UPDES Permit for Discharge of Reverse Osmosis By-product to Great Salt Lake

SOUTHWEST GROUNDWATER TREATMENT PLANT

Mark Atencio

March 2010

JORDAN VALLEY WATER CONSERVANCY DISTRICT

Delivering Quality Every Day

Sulfate (mg/L)

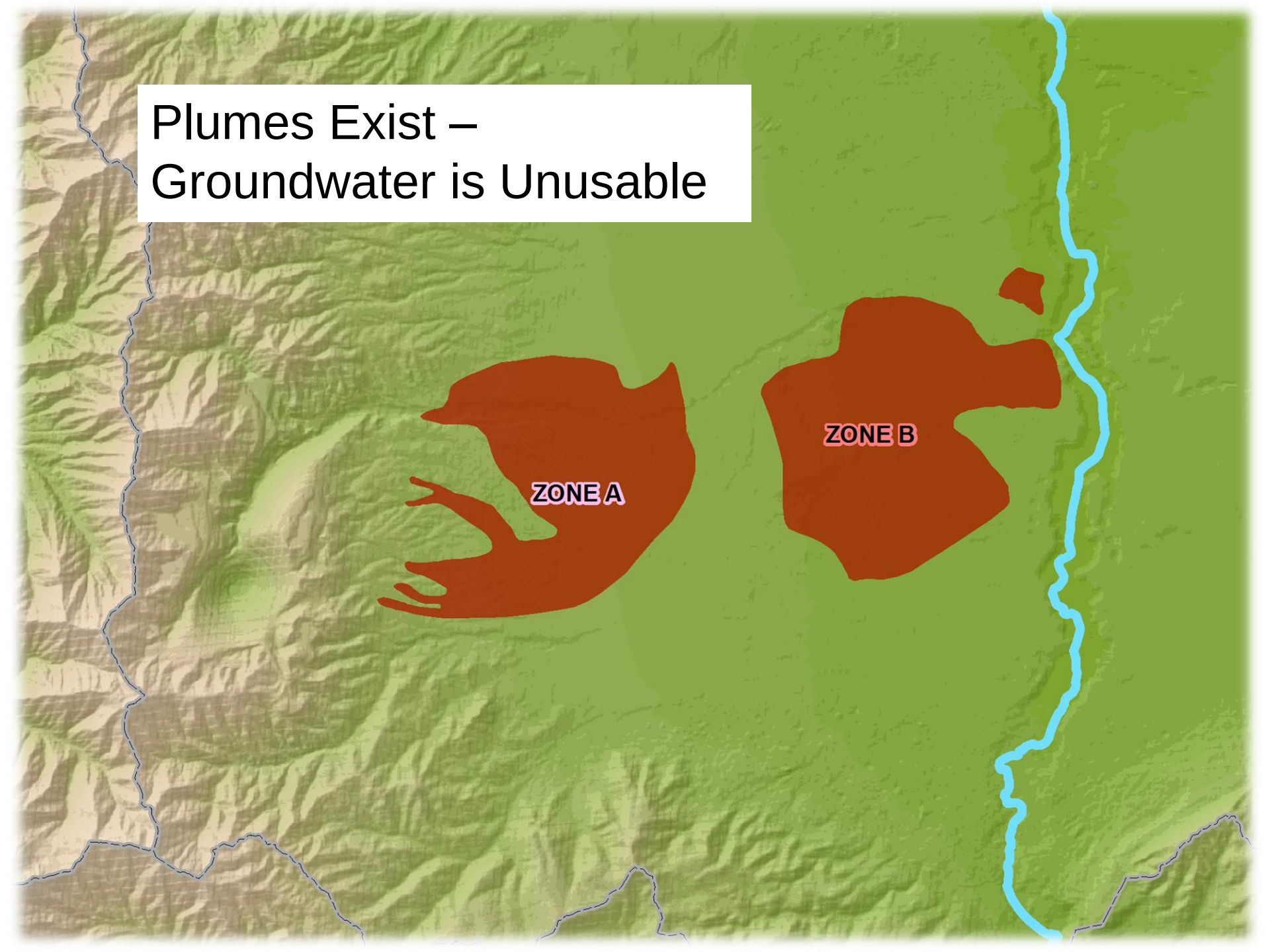
Plume	Secondary Drinking Water Standard	Great Salt Lake
800	250	7,000

Selenium and Mercury

- Naturally occurring
- Not related to mining activities
- Need to address these issues

End of Pipeline to Lake Water

- Habitat is created by pipeline discharge when lake level is low
- Need to address this issue


Plumes Exist –
Groundwater is Unusable
ZONE A
ZONE B

Project Accomplishes

- Sulfate contained and relocated
- Drinking water produced
- Aquifer remediated

One of Great Salt Lake's Beneficial Uses:

water-oriented wildlife and their necessary food chain

Photo by CDSD

Anticipated permit limits structured to protect wildlife

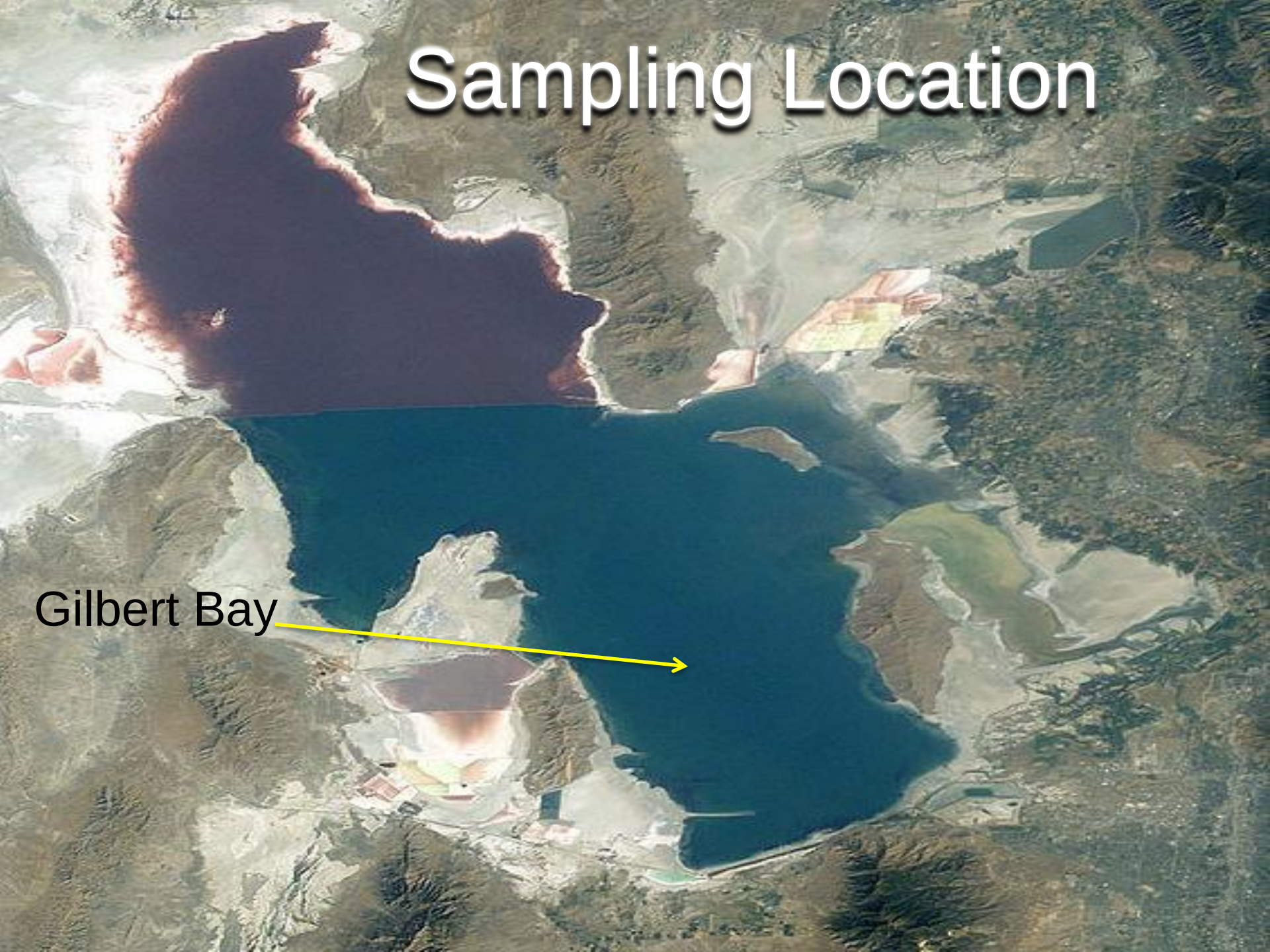
Presentation Information

- Water quality
- Discharge scenarios
- Pipeline alignment
- Discharge location
- Monitoring expectation

Water Quality

Total Dissolved Solids (TDS) (mg/L – ppm)

JVWCD Discharge	Existing Gilbert Bay	Existing Jordan River	Secondary Drinking Water Standard
10,746	80,000 – 100,000	1,100	500


Sampling Location
Gilbert Bay

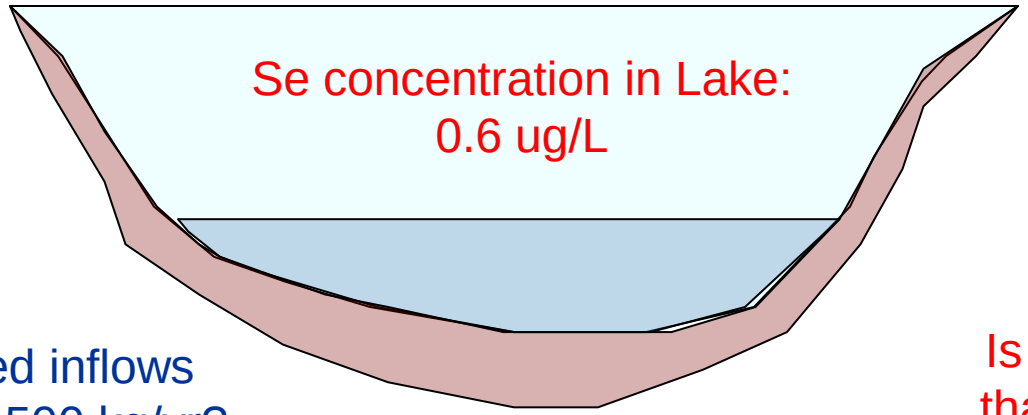
Selenium
(ug/L - ppb)

JVWCD Discharge	Existing Gilbert Bay	Existing Jordan River	Primary Drinking Water Standard
55	0.6	2	50

Project 3
Selenium Loads to Great Salt Lake

Rivers, streams load:
1500 kg/yr?

Concentration:
1 – 3 ug/L

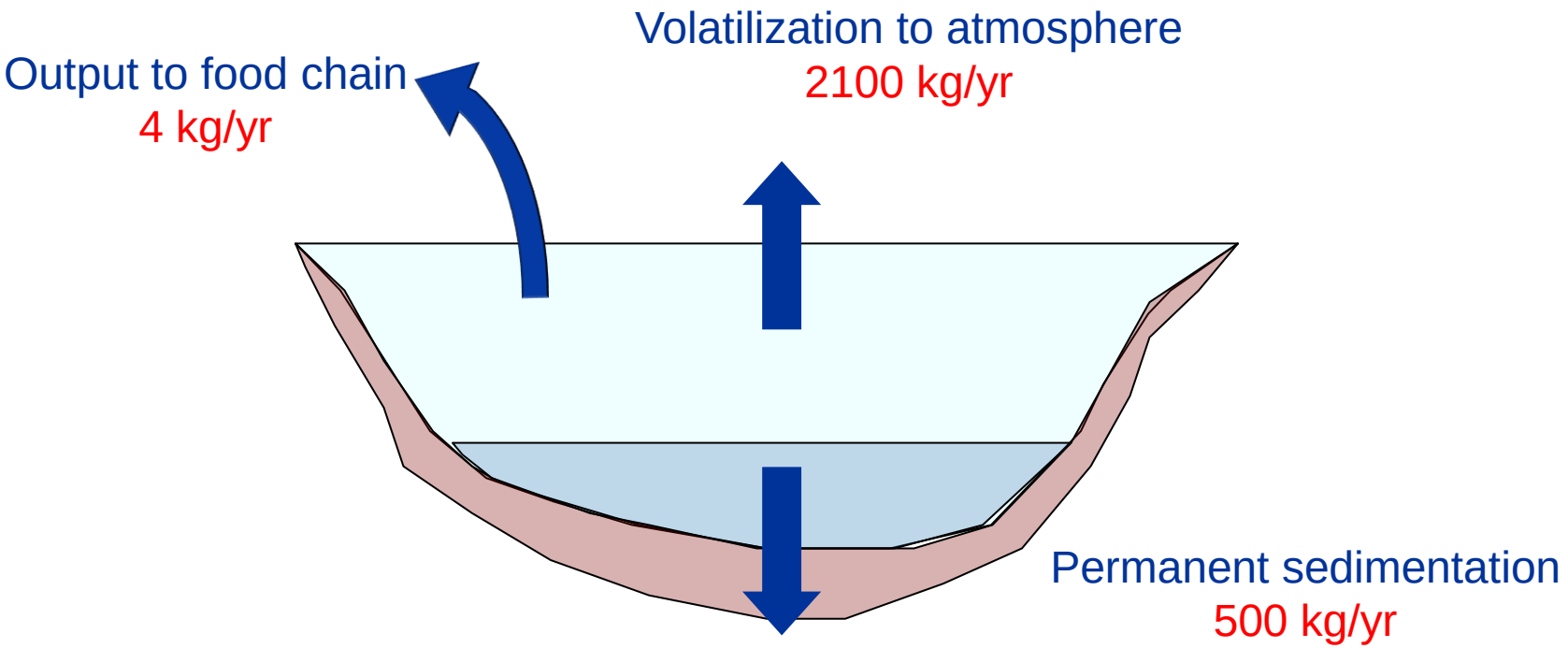


Unmeasured inflows
load: 600 – 1500 kg/yr?
Concentration:
2-4 ug/L?

Is the chemistry such that the concentration of Se in the Lake is independent of input sources?

Thanks to DEQ for this information

Project 4
Selenium Flux (Transport and Fate)



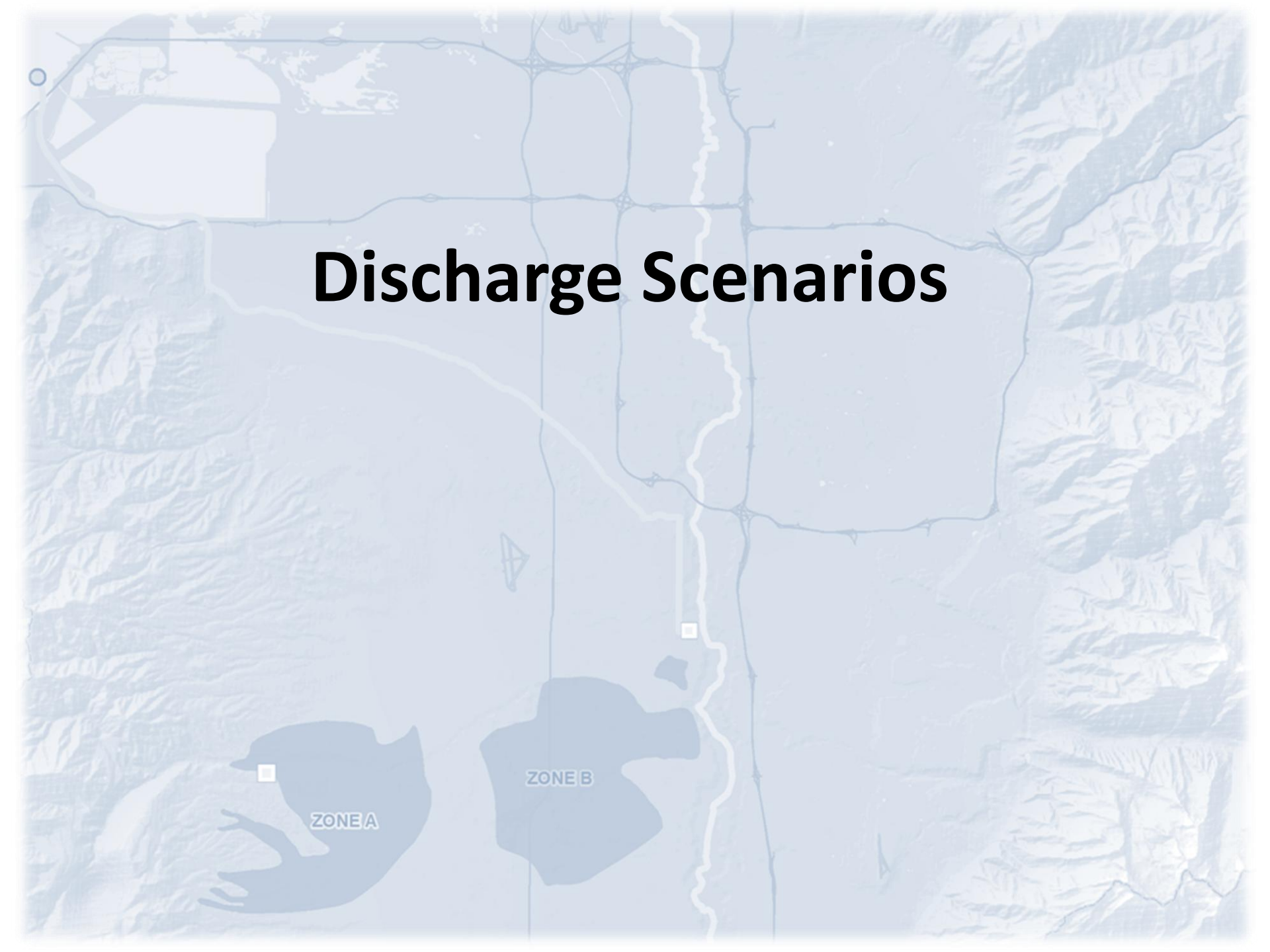
Thanks to DEQ for this information

Mercury
(ug/L - ppb)

JVWCD Discharge	Existing Gilbert Bay	Farmington Bay	Goggin Drain	Lee Creek
.030-.070	.007-.045	.00742	.00441	.00426

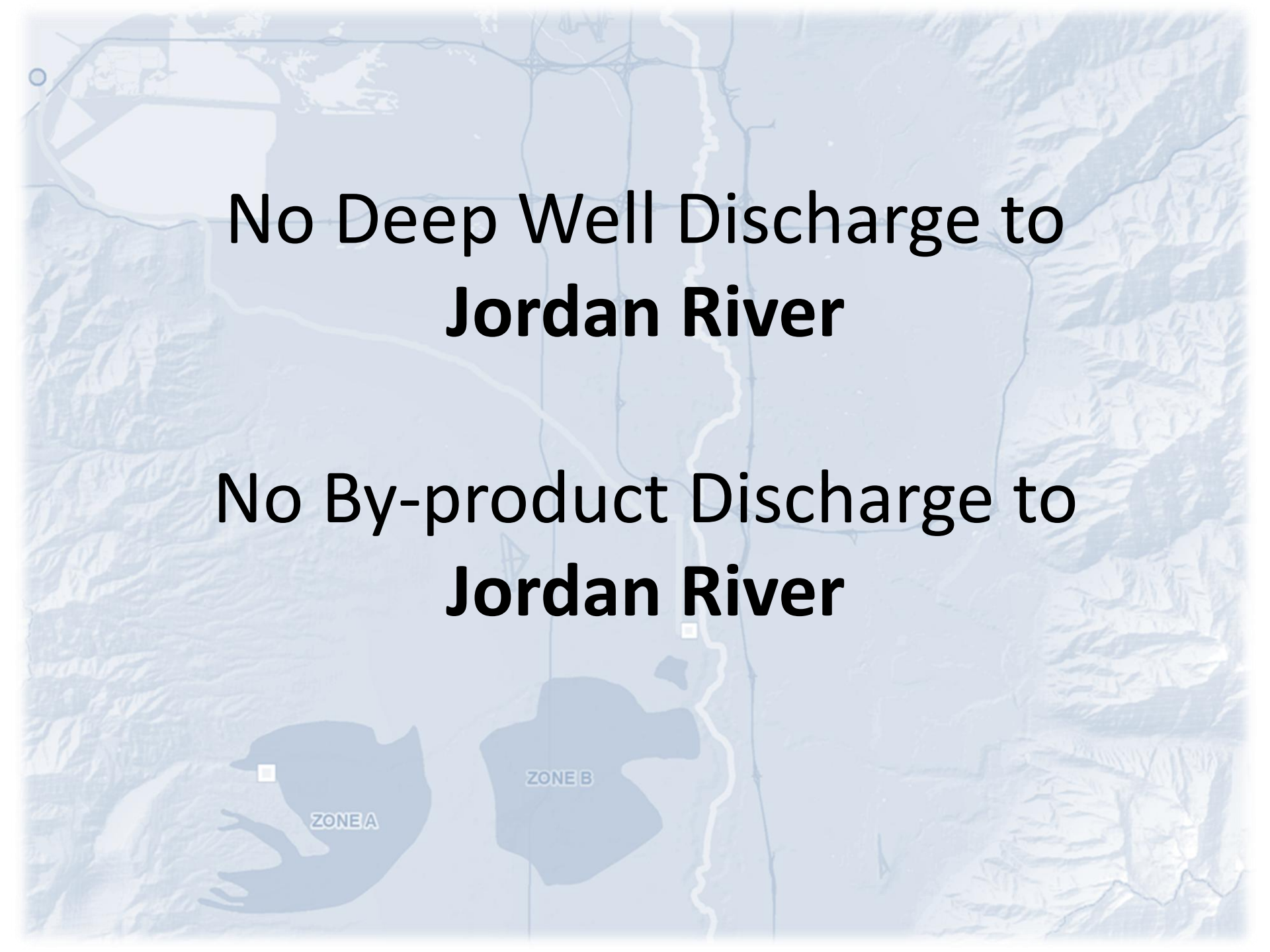
Thanks to USGS science for a changing world for guidance, new data, and data interpretation.

Discharge Scenarios



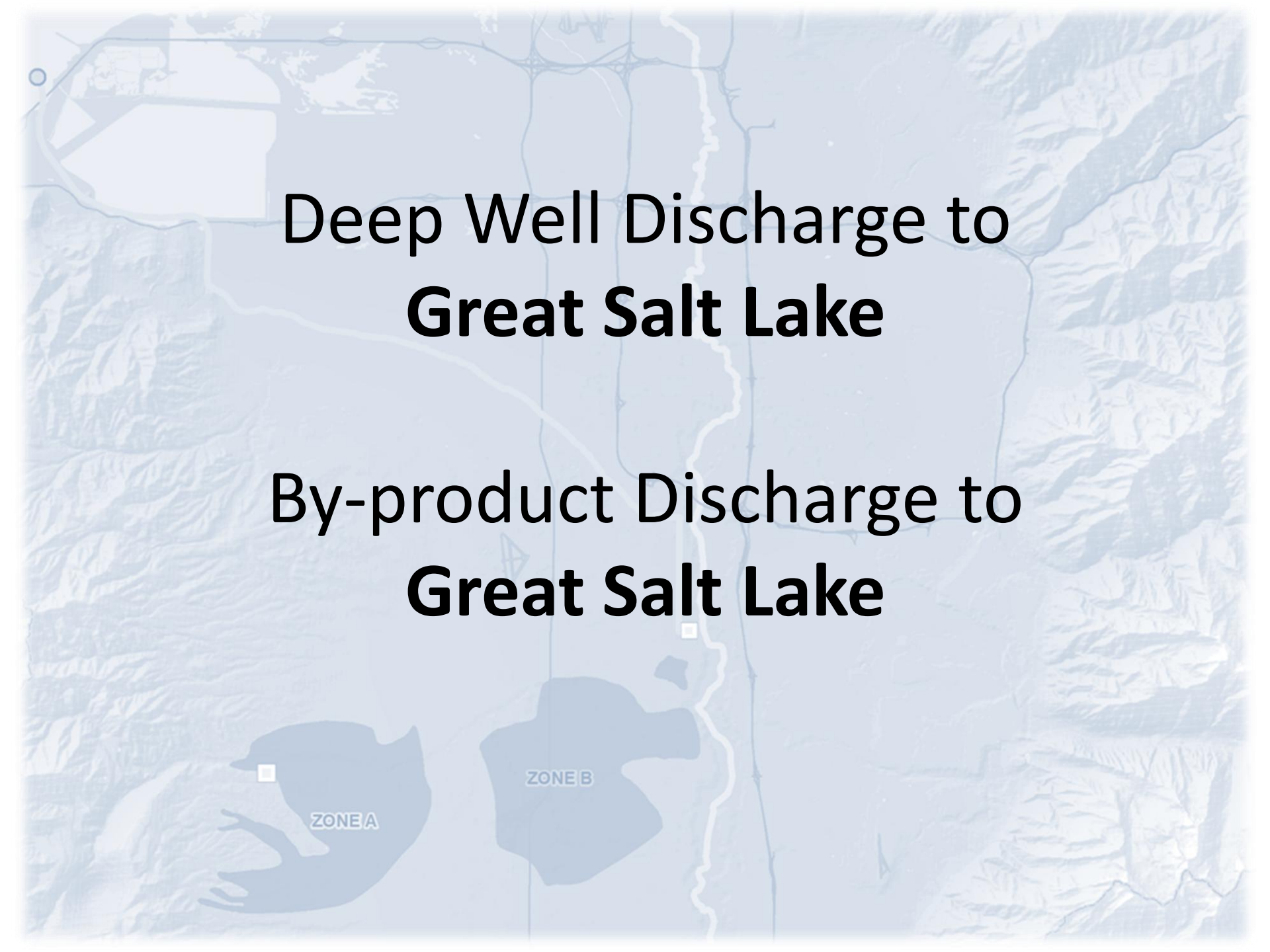
No Deep Well Discharge to **Jordan River**

No By-product Discharge to **Jordan River**



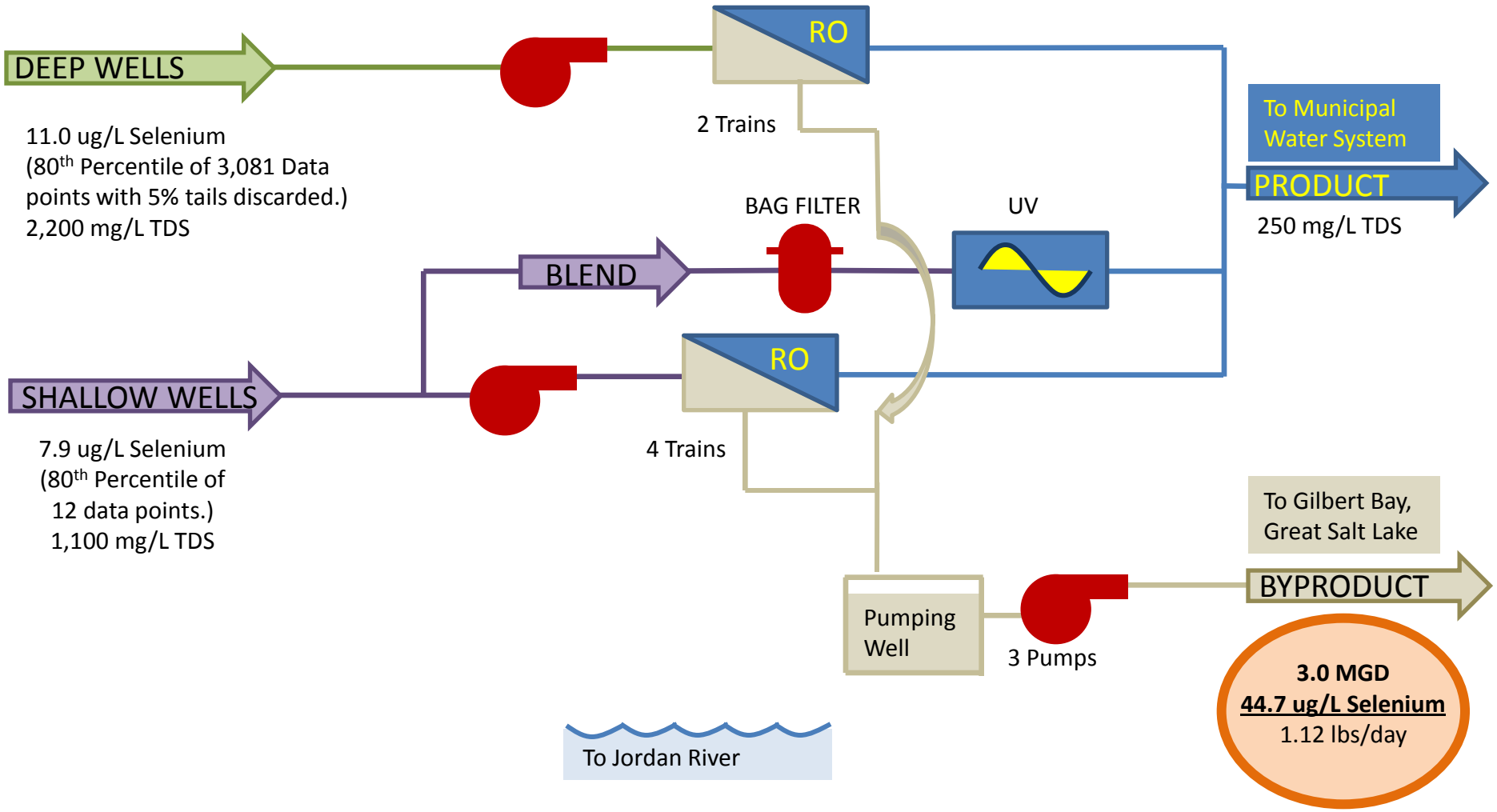
Deep Well Discharge to
Great Salt Lake

By-product Discharge to
Great Salt Lake



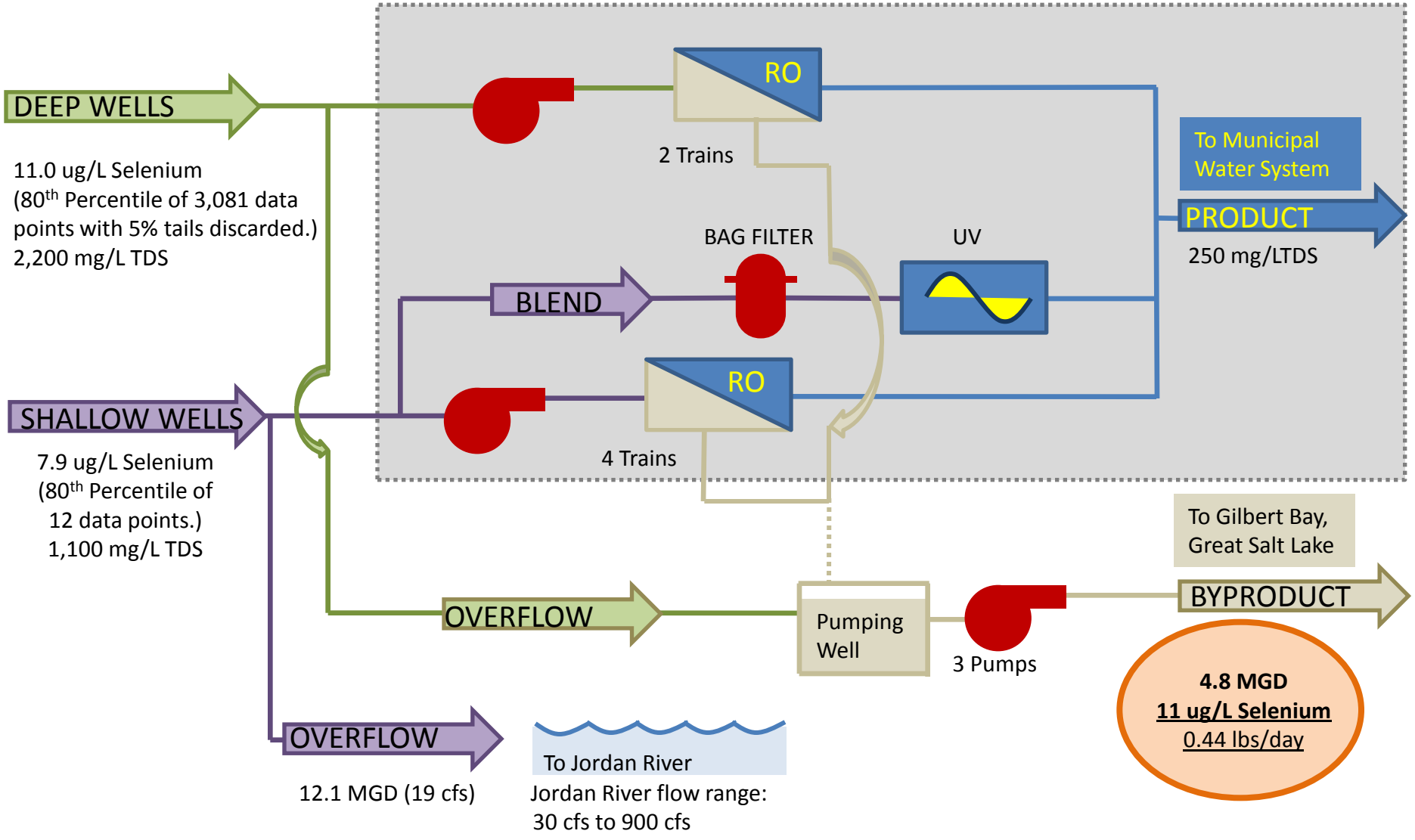
PROCESS FLOW DIAGRAM

Normal Operation



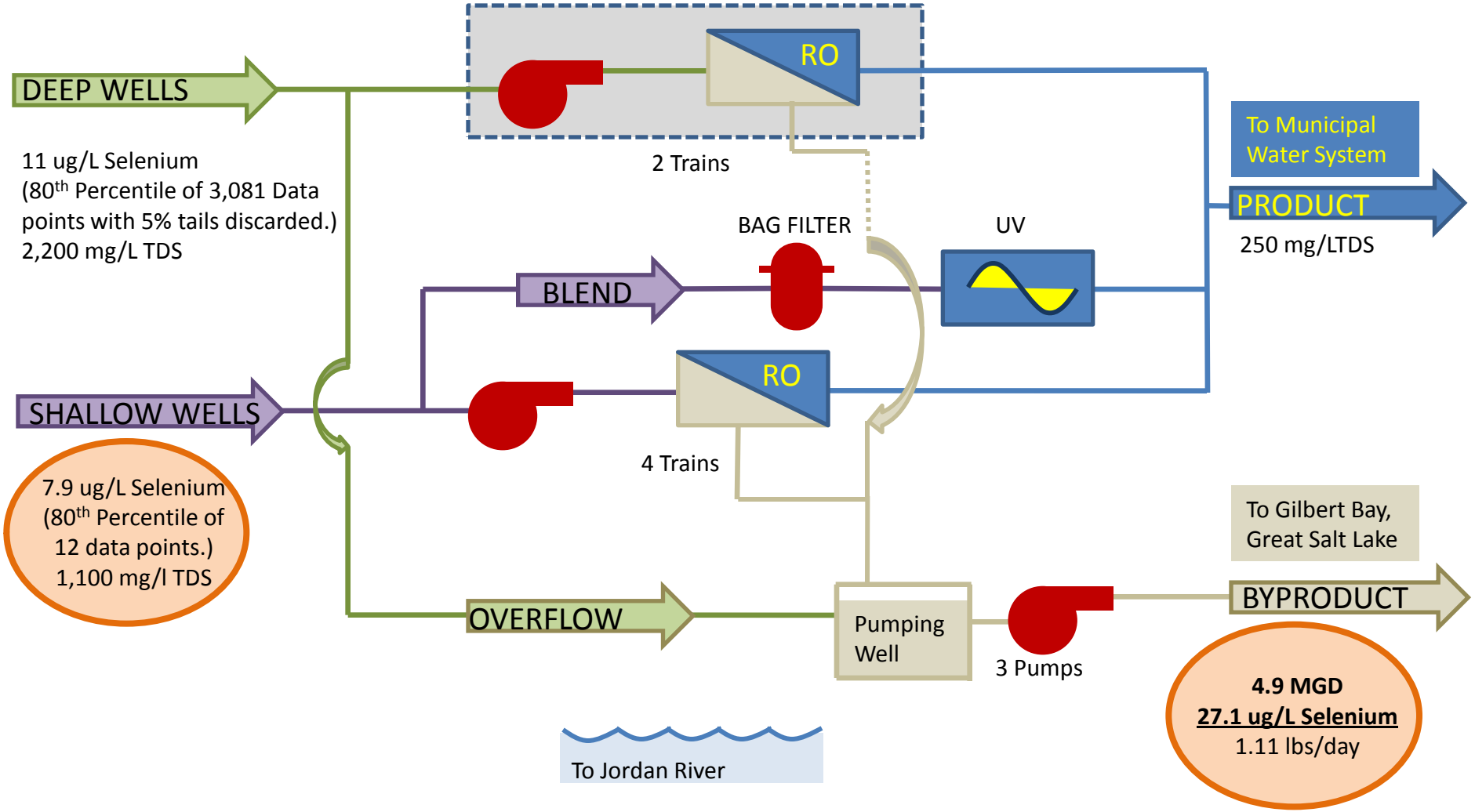
PROCESS FLOW DIAGRAM

Start-up



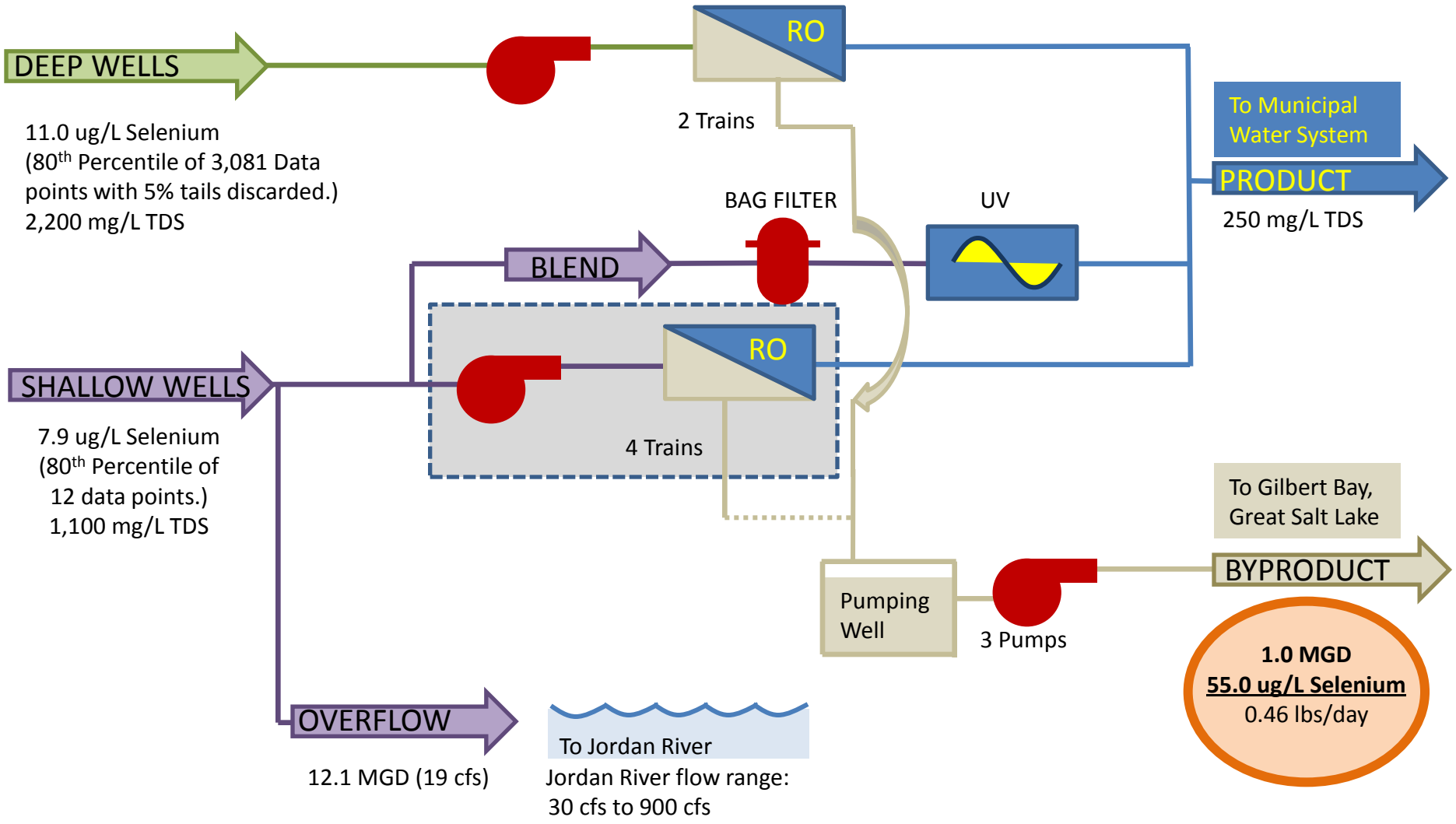
Scenario will occur during initial start-up and after power failure for approximately a 24 hour period

PROCESS FLOW DIAGRAM
Cleaning and Maintenance Deep RO



Scenario will occur every three months for approximately a 24 hour period

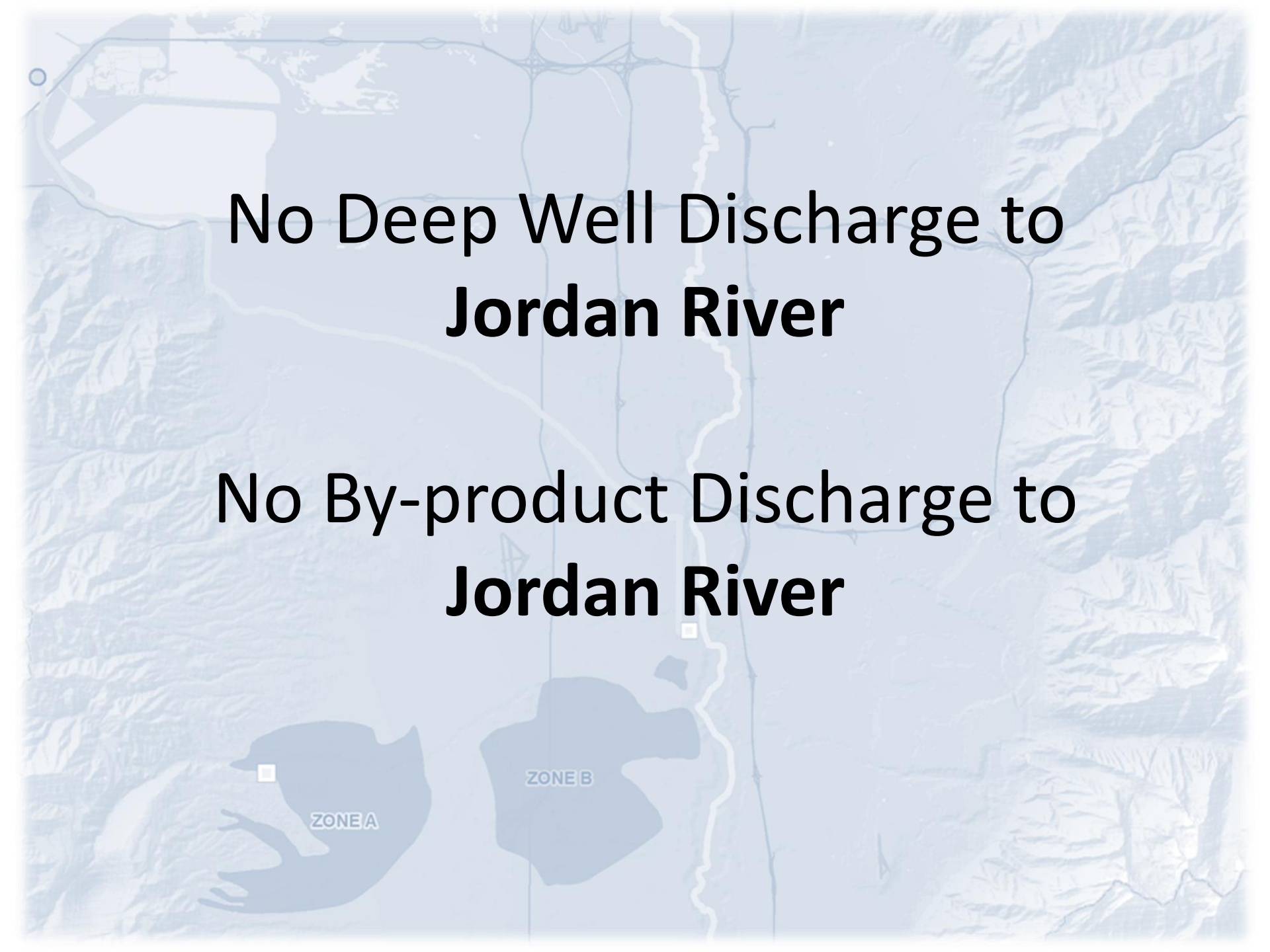
PROCESS FLOW DIAGRAM
Cleaning & Maintenance Shallow RO



Scenario will occur every three months for approximately a 24 hour period

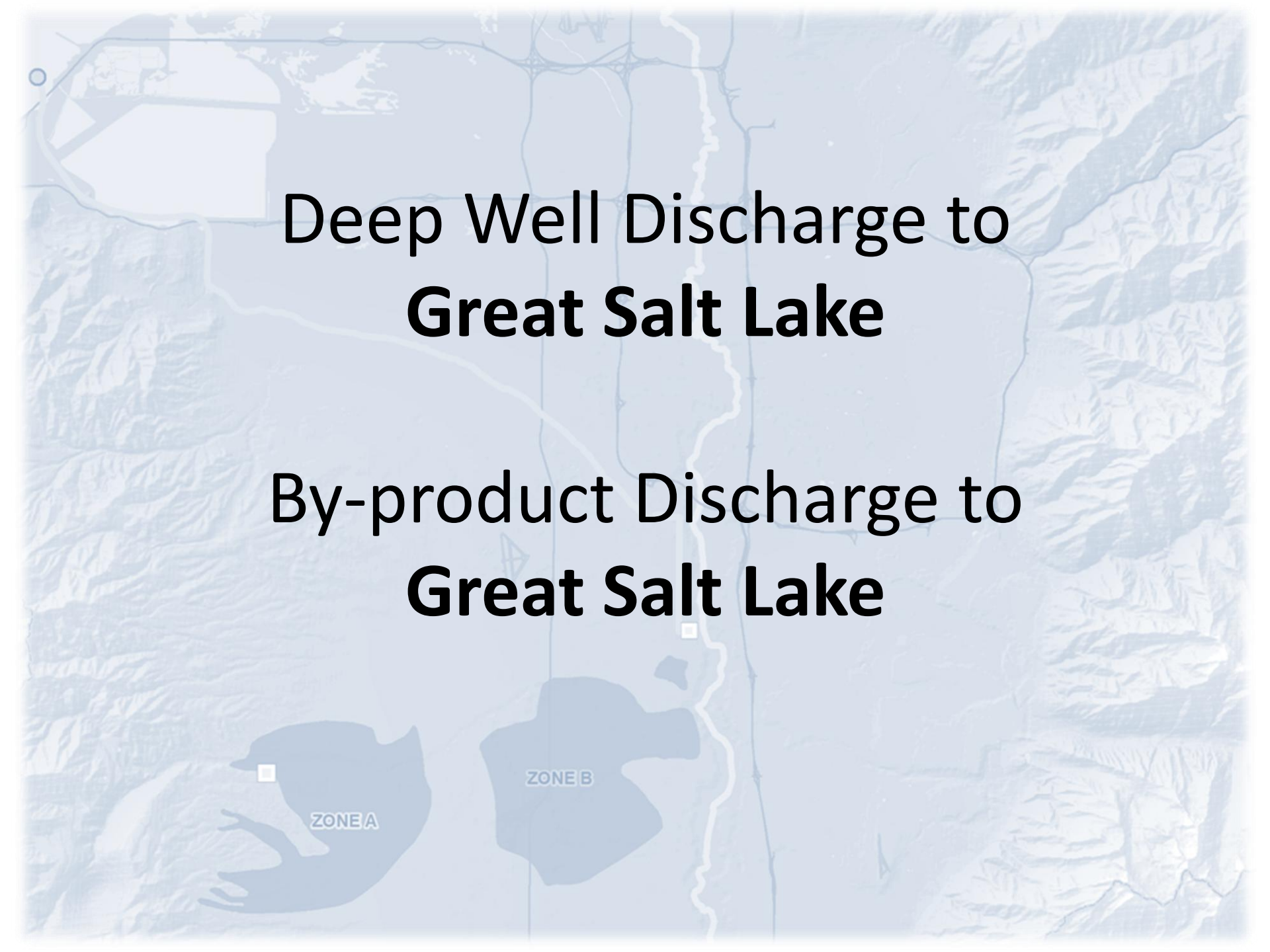
No Deep Well Discharge to **Jordan River**

No By-product Discharge to **Jordan River**



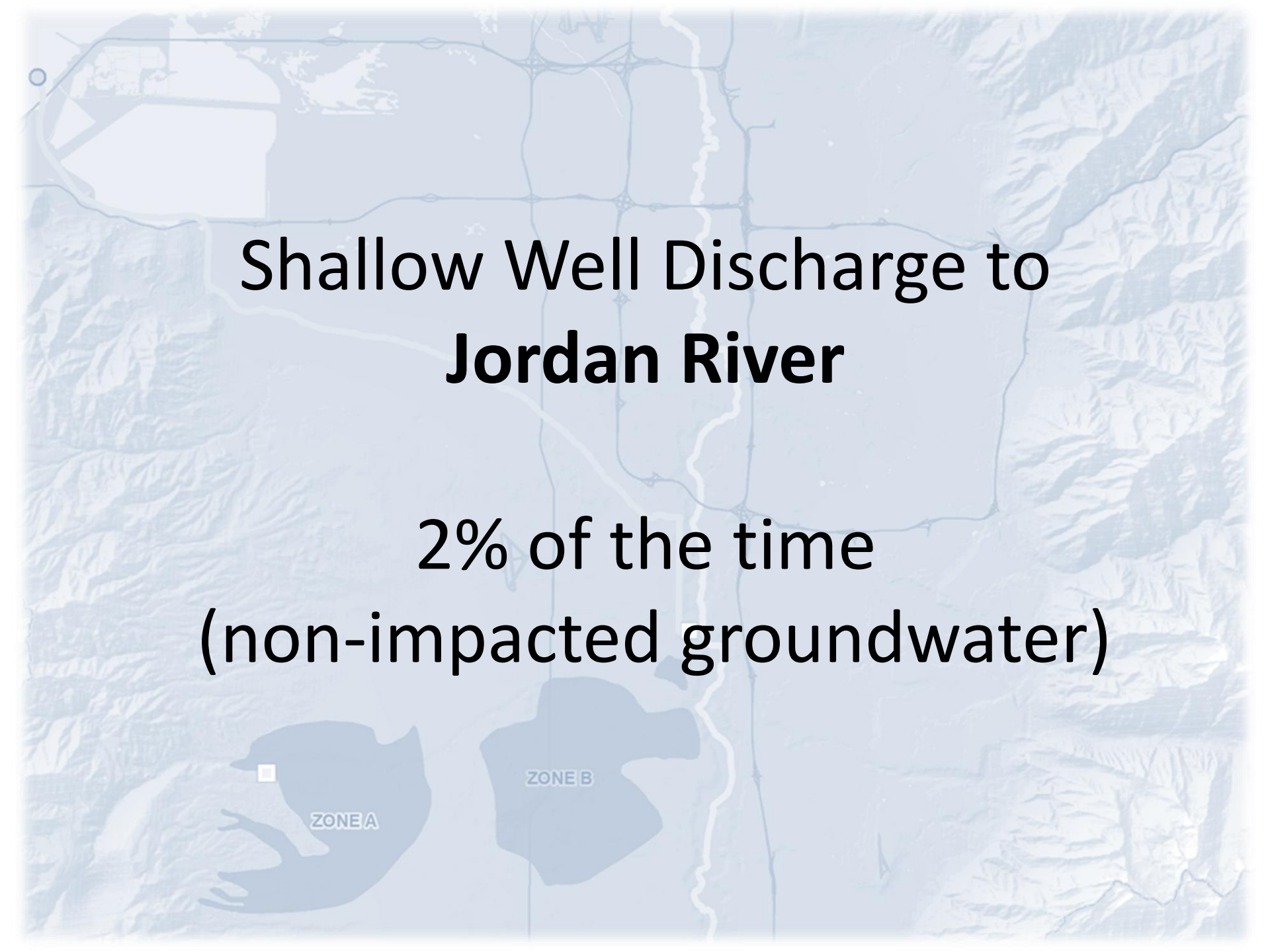
Deep Well Discharge to
Great Salt Lake

By-product Discharge to
Great Salt Lake



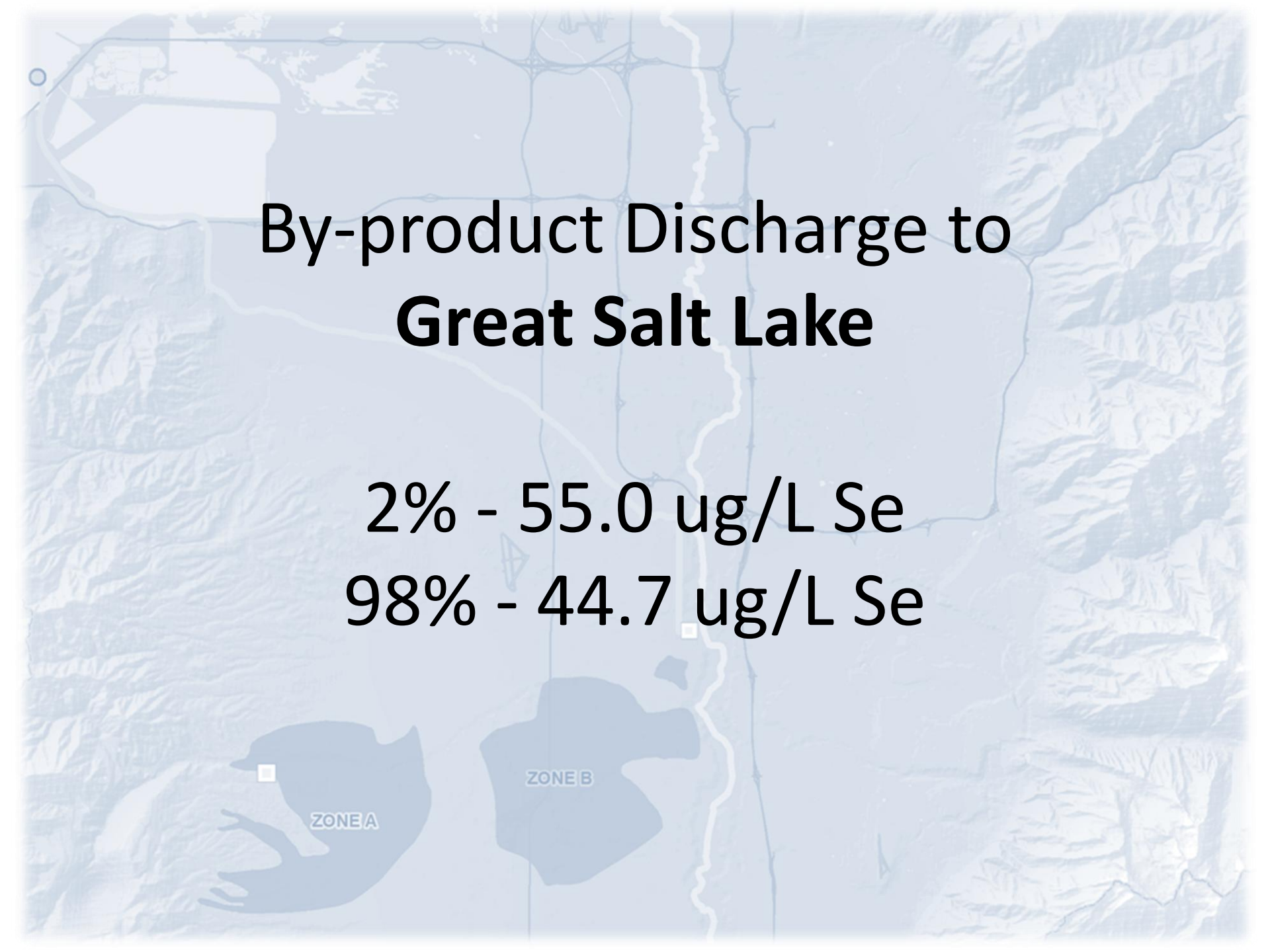
Shallow Well Discharge to
Jordan River

2% of the time
(non-impacted groundwater)

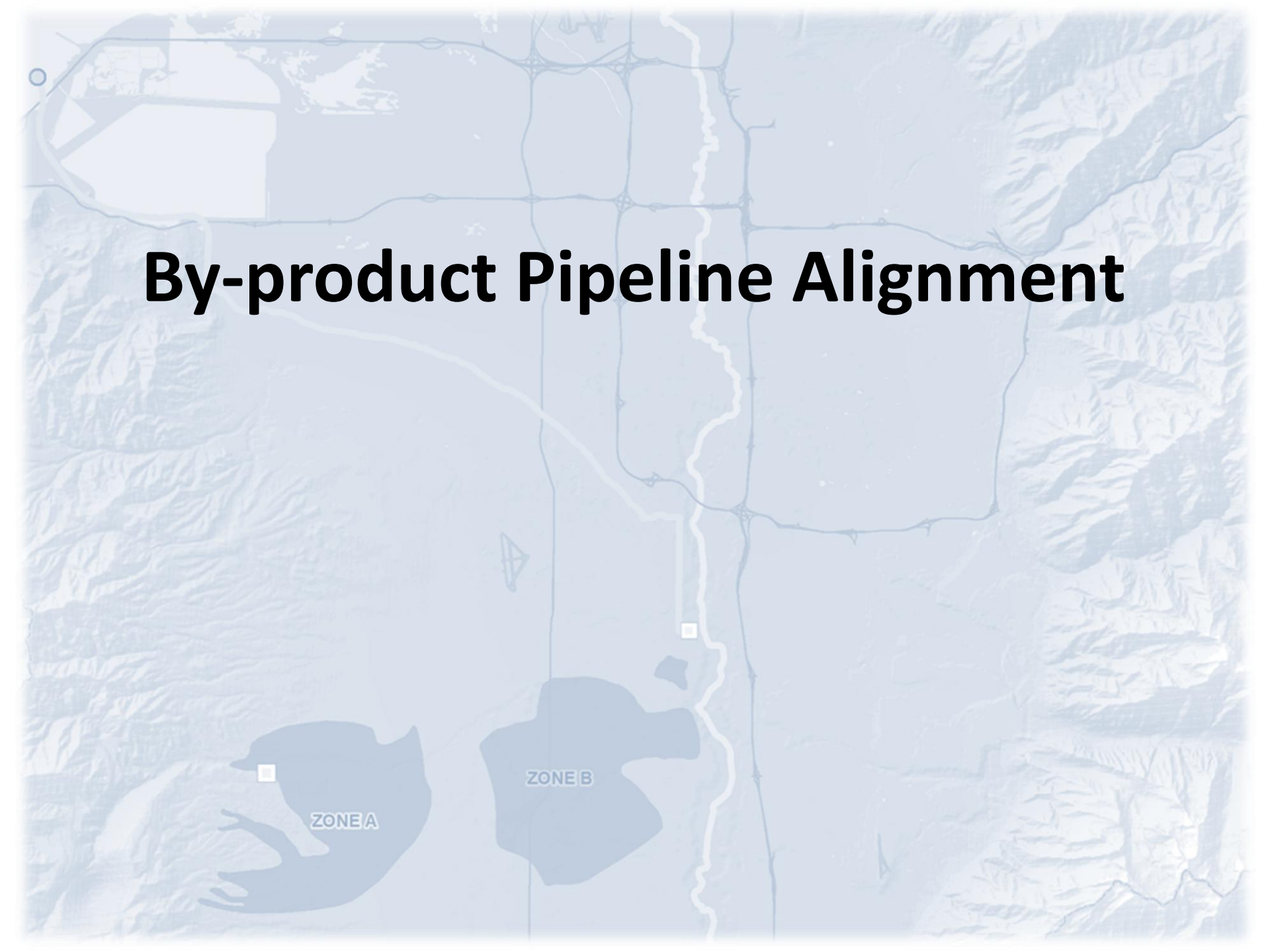


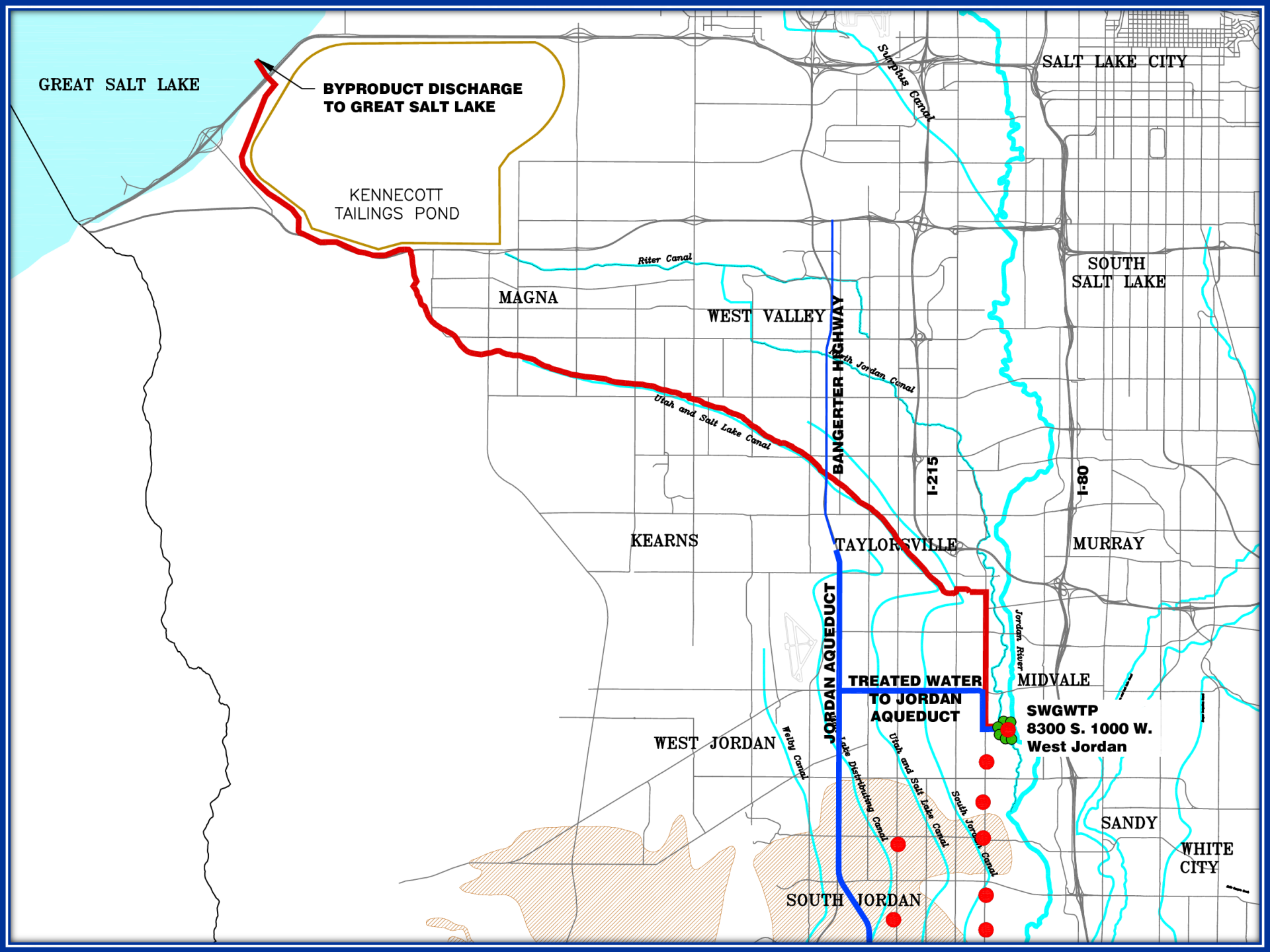
By-product Discharge to
Great Salt Lake

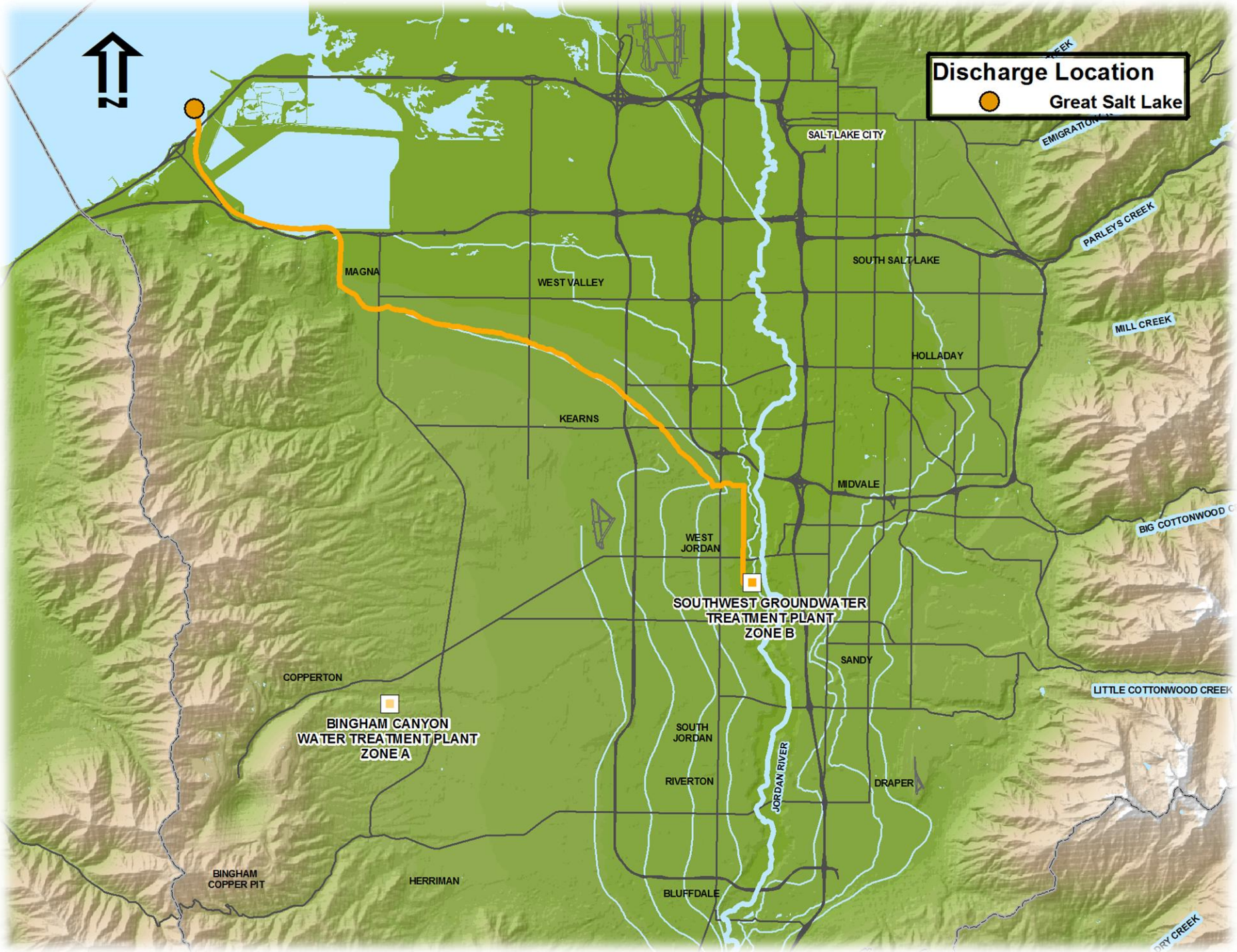
2% - 55.0 ug/L Se
98% - 44.7 ug/L Se



By-product Pipeline Alignment

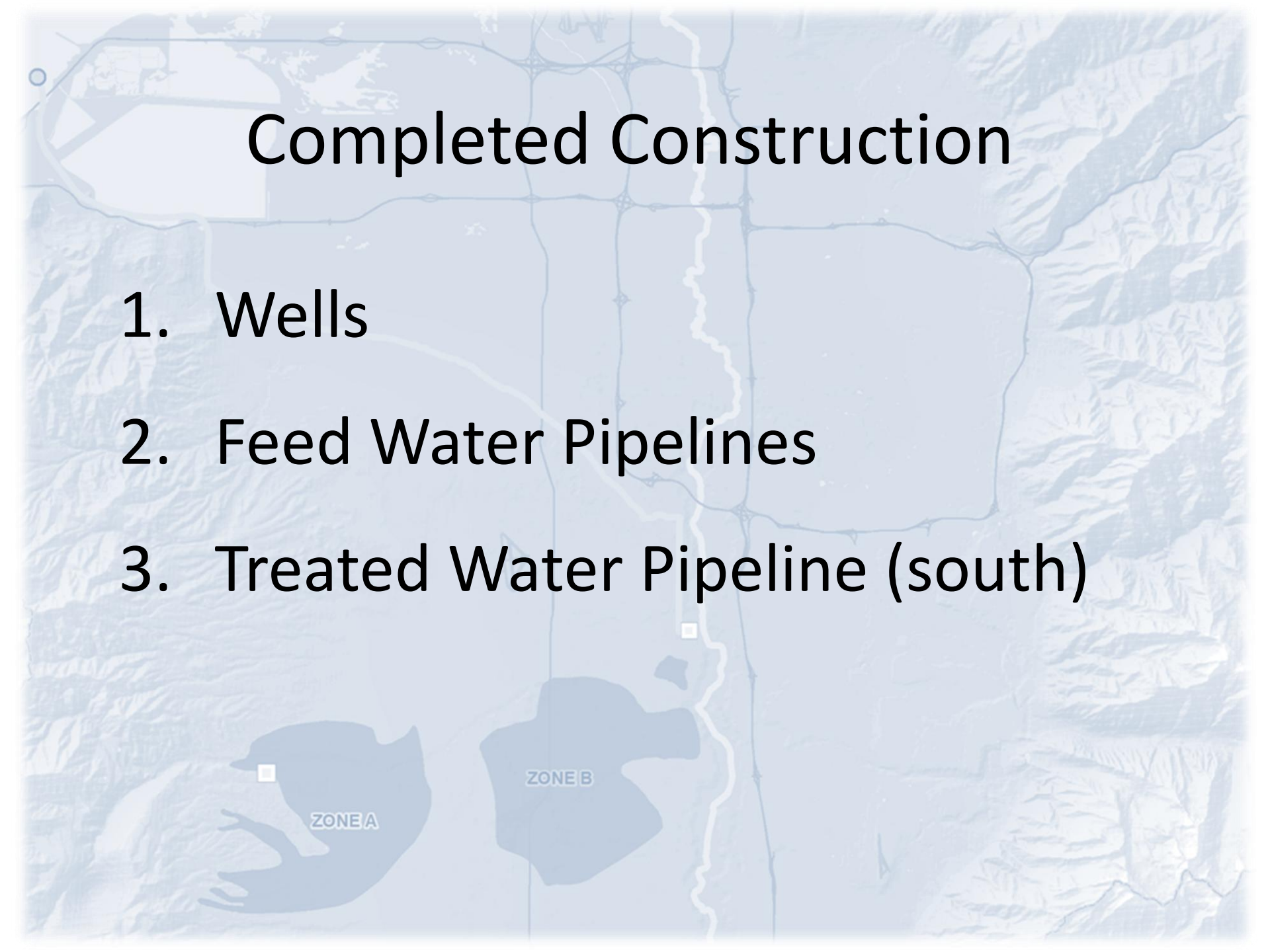


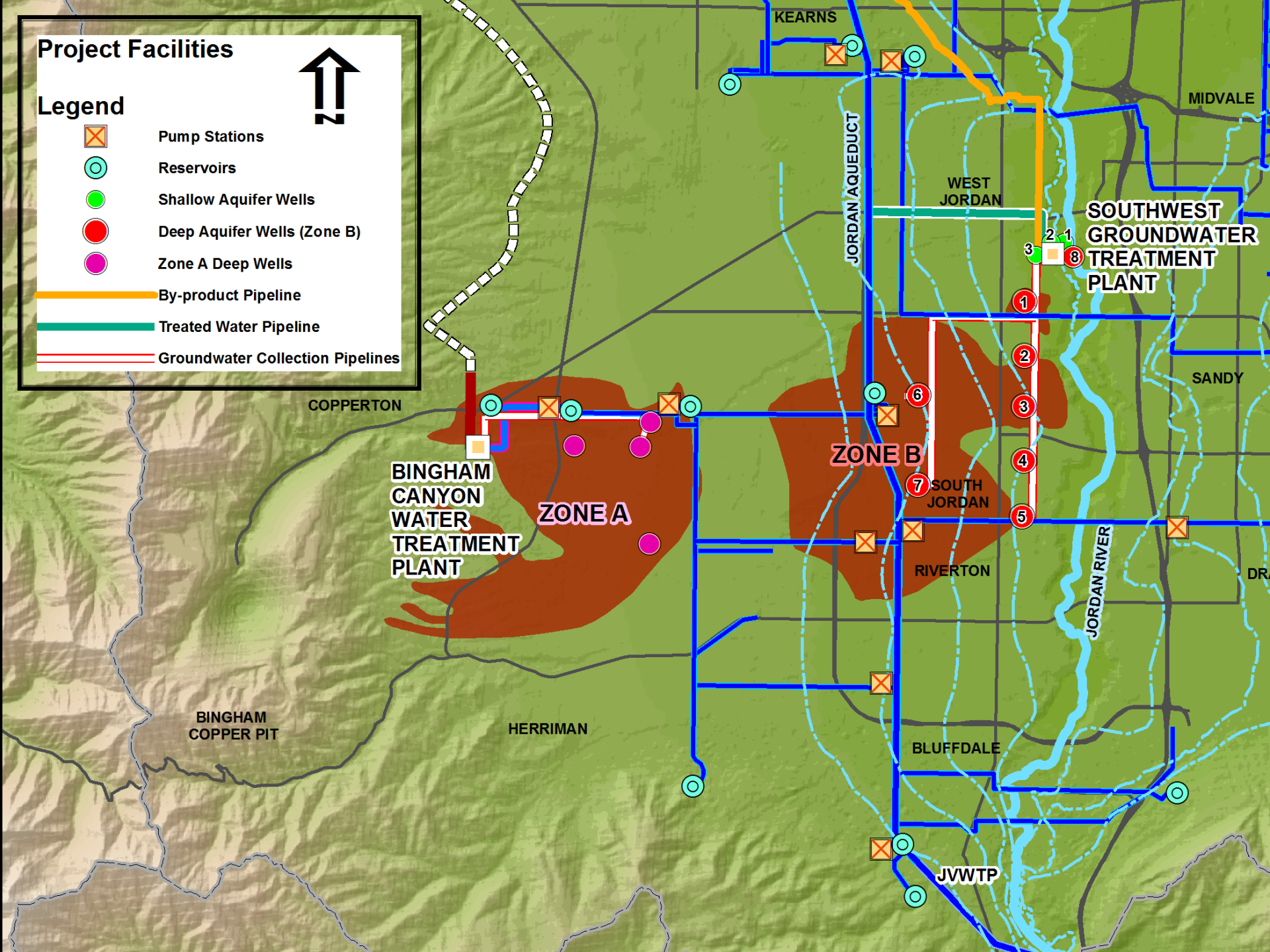

GREAT SALT LAKE
BYPRODUCT DISCHARGE
TO GREAT SALT LAKE
KENNECOTT
TAILINGS POND
SALT LAKE CITY
Surplus Canal
Riter Canal
MAGNA
WEST VALLEY
SOUTH
SALT LAKE
South Jordan Canal
Utah and Salt Lake Canal
BANGERTER HIGHWAY
I-215
I-80
KEARNS
TAYLORSVILLE
MURRAY
JORDAN AQUEDUCT
Jordan River
TREATED WATER
TO JORDAN
AQUEDUCT
MIDVALE
SWGWTP
8300 S. 1000 W.
West Jordan
WEST JORDAN
Welby Canal
Lake Distributing Canal
Utah and Salt Lake Canal
South Jordan Canal
SANDY
WHITE
CITY
SOUTH JORDAN


N
Discharge Location
Great Salt Lake
SALT LAKE CITY
EMIGRATION
PARLEYS CREEK
SOUTH SALT LAKE
MAGNA
WEST VALLEY
MILL CREEK
HOLLADAY
KEARNS
MIDVALE
BIG COTTONWOOD
WEST JORDAN
SOUTHWEST GROUNDWATER TREATMENT PLANT ZONE B
SANDY
LITTLE COTTONWOOD CREEK
COPPERTON
BINGHAM CANYON WATER TREATMENT PLANT ZONE A
SOUTH JORDAN
JORDAN RIVER
RIVERTON
DRAPER
BINGHAM COPPER PIT
HERRIMAN
BLUFFDALE

Completed Construction

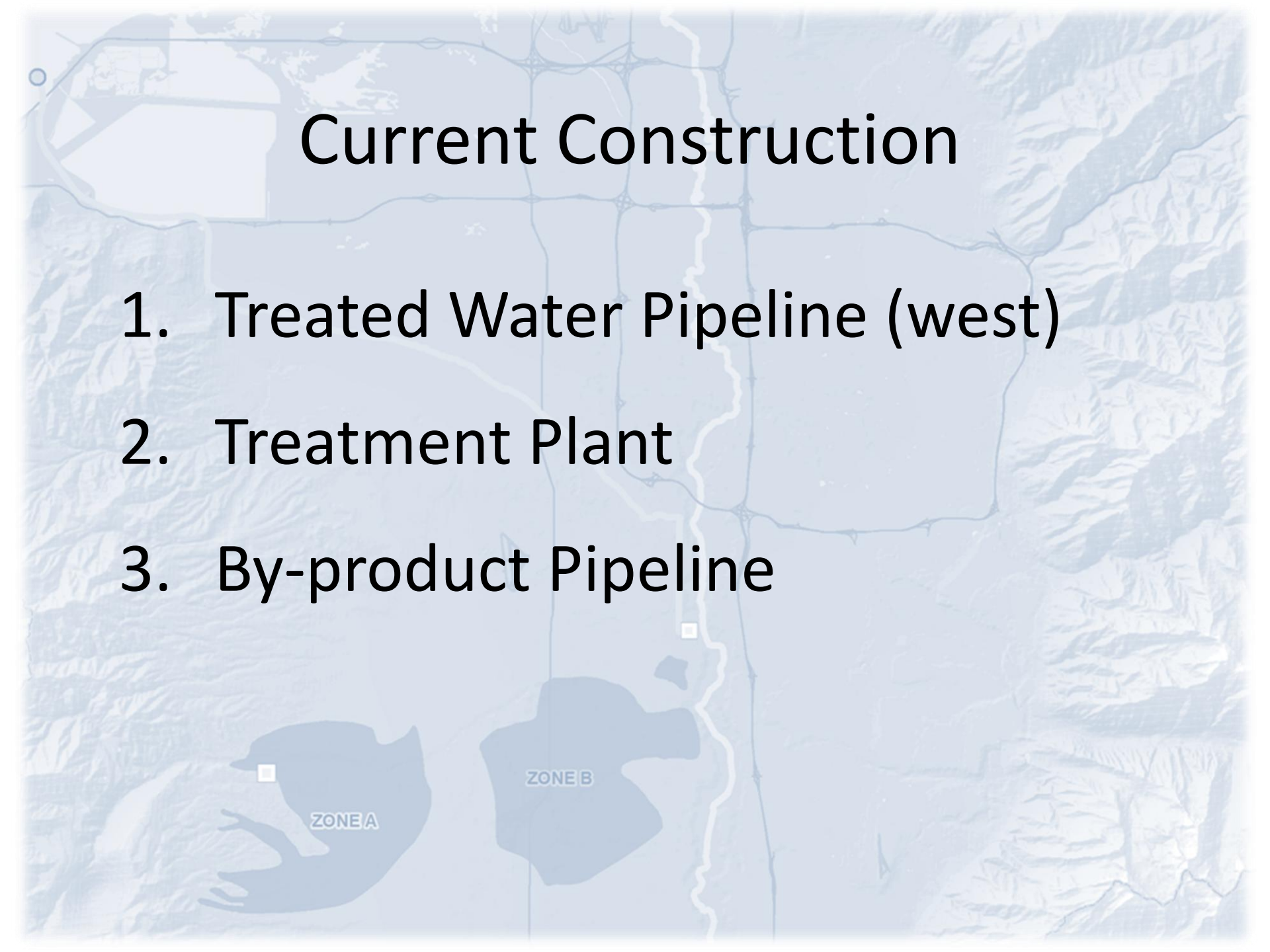
1. Wells
2. Feed Water Pipelines
3. Treated Water Pipeline (south)




Project Facilities
Legend
Pump Stations
Reservoirs
Shallow Aquifer Wells
Deep Aquifer Wells (Zone B)
Zone A Deep Wells
By-product Pipeline
Treated Water Pipeline
Groundwater Collection Pipelines
N
KEARNS
MIDVALE
WEST JORDAN
JORDAN AQUEDUCT
SOUTHWEST GROUNDWATER TREATMENT PLANT
SANDY
COPPERTON
BINGHAM CANYON WATER TREATMENT PLANT
ZONE A
ZONE B
SOUTH JORDAN
RIVERTON
JORDAN RIVER
BINGHAM COPPER PIT
HERRIMAN
BLUFFDALE
JVWTP

Current Construction

1. Treated Water Pipeline (west)
2. Treatment Plant
3. By-product Pipeline



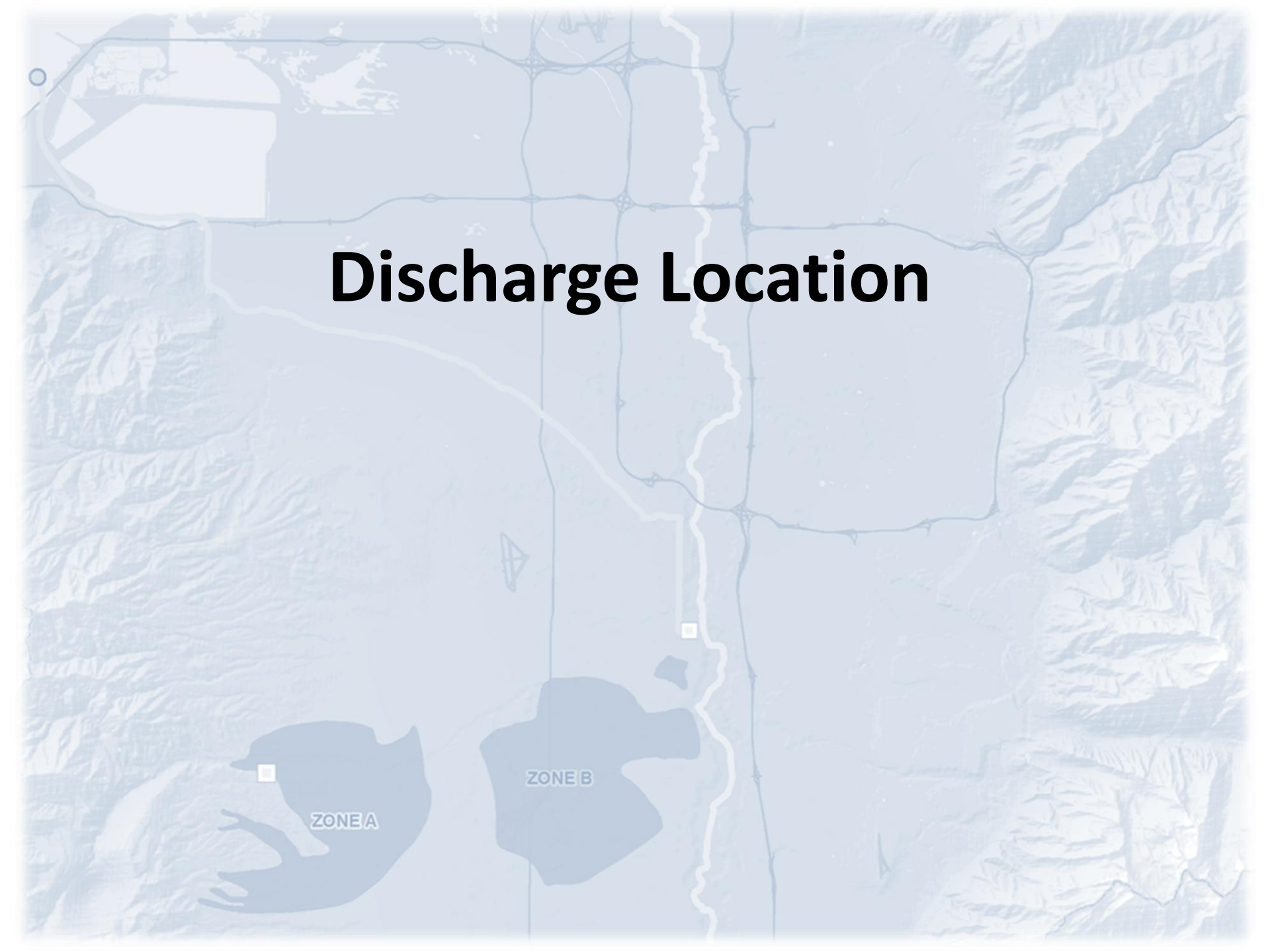
Construction Prior to Permit Issuance

1. Project agreements have a completion requirement date (2012)
2. 1/3 of the project can be operated without the permit

Project Agreement Provides for Operation without a Permit

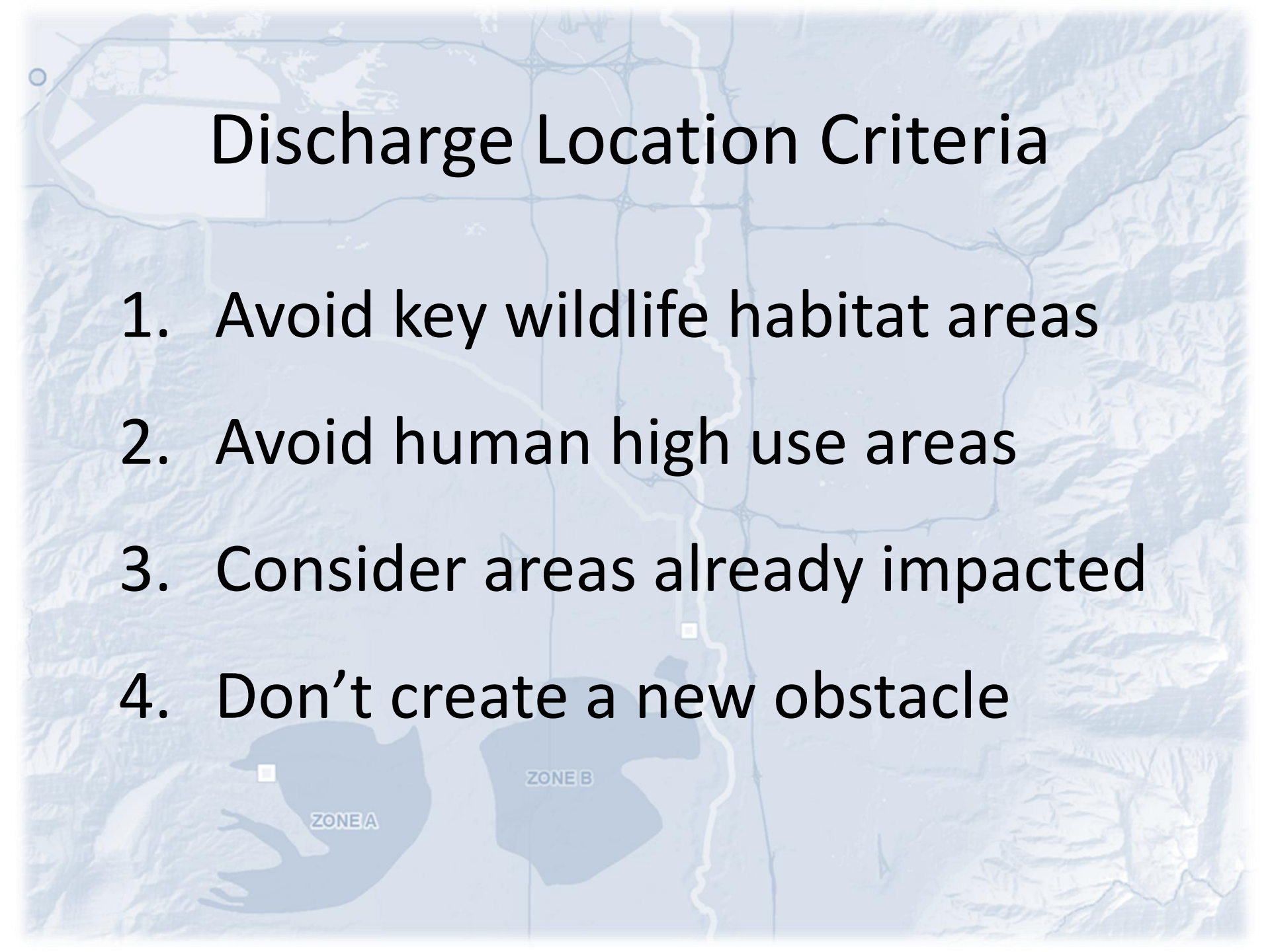
1. Discharge deep aquifer by-product to Tailings Impoundment
   (No shallow aquifer by-product to Tailings Impoundment)
2. Fixed term arrangement (40 yrs)

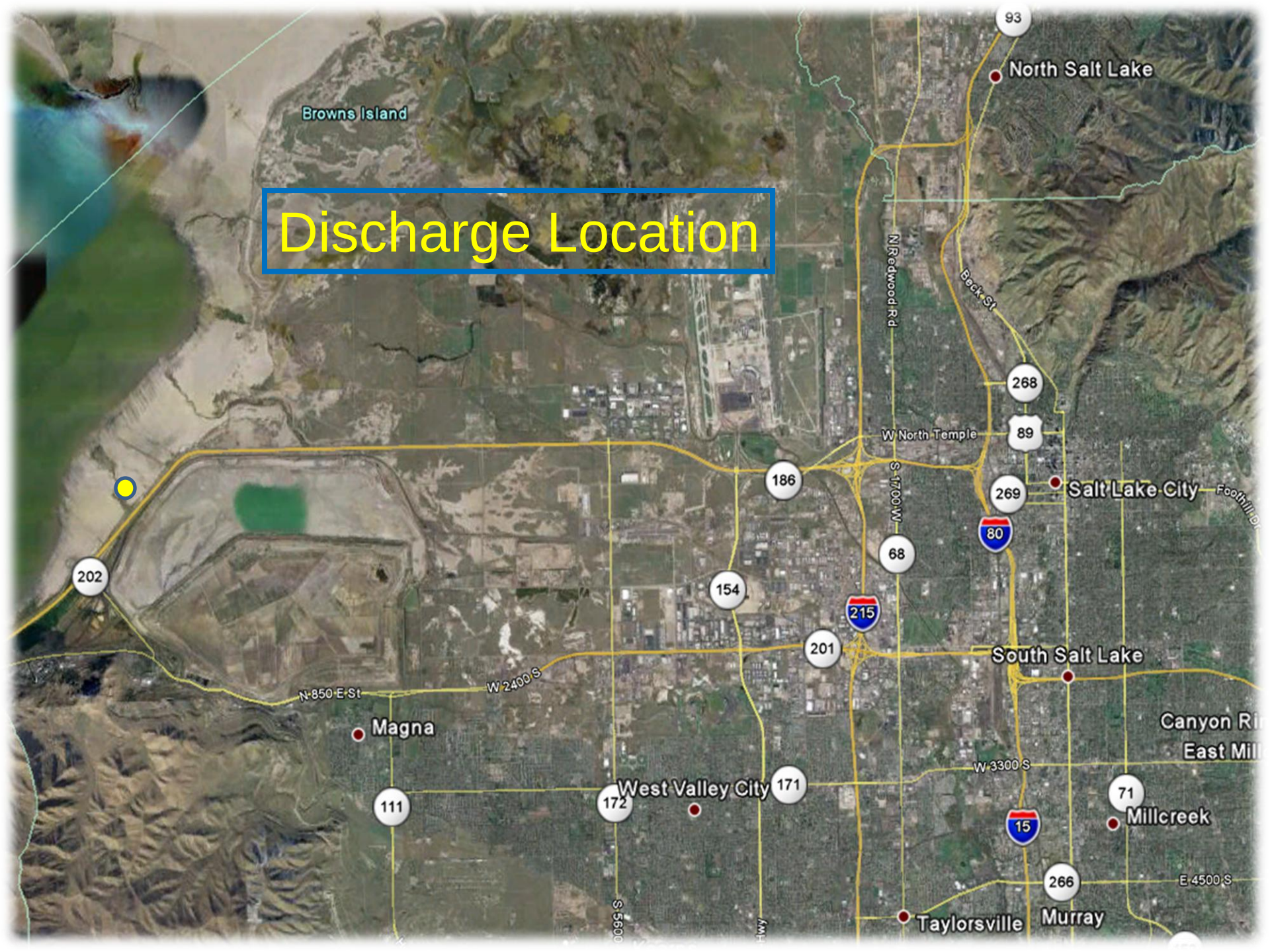
Discharge Location

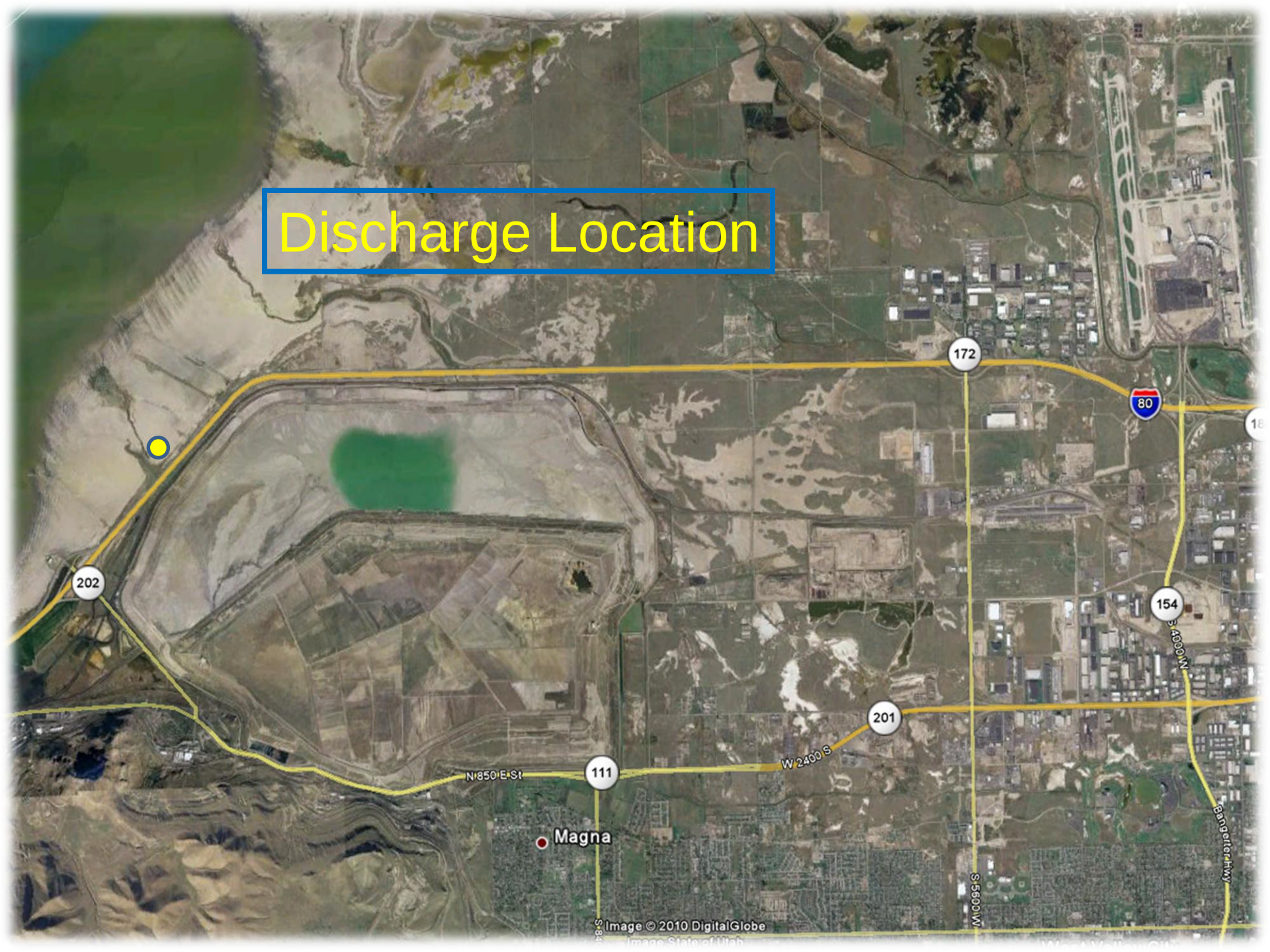


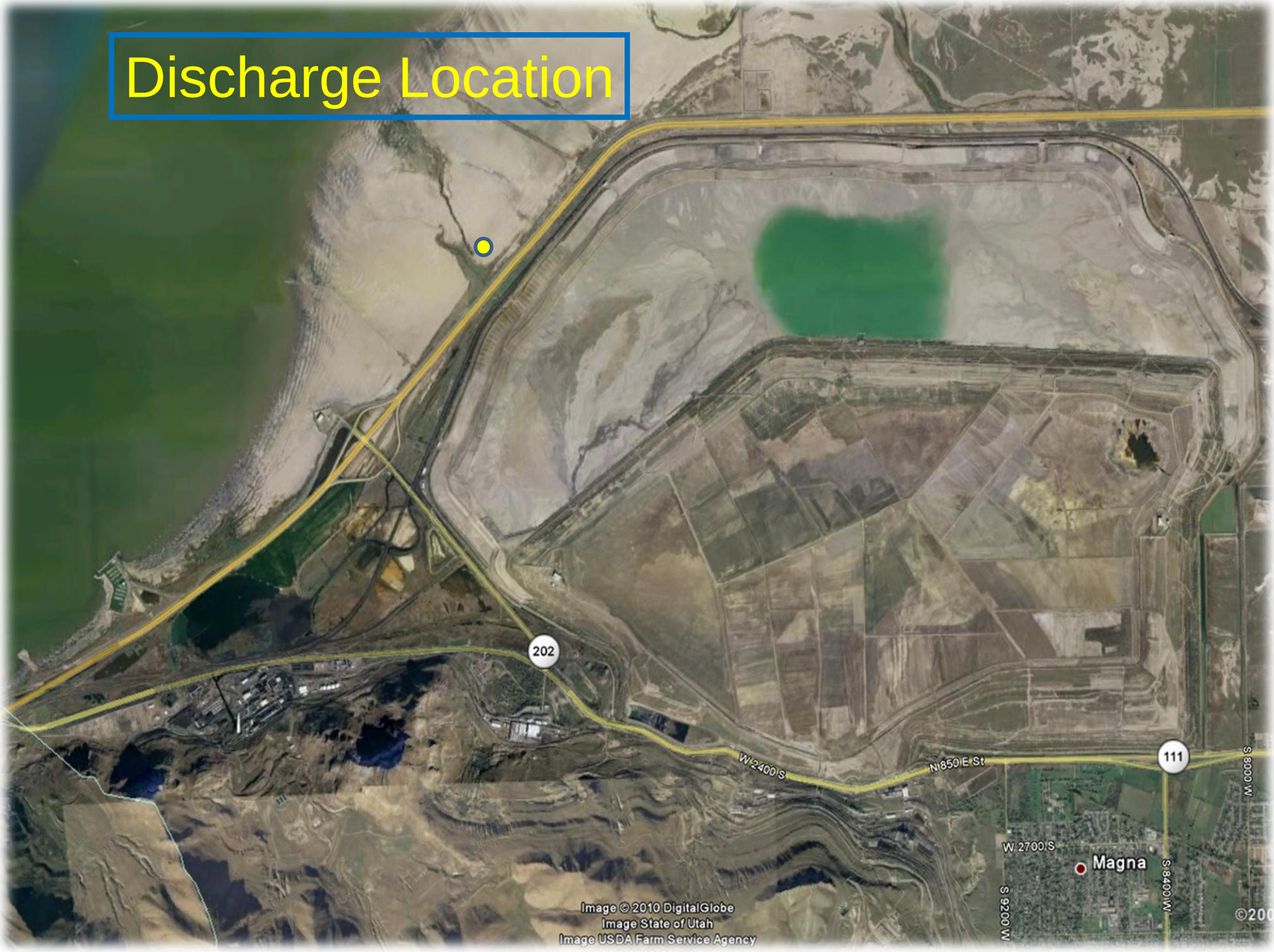
Discharge Location Criteria

1. Avoid key wildlife habitat areas
2. Avoid human high use areas
3. Consider areas already impacted
4. Don’t create a new obstacle



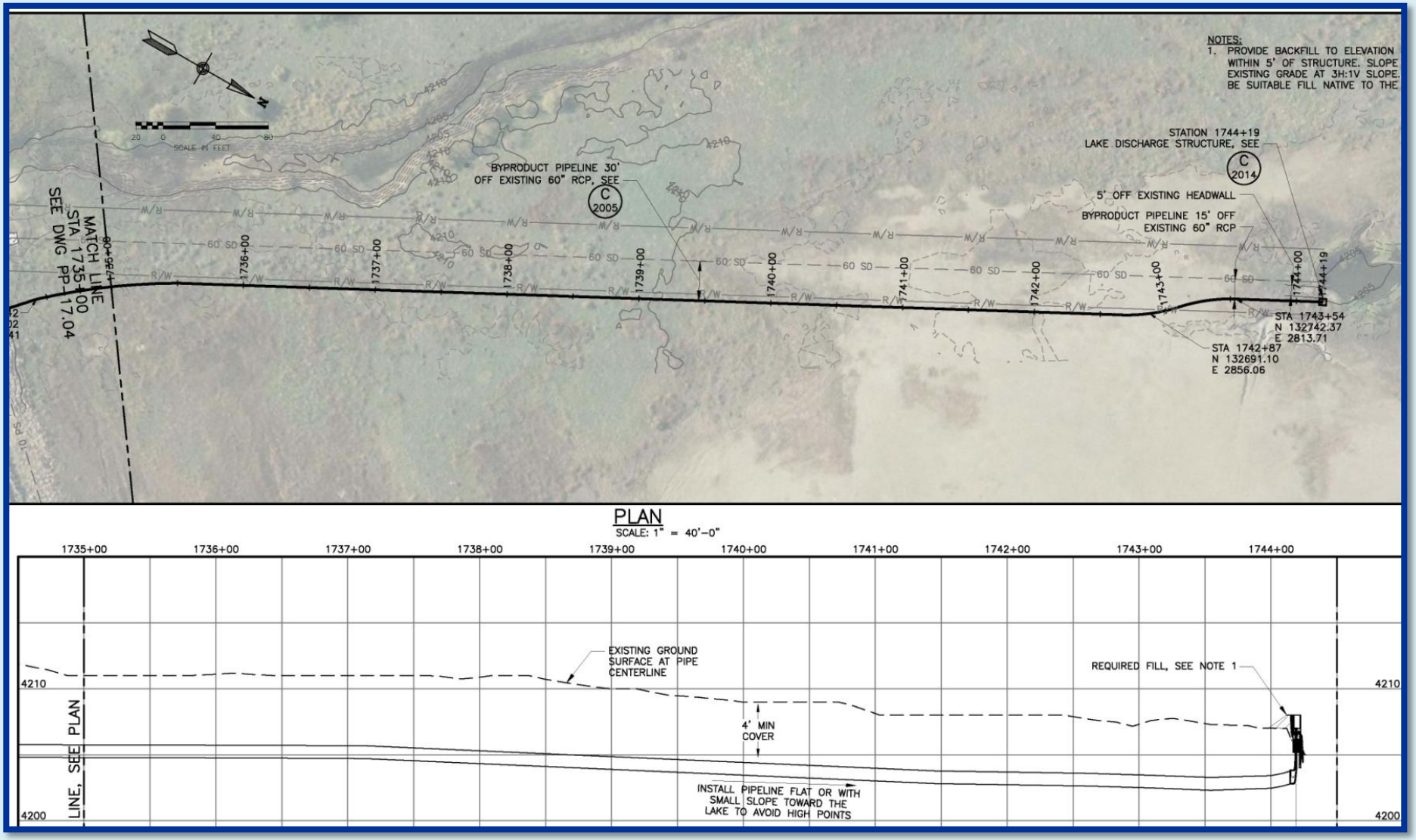

Discharge Location
Browns Island
North Salt Lake
93
N Redwood Rd
Beck St
268
W North Temple
89
186
S 1700 W
269
Salt Lake City
80
68
202
154
215
201
South Salt Lake
N 850 E St
W 2400 S
Magna
Canyon Ri
East Mil
W 3300 S
West Valley City
171
111
172
71
Millcreek
15
266
E 4500 S
Taylorsville
Murray

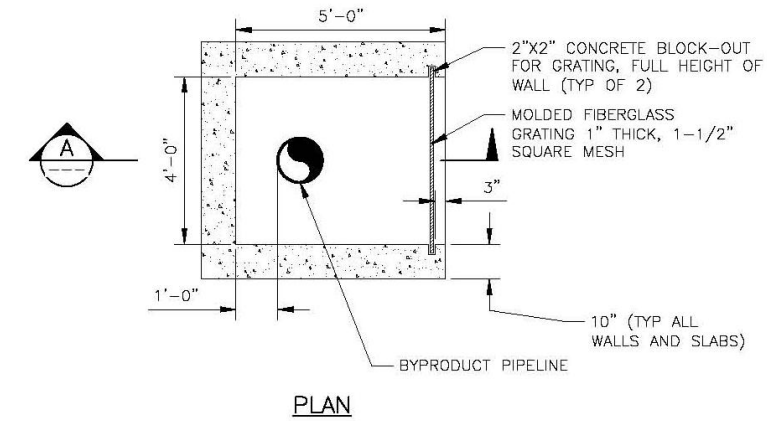

Discharge Location
172
80
202
154
201
111
N 850 E St
W 2400 S
Magna
S 5600 W
Bangerter Hwy
Image © 2010 DigitalGlobe


Discharge Location
202
W 2400 S
N 850 E St
111
S 8000 W
W 2700 S
Magna
S 8400 W
S 9200 W
Image © 2010 DigitalGlobe
Image State of Utah
Image USDA Farm Service Agency

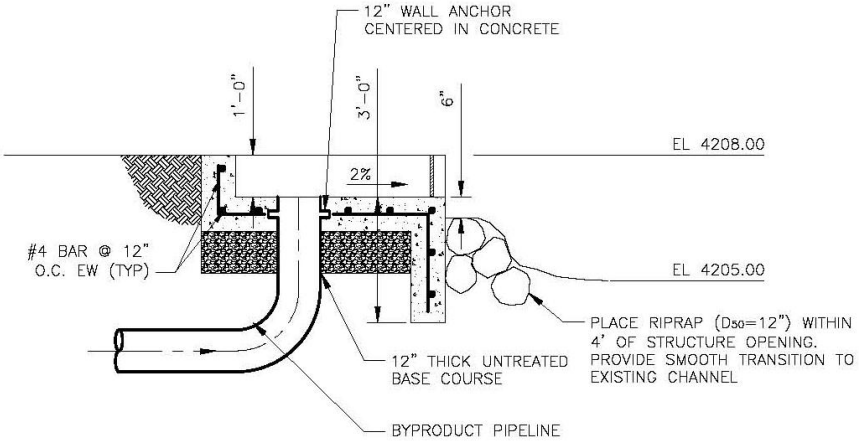

Discharge Location
202


Discharge Location


NOTES:
1. PROVIDE BACKFILL TO ELEVATION WITHIN 5' OF STRUCTURE. SLOPE EXISTING GRADE AT 3H:1V SLOPE. BE SUITABLE FILL NATIVE TO THE
STATION 1744+19
LAKE DISCHARGE STRUCTURE, SEE
C 2014
5' OFF EXISTING HEADWALL
BYPRODUCT PIPELINE 15' OFF EXISTING 60" RCP
BYPRODUCT PIPELINE 30' OFF EXISTING 60" RCP, SEE
C 2005
MATCH LINE STA 1735+00 SEE DWG PP-17.04
SCALE IN FEET
STA 1743+54
N 132742.37
E 2813.71
STA 1742+87
N 132691.10
E 2856.06
PLAN
SCALE: 1" = 40'-0"
1735+00
1736+00
1737+00
1738+00
1739+00
1740+00
1741+00
1742+00
1743+00
1744+00
EXISTING GROUND SURFACE AT PIPE CENTERLINE
REQUIRED FILL, SEE NOTE 1
4' MIN COVER
INSTALL PIPELINE FLAT OR WITH SMALL SLOPE TOWARD THE LAKE TO AVOID HIGH POINTS
4210
4200
LINE, SEE PLAN



PLAN



SECTION – A

LAKE DISCHARGE STRUCTURE

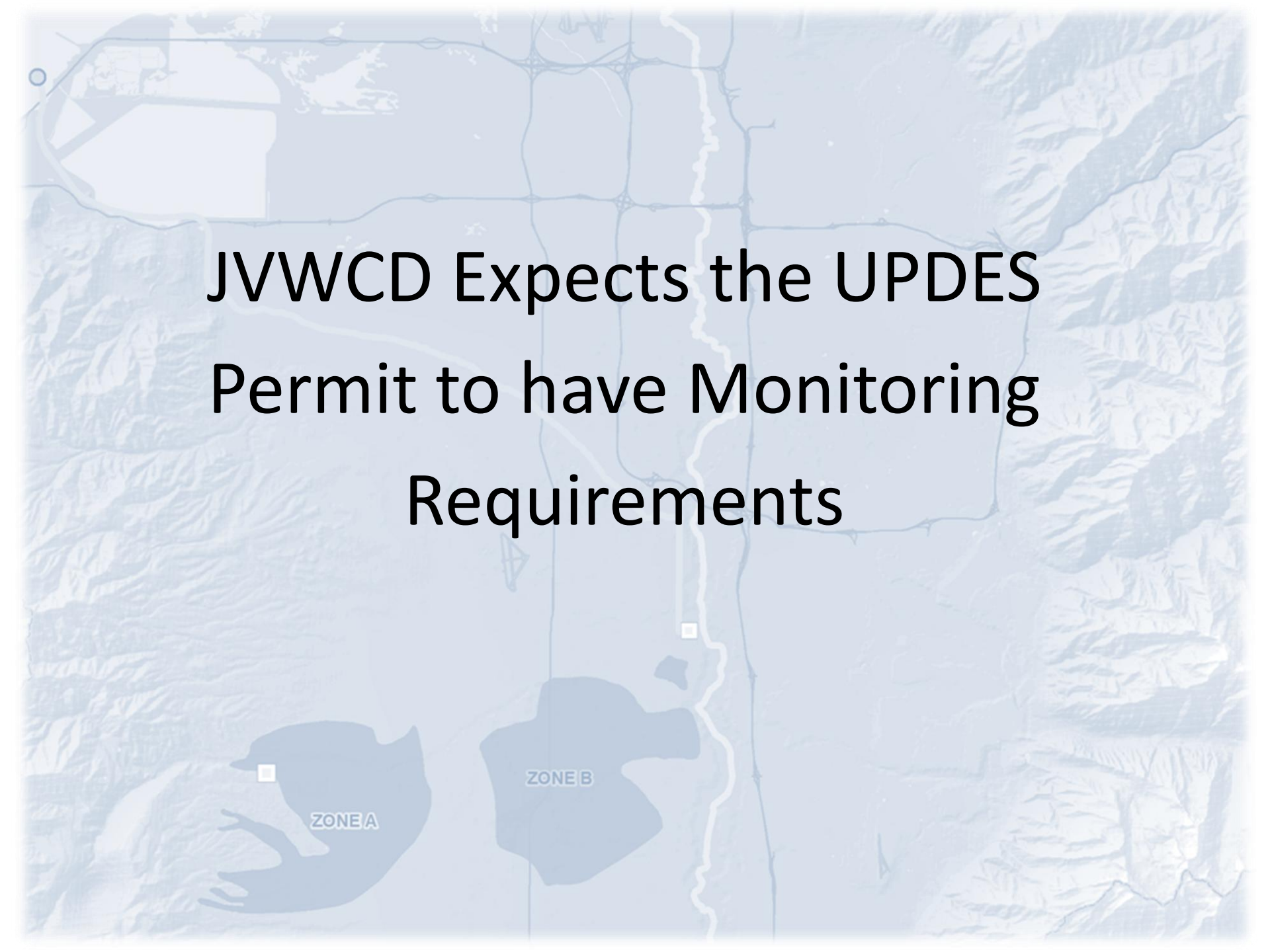
1/2"= 1'-0"

C 2014

End of Pipeline – Discharge Structure

Monitoring Expectation

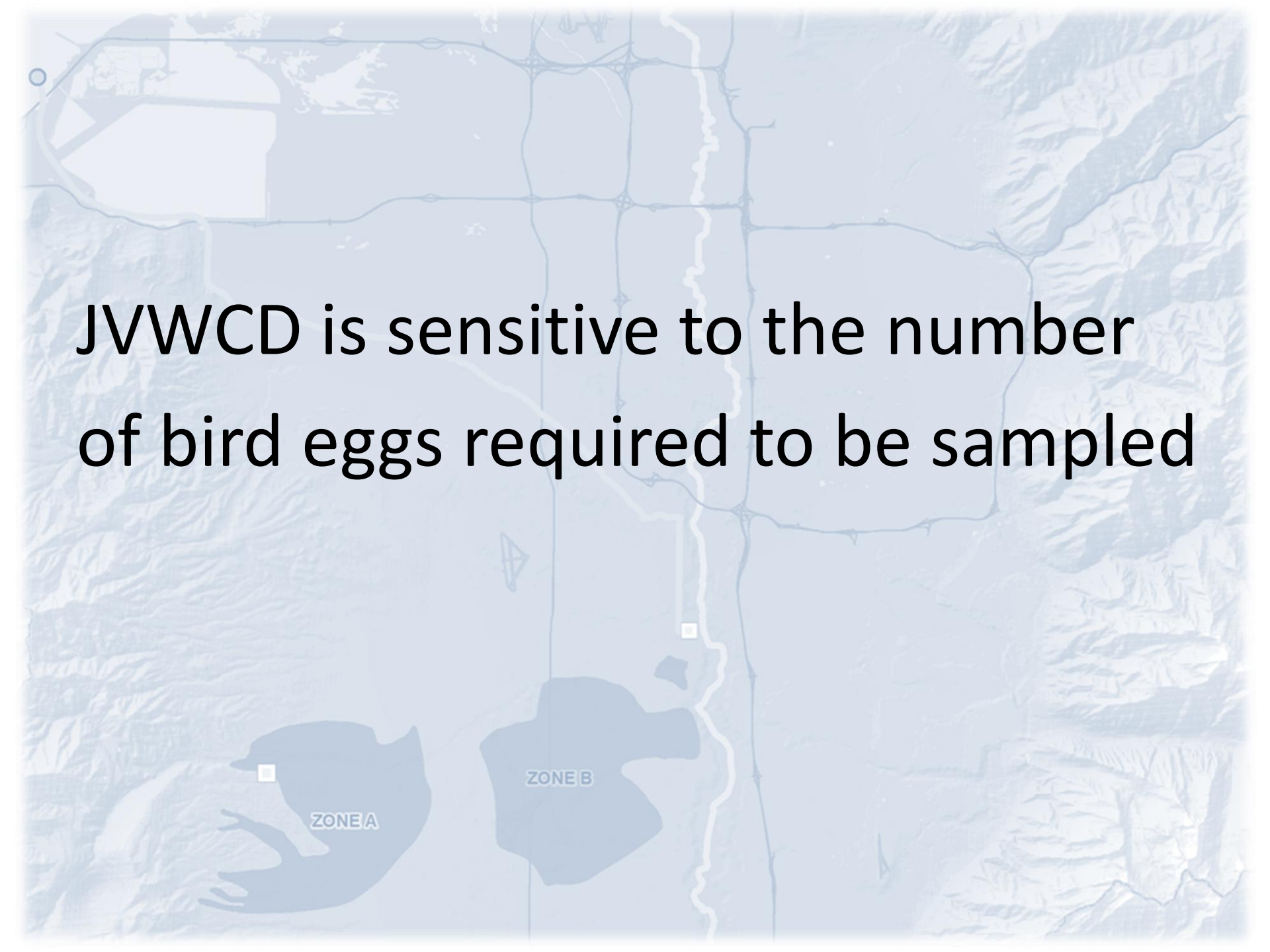
JVWCD Expects the UPDES Permit to have Monitoring Requirements



Monitoring Likely to Include:

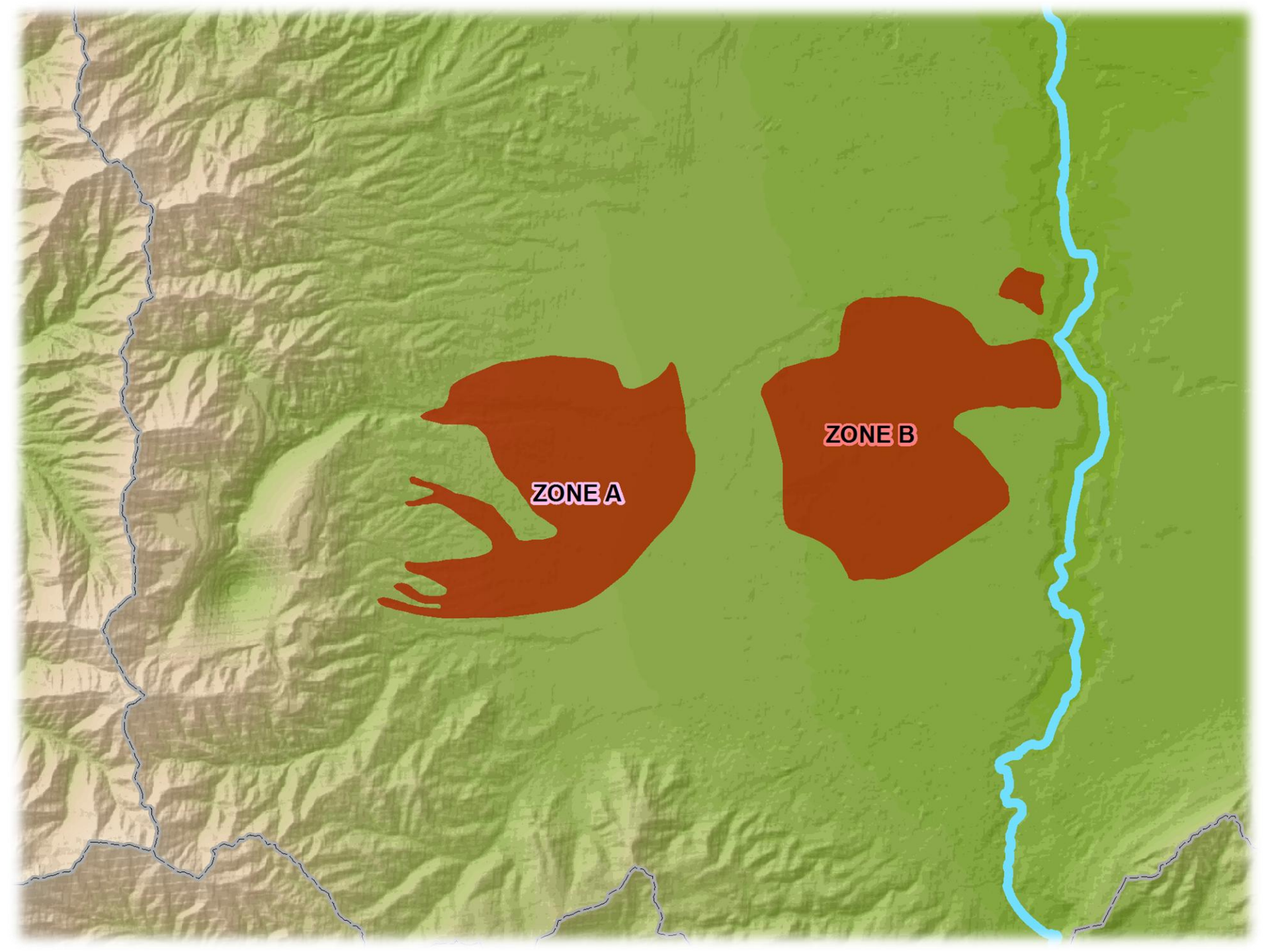
- Water Quality
- Invertebrates
- Bird Eggs

JVWCD is sensitive to the number of bird eggs required to be sampled

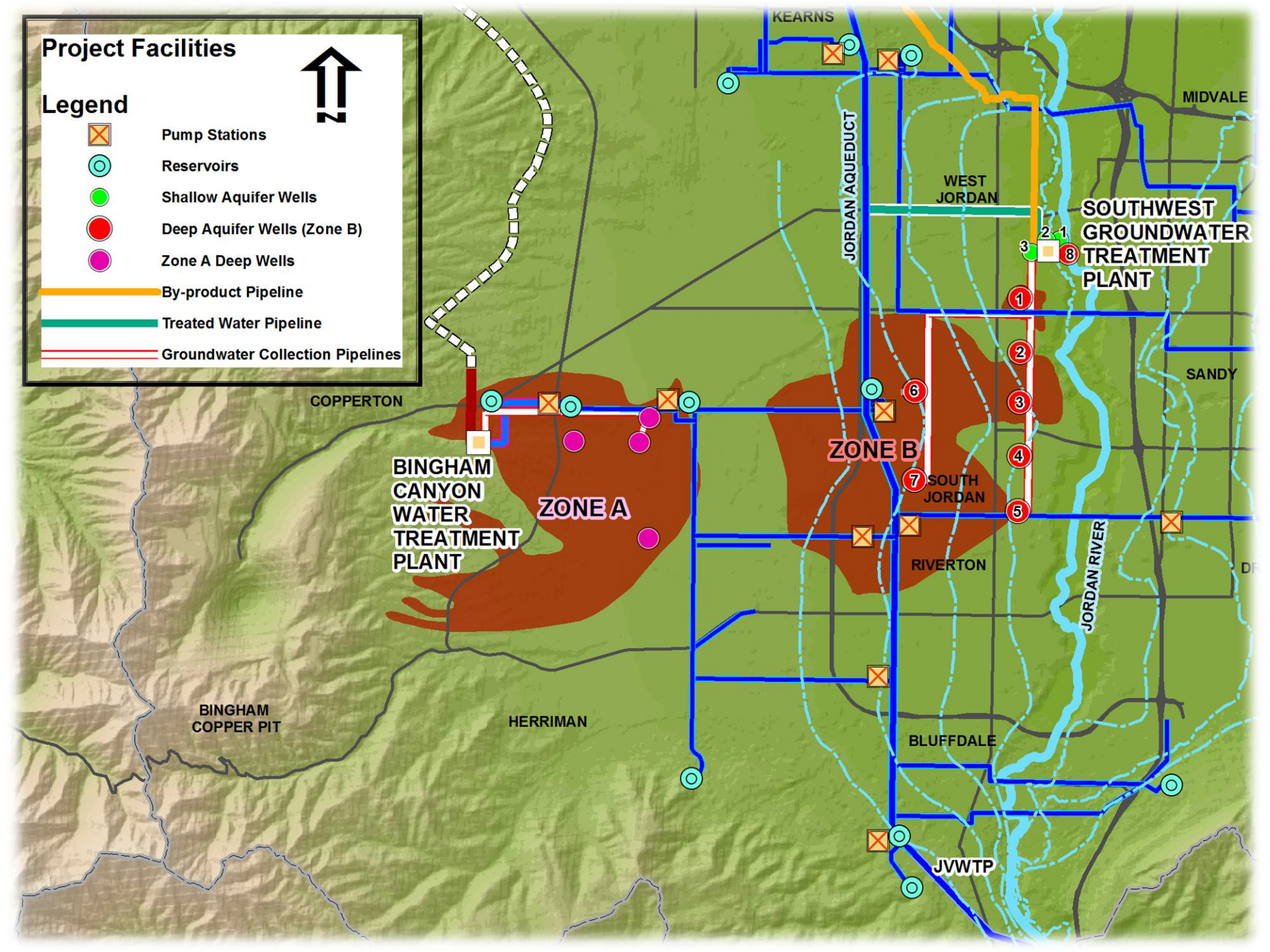



Summary


Problem –
Unusable Groundwater


ZONE A
ZONE B


Solution –
Wells and Treatment Plant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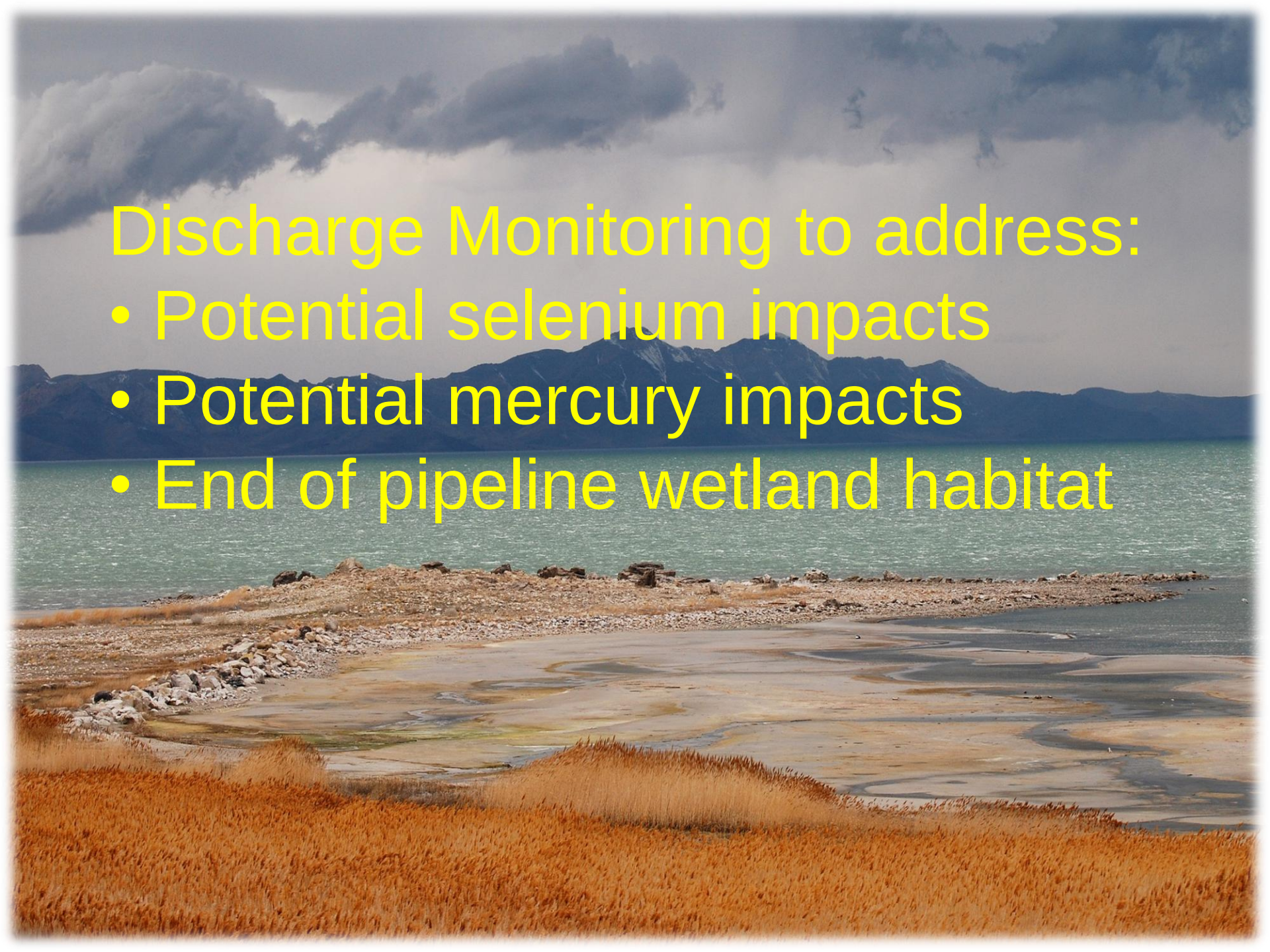
ZONE A
ZONE B
SOUTH JORDAN
RIVERTON
JORDAN RIVER
BINGHAM COPPER PIT
HERRIMAN
BLUFFDALE
JVWTP


By-product –
Discharge will be Monitored


Discharge Location


Discharge Monitoring to address:
• Potential selenium impacts
• Potential mercury impacts
• End of pipeline wetland habitat

Result –

1) Hundreds of Drinking Water Wells Protected

Result –

2) Aquifer is Remediated

Final Design Modeled Pumping Scenario

40 Year Simulation


Result –
3) New Water Supply Produced for the Public
SOUTHWEST
GROUNDWATER
TREATMENT PLANT
JORDAN VALLEY WATER
CONSERVANCY DISTRICT
Delivering Quality Every Day

What We Should Know

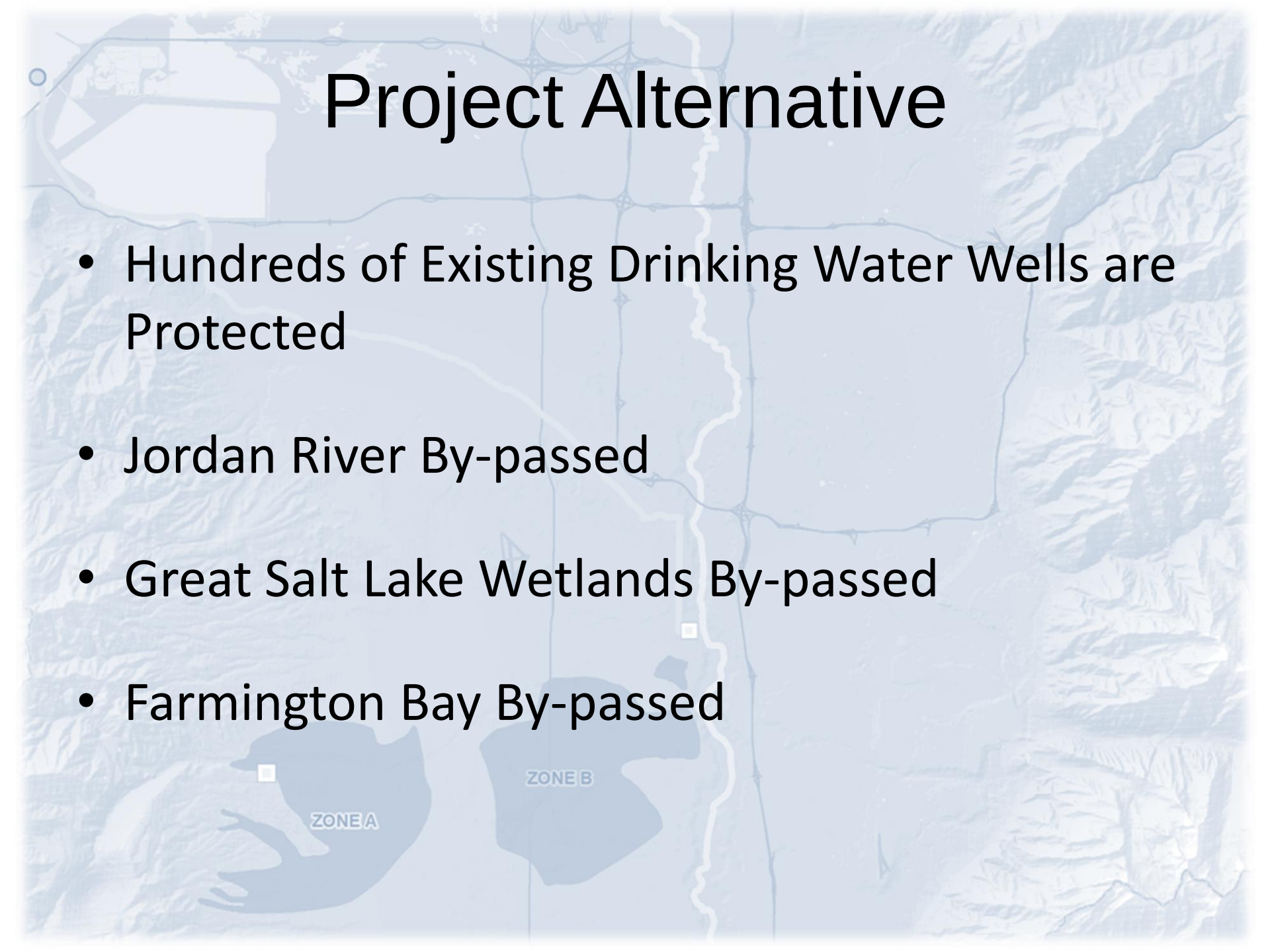
- Plume Exists
- Plume is Moving towards Jordan River and Great Salt Lake
- Groundwater currently unusable

Do Nothing Alternative

- Plume Migrates into Hundreds of Existing Drinking Water Wells
- Plume Migrates into Jordan River
- Plume Migrates into Great Salt Lake Wetlands
- Plume Migrates into Farmington Bay
- Plume Migrates into Great Salt Lake

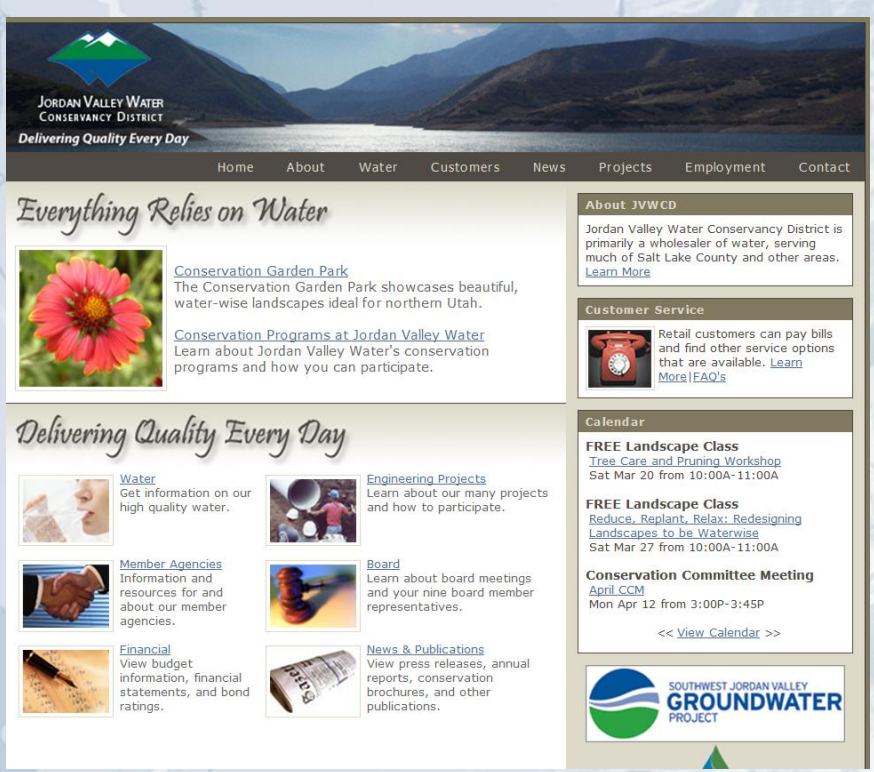
Project Alternative

- Hundreds of Existing Drinking Water Wells are Protected
- Jordan River By-passed
- Great Salt Lake Wetlands By-passed
- Farmington Bay By-passed



JVWCD Web Site

- Google “Jordan Valley Water”
- www.jvwcd.org
- Click on logo



SOUTHWEST GROUNDWATER TREATMENT PLANT

ZONE B

ZONE A

JORDAN VALLEY WATER CONSERVANCY DISTRICT

Delivering Quality Every Day