC and e. Coli).
    - Attenuate rapidly below ground.
- Continued monitoring is essential.
  - 38 additional surface water samples collected – no RDLs exceeded.
  - Except e. Coli and TC.

Current and Recently Completed Projects

Recharge Program Staff

- Water quality surface and bacteria attenuation study results.
  - Under review within IDWR's open-file report process.

Current and Recently Completed Projects

Southwest Irrigation District

- Recharge well funded for $250,000
- Contract difficulties about to be overcome.

Current and Recently Completed Projects

Minidoka Irrigation District

- $3,387,047 in ARPA funding for infrastructure improvements to enhance deliveries to Goyne Sump.
  - But, Goyne Sump got plugged.
- It's likely new recharge wells will be proposed.

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Current and Recently Completed Projects

New Sweden Irrigation District

Head of the Basalt Basin

- **"Wetted" acres:** ~8.
- **Flow Rate:** 14.5 cfs
  - 1.9 cfs/acre.
- **Budgeted:** $1.2 Million
  - Spent $1,129,399 (94% of budget)
- **Ongoing Work:** Water quality monitor plan.
- **Future Work:** Monitor well.
- **Proposal:** A recharge well.

Current and Recently Completed Projects

Enterprize Irrigation District

55th Road Basin

- **"Wetted" acres:** 5.2
- **Flow Rate** (5/12 – 6/2):~16 cfs
  - 3.1 cfs/acre.
  - Consultant reports a later operation performed 6.17 cfs/acre.
- **Budgeted** $1.7 Million
  - Invoiced to-date: $48,000
- **Ongoing Work:** Water quality monitor plan.
- **Future Work:** Monitor well.
- **Proposal:** Expanded basin.

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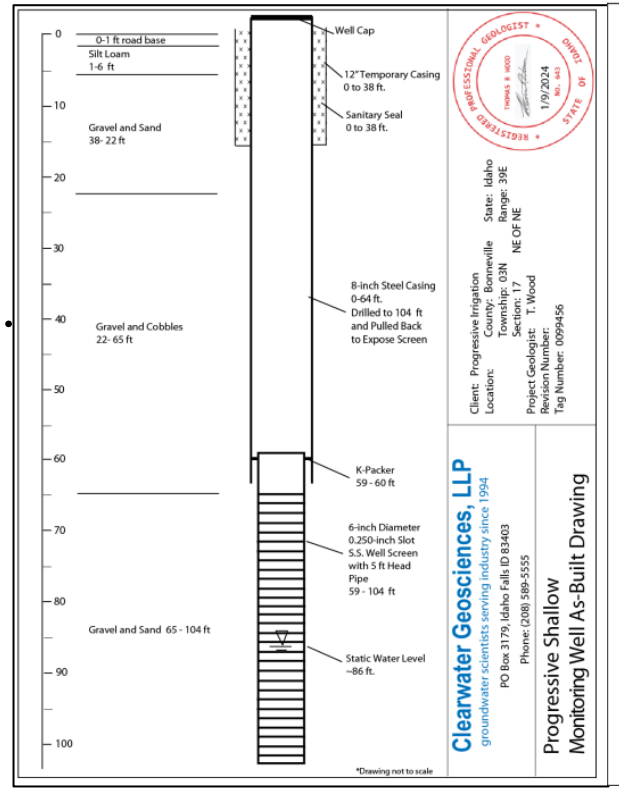
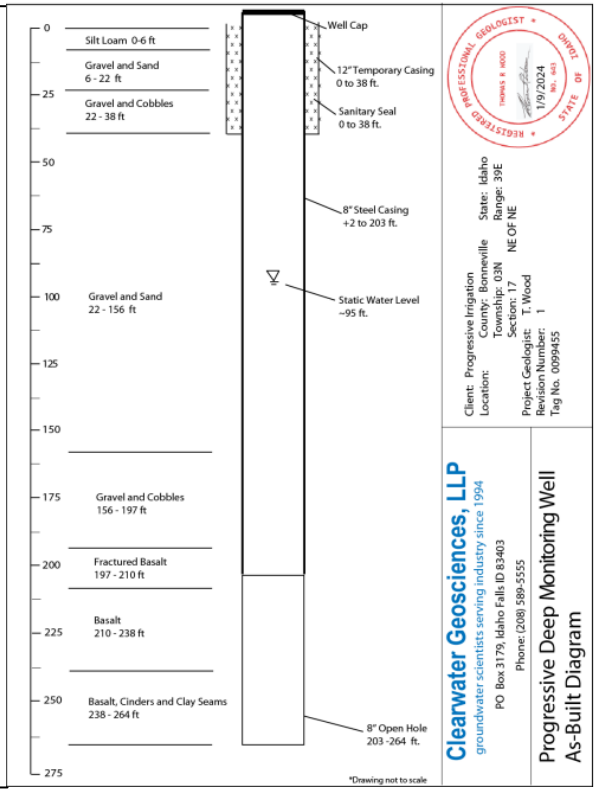
Current and Recently Completed Projects

Progressive Irrigation District

Milo Recharge Wells:

- UIC Permit has been acquired.
- One shallow (104 ft), one deep (264 ft).
  - Shallow recharges into sand/gravel.
  - Deep recharges into fractured basalt/cinders.
- Each well is 8-inches in diameter and recharges 2.5 cfs.
- Budgeted: $120,000
  - Total invoiced:$79,280
  - Total Expected: $114,130 (95% of proposal)





Current and Recently Completed Projects

Progressive Irrigation District

South Fork Recharge Basin:

- Funded for $5,868,000.
- Remains under construction.
  - No major unexpected costs.
  - Final basin size approximately 35 acres.
  - Expected to be operational by September 17.
- There is currently some debate about the excavated material.
- Because it sits on Willow Creek above the Rock Channel, it *may* increase carryover in Ririe Reservoir.

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Current and Recently Completed Projects

Progressive Irrigation District

Current and Recently Completed Projects

Progressive Irrigation District

South Fork Recharge Basin:

- Remaining to-do:
  - Test the site
    - How much does depth of water impact infiltration?
    - Drill a monitor well.
    - Create a hydrologic monitoring network.
    - Create a Water Quality Monitoring Plan.
  - Progressive is interested in Phase II of the project.

Current and Recently Completed Projects

Enterprize Canal Company

Swan Valley Highway Basins:

- Funded for $3,400,000.
  - Awaiting invoices.
- Pipeline construction has been completed.
- Enterprise is working to construct the basins.
- Monitor well expected to be installed this fall.
- Actively working with DEQ to develop a water quality monitoring plan.

Current and Recently Completed Projects

Butte & Market Lake Canal Company

Has a "successful" recharge well -- ~10 cfs, 18" diameter.

Two new recharge wells:

- Funded for $546,700.
- Contract expected to be finalized imminently.

Canal Capacity Increase Study

- Funded for $94,000.
  - $72,382 invoiced to date.
- Results expected to be presented in the next committee meeting.

Current and Recently Completed Projects
Fremont Madison Irrigation District

West Egin Test Recharge Well

- Obtained UIC permit.
- Well completed in Spring 2024.
  - Funded for $230,000.
    - Awaiting invoices.
- “Successful” well – 10 cfs.
- Proposing a recharge well complex.

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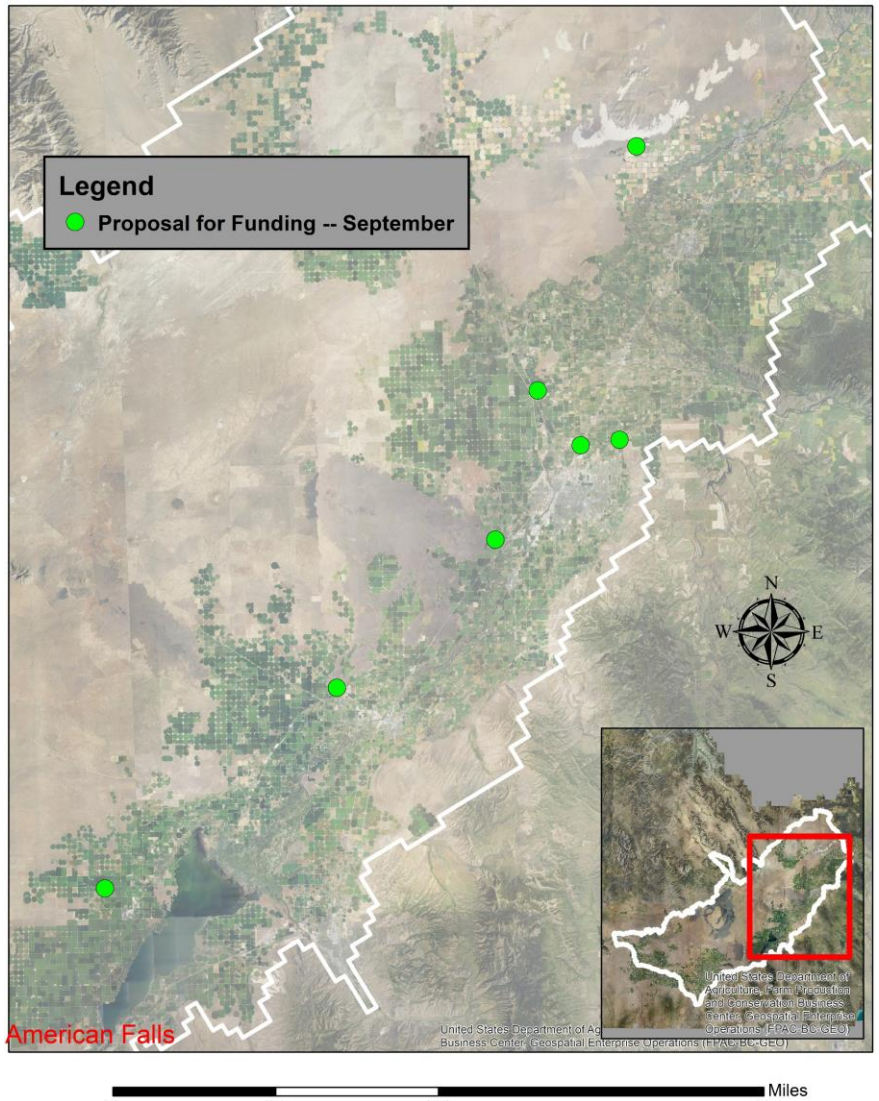
Proposed Projects – Part I

- Four test recharge well sites,
- A recharge well complex based on successful test well results,
- Two basins.



Water Quality --

- It is a primary goal to ensure that recharge water does not negatively impact the aquifer.
- We have a lot of water available that is simply mountain snow runoff.
  - And, we have an aquifer that is rechargeable!
- We monitor closely and will continue to monitor.

Cost per Acre Foot Calculation

- **Consistency** -- A method to fairly compare projects.
- **Financial forecasts**: Based on a 20-year period.
  - Capital outlay averaged annually (Total project cost / 20 years = Average yearly cost).
  - Water is available for 100 days in half of all years.
    - Infrastructure operates 90% of the time water is available (i.e., 45 days/year).
- Does not include conveyance fee.
- Only includes IWRB natural flow.
- But the forecast should be used primarily for comparative purposes.
  - If for no other reason, it is difficult to forecast how much recharge a site will do.
- Cost for South Fork Recharge Basin -- ~$33/AF.

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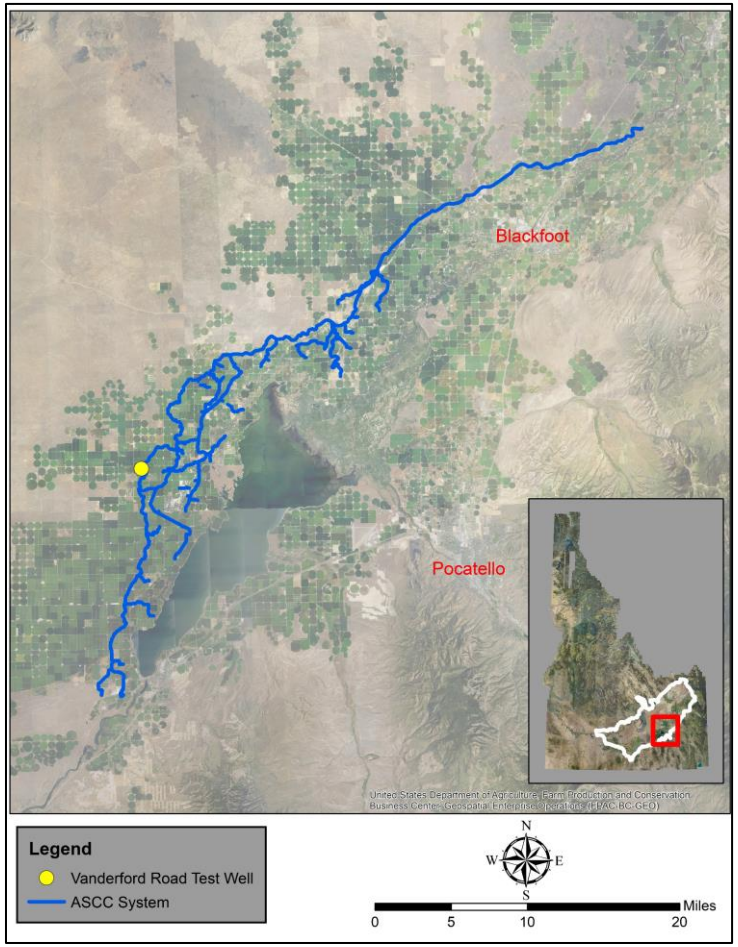
Aberdeen Springfield's Vanderford Road Test Recharge Well

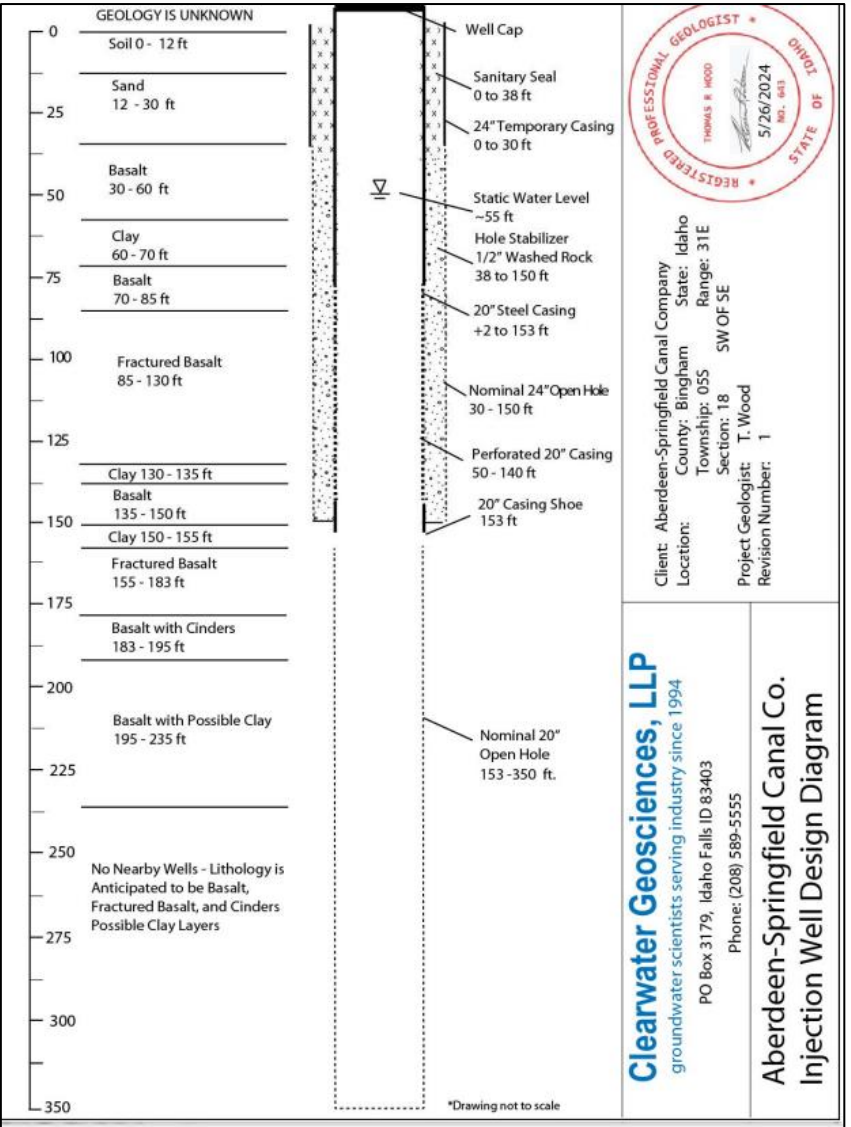


Intent of Test Well:

- Test the viability of recharge wells in the ASCC system.
- If successful:
  - Construct multiple wells and complexes.
  - Fund some through ASCC, others proposed to IWRB.
- Recharge below local perched aquifer.

Purposes of Monitor Well:

- Assess hydrologic responses.
- Repeat bacteria attenuation test.



Aberdeen Springfield's Test Well

Well Design Overview:

- Cased below the regional perching clay layer.
- Anticipate hydrologically productive zones below clay layer.
  - Logs indicate substantial fractured basalt and cinders.
- ASCC proposes 350 ft to ensure productive zones are reached.
  - Drilling may cease before 350 ft if IWRB staff or ASCC representative determine productive zones are encountered.

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Aberdeen-Springfield's Test Well

Costs

Item	Cost
Construction of 20" - 350' Well	$201,620
Plumbing	$20,925
Meter	$7,000
Geology Consultant	$10,000
Monitor Well	$30,000
Contingency (10% of Total)	$26,955
Total Requested	**$296,500**

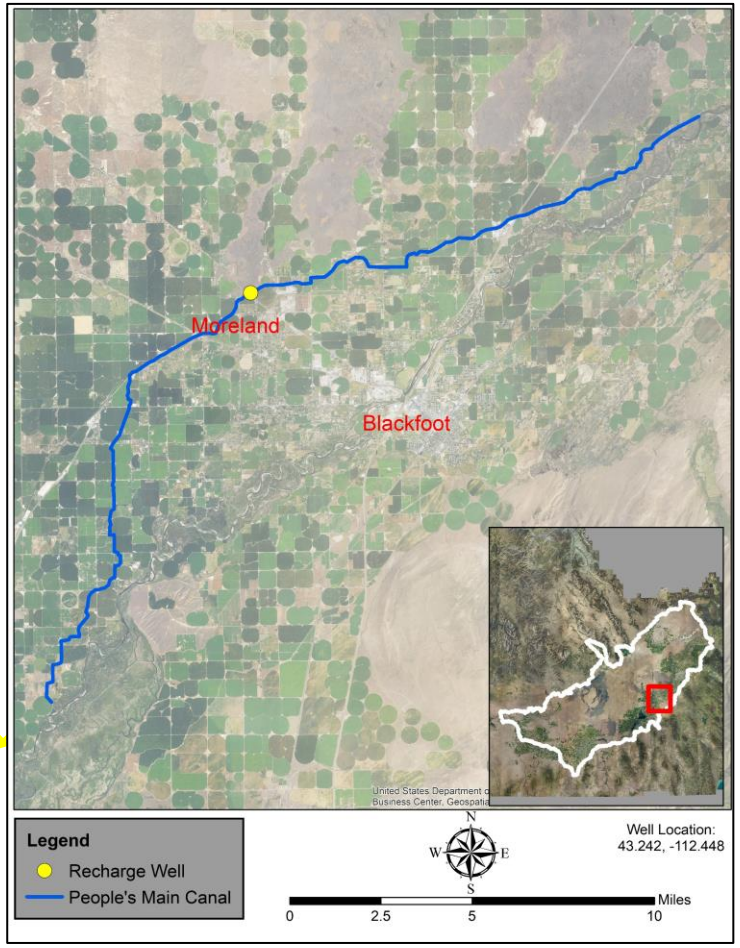
Benefits

- **20% returns within 4 months**
  - Above Blackfoot: 9%
  - Blackfoot to Minidoka: 91%
- **50% returns within 1.33 years**
  - Above Blackfoot: 13%
  - Between Blackfoot and Minidoka: 87%
- Primary Reach Impacted: **Blackfoot to Minidoka** (73%)

Cost per Acre Foot over 20 Years*: $16.61

*assuming **10 cfs** and average water availability.

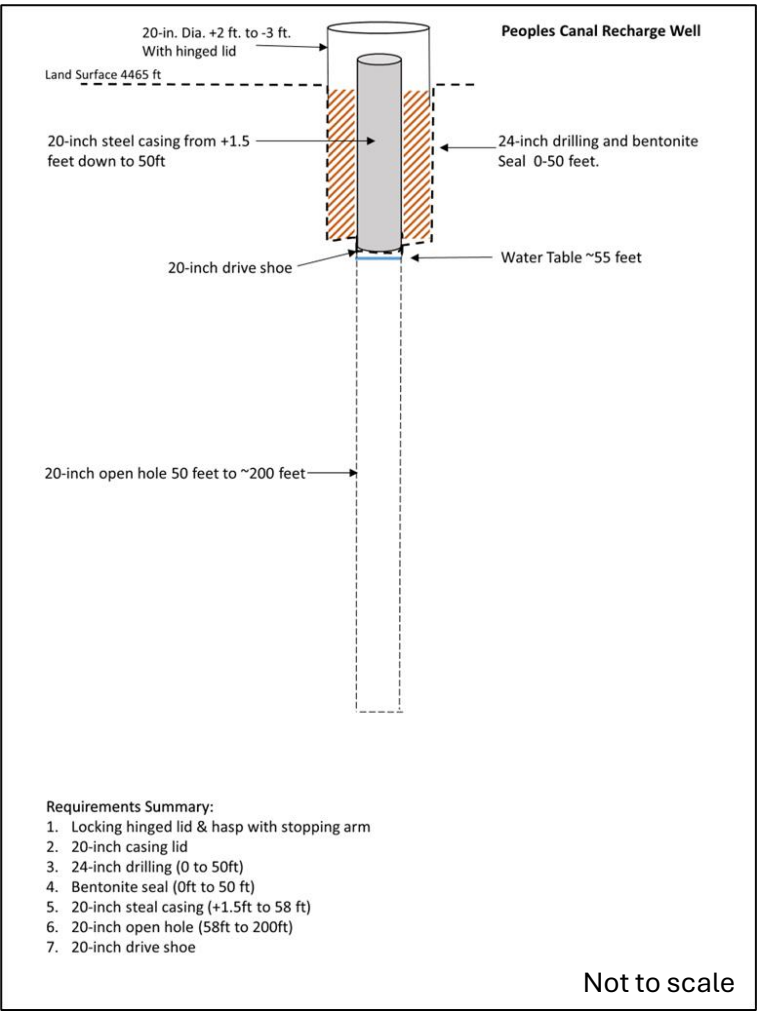
People's Canal Company's Test Recharge Well



Intent of Test Well:

- Test the viability of recharge wells in the PCC system.
  - Initial location is in the vicinity of an under-performing basin.
- If successful:
  - Construct multiple wells and complexes.
  - Fund some through PCC, others proposed to IWRB.
- **Proposal also includes monitor well.**

People's Canal Company's Test Well



Well Design Overview:

- Cased to 50 ft below ground surface (bgs)
  - May case above or below, depending on drilling results.
- Open interval from 50 to 200 feet bgs.
  - Rapid geological changes are expected in open interval.
  - Hydraulically conductive layers anticipated based on nearby well data.
- Presence of nearby irrigation wells suggests favorable conditions for recharge.

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People's Canal Company Test Well

Costs

Item	Cost
Construction of 20" 200' Recharge Well	$53,000
Infrastructure (incl. Meter)	$33,400
Monitor Well*	$31,050
Contingency (15%)*	$17,600
Total Request	**$135,000**

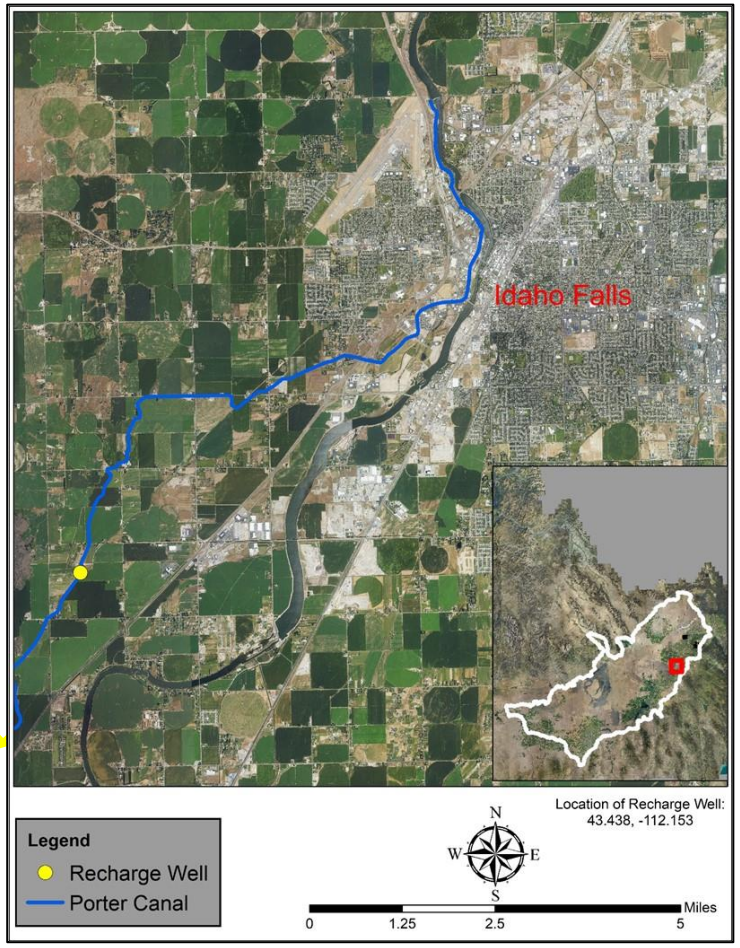
Cost per Acre Foot over 20 Years*: $7.56

*assuming **10 cfs** and average water availability.

Benefits

- **20% returns within 4 months**
  - Above Blackfoot: 37%
  - Blackfoot to Minidoka: 63%
- **50% returns within 1.25 years**
  - Above Blackfoot: 31%
  - Between Blackfoot and Minidoka: 69%
- Primary Reach Impacted: **Blackfoot to Minidoka** (64%).

New Sweden Irrigation District
Head of the Basalt Test Well



Intent of Test Well:

- Test the viability of recharge wells in the vicinity of underperforming infiltration basin.
  - Approximately 200 cfs can be delivered to the site until irrigation begins in mid-May.
    - Delivery capacity decreases to 0 rapidly over ~three weeks.
- If successful, construct additional wells to potentially develop the full 200 cfs capacity.
- Proposal also includes dedicated monitor well.

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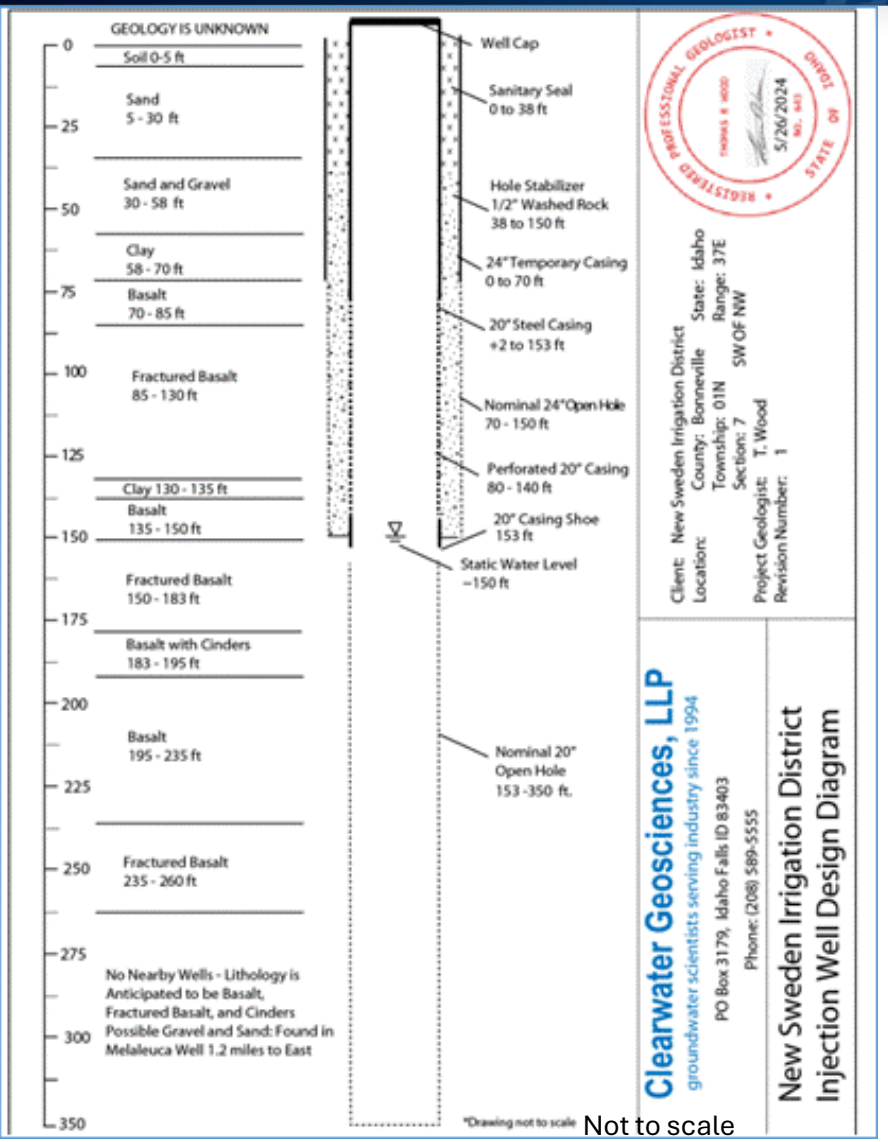

Not to scale

New Sweden Irrigation District Head of the Basalt Test Well

Well Design Overview:

- Cased below sand/gravel and clay layer.
- Anticipate hydrologically productive zones below clay layer.
  - Logs indicate substantial fractured basalt and cinders.
- NSID proposes 350 ft depth to ensure that hydraulically productive zones are encountered.
  - Drilling may cease before 350 ft if IWRB staff or NSID representative determine productive zones are encountered.

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New Sweden Irrigation District
Head of the Basalt Test Well

Costs

Item	Cost
20" 350' Recharge Well	$147,035
Canal Connection Infrastructure	$30,140
Consultant	$11,000
20% contingency*	$37,635
Monitor Well*	$30,000
Total Requested	**$256,000**

Cost per Acre Foot over 20 Years*: $14.34

*assuming **10 cfs** and average water availability.

Benefits

- **20% returns within 8 months**
  - Above Blackfoot: 81%
  - Blackfoot to Minidoka: 19%
- **50% returns within 1.25 years**
  - Above Blackfoot: 66%
  - Between Blackfoot and Minidoka: 33%
- **Primary Reaches Impacted by total recharge:** Shelley to Near Blackfoot, *and* Near Blackfoot to Minidoka (41% each).

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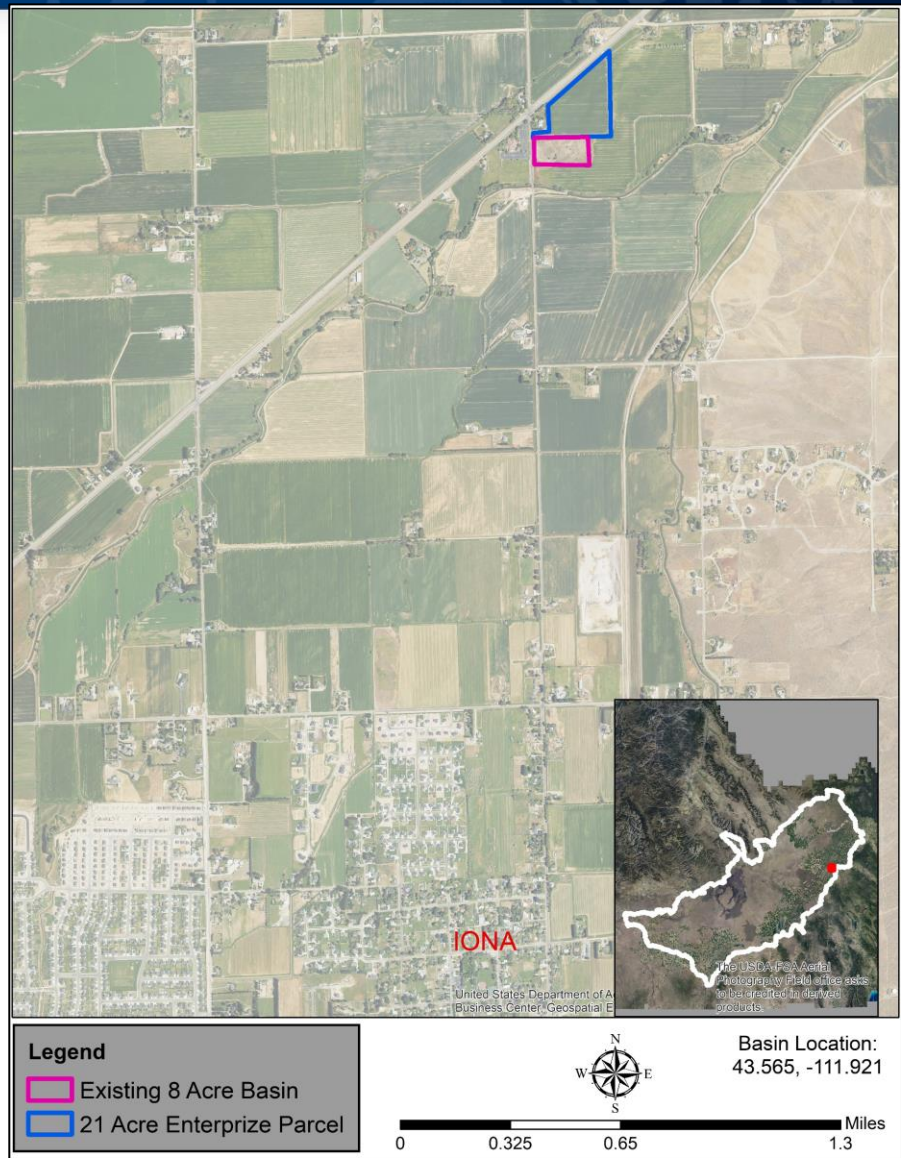
Enterprize Canal Company
55th Road Basin Expansion

Project Overview:

- **Spring 2024 Existing Basin Recharge Results:** 8 Acre basin (5.2 “wetted” acres), 16 cfs recharged.
  - This will likely increase with operational familiarity.
- **Recharge Basin Expansion:** Enterprize purchased a 21-acre parcel adjacent to the existing basin and proposes to excavate 14.8 acres directly next to it.
- **Material Haul Off:** Enterprize desires to maximize basin size by hauling off the material.
- **Engineering Oversite.**



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Enterprize Canal Company
55th Road Basin Expansion

Overview of Funding Proposal:

- **Earthwork:** Some excavated material for berms, most hauled off.
- **Engineering Services.**
- **Miscellaneous Necessities.**

Item	Cost
Earthwork (Excavation and Removal of Material)	$5,365,649
Engineering Services	$481,706
Piping of Lateral Ditch	$250,390
Inlet Trash Diverter	$40,000
Fence	$35,200
Construction Traffic Control	$17,588
Total Requested	**$6,190,533**

Cost per Acre Foot over 20 Years*: $75.96

*assuming 45.7 cfs (as proposed) and average water availability.

Cost per Acre Foot over 20 Years*: $63.39

*assuming 55 cfs (equivalent to Jones Pit) and average water availability.

Enterprize Canal Company
55th Road Basin Expansion

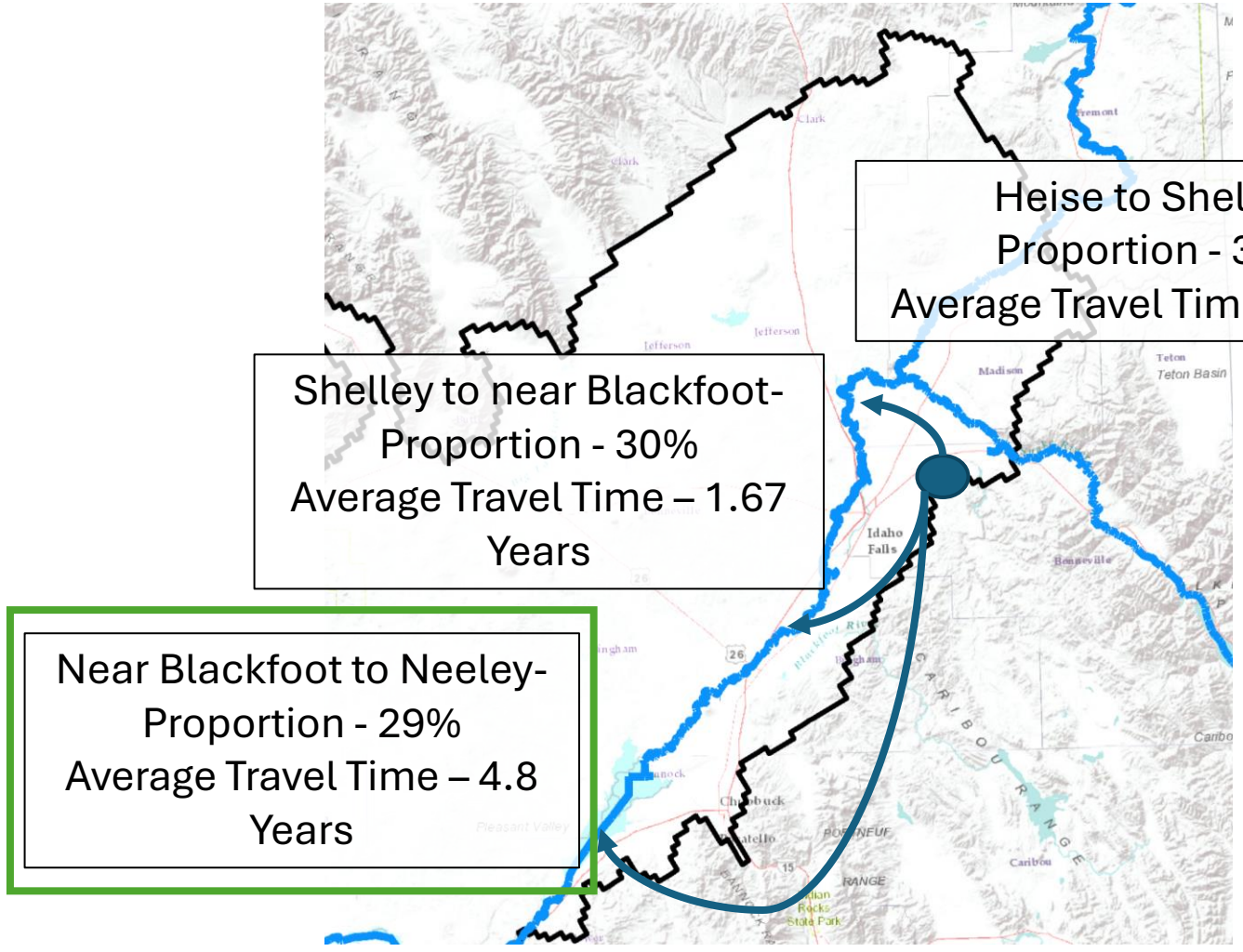
Benefits

- **20% returns within eight months.**
  - Above Blackfoot: 95%
  - Between Blackfoot and Minidoka: 5%

- **50% returns within 2 years**
  - Above Blackfoot: 85%
  - Between Blackfoot and Minidoka: 14%

- **Primary Reach Impacted by total recharge:**
  Heise to Shelley (36%)

Where does Willow Creek recharge end up?



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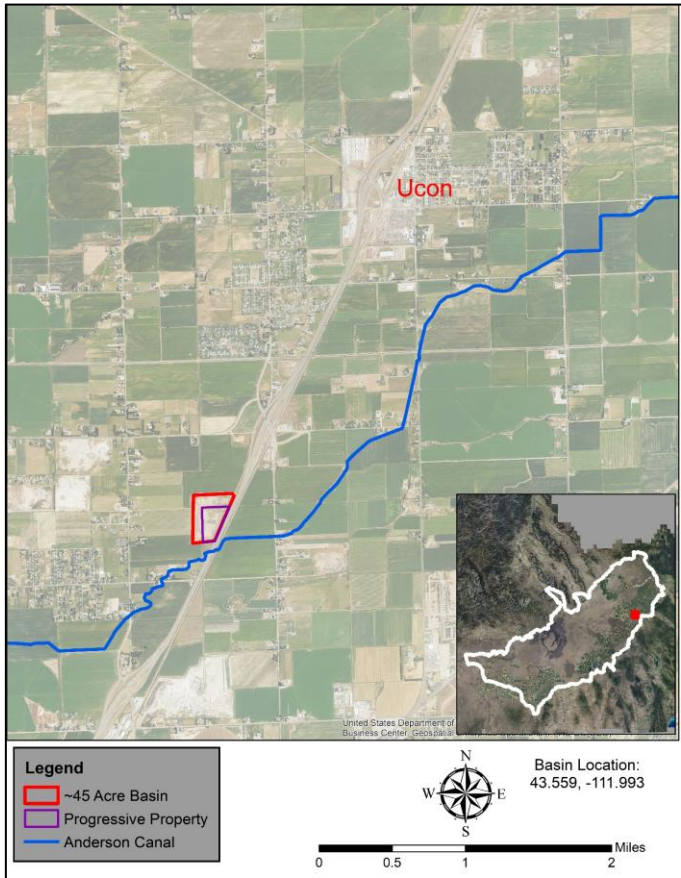
Progressive Irrigation District
Anderson Channel Recharge Basin

Project Background and Overview:

- **Basin Overview:** Progressive owns 18 acres of a 45-acre basin, which underperformed during an infiltration test.
- **Follow Up:** Drilled seven 33-foot test holes; found 10 feet of overburden above solid basalt but four holes contained fractured basalt.
- **Proposal:**
  - Excavate overburden, construct a 46-foot high berm using excavated material. Floor would be 5.9 acres.
  - Use a Sandvik Ranger 800 to drill 30-foot holes (5-inch diameter) spaced 8 feet apart.
  - Detonate dynamite to create conduits through solid basalt to fractured basalt.



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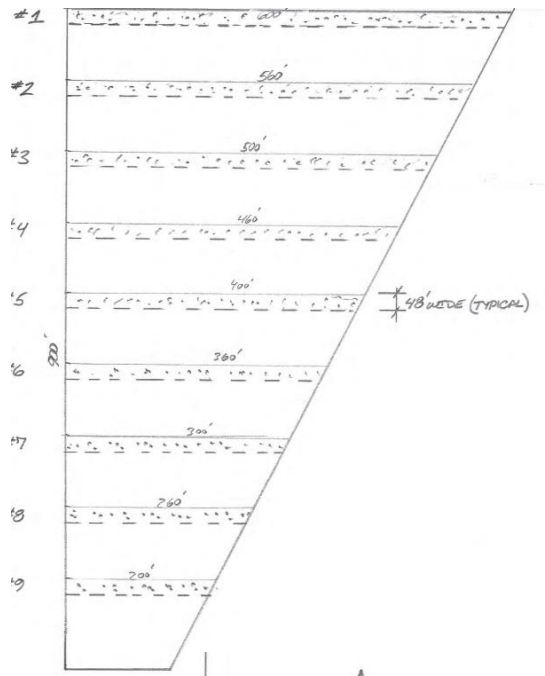
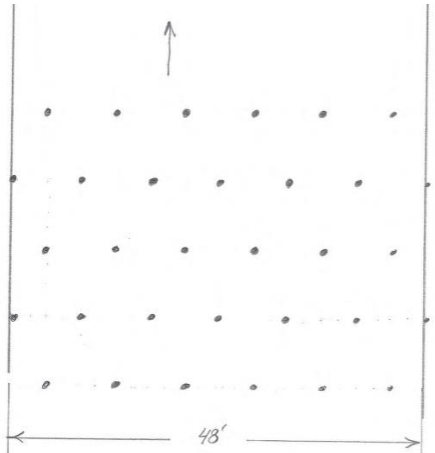
Progressive Irrigation District Anderson Channel Recharge Basin





Risk and Reward:

- **Risk:** The extent of hydraulically conductive fractures is uncertain and may not be widespread.
  - **IWRRI Conclusion:** "It is unclear how deep the dynamite is expected to penetrate the basalt, but it would likely need to create sufficient fractures at least 65 ft below the bottom of the basin (an additional 35 ft below the drilled holes) to reach more conductive lithological layers."
- **Reward:** If successful, this approach could be replicated in other basins, significantly improving recharge capacity in similar geological settings.

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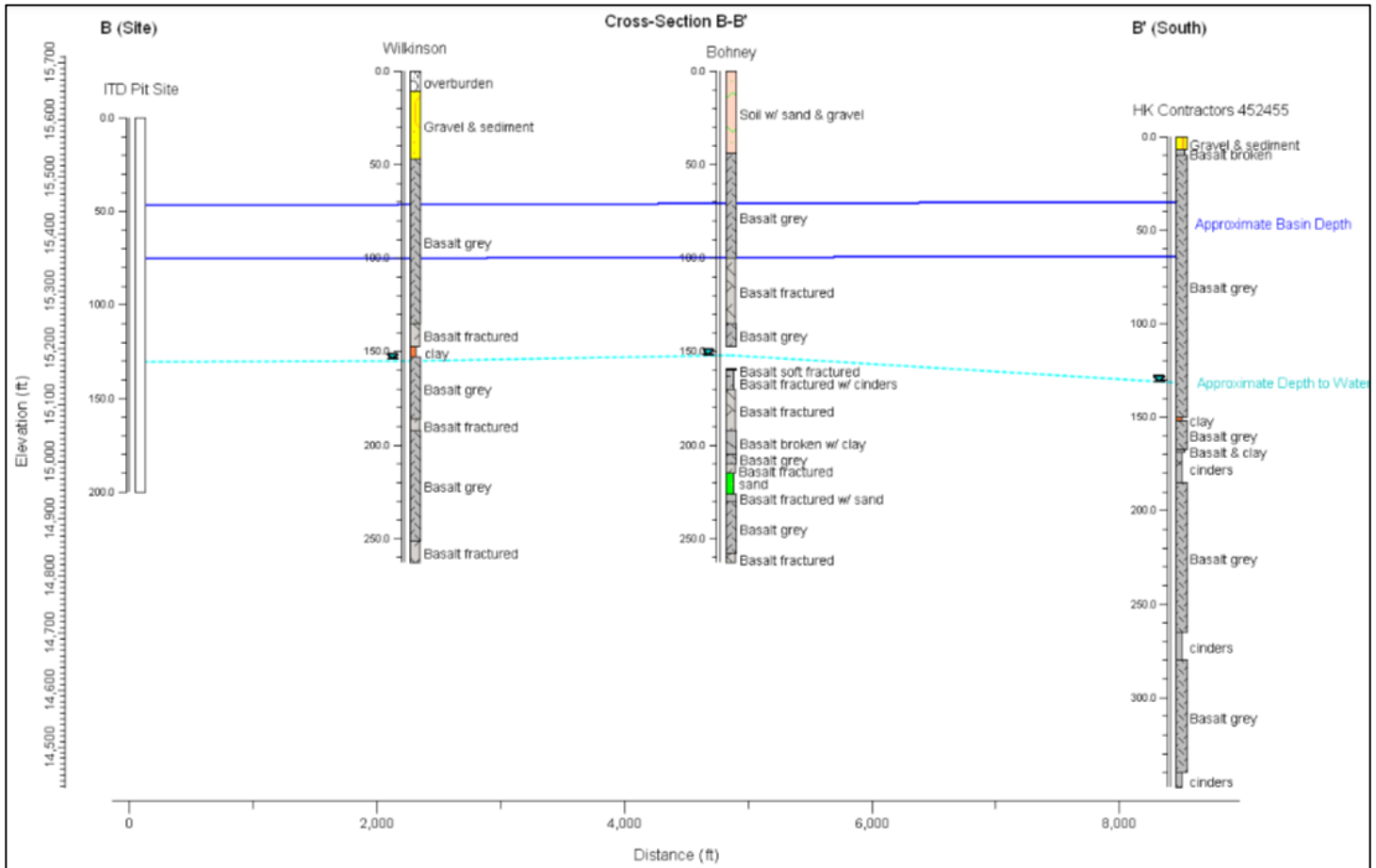
Anderson Channel Recharge Site
IWRRI-Developed Cross Section



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Progressive Irrigation District
Anderson Channel Recharge Basin

Overview of Funding Proposal:

- **Earthwork:** Excavate and berm-off property.
- **Drilling and Dynamiting.**
- **Diversion Structure.**
  - **Including inlet and outlet structure (48” culvert).**

Cost per Acre Foot over 20 Years*: between $304 - $30

*assuming between 5.9 cfs and 59 cfs and average water availability.

Item	Cost
Excavation	$1,661,740
Drilling and Blasting	$851,500
SWPP	$11,000
Diversion Structure	$396,000
Engineer	$20,000
Contingency (10%)*	$294,024.0
Total	**$3,200,000**

Progressive Irrigation District
Anderson Channel Recharge Basin

Benefits

- **20% returns within nine months.**
  - Above Blackfoot: 88%
  - Between Blackfoot and Minidoka: 12%

- **50% returns within 2 years**
  - Above Blackfoot: 80%
  - Between Blackfoot and Minidoka: 20%

- **Primary Reach Impacted by total recharge:**
  Near Blackfoot to Neeley (33%)

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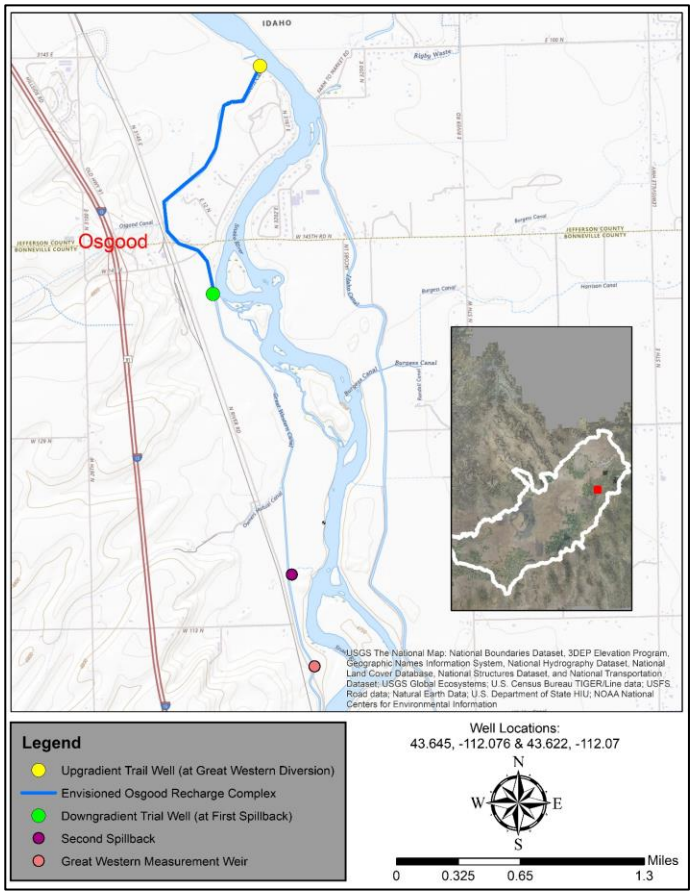
New Sweden Irrigation District
Osgood Recharge Complex Test Wells



Intent of Test Wells:

- Two wells – One at each end of 1.6 canal-miles.
- Test the viability of recharge along 1.6 canal miles above measuring devices, between the diversion and the first spillback.
  - Consistent > 150 cfs water availability.
  - Not subject to WWS.
  - Snow removal relatively easy.
- If successful, construct additional wells to potentially develop the full 150+ cfs capacity.
- **Proposal also includes dedicated monitor wells.**

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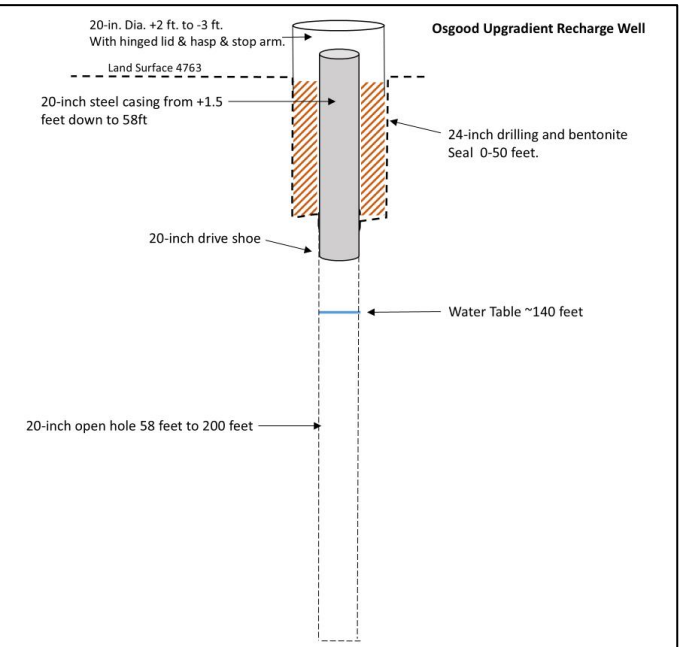
New Sweden Irrigation District
Osgood Recharge Complex Test Wells



Well Design Overview:

- Cased below hard basalt layer.
- 200’ deep, 20” diameter.
- Anticipate hydrologically productive zones below hard basalt layer.
  - Logs indicate substantial fractured basalt and cinders.
- First must be successful before second is authorized to be drilled.

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New Sweden Irrigation District
Osgood Recharge Complex Test Wells

Item	Cost	Number Requested	Total
Construction of 20" - 200' Well	$53,000	2	$106,000
Monitor Well 6" - 200'	$15,525	2	$31,050
Diversion Structures	$31,000	2	$62,000
Contingency (~25%)			$50,950
Total Request			**$250,000**

Cost per Acre Foot over 20 Years*: $7.00

*assuming **each well recharges 10 cfs** and average water availability.

New Sweden Irrigation District
Osgood Recharge Complex

Benefits

- **20% returns within one year**
  - Above Blackfoot: 80%
  - Between Blackfoot to Minidoka: 20%

- **50% returns within 2.33 years**
  - Above Blackfoot: 70%
  - Between Blackfoot and Minidoka: 28%

- **Primary Reach Impacted by Total Recharge:**
  Near Blackfoot to Neeley (37%)

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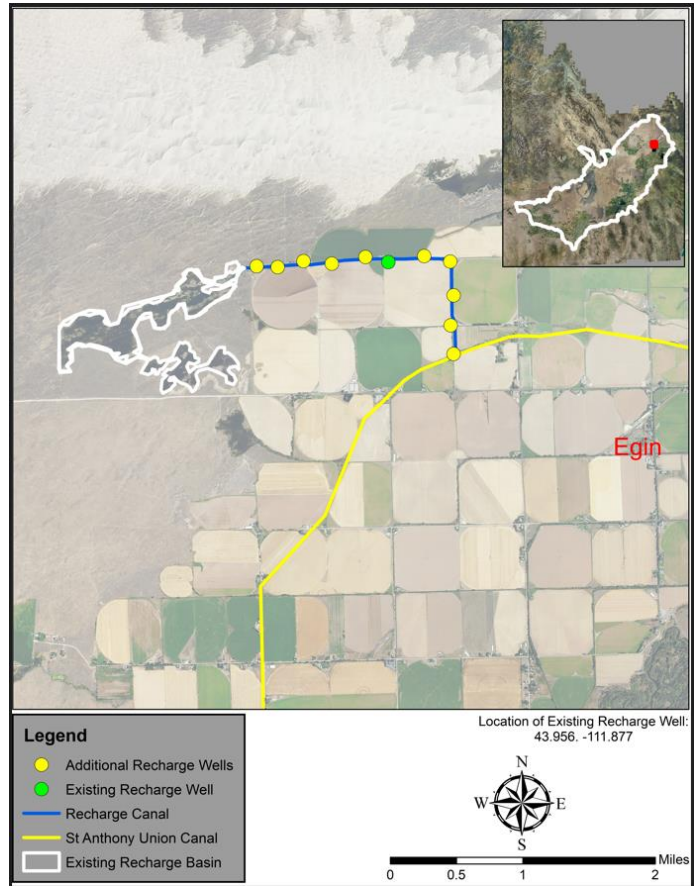
Fremont Madison Irrigation District
West Egin Recharge Wells Complex

Project Overview:

- **Test Well -- Spring 2024:** FMID and IWRB built a 20-inch, 238-ft test recharge well, which recharges up to 10.5 cfs.
- **Recharge Well Complex Buildout:** Based on test well results, FMID proposes 10 additional wells along 2.2 miles of the Recharge Canal, located 2.5 miles northwest of Egin and 9 miles west of St. Anthony.
- **Geologic Setting:** Highly permeable geologic material (69 ft of fractured basalt, 6 ft of cinders in Test Well) should support 105 cfs of additional recharge.
- **Canal Infrastructure Improvements:** Necessary to accommodate increased recharge capacity.
  - Recharge Canal: Bridge rehabilitation, rock hammering, excavation,
  - St. Anthony Union: SCADA automation of 25 check dams,



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Fremont Madison Irrigation District
West Egin Recharge Wells Complex

Overview of Funding Proposal:

- **Easement Procurement:** Secure a perpetual easement for the maintenance road along FMID's Recharge Canal, fed by the St. Anthony Union Canal from the Henry's Fork.
- **Recharge Well Construction:** Build 10 recharge wells along the Recharge Canal within the easement, including diversion structures and meters.
- **Canal Improvements:** Enhance the Recharge Canal's delivery capacity by improving bridges, rock hammering, and earthwork.
- **Automation Upgrade:** Automate gates on 25 check dams along the St. Anthony Union Canal, including installation of control software.

Cost per Acre Foot over 20 Years*: $30.51

*assuming 105 cfs, average water availability, and $1,670,000 procured externally.

Item	Cost
Easement to Maintenance Road along Recharge Canal	$200,000
Wells, including diversion structures	$2,500,000
Recharge Canal Improvements	$500,000
Gates for Checks in the St. Anthony Union	$3,029,500
SCADA (Gate Automation Software)	$225,000
Network Communications	$85,000
15% Contingency	$789,000
Two Monitor Wells*	$60,000
Total Request	**$7,388,500**

Cost per Acre Foot over 20 Years*: $39.42

*assuming 105 cfs and average water availability.

Fremont Madison Irrigation District
West Egin Recharge Wells Complex

Benefits

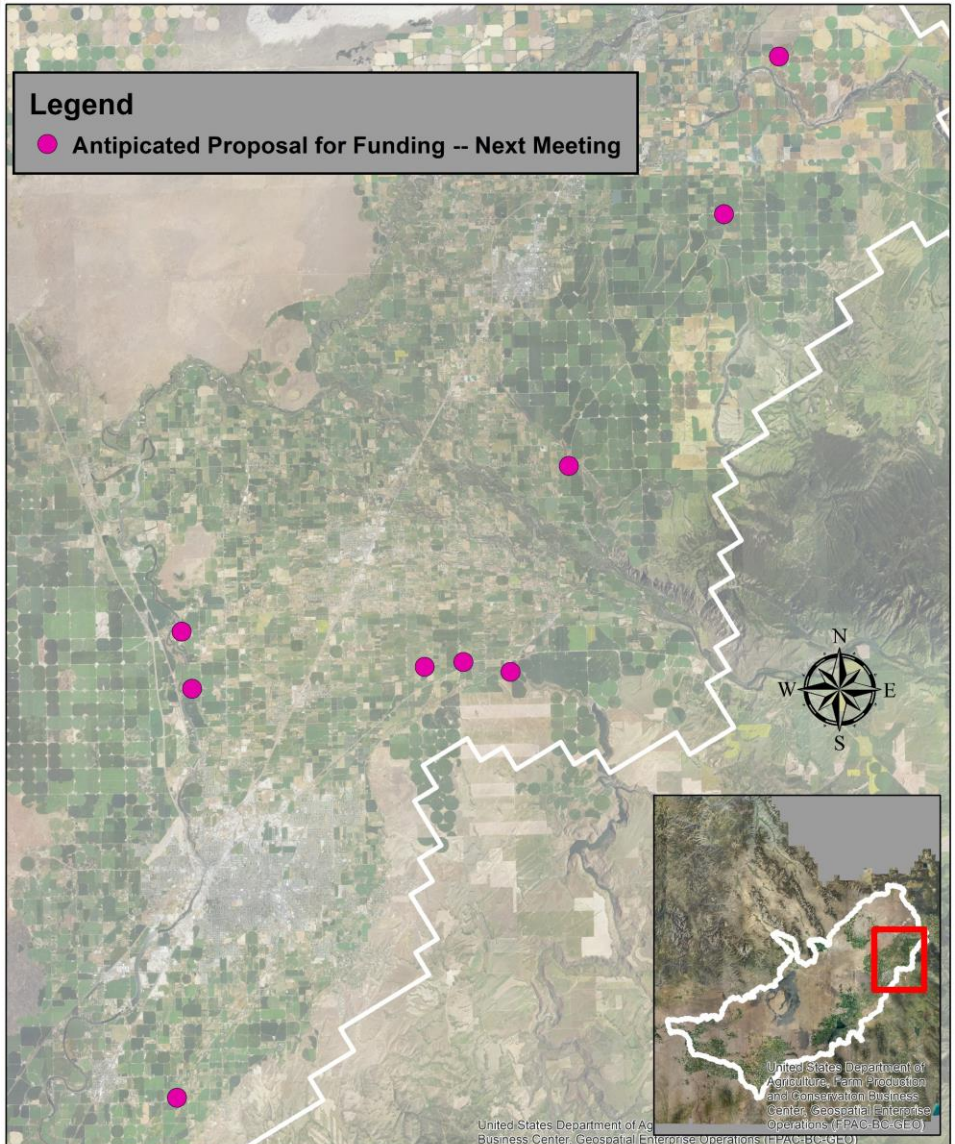
- **20% returns within one year**
  - Above Blackfoot: 100%

- **50% returns within 4.66 years**
  - Above Blackfoot: 97%
  - Between Blackfoot and Minidoka: 3%

- **Primary Reach Impacted by total recharge:**
  Ashton to Rexburg (52%)

Anticipated Future Proposals

- **Idaho Irrigation District:.**
  - Three distinct recharge wells.
- **Private Owner:**
  - Recharge well near Ririe Dam.
- **Farmers Friend Irrigation District:**
  - Two basins.
- **Sunnydell Irrigation District:**
  - Basin.
- **Fremont Madison Irrigation District.**
  - Two distinct recharge wells.
- **Burgess Canal Company (Not Shown)**
  - 80-acre basin



Memorandum

To: Aquifer Stabilization Committee

Date: August 06, 2024

Re: ESPA Managed Recharge Project Update & Potential New Projects

REQUIRED ACTION: The Committee will consider recommendations for funding new managed recharge projects to the IWRB.

The overall goal of the ESPA Managed Recharge Program (Program) is to assist in stabilizing and potentially enhancing aquifer levels, improving reach gains in some river reaches, increase water supply certainty for all users, and to decrease the demand for litigation and administrative remedies.

The IWRB has been actively developing managed recharge capacity throughout the ESPA since the start of the full-scale Program in 2014. Over the past ten years the IWRB has added over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

Included in this memo is an update of current funded IWRB managed recharge projects and a list of proposed projects with attached summaries for each of the projects.

Current Project Update

<u>Southwest Irrigation District (SWID) - Recharge Wells</u>

- Project Summary:
  - 2 Recharge wells
  - Estimated Recharge Capacity: +20 cfs
- Funding:
  - $240,000 – from ARPA funds
- Status:
  - Finalizing Contract with SWID

<u>Minidoka Irrigation District (MID) – Goyne Sump Development</u>

- Project Summary:
  - Improve delivery system to Goyne Sump site.
  - Estimated Recharge Capacity: +100 cfs
- Funding:
  - $3,387,047 – from ARPA funds

- Status:
    - Project is currently under construction, expected completion Fall 2026.
    - Potentially additional work required to improve capacity at Goyne Sump.

New Sweden Irrigation District (NSID) – Basalt Recharge Basin

- Project Summary:
    - Develop Recharge Basin: ~10 ac
    - Estimated Recharge Capacity: +40-50 cfs
- Funding:
    - $1.33 million – from ARPA funds
- Status:
    - Basin completed Spring 2024
    - Test Spring 2024 - Recharge Capacity: +15 cfs

Progressive Irrigation District (PID) – Test Recharge Wells

- Project Summary:
    - Construct 2 recharge wells (1-shallow & 1-deep)
        - Test feasibility of recharge wells in the area in the alluvium (shallow) and the basalt (deep).
- Funding:
    - Contract - $120,000 – from Secondary Aquifer funds
- Status:
    - Completed Fall 2023
    - Final Cost - $79,300
    - Tested Spring 2024
        - Recharge Capacity per well: ~2.5 cfs

Progressive Irrigation District (PID) – South Fork Recharge Basin

- Project Summary:
    - Develop Recharge Basin: ~40 ac
    - Recharge Capacity:
        - Estimated Increase: +90-120 cfs
- Funding:
    - Contract Total: $5,868,000
        - ARPA Fund: $4,240,000 – Basin Construction
        - Secondary Aquifer Fund: $1,628,000 – purchase of land
- Status:
    - Project is currently under construction, expected completion Fall 2024.

Enterprize Canal Company (ECC) – 55th Road Recharge Basin

- Project Summary:
    - Develop Recharge Basin: ~8 ac

    - Recharge Capacity:
        - Estimated Increase: +45 cfs
- Funding:
    - Contract Total: $1,700,000 from ARPA funds
- Status:
    - Completed Fall 2024
    - Test Spring 2024 - Recharge Capacity: +16 cfs

Enterprize Canal Company (ECC) – Swan Highway Recharge Basin

- Project Summary:
    - Develop Recharge Basin: ~9.5 ac
    - Recharge Capacity:
        - Estimated Increase: +40-50 cfs
- Funding:
    - Contract Total: $3,400,000 from ARPA funds
- Status:
    - Project is currently under construction, expected completion Fall 2024.

Butte & Market Lake Canal Company (BMLCC) – Recharge Wells

- Project Summary:
    - 2 Recharge wells
    - Estimated Recharge Capacity: +24-30 cfs
- Funding:
    - $571,000 – from ARPA funds
- Status:
    - Finalizing Contract with BMLCC

Butte & Market Lake Canal Company (BMLCC) – System Capacity Expansion Study

- Project Summary:
    - Identify improvements necessary to increase system capacity by 200 cfs.
- Funding:
    - $94,000 – from Secondary Aquifer Fund
- Status:
    - Evaluation Complete
    - Scheduled presentation to Aquifer Stabilization Committee in October.

Egin Bench Canal Company (EBCC/FMID)) – Test Recharge Well

- Project Summary:
    - Construct test recharge well
        - Test feasibility of recharge wells in the area in the area.
- Funding:
    - Contract - $230,000 – from Secondary Aquifer funds

- Status:
    - Completed Spring 2024
    - Tested Spring 2024
        - Recharge Capacity: ~10 cfs

Proposed Projects

Enclosed are overviews of seven projects that make up the first of two rounds of proposals for managed aquifer recharge sites in the Upper Valley (above American Falls). These projects are geographically diverse, ranging from the Aberdeen area, to near Ririe to the Egin area and potentially represent a nascent portfolio of recharge opportunities for the IWRB. This diversity is essential because the proposed projects provide increases to reach gains ranging from one year (Aberdeen) to five years (Egin) based on when 50% of the water recharged returns to river reaches. As a result, reach gains above American Falls will continue to be positively impacted for up to five years after a single recharge season.

It is essential that IWRB operations do not negatively impact groundwater quality in the aquifer. Therefore, it is important to reiterate that the water in the Upper Valley is of high quality – except that it contains high levels of bacteria which dies rapidly below ground. While over 200 surface water samples collected over 10 years back the previous statement, continued monitoring is essential.

Four of the enclosed proposals are for test recharge wells. If these wells are successful, the proposing entities intend to construct additional wells within their canal systems, with each well complex or network potentially capable of delivering over 100 cfs. A fifth proposal is for a recharge well complex that should deliver over 100 cfs to the aquifer. This proposal resulted from a successful test recharge well. The remaining two proposals are for recharge basins, the method traditionally used by the recharge program in the Upper Valley.

The following project will be presented at the upcoming Aquifer Stabilization Committee (more detailed memos for each project are attached):

1. Aberdeen-Springfield Canal Test Recharge Well
2. Peoples Canal Test Recharge Well
3. New Sweden/ Bingham-Jefferson Groundwater District Test Recharge Well
4. New Sweden Test Recharge Well – Head of the Basalt
5. Progressive Canal – ITD Pit Recharge Basin
6. Enterprize Canal – 55th Road Expansion Basin
7. Fremont Madison / Egin Bench Canal Recharge Well Complex

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: Aberdeen-Springfield Canal Company – Vanderford Road Test Recharge Well

REQUIRED ACTION: Consider a recommendation to the IWRB for the authorization of funding a test recharge well within the Aberdeen-Springfield Canal Company (ASCC) system.

Aberdeen Springfield Canal Company's Test Well Summary:

Project Cost as Recommended: $296,500
Estimated 20-year Cost per Acre Foot : $16.61
Anticipated Recharge Capacity: 10 cfs
Depth to Water: 1st: 65 -75 ft, 2nd: ~120+ ft

Project Proposal:

- Construction of a recharge well.
- Construction of a dedicated monitor well.
- Installation of diversion structure including a meter.

Request of the IWRB:

Authorize the expenditure of $296,500 for constructing two test recharge wells, associated infrastructure, and two monitoring wells.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

Vanderford Road Test Well:

ASCC proposes a test recharge well where water can be consistently delivered, is near a power source, and has the support of the landowner. Located along ASCC's Highline Canal, about three miles northwest of Aberdeen (Figure 1), this test well will help ASCC determine the next steps in potentially developing multiple recharge well complexes throughout their system. It's likely that some of these would be funded by ASCC while others would be proposed to the IWRB for funding.

IWRB staff are recommending a monitoring well to observe the hydrologic responses in the aquifer as well as bacteria attenuation. Given that rapid bacteria attenuation has been observed in a similar aquifer, IWRB staff does not anticipate different results but consider it appropriate to repeat the study.

Recharge Test Well

The proposed recharge well is a 20-inch, 350-foot deep well cased below a clay layer found between 60 and 70 feet below ground surface (bgs) (Figure 2), which is observed regionally. The first indication of groundwater in surrounding wells occurs above this clay layer and is referred to locally as "first water". The impact of recharging first water (e.g., from a basin) on the aquifer is unclear and anecdotal evidence suggests that retention times may be shorter than ESPAM predictions due to the locally perched aquifer. The well will allow recharge operations to access the regional aquifer, below the clay layer.

While the exact lithology at the site is unknown, nearby well logs indicate a 40-foot zone of fractured basalt and cinders below the casing (Figure 2). Beyond 235 feet bgs, the geology is uncertain, and ASCC proposes drilling deeper if no suitable permeable layers are found by 235 feet. Drilling may cease before reaching the proposed 350-foot depth if IWRB staff or ASCC's consultant identifies a suitable hydraulically conductive layer.

Hydrologic and Water Quality Monitoring Well

The monitor well will help ASCC and IWRB determine the optimal spacing for any future wells. At a monitor well 0.1 miles from a recharge well near Roberts, no hydrologic response was observed during recharge, suggesting that wells in this area could be spaced about 0.1 miles apart without interference. If similar conditions are found in the ASCC system, this well density could be considered.

Bacteria is the primary contaminant of concern for human health in ASCC canal water, based on extensive sampling within the ASCC system and across the Upper Valley (above American Falls). Data from the recharge well near Roberts, with a similar geology, demonstrated a rapid attenuation of bacteria in the subsurface. While similar results are expected, a dedicated monitor well should ensure the protection of the aquifer and local water users.

Cost

ASCC's proposal for the recharge well, infrastructure, and services totals $239,535. Including the staff-suggested monitor well and a 10% contingency, the total cost amounts to $269,600, as detailed in Table 1.

Table 1 – Total request for the development of a test well in the ASCC system. * denotes IWRB staff recommendations.

Item	Cost
Construction of 20" - 350' Well	$201,620
Infrastructure	$20,925
Meter	$7,000
Geology Consultant	$10,000
Monitor Well*	$30,000
Contingency* (10% of Total)	$26,955
Total Requested	**$296,500**

- Total project cost as recommended** $16.61 per acre-foot

  **Assumptions used in the calculation:
  - Cost averaged over 20 years.
  - Recharge capacity of the well: 10 cfs
  - Yearly available of natural flow for recharge: 45 days***

*** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

Potential Impacts

Based on ESPAM2.2 via ETRAN

- 20% of the water recharged returns to the river — 4 months
  - Above Blackfoot: — 9%
  - Blackfoot to Minidoka: — 91%
- 50% of the water recharged returns to the river — 1.33 years
  - Above Blackfoot — 13%
  - Between Blackfoot and Minidoka — 87%

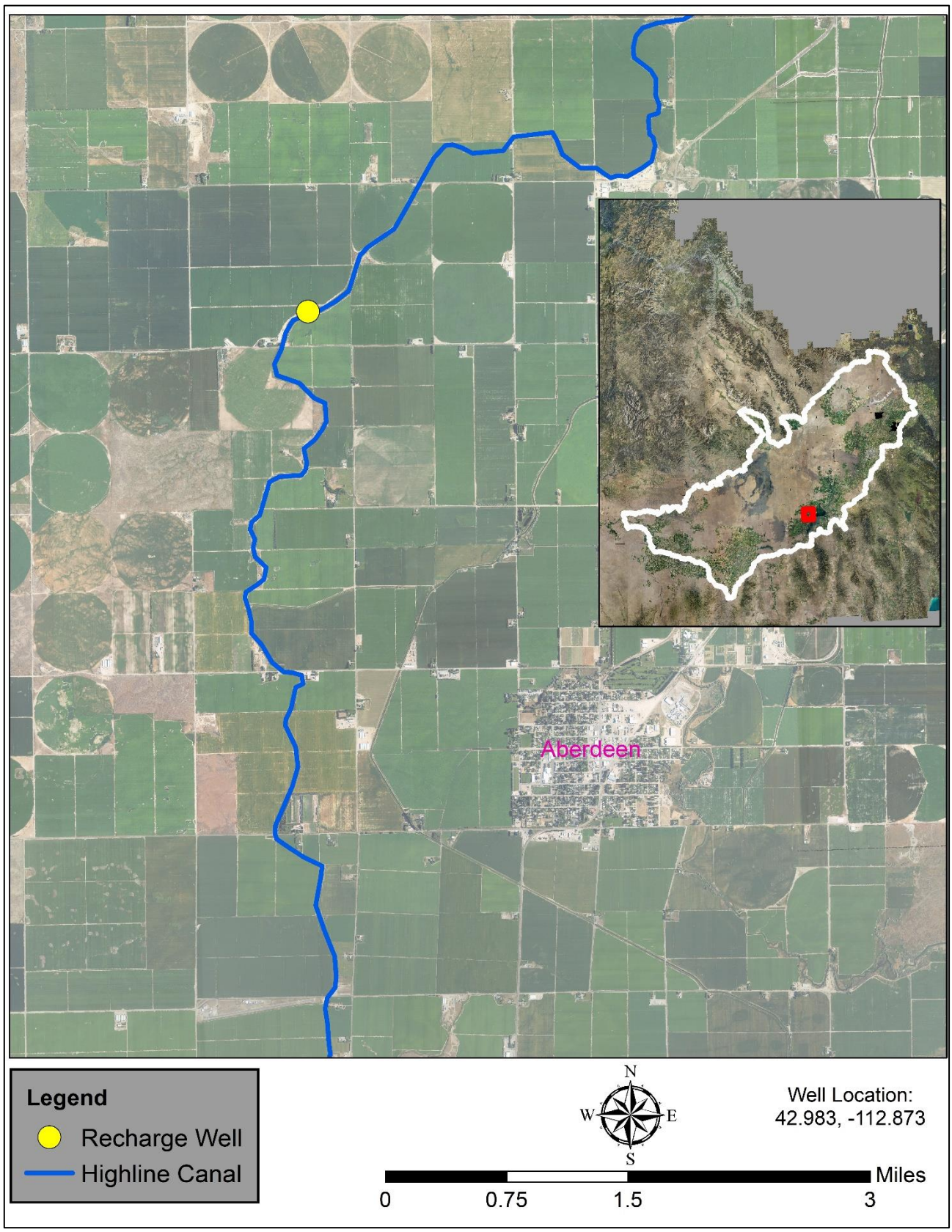


Figure 1 – The proposed recharge well, Highline Canal, and town of Aberdeen. The inset highlights the well's location in red within the East Snake River Plain Aquifer (outlined in white), in Idaho.

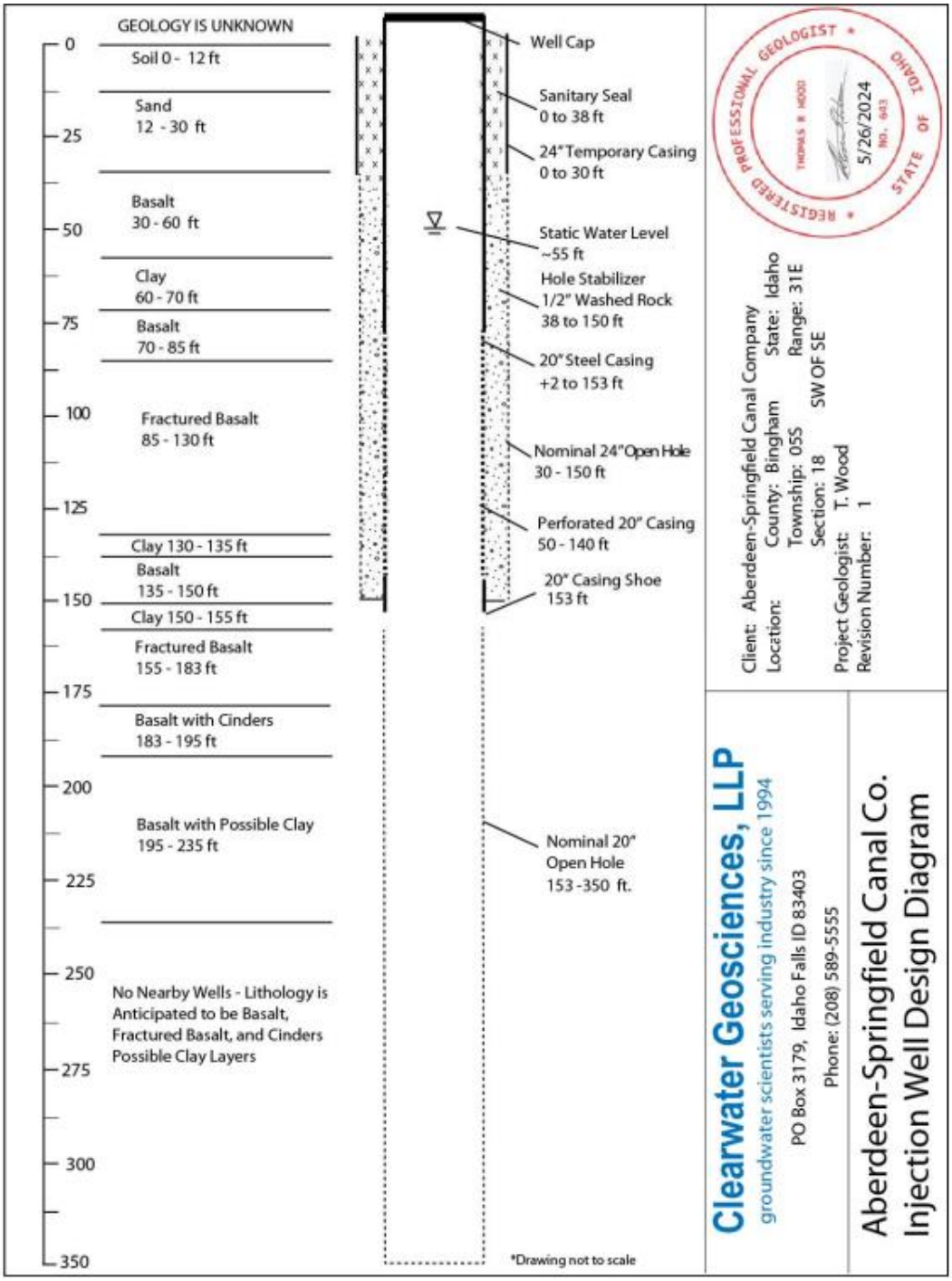


Figure 2 – Proposed recharge well design for Aberdeen Springfield Canal Company's 350-foot deep 20-inch recharge well.

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: People's Canal Company –Test Recharge Well

REQUIRED ACTION: Consider a recommendation to the IWRB for the authorization of funding a test well within the People's Canal Company (PCC) system.

People's Canal Company Trail Well Summary:

Project Cost as Recommended: $135,000
Anticipated Cost per Acre Foot (20 yr): $7.56
Anticipated Recharge Capacity: 10 cfs
Depth to Water: 40 – 65 ft

Project Proposal:

- Construction of a recharge well.
- Construction of a monitor well to-be located ~0.1 miles downgradient.
- Installation of diversion structure including a meter.

Request of the IWRB:

Authorize the expenditure of $135,000 to construct a test recharge well, associated infrastructure, and a monitoring well for hydrologic and water quality assessments.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

People's Canal Company Test Well:

People's Canal Company (PCC), with support from Bingham Groundwater District (BGD), proposes a trial recharge well at an existing basin along their main canal. Located along PCC's Main Canal, about 1.5 miles north of Moreland (or, 5.5 miles northwest of Blackfoot, Figure 1), this test well will help PCC determine the next steps in potentially developing multiple recharge well complexes throughout their system. Some of these wells may be funded by PCC, while others could be proposed for IWRB funding.

IWRB staff are recommending a monitoring well to observe the hydrologic responses in the aquifer as well as bacteria attenuation. Given that rapid bacteria attenuation has been observed in a similar aquifer, IWRB staff does not anticipate different results but consider it appropriate to repeat the study.

Recharge Test Well

The proposed recharge well is 20 inches in diameter and 200 feet (ft) below ground surface, located on PCC-owned land within an existing recharge basin. The basin currently does not provide a satisfactory recharge rate, potentially due to subsurface clay units. The groundwater levels in the area appear, for the most part, to be above a substantial clay unit (20+ feet think). The proposed recharge well is designed to complete below the potential clay unit.

While the exact lithology at the site is unknown until drilling, well logs in the area suggest cinder layers and/or fractured basalt starting in the proposed well at 80 ft below land surface. Given the prevalence of irrigation wells in the area, there is a preliminary expectation that the well will achieve a sufficient recharge rate going to a depth of 200 ft.

Hydrologic and Water Quality Monitoring Well

The monitor well will help PCC, BGD, and IWRB determine the optimal spacing for any future wells. At a monitor well 0.1 miles from the Roberts recharge well, no hydrologic response was observed during recharge, suggesting that wells in this area could be spaced about 0.1 miles apart without interference. If similar conditions are found in the PCC system, this well density could be considered.

Bacteria is the primary contaminant of concern for human health in PCC canal water, based on preliminary sampling within the PCC system and extensive sampling across the Upper Valley (above American Falls).Data from the Roberts well indicates a rapid attenuation of bacteria in the subsurface with a similar geology. While similar results are expected, IWRB staff want to repeat that study in this location because protecting human health is a priority for the aquifer recharge program, PCC, and BGD.

Cost

PCC's proposal for the recharge well, infrastructure, and services totaled $68,125. Including the staff-suggested monitor well and a 15% contingency, the total cost amounts to $93,000, as detailed in Table 1.

Table 1 – Total request for the development of a trial well in the PCC system. * denotes IWRB staff recommendations.

Item	Cost
Construction of 20" - 200' Well	$53,000
Infrastructure (incl. Meter)	$33,400
Monitor Well*	$31,050
Contingency (15%)*	$17,600
Total Requested	**$135,000**

- Total project cost as recommended** $7.56 per acre-foot

  **Assumption used in the calculation:
  - Cost averaged over 20 years
  - Recharge capacity of the well: 10 cfs
  - Yearly available of natural flow for recharge: 45 days***

*** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

Potential Impact

Based on ESPAM2.2 via ETRAN

- 20% of the water recharged returns to the river — 4 months
  - Above Blackfoot: — 37%
  - Blackfoot to Minidoka: — 63%
- 50% of the water recharged returns to the river — 1.25 years
  - Above Blackfoot — 31%
  - Between Blackfoot and Minidoka — 69%

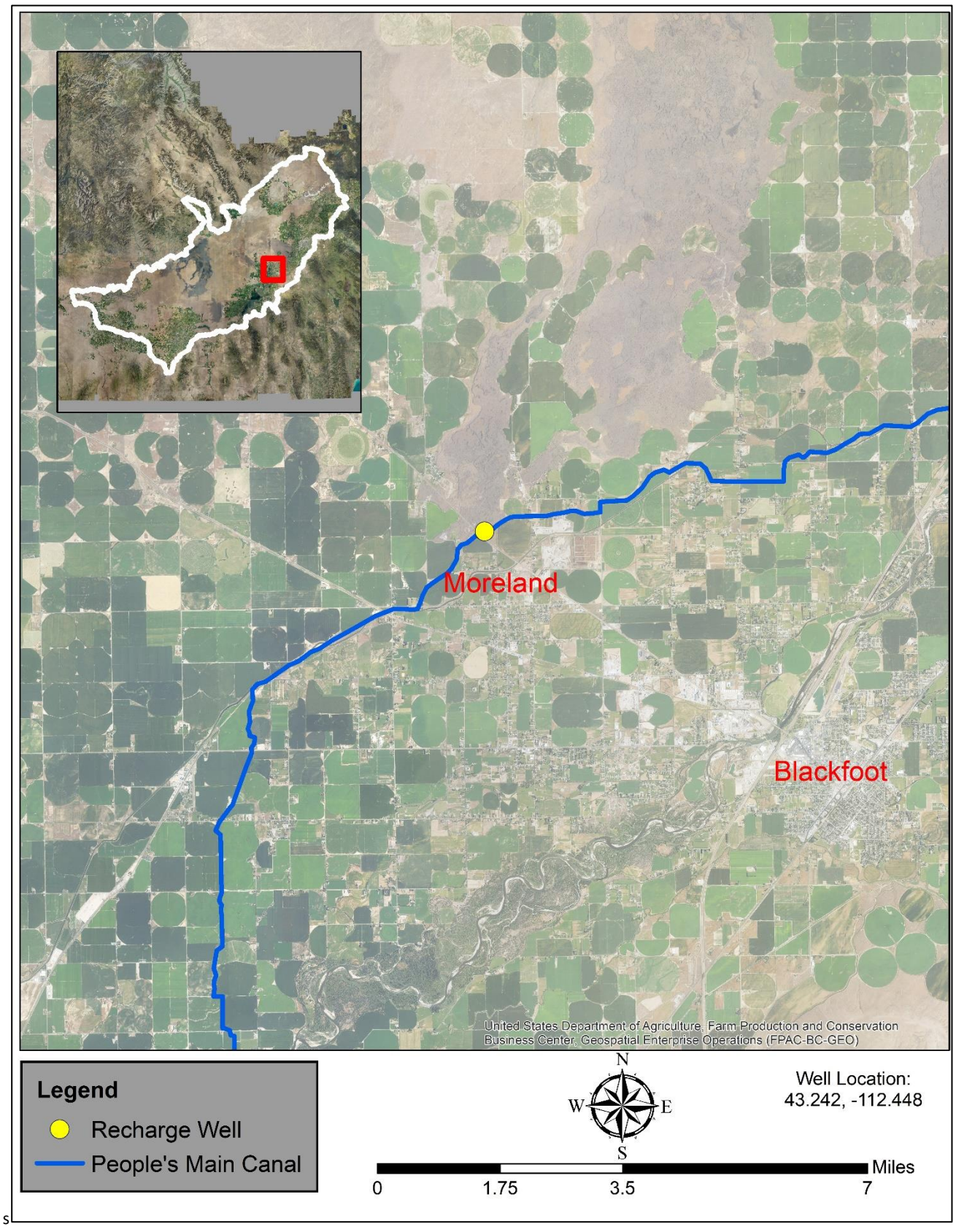


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Figure 1 – The proposed recharge well along People's Main Canal in relation to Moreland and Blackfoot.

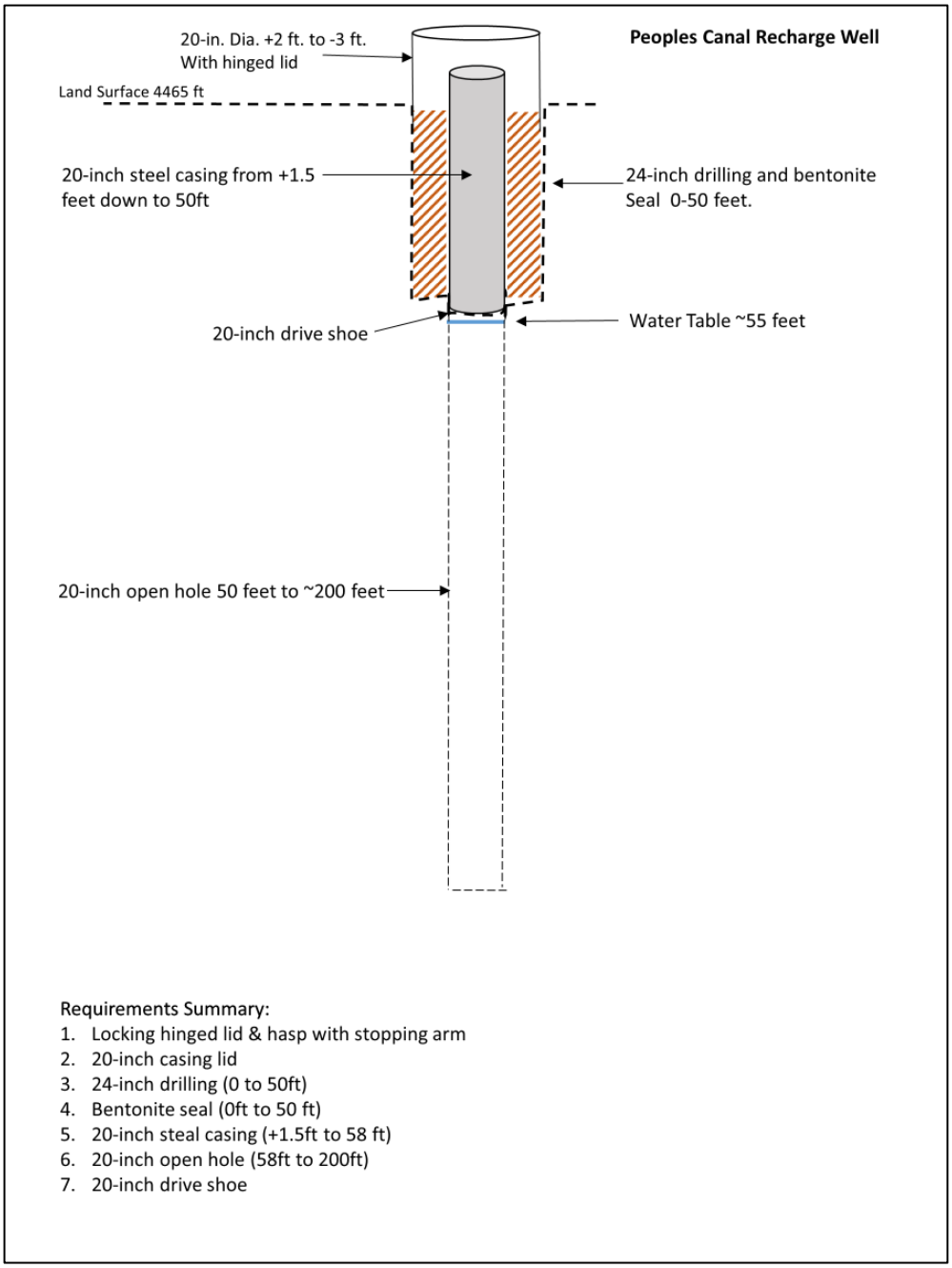

Figure 2 – Proposed recharge well design for People's Canal Company's 200-foot-deep 20-inch recharge well.

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: BJGWD/NSID – Osgood Recharge Complex Trial Wells

REQUIRED ACTION: Consider a recommendation to the IWRB for the authorization of two test recharge wells in part of the New Sweden Irrigation District (NSID) system at either end of a 1.6-mile canal section, planned as a dedicated aquifer recharge complex.

Osgood Recharge Complex Trail Wells Summary:

Project Cost: $250,000
Estimated 20-year Cost per Acre Foot: $7.00
Estimated Recharge Capacity: 20 cfs
Depth to Water: 125 ft-160 ft bgs

Project Proposal:

- Construction of two recharge wells.
- Construction of associated monitor wells located ~0.1 miles downgradient.
- Installation of diversion structures including meters.

Request of the IWRB:

Authorize the expenditure of $250,000 for construction of two test recharge well and associated infrastructure and two monitoring wells.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

Osgood Recharge Complex Test Wells:

NSID and the Bonneville-Jefferson Groundwater District (BJGWD) propose two test recharge wells along the upper reaches of the Great Western Canal about 1.25 miles northeast of Osgood (Figure 1) and nine miles north of Idaho Falls . The upgradient well is located at the canal's diversion point from the Snake River, while the downgradient well is 1.6 canal-miles downstream at the uppermost spillback between the diversion and the measuring weir for the Great Western. These wells will help determine the feasibility of developing the 1.6 canal-miles into the Osgood Recharge Complex. However, the second well will only be drilled if the well recharges a satisfactory rate.

IWRB staff are recommending a monitoring well to observe the hydrologic responses in the aquifer as well as bacteria attenuation. Given that rapid bacteria attenuation has been observed in a similar aquifer, IWRB staff does not anticipate different results but consider it appropriate to repeat the study.

Recharge Test Wells and Osgood Recharge Complex

Both recharge wells are proposed to be 20-inch and 200-feet deep (Figures 2 & 3). The 1.6 canal-miles between them could become the Osgood Recharge Complex (Figure 1) if the wells achieve a sufficient recharge rate. Although exact lithology is unknown until drilling, well logs in the area indicated fractured basalt zone (10 – 30 ft thick) above the water table and potentially thicker zones of cinders and/or fractured basalt below the groundwater table.

The potential Osgood Recharge Complex's location near the river and above measuring devices is advantageous because it minimizes snow removal requirements and is exempt from Winter Water Savings contracts. This exemption may provide additional recharge opportunities in November and March. Additionally, at least 150 cfs is available for recharge during the irrigation season.

Hydrologic and Water Quality Monitoring Well

The monitor well will help NSID, BJGWD, and IWRB determine the optimal spacing for future wells. At a monitor well located 0.1 miles from a recharge well near Roberts, no hydrologic response was observed during recharge, suggesting that wells in that area could be spaced about 0.1 miles apart without interference. If similar hydrologic conditions are identified in this vicinity, a comparable well density could be considered.

Bacteria is the main contaminate of concern to human health in canal water across the Upper Valley (above American Falls). Data from the recharge well near Roberts, with a similar geology, demonstrated a rapid attenuation of bacteria in the subsurface. While similar results are expected, a dedicated monitor well ensure the protection of the aquifer and local water users.

Cost

NSID's proposal for the recharge wells, infrastructure, and monitor wells, including pumps, totals $250,000, with a 25% contingency, as shown in Table 1. This contingency is necessary to account for unforeseen challenges.

Table 1 – Total request for the development of two trial recharge wells which will test the viability of the envisioned Osgood Recharge Complex.

Item	Cost	Number Requested	Total
Construction of 20" -200' Well	$53,000	2	$106,000
Monitor Well 6" - 200'	$15,525	2	$31,050
Diversion Structures	$31,000	2	$62,000
Total			$199,050
Contingency (~25%)			$50,950.00
Total Request			**$250,000**

- Total project cost (over 20 years)** $7.00 per acre-foot

  **Assumptions used in the calculation:
  - Cost averaged over 20 years.
  - Recharge capacity of the well: 10 cfs
  - Yearly available of natural flow for recharge: 45 days***

  *** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

Potential Impacts

Based on ESPAM2.2 via ETRAN

- 20% of the water recharged returns to the river — 1 year
  - Above Blackfoot: — 80%
  - Blackfoot to Minidoka: — 20%
- 50% of the water recharged returns to the river — 2.33 years
  - Above Blackfoot — 70%
  - Between Blackfoot and Minidoka — 28%

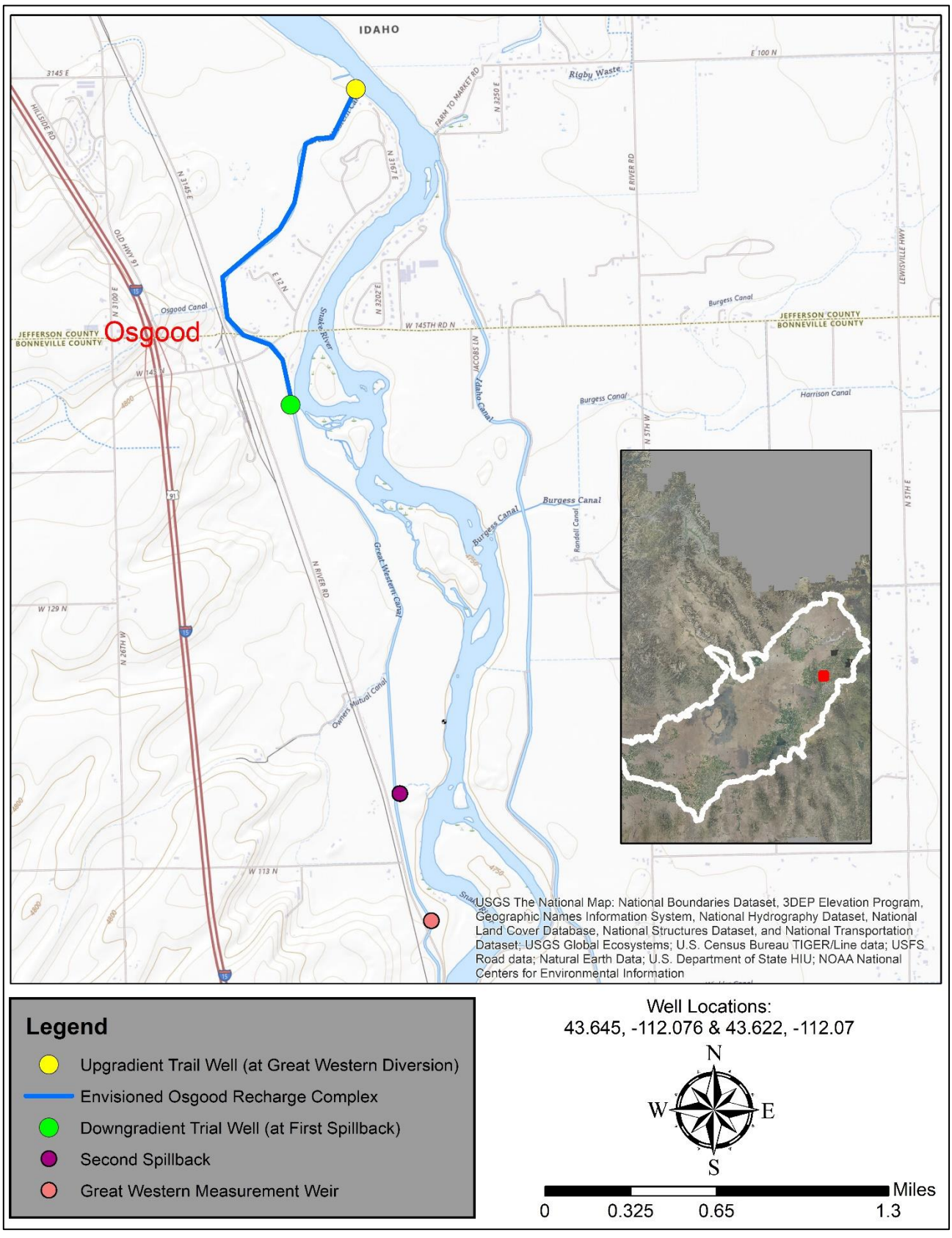

Figure 1 – The 1.6-mile stretch of the Great Western Canal between the Upgradient Trial Well (43.639, -112.064) and the Downgradient Trial Well near the first spillback above the Great Western Measurement Weir, envisioned as the Osgood Recharge Complex.

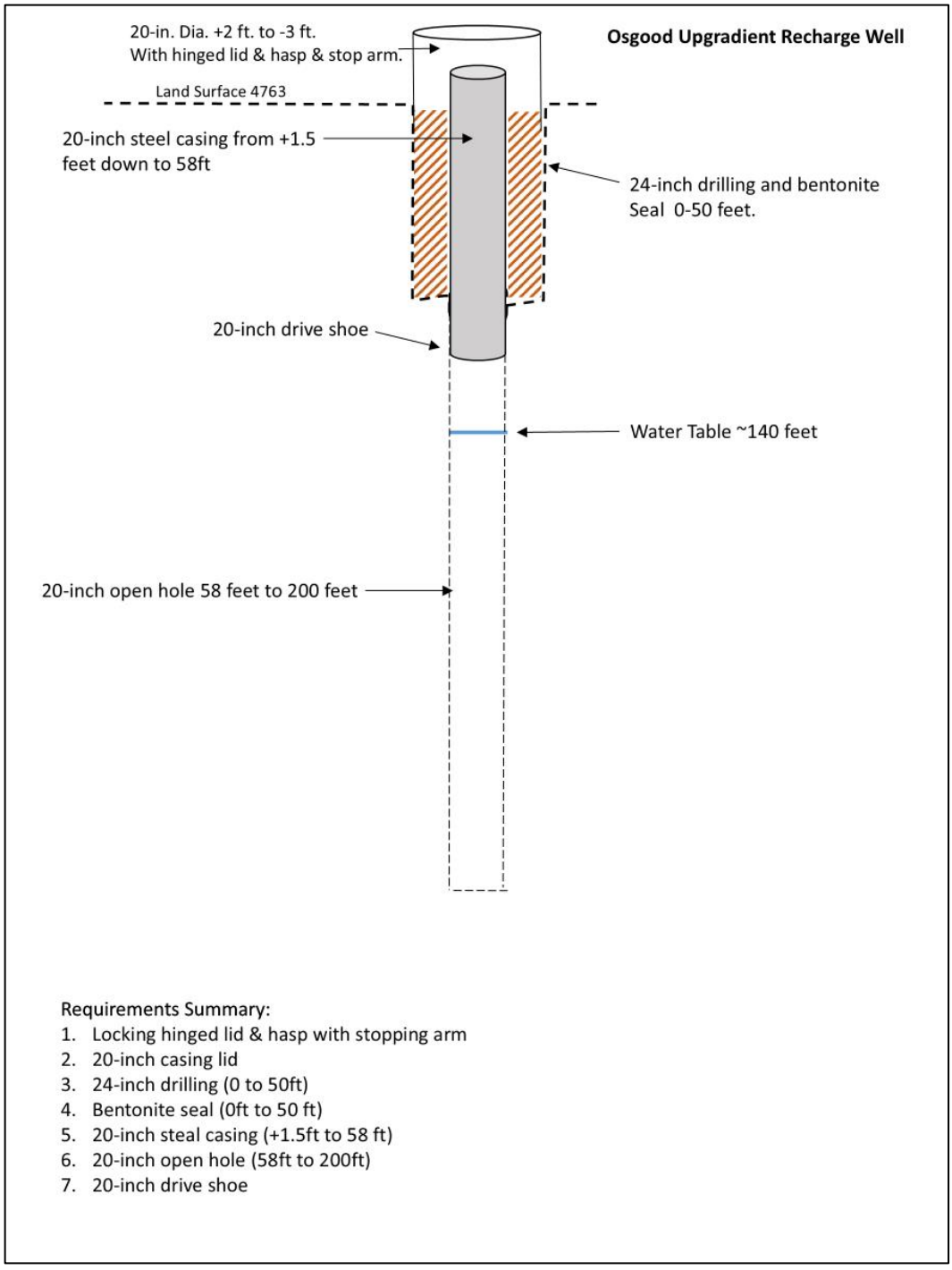

Figure 2 – Proposed upgradient recharge well schematics for NSID's envisioned Osgood Recharge Complex.

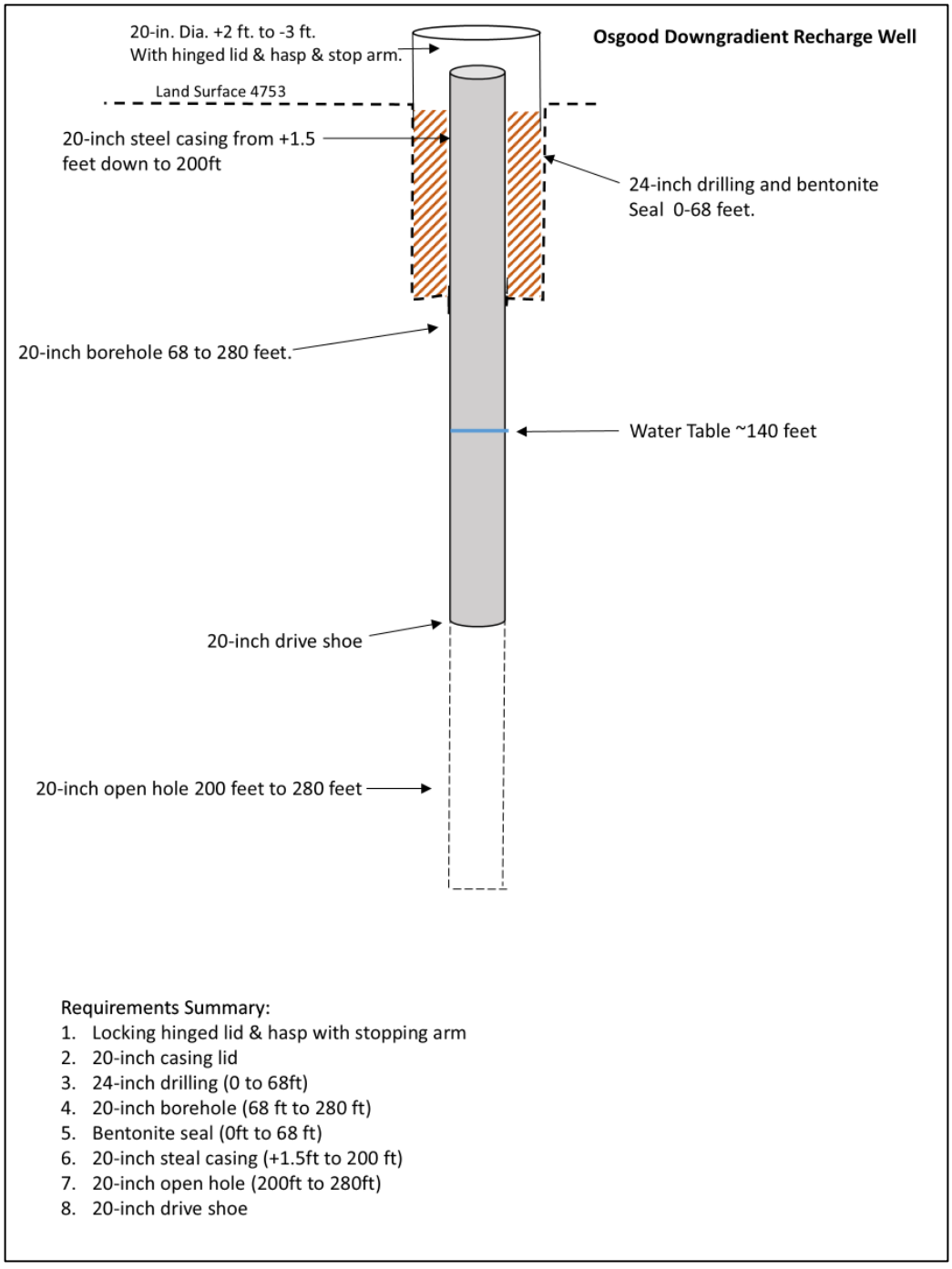

Figure 3 – Proposed downgradient recharge well schematics for NSID's envisioned Osgood Recharge Complex.

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: New Sweden Irrigation District – Head of the Basalt Trial Well

REQUIRED ACTION: Consider a recommendation to the IWRB for the authorization of funding a test recharge well within the New Sweden Irrigation District (NSID) system.

New Sweden Irrigation District's Head of the Basalt Trail Well Summary:

Project Cost as Recommended: $256,000
Estimated 20-year Cost per Acre Foot: $14.34
Anticipated Recharge Capacity: 10 cfs
Depth to Water: 150 ft

Project Proposal:

- Construction of a recharge well.
- Construction of a dedicated monitor well.
- Installation of diversion structure including a meter.

Request of the IWRB:

Authorize the expenditure of $256,000 to construct a test recharge well, associated infrastructure, and a dedicated monitoring well.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

Head of the Basalt Trial Wells:

New Sweden Irrigation District (NSID) proposes a test recharge well where water can be consistently delivered, has a power source, and is owned by NSID. The location is adjacent to an existing recharge basin which does not provide satisfactory infiltration rates, a common issue in the Upper Valley except in a few select areas. Located along NSID's Porter Canal about six miles southwest of Idaho Falls (Figure 1), the test well will help NSID determine the next steps in developing a recharge well complex in this location.

IWRB staff are recommending a monitoring well to observe the hydrologic responses in the aquifer as well as bacteria attenuation. Given that rapid bacteria attenuation has been observed in a similar aquifer, IWRB staff does not anticipate different results but consider it appropriate to repeat the study.

Recharge Test Well

The proposed recharge well will be 20 inches in diameter and 350 feet deep (Figure 2). While the exact lithology at the site is unknown, nearby well logs suggest the well may encounter 12 feet of cinders and 103 feet of fractured basalt between the bottom of the casing and 250 feet bgs. Both materials are highly permeable and capable of supporting high recharge rates. However, NSID seeks funding to drill beyond 250 feet if no suitable permeable layers are found. Drilling may cease before reaching the proposed 350-foot depth if IWRB staff or NSID's consultant identifies a suitable hydraulically conductive layer.

Hydrologic and Water Quality Monitoring Well

The monitor well will help NSID and IWRB determine the optimal spacing for any future wells. At a monitor well 0.1 miles from the Roberts recharge well, no hydrologic response was observed during recharge, suggesting that wells in this area could be spaced about 0.1 miles apart without interference. If similar conditions are found in the PCC system, this well density could be considered.

Bacteria is the main contaminate of concern to human health in NSID canal water (Appendix A) as well as across the Upper Valley (above American Falls). Data from the Butte Market Lake recharge well west of Roberts, with a similar geology, demonstrated a rapid attenuation of bacteria in the subsurface. While similar results are expected, a dedicated monitor well ensure the protection of the aquifer and local water users.

Cost

NSID's proposal for the recharge well and plumbing infrastructure totals $188,175. With the addition of the staff-recommended monitor well and a 20% contingency, the total cost comes to $256,000, as outlined in Table 1. The 20% contingency is necessary due to multiple well drillers bidding on the contract and the uncertainty regarding the required casing depth.

Table 1 – Total request for the development of a test well in the NSID system. * denotes IWRB staff recommendations.

Item	Cost
20" 350' Recharge Well	$147,035
Canal Connection Infrastructure	$30,140
Consultant	$11,000
20% contingency*	$37,635
Monitor Well*	$30,000
Total Requested	**$256,000**

- Total project cost as recommended** $14.34 per acre-foot

  **Assumption used in the calculation:
  - Recharge capacity of the well: 10 cfs
  - Yearly available of natural flow for recharge: 45 days***

  *** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

Potential Impact

Based on ESPAM2.2 via ETRAN

- 20% of the water recharged returns to the river — 8 months
  - Above Blackfoot: — 81%
  - Blackfoot to Minidoka: — 19%
- 50% of the water recharged returns to the river — 2.25 years
  - Above Blackfoot — 66%
  - Between Blackfoot and Minidoka — 33%

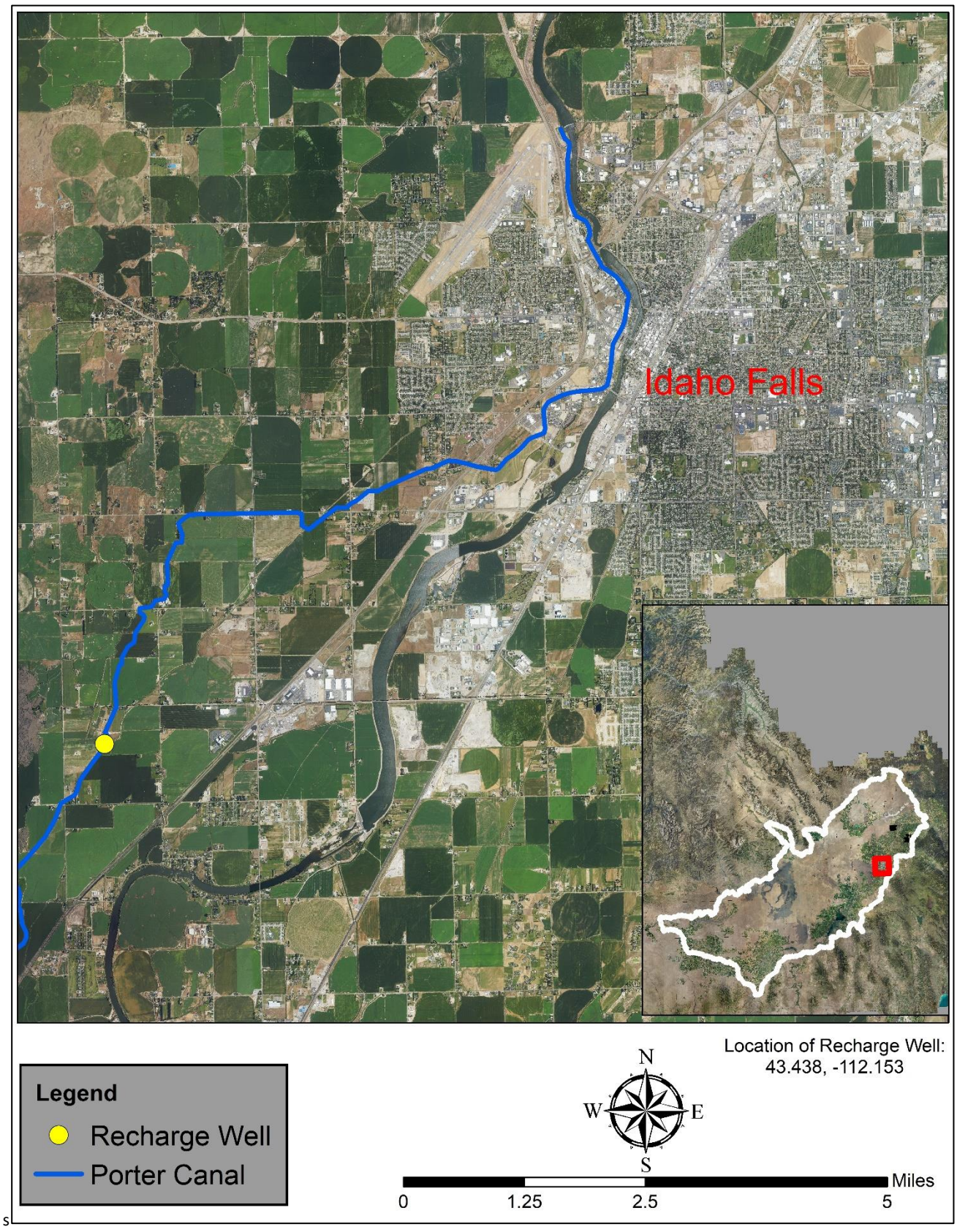

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Figure 1 – The proposed recharge well and IWRB staff-recommended monitor well along New Sweden Irrigation District's Porter Canal. The basin had not been excavated when this 2023 photo was collected. The inset highlights the well's location in red within the East Snake River Plain Aquifer (outlined in white), in Idaho.

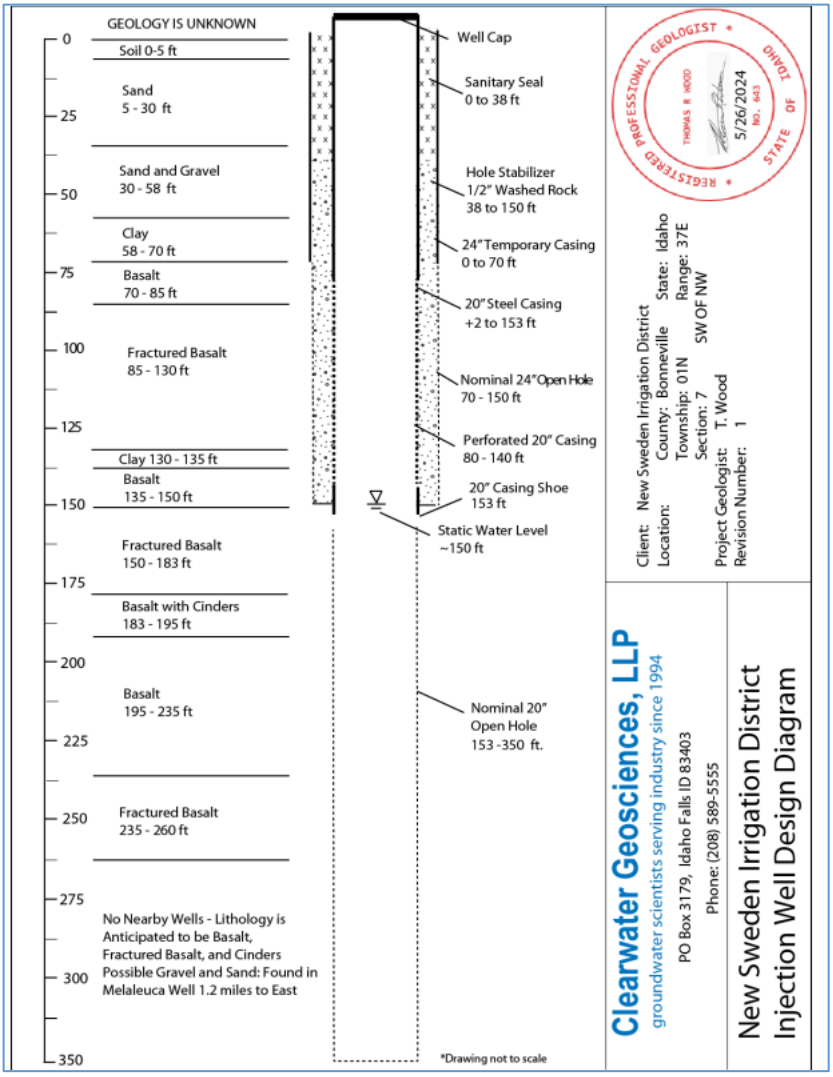


Figure 2 – Recharge well design for New Sweden Irrigation District's 350-foot deep 20-inch recharge well.

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: Progressive Irrigation District – Anderson Channel Recharge Basin

REQUIRED ACTION: The Committee will consider a recommendation to the IWRB for the authorization of the development of a 25-acre basin which will include excavation and the blasting of an impervious layer.

Anderson Channel Recharge Basin Project Summary:

Project Cost: $3,200,000
Anticipated Cost per Acre Foot: $30.38 - $303.82

Anticipated Recharge Capacity: 5.9 - 59 cfs
Basin Size: 5.9 acres
Depth to Water: 110'-170'bgs

Project Proposal:

- Excavate overburden to build berms.
- Blast impervious basalt layer to access hydraulically conductive layers beneath.
- Installation of a diversion structure from the Anderson.

Request of the IWRB:

Authorize the expenditure of $3,200,000 to excavate the basin, build berms, and drill into and blast the underlying impervious surface to potentially reveal fractured basalt, which could allow for high volumes of recharge.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

Anderson Channel Recharge Basin Project Proposal:

Progressive Irrigation District owns ~18 acres of a 46-foot deep, 45-acre basin near Ucon (Figure 1) that underperformed during an infiltration test. A construction firm then drilled seven 33-foot test holes, finding an average of 10 feet of overburden above solid basalt (Figure 2). Four holes revealed fractured basalt, suggesting the solid basalt may overlie a fractured layer. Progressive proposes to excavate the overburden, berm off its 16 acres, blast the solid basalt on the bottom seven acres, and recharge the fractured layer. When completed, the basin would have a top area of 15.4 acres, a bottom area of 5.9 acres, and would hold a total of 477 acre-feet due to its depth.

The excavated material would be used to create a 46' high berm between Progressive's property and those of its neighbors. Progressive does not believe bentonite is necessary due to the high clay content in the

overburden. Progressive then proposes to use a Sandvik Ranger 800 drilling machine to drill 30-foot holes (to 75 feet below ground surface) five inches in diameter and spaced approximately 8 feet apart, across 9 rows, each row 48 feet wide. It would then detonate 0.5 or 1 stick of dynamite in each hole. The goal is to create a conduit from the excavated surface, through the solid basalt, to the fractured basalt, which would then allow water to infiltrate at high volumes through the floor of the basin and into the aquifer.

Nearby well logs vary in their descriptions of the subsurface between 46 and 76 feet below ground. Two report basalt, while a third indicates broken basalt underlain by solid basalt. Since the basalt isn't specified as "soft" or "fractured," its ability to support high-volume recharge is uncertain. A more detailed hydrogeologic report by IWRRI staff, attached as Appendix C, finds similar uncertainties. This is a risky venture but if successful the process could be replicated in other existing basins above American Falls that do not currently achieve sufficient recharge capacity.

The Anderson Canal can consistently deliver at least 50 cfs to the site, with up to 75 cfs available when irrigation is not occurring. A diversion structure is also proposed.

Cost

The total proposed project cost is $3,200,000, covering excavation, drilling, blasting, and a diversion structure, and other items generally listed in Table 1.

Table 1 -- Costs associated with the development of the Anderson Channel Recharge Basin. * denotes IWRB staff recommendation.

Item	Cost
Excavation	$1,661,740
Drilling and Blasting	$851,500
SWPP	$11,000
Diversion Structure	$396,000
Engineer	$20,000
Contingency (10%)*	$294,024.0
Total	**$3,200,000**

It is difficult to forecast a cost per acre foot due to the uncertainty associated with the infiltration rate. The order of magnitude difference in the Anticipated Recharge Capacity, 5.9 cfs – 59 cfs, was provided to illustrate the variability.

- Total project cost as recommended** $304/ $101/ $30 per acre-foot

**Assumptions used in the calculation:

- Cost averaged over 20 years
- Project recharge capacity: 5.9/ 17.7/ 59 cfs
- Yearly available of natural flow for recharge: 45 days***

*** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

Potential Impact

Based on ESPAM2.2 via publicly available ETRAN, which models impacts over 150 years:

- 20% of the water recharged returns to the river 9 months
  - Above Blackfoot: 88%
  - Blackfoot to Minidoka: 12%
- 50% of the water recharged returns to the river Two years
  - Above Blackfoot 80%
  - Between Blackfoot and Minidoka 20%

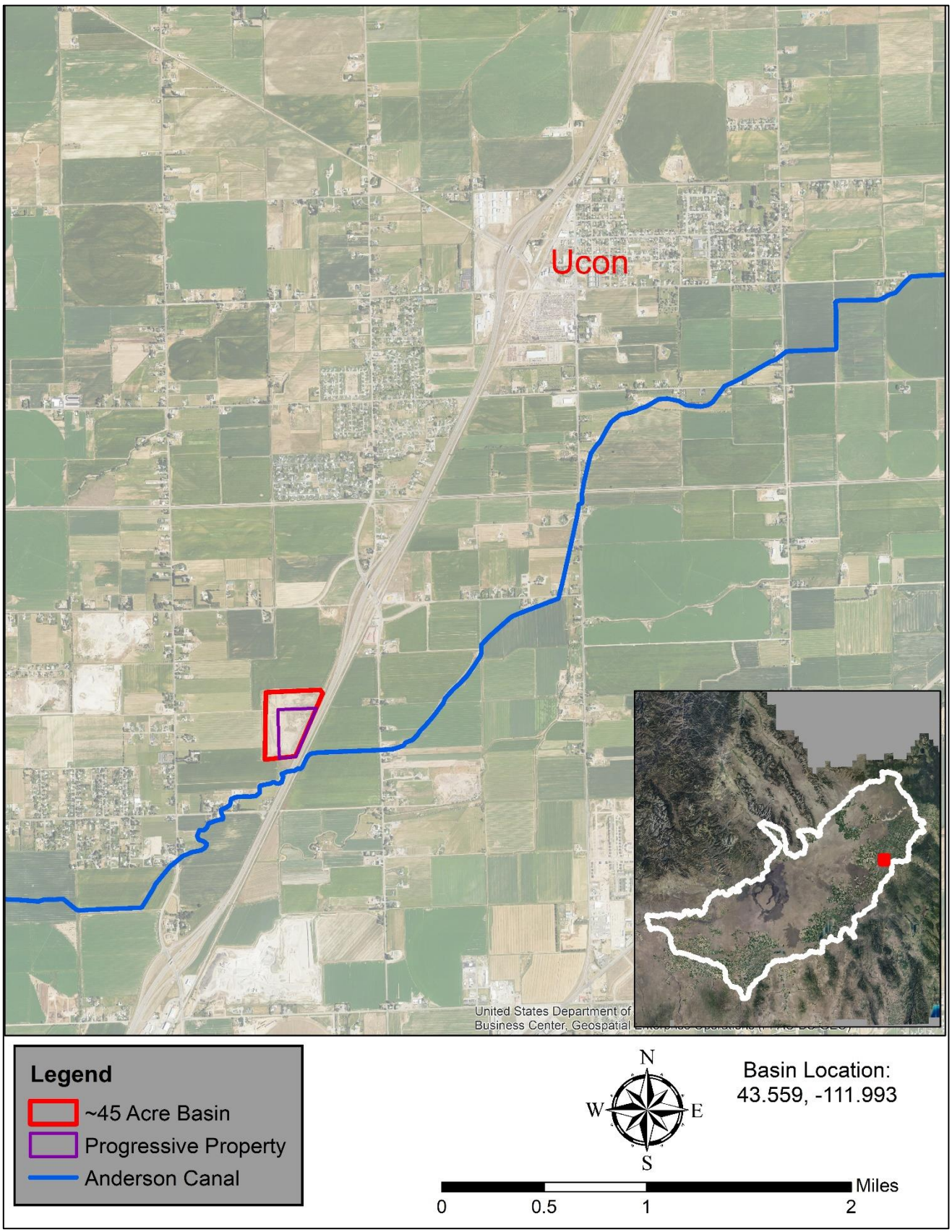


Figure 1 -- The location of the 45 acre, in which Progressive Irrigation District owns 18 acres it proposes to develop into a recharge basin.

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: Enterprize Canal Company – 55th Road Recharge Basin Expansion Site Construction

REQUIRED ACTION: Consider a recommendation to the IWRB for the authorization of funding for the construction of a 14.8-acre expansion of the 55th Road Recharge Basin.

55th Road Basin Expansion Project Summary:

Project Cost: $6,196,740
Estimated 20-year Cost per Acre Foot: $75.96 - $63.39

Additional Recharge Capacity: 45 - 55 cfs
Additional Basin Size: 14.8 acres
Depth to Water: 110'-125'bgs

Project Proposal:

- Excavation of a new 14.8-acre recharge basin adjacent to an existing 5.6-acre recharge basin.
- Hauling off excavated material.
- Engineering oversight.

Request of the IWRB:

Authorize the expenditure of $6,196,740 for the construction of a 14.8-acre expansion of the existing 55th Road Recharge Basin.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

55th Road Recharge Basin Expansion Project Proposal:

Enterprize Canal Company (ECC) proposes to excavate and remove the top 11 feet of material from a new 17.9-acre parcel, adding 14.8 acres to the wetted area adjacent to the existing 5.6-acre 55th Road recharge basin. Located approximately 2.5 miles north of Iona (see Appendix C of the attached engineering proposal for its location within Idaho), the current basin, which is deeper than 11 feet, will be terraced at the northern edge to connect with the new basin, creating a combined total of 20.4 wetted acres. The project also proposes to pipe an existing lateral that runs through the northern portion of the property (Appendix D in the attached engineering proposal).

The existing basin recharged at an average rate of 2.73 cfs/acre (27.6 AF/day) from May 12 to June 2, 2024. with the recharge capacity may potentially be higher as operations become better understood. The proposed expansion is therefore expected to add at least 40 cfs. The proposal estimates the expansion will recharge 45.7

cfs. That rate could reach 55 cfs, if rates similar to the Jones Pit (3.7 cfs/acre), less than five miles away is achieved.

The current diversion structure can deliver 80 cfs. The source of water into the basin is Sand Creek, which branches from Willow Creek. ECC can deliver at least 80 cfs of natural flow from the Snake River to Willow Creek via a pipeline until mid-June, when peak irrigation begins. In the spring of 2024, the basin operated under a temporary natural flow recharge water right from Willow Creek, which provides an additional source of water that offers at least 80 cfs of natural flow when flood control is occurring from Ririe Reservoir.

Cost

The total proposed project cost is $6,196,740, covering excavation, material removal, and other items generally listed in Table 1 and detailed on the final page of the attached engineering report.

Table 1 – Generalized cost breakdown of Enterprize Canal Company's proposed 55th Road Basin Expansion. More detailed cost summaries are available on the final page of the attached engineering proposal.

Item	Cost
Earthwork (Excavation and Removal of Material)	$5,365,648.87
Engineering Services	$481,706
Piping of Lateral Ditch	$250,390
Inlet Trash Diverter	$40,000
Fence	$35,200
Construction Traffic Control	$17,588
Total Requested	**$6,196,740**

- Total project cost as requested** $75.96 per acre-foot

  **Assumptions used in the calculation:
  - Cost averaged over 20 years.
  - Recharge capacity of the basin: 45.7 cfs (as proposed)
  - Yearly available of natural flow for recharge: 45 days***

*** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

If the expanded area achieves a rate of 55 cfs (equivalent to 3.7 cfs/acre, as at the Jones Pit), the 20-year average cost per acre-foot would be $63.39.

Potential Impact

Based on ESPAM2.2 via publicly available ETRAN, which models impacts over 150 years:

- 20% of the water recharged returns to the river — 8 months
  - Above Blackfoot: — 95%
  - Blackfoot to Minidoka: — 5%
- 50% of the water recharged returns to the river — Two years
  - Above Blackfoot — 85%
  - Between Blackfoot and Minidoka — 14%

The following figure shows the existing 55th Road recharge basin and the proposed expansion (in red).

OVERALL SITE PLAN

SCALE 1" = 150'

0 75 150 300 450

KEYNOTES:

1. EXISTING CONCRETE INTAKE STRUCTURE ON SAND CREEK
2. EXISTING Ø48" SDR-32.5 HDPE PIPELINE
3. EXISTING RECHARGE POND (42 FT DEPTH, 8.06 ACRES)
4. EXISTING CONCRETE POND INLET STRUCTURE (RETAIN AND PROTECT)
5. PROPOSED RECHARGE POND EXPANSION (10 FT DEPTH, 17.97 ACRES)
6. PROPOSED TIE-IN WITH EXISTING RECHARGE POND
7. PROPOSED EMBANKMENT TO SLOPE TO EXISTING GROUND AT 2H:1V
8. PROPOSED Ø12" HDPE PIPELINE

LEGEND

Symbol	Description
	ROAD CENTERLINE
	SAND CREEK
	EAST CENTRAL CANAL
TOE	TOE OF SLOPE
TOP	TOP OF SLOPE
IR	PROPOSED 12" HDPE PIPELINE
48"IR	EXISTING 48" HDPE PIPELINE
	EXISTING RECHARGE POND AREA
	PROPOSED RECHARGE POND EXPANSION

PROFESSIONAL ENGINEER LICENSED 16775 STATE OF IDAHO HATTIE ZOBOTT

DRAFT

BORDER SIZE	22"x34"
DESIGNED	H. ZOBOTT, P.E.
DRAWN	H. WARD
CHECKED	H. ZOBOTT, P.E.
APPROVED	H. ZOBOTT, P.E.

REVISIONS

NO.	DESCRIPTION	DATE

ARDURRA
COLLABORATE. INNOVATE. CREATE.
2471 S. TITANIUM PLACE
MERIDIAN, IDAHO 83642
208-323-2288 | WWW.ARDURRA.COM

CONCEPTUAL DRAWINGS FOR

IONA RECHARGE EXPANSION

SITE PLAN

ATTENTION:
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" ON 22x34 SHEET or 1/2" ON 11x17 SHEET, THEN DRAWING IS NOT TO SCALE

DATE: July 31, 2024
PROJECT: 240160
SHEET: C1.0

CONCEPTUAL DESIGN: NOT FOR CONSTRUCTION

Memorandum

To: IWRB Aquifer Stabilization Committee

From: Cooper Fritz

Date: August 29, 2024

Re: FMID – West Egin Recharge Wells Complex

REQUIRED ACTION: Consider a recommendation to the IWRB for the authorization of funding of the West Egin Recharge Wells Complex within the Fremont Madison Irrigation District (FMID) system.

West Egin Recharge Wells Complex Summary:

Project Cost: $7,388,500
Anticipated Cost per Acre Foot (20 yr): $39.42
Anticipated Recharge Capacity: 105 cfs
Depth to Water: Perched: 10', Regional: 85'

Project Proposal:

- **Procure a fully executed easement for the maintenance road** along Fremont Madison Irrigation District's (FMID) Recharge Canal, which is fed by the St. Anthony Union Canal from the Henry's Fork.
- **Construct ten recharge wells along the Recharge Canal** within the easement, including diversion structures and meters.
- **Improve bridges, conduct rock hammering, and perform earthwork** to increase the delivery capacity of the Recharge Canal to accommodate the new recharge rate.
- **Automate the gates on the 25 check dams along the St. Anthony Union Canal** between the Henry's Fork and Recharge Canal, including installation of the associated control software.

Request of the IWRB:

Authorize the expenditure of $7,358,500 to construct the West Egin Recharge Wells Complex.

Background:

The ESPA Managed Recharge Program aims to stabilize and potentially enhance aquifer levels, increase spring flows, and boost reach gains along the Snake River. Since 2014, the IWRB has developed over 2,300 cfs of recharge capacity across the ESPA, with only 300 cfs added in the Upper Valley (above American Falls).

Since 2018, the IWRB has focused on increasing recharge capacity in the Upper Valley, where opportunities, infrastructure, and water availability differ significantly from the Lower Valley (below American Falls Reservoir). The current strategy involves developing capacity in multiple geographic areas to provide both short- and long-term benefits to the aquifer and surface flows. Given the variations in subsurface geology the IWRB is exploring both recharge wells and basins.

West Egin Recharge Wells Complex:

In spring 2024, FMID, with support from IWRB, constructed a 20-inch, 238-foot test recharge well that recharges up to 10.5 cfs. Based on these results, FMID proposes to build 10 additional recharge wells and associated diversion structures (including meters) along approximately 2.2 canal miles of its Recharge Canal about 2.5 miles northwest of Egin (Figure 1) and nine miles west of St. Anthony. As part of the proposal, FMID plans to purchase a perpetual easement for the canal's maintenance road, along which the wells will be constructed.

Although the test well lacked a monitor well, hydrologic interference is not expected. This is due to the highly permeable geologic material noted during test well construction: 69 feet of fractured basalt and 6 feet of cinders between a bottom casing depth of 140 feet and a total well depth of 238 feet (Figure 2). This geologic setting should support at least 105 cfs of additional recharge distributed over the 2.2 miles of the Recharge Canal.

Currently, the Recharge Canal delivers water to an approximately 256-acre basin (Figure 1) that infiltrates about 120 cfs (0.47 cfs/acre). The proposed wells are expected to recharge at a similar rate as the existing trial well. The additional 105 cfs of recharge capacity requires improvements to the Recharge Canal and the St. Anthony Union Canal, which delivers water to the Recharge Canal from the Henry's Fork.

The Recharge Canal requires improvements including bridge rehabilitation and deepening through rock hammering and excavation. Of the four bridges between its diversion from the St. Anthony Union Canal and its entrance into the basin, two require rehabilitation to handle the increased flows. This focus on the first two bridges is because four of the wells are located before the third bridge. The bridge rehabilitation work may include concrete reinforcement of the piers (beams) or the decking (road). Rock hammering is needed to deepen the canal, which is currently flat and situated within a solid-rock framework. Without deepening, increased water flow to the recharge wells could flood neighboring farmland. Ater rock hammering, earthwork will be conducted to further excavate the channel to accommodate the higher flow rates.

To improve water delivery to the Recharge Canal from the St. Anthony Union, this proposal includes automating the gates on 25 check dams between the St. Anthony Union's diversion from the Henry's Fork and the Recharge Canal. The proposal covers the cost of SCADA software and setup required to operate the automated dams. While this automation will streamline irrigation, its primary purpose is to support the planned increase in water delivery to the recharge well complex and enhance flow to the existing recharge basin. In the spring of 2024, FMID delivered approximately 73% of the basin's capacity (with a median rate of 88 cfs) once irrigation from the St. Anthony Union was fully underway. This limitation stemmed not from capacity constraints but from the manual labor required to adjust the wooden checks as irrigation demand fluctuated. The automated system would also support water delivery to a potential Phase II of the Egin Lakes Recharge Wells complex, which may be constructed within the BLM easement where the West Egin Lakes Basin currently sits.

Cost

The total proposed project cost is $7,388,500, which includes the installation of two monitor wells for water quality and hydrologic monitoring. A general cost breakdown is provided in Table 1.

St. Anthony Union Canal automation accounts for 51% of the proposed cost (excluding the monitor well and contingency). While the full cost is included in this proposal, FMID is also seeking funding through the BOR's WaterSmart program and could also pursue additional funding through the IWRB Aging Infrastructure program. FMID is currently working on a WaterSmart grant proposal, which will be submitted in November. *If half of the automation cost ($1,670,000) is secured from another source, the cost per acre-foot over 20 years would be $30.51.*

Table 1 – Generalized breakdown of the total request for the development of the West Egin Recharge Wells Complex. * denotes IWRB staff recommendation.

Item	Cost
Easement to Maintenance Road along Recharge Canal	$200,000
Wells, including diversion structures	$2,500,000
Recharge Canal Improvements	$500,000
Gates for Checks in the St. Anthony Union	$3,029,500
SCADA (Gate Automation Software)	$225,000
Network Communications	$85,000
15% Contingency	$789,000
Two Monitor Wells*	$60,000
Total Request	**$7,388,500**

- Total project cost as recommended** $39.42 per acre-foot

  **Assumption used in the calculation:
  - Cost averaged over 20 years
  - Recharge capacity of the complex: 105 cfs
  - Yearly available of natural flow for recharge: 45 days***

*** The average water availability for recharge in the Upper Valley over the 10 years the full-scale recharge program has operated has been 90 days every other year, therefore 45 days was used in the calculation.

Potential Impact

Based on ESPAM2.2 via publicly available ETRAN, which models impacts over 150 years:

- 20% of the water recharged returns to the river One year
  - Above Blackfoot: 100%
  - Blackfoot to Minidoka: 0%
- 50% of the water recharged returns to the river 4.66 years
  - Above Blackfoot 97%
  - Between Blackfoot and Minidoka 3%

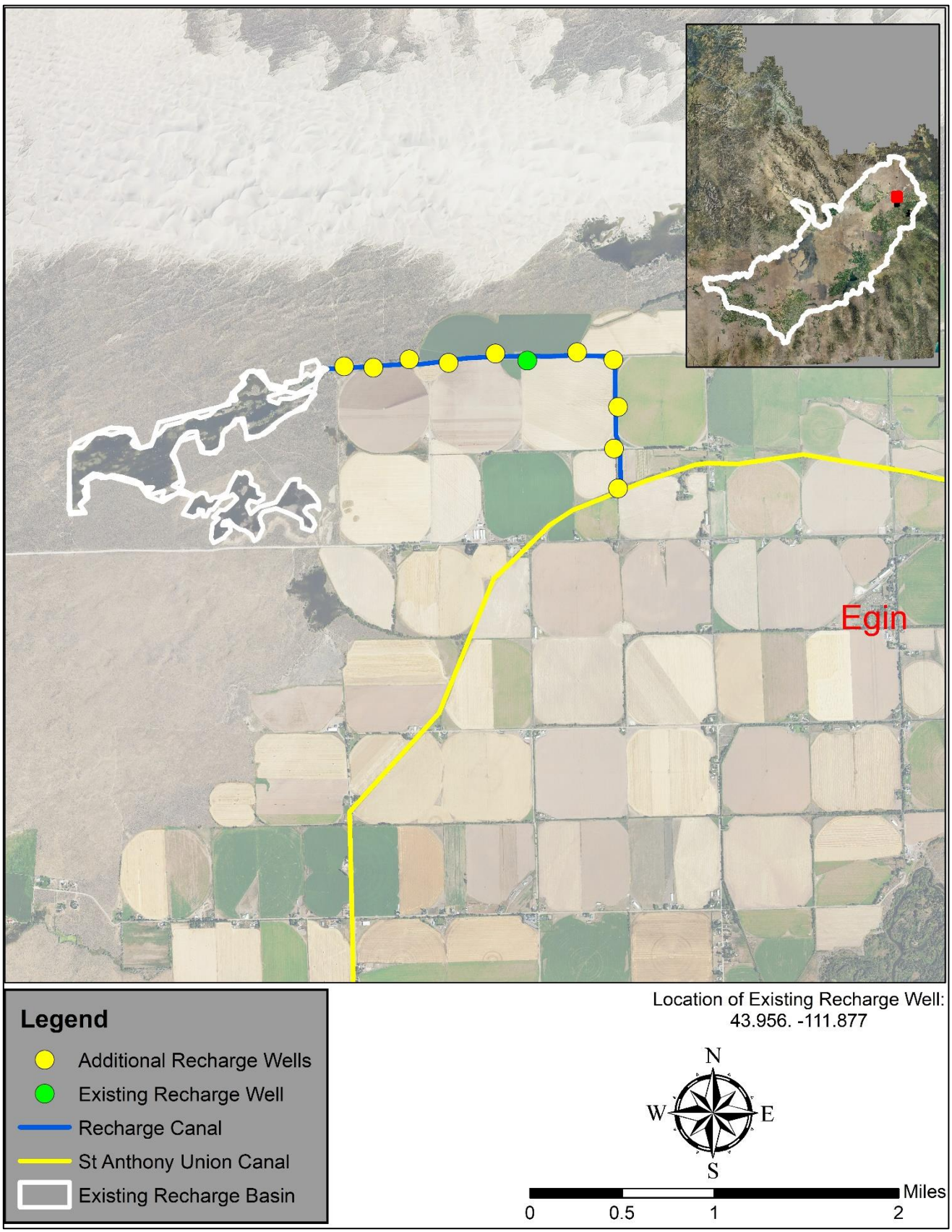
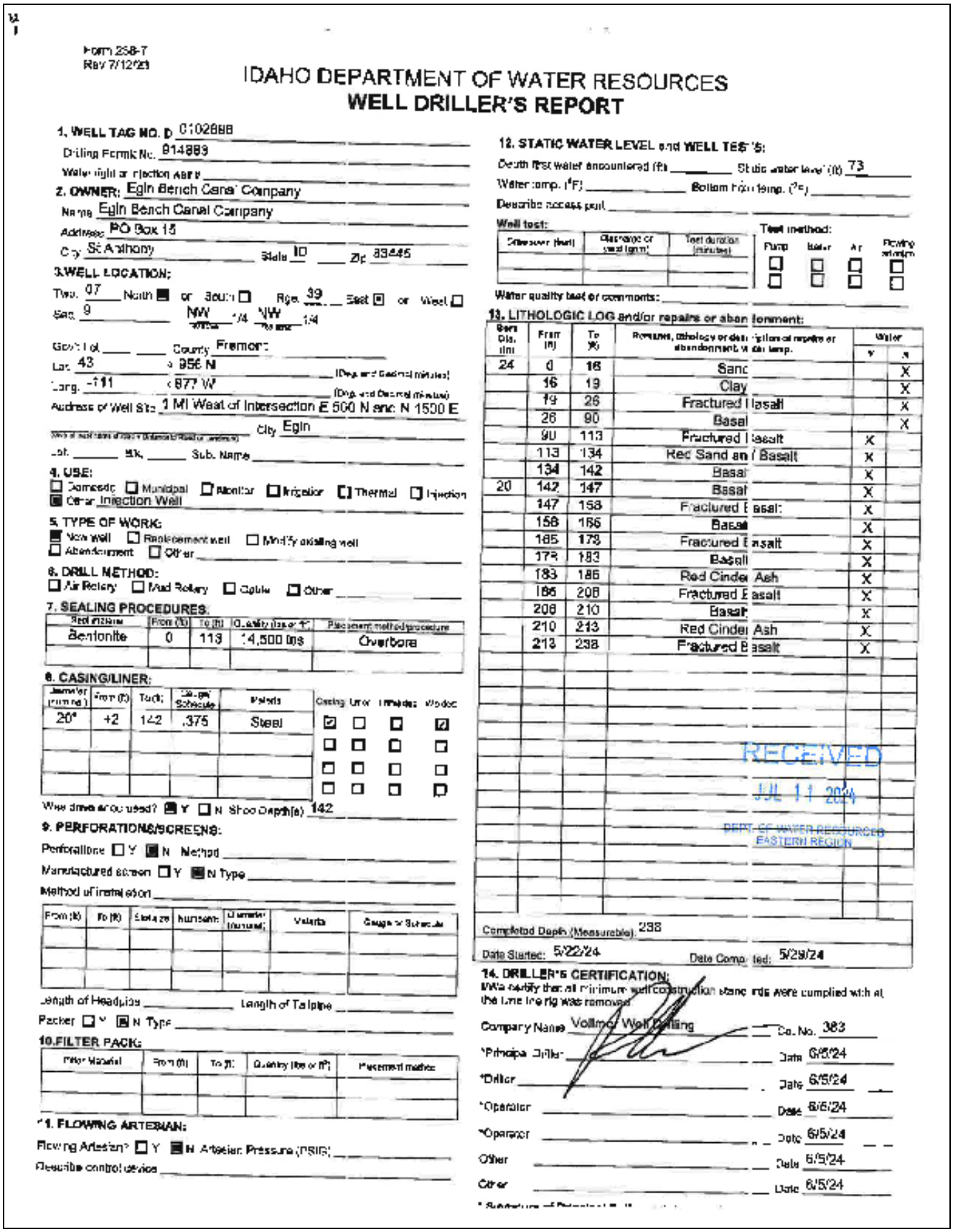


Figure 1 – The location of the Egin Lakes Wells Complex, including the existing well and the proposed additional well, in relation to the community of Egin.



Form 238-7
Rev 7/12/23

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

1. WELL TAG NO. D 0102888
Drilling Permit No. 914889
Water right or injection well #
2. OWNER: Egin Bench Canal Company
Name Egin Bench Canal Company
Address PO Box 15
City St Anthony State ID Zip 83445
3. WELL LOCATION:
Twp. 07 North ■ or South □ Rge. 39 East ■ or West □
Sec. 9 NW 1/4 NW 1/4
Gov't Lot ____ County Fremont
Lat. 43 ° 956 N (Deg. and Decimal minutes)
Long. -111 ° 877 W (Deg. and Decimal minutes)
Address of Well Site 1 MI West of Intersection E 500 N and N 1500 E
City Egin
Lot ____ Blk. ____ Sub. Name
4. USE:
□ Domestic □ Municipal □ Monitor □ Irrigation □ Thermal □ Injection
■ Other Injection Well
5. TYPE OF WORK:
■ New well □ Replacement well □ Modify existing well
□ Abandonment □ Other
6. DRILL METHOD:
□ Air Rotary □ Mud Rotary □ Cable □ Other
7. SEALING PROCEDURES:

Material from	From (ft)	To (ft)	Quantity (sacks or ft³)	Placement method/procedure
Bentonite	0	113	14,500 lbs	Overbore

8. CASING/LINER:

Diameter (inches)	From (ft)	To (ft)	Gauge/Schedule	Material	Casing	Liner	Perforated	Welded
20"	+2	142	.375	Steel	☑	□	□	☑
					□	□	□	□
					□	□	□	□
					□	□	□	□

Was drive shoe used? ■ Y □ N Shoe Depth(s) 142
9. PERFORATION/SCREENS:
Perforations □ Y ■ N Method
Manufactured screen □ Y ■ N Type
Method of installation

From (ft)	To (ft)	Slot size	Number	Diameter (inches)	Material	Gauge or Schedule

Length of Headpipe ____ Length of Tailpipe ____
Packer □ Y ■ N Type
10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? □ Y ■ N Artesian Pressure (PSIG)
Describe control device

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) ____ Static water level (ft) 73
Water temp. (°F) ____ Bottom hole temp. (°F)
Describe access port
Well test:

Stimulation (type)	Discharge (gpm)	Test duration (minutes)

Test method: Pump □ Bailer □ Air □ Flowing artesian □
Water quality test or comments:
13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
24	0	16	Sand		X
	16	19	Clay		X
	19	26	Fractured Basalt		X
	26	90	Basalt		X
	90	113	Fractured Basalt	X	
	113	134	Red Sand and Basalt	X	
	134	142	Basalt	X	
20	142	147	Basalt	X	
	147	158	Fractured Basalt	X	
	158	165	Basalt	X	
	165	173	Fractured Basalt	X	
	173	183	Basalt	X	
	183	186	Red Cinder Ash	X	
	186	208	Fractured Basalt	X	
	208	210	Basalt	X	
	210	213	Red Cinder Ash	X	
	213	238	Fractured Basalt	X	

RECEIVED
JUL 11 2024
DEPT OF WATER RESOURCES
EASTERN REGION

Completed Depth (Measurable) 238
Date Started: 5/22/24 Date Completed: 5/29/24
14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name Vollmer Well Drilling Co. No. 383
*Principal Driller Date 6/5/24
*Driller Date 6/5/24
*Operator Date 6/5/24
*Operator Date 6/5/24
Other Date 6/5/24
Other Date 6/5/24

Figure 2 – Well log from the existing well at the Egin Lakes Recharge Wells Project, where ten additional identical wells are proposed for construction.