Buckeye Creek Flood Mitigation Design Concept

July 18, 2023

JE FULLER
hydrology • geomorphology

Buckeye Creek Flood Mitigation Design Concept

FEMA

Project Funding

CARSON WATER SUBCONSERVANCY DISTRICT

DOUGLAS COUNTY NEVADA EST. 1861 GREAT PEOPLE GREAT PLACES

Technical Team

JE FULLER hydrology • geomorphology

An Employee Owned Company CA Group, Inc

Agenda

Project Goals

Topographic Mapping

Project Hydrology

Existing Conditions Hydraulic Modeling

Flood Mitigation Location Decision Process

Concept Mitigation Design

Proposed Conditions

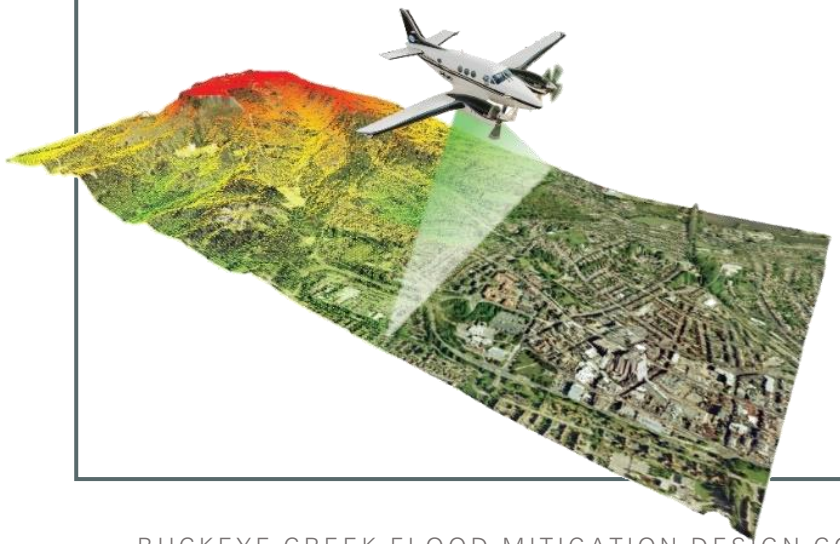
Questions

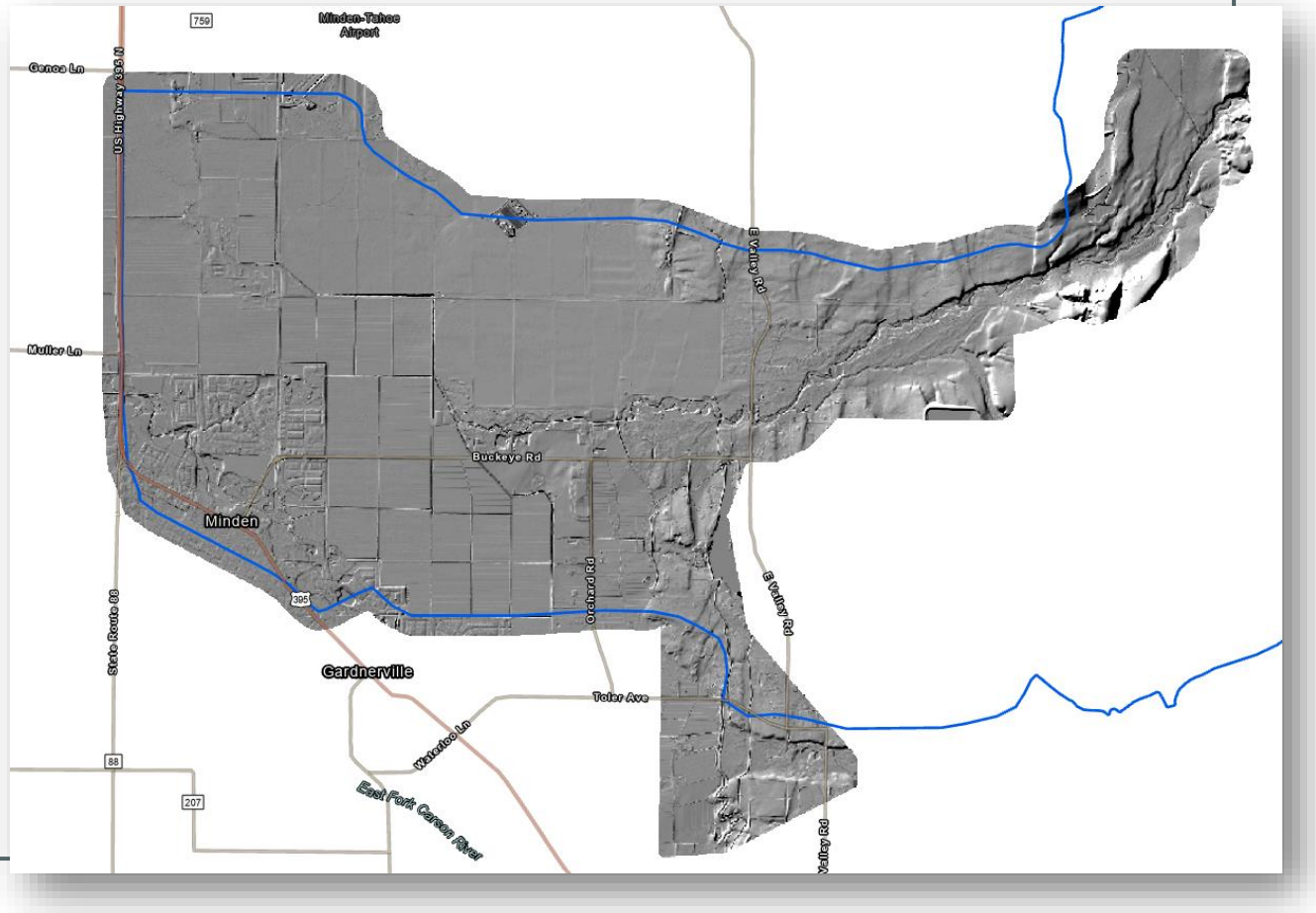
Project Goals

1. Evaluate the potential locations provided by Douglas County for flood control basins.
2. Assess the viability of the basin(s) that would reduce the downstream Buckeye Creek 100-year flow from 3,940 cfs (100-year regulatory discharge) to approximately 400 cfs.
3. If basin(s) are viable, develop 15% concept design plans for the basin(s).
4. Ensure that the post-project outflow discharge is compatible with the on-going proposed Muller Parkway improvement design plans.
5. Evaluate the existing network of drainage ditches and canals downstream of Orbit Way and their capacity for the proposed outflow discharge.
6. Where capacity is inadequate, develop a conceptual channel design that would sufficiently convey the reduced outflow discharge.

Topographic Mapping

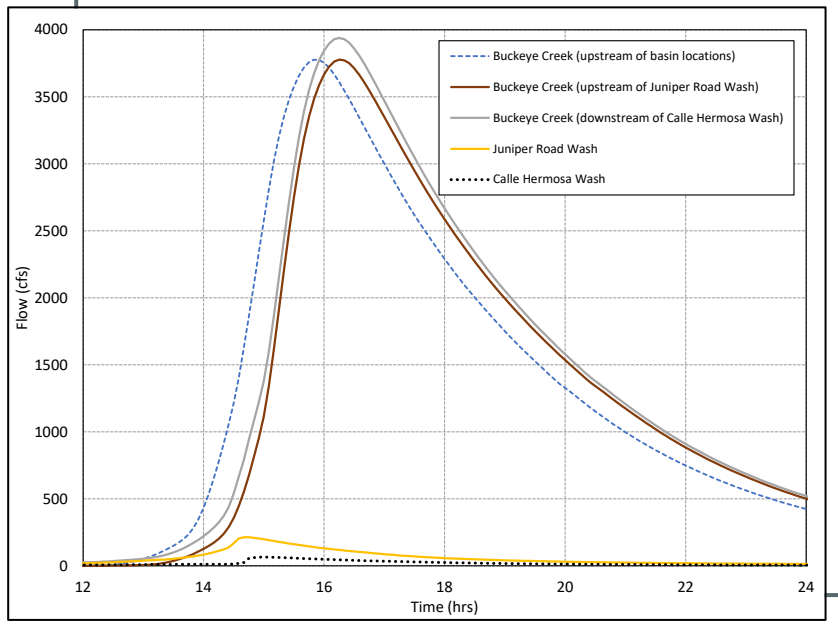
- LiDAR Mapping
- Existing Culverts and Bridges





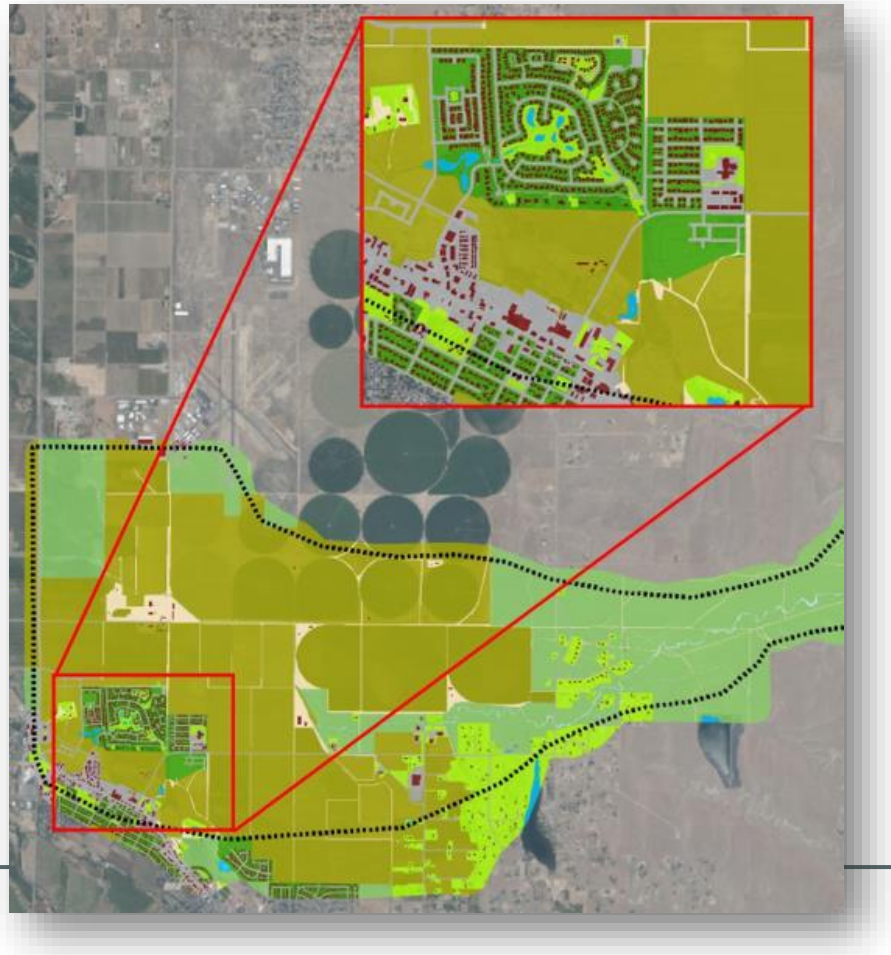
Project Hydrology

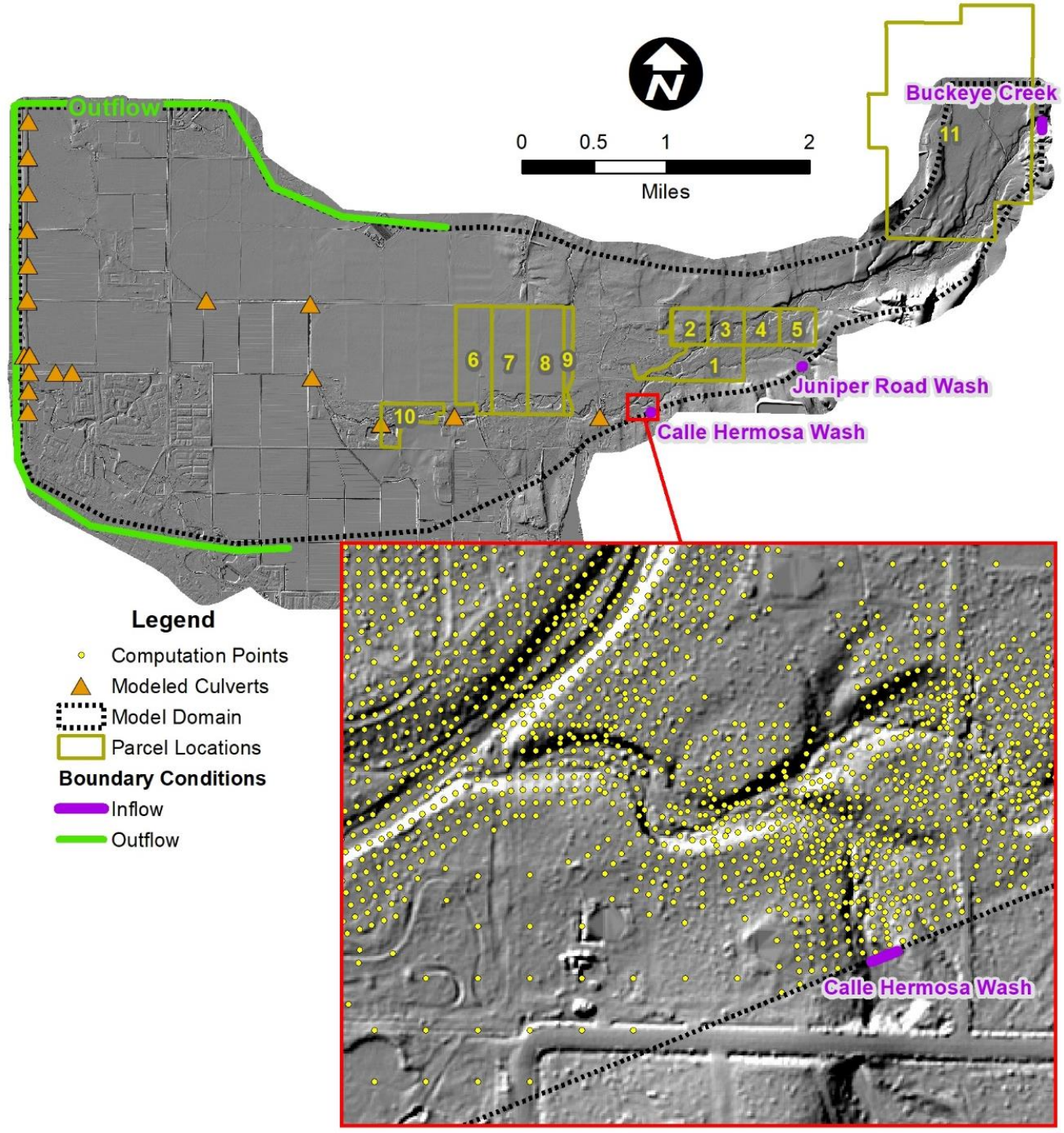
- FEMA Effective Hydrology (2012)
- 100-Year Storm
- Buckeye Creek + Tributaries

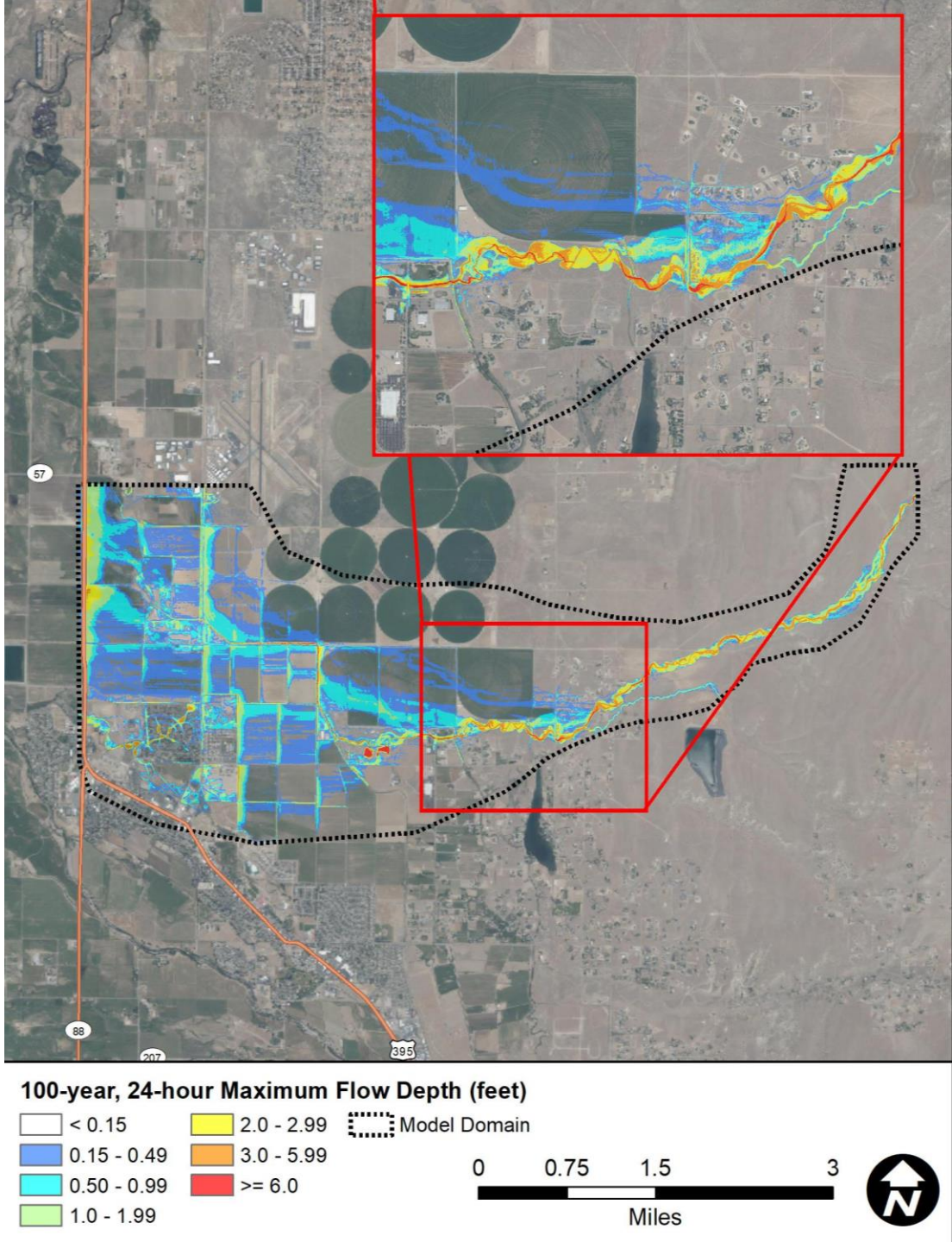


Existing Cond. Hydraulic Modeling

- Surface Feature Classification
- Latest technology (HEC-RAS 2D)
- Define existing flooding limits
- Flow Depths + Discharge + Velocities

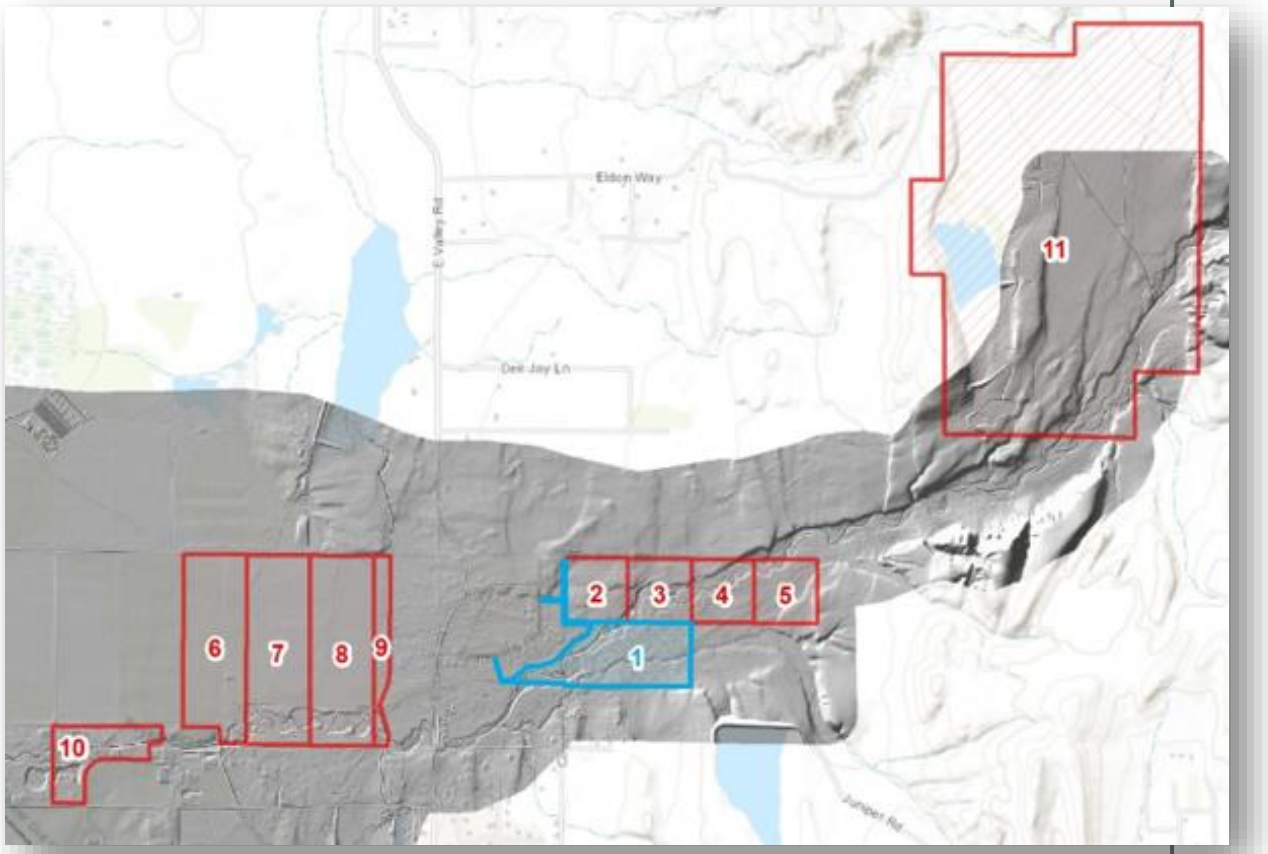



Outflow
Buckeye Creek
11
0
0.5
1
2
Miles
2
3
4
5
1
6
7
8
9
10
Juniper Road Wash
Calle Hermosa Wash
Legend
Computation Points
Modeled Culverts
Model Domain
Parcel Locations
Boundary Conditions
Inflow
Outflow
Calle Hermosa Wash


57
88
207
395
100-year, 24-hour Maximum Flow Depth (feet)
< 0.15
0.15 - 0.49
0.50 - 0.99
1.0 - 1.99
2.0 - 2.99
3.0 - 5.99
>= 6.0
Model Domain
0
0.75
1.5
3
Miles

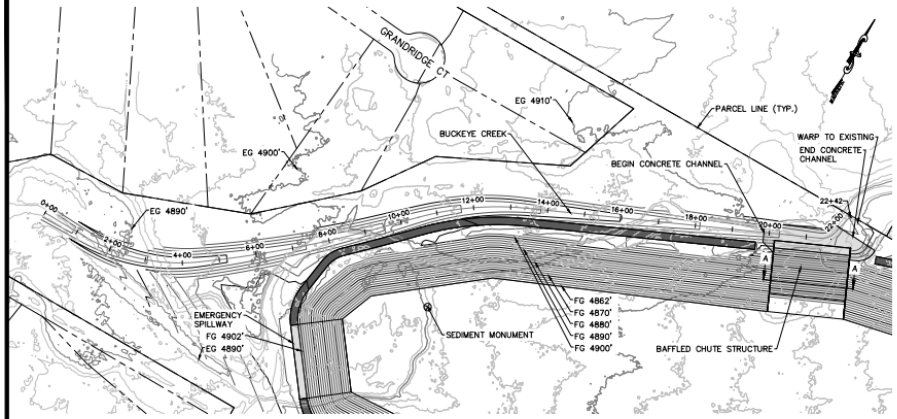
Flood Mitigation Location Decision Process

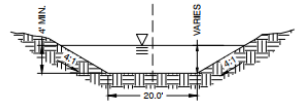
- Douglas County selected a series of parcels to investigate
- Assessed the viability of each parcel
- Combination of multiple parcels
- Parcel priority #1 was ultimately selected for the concept mitigation design



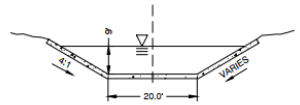
Concept Mitigation Design

- GOAL: reduce 100-year flow from 3,940 cfs to 400 cfs.
- Challenges
  - No jurisdictional dam
  - Basin entirely below grade
  - Large runoff volume
  - Account for sediment
- Final basin design elements
  - Basin excavation volume = 3,740,000 cubic yards
  - Channel excavation volume = 78,000 cubic yards
  - 100-year outflow discharge = 781 cfs

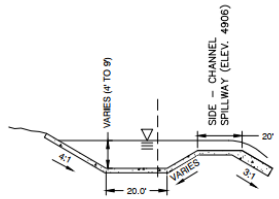




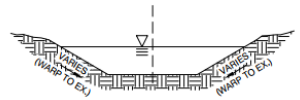
STA 0+00 TO 19+75



STA 19+75 TO 20+16
STA 21+81 TO 22+00



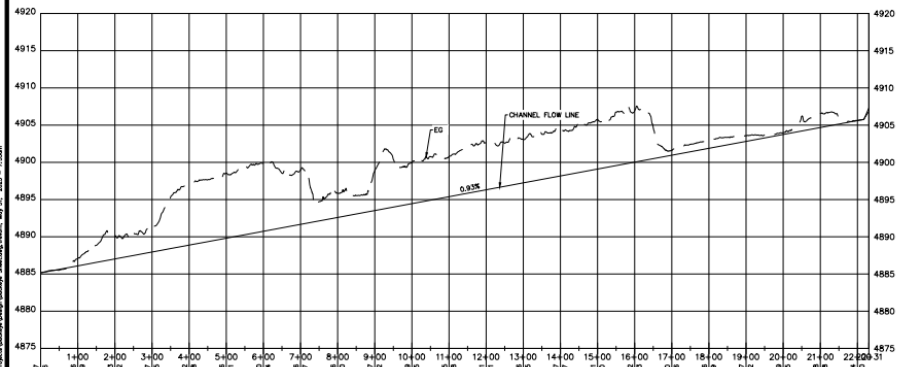
STA 20+16 TO 21+81



STA 22+00 TO 22+42

TYPICAL SECTIONS

BUCKEYE CREEK



BUCKEYE CREEK PROFILE

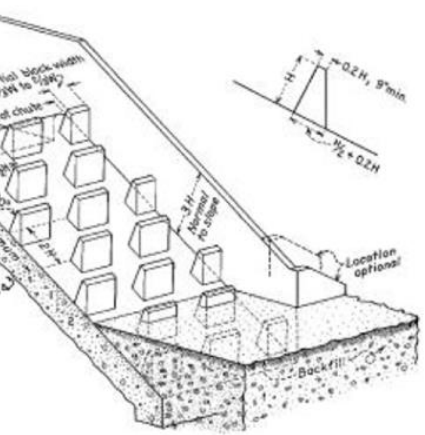
SCALE HORIZ: 1"=120' VERT: 1"=20'

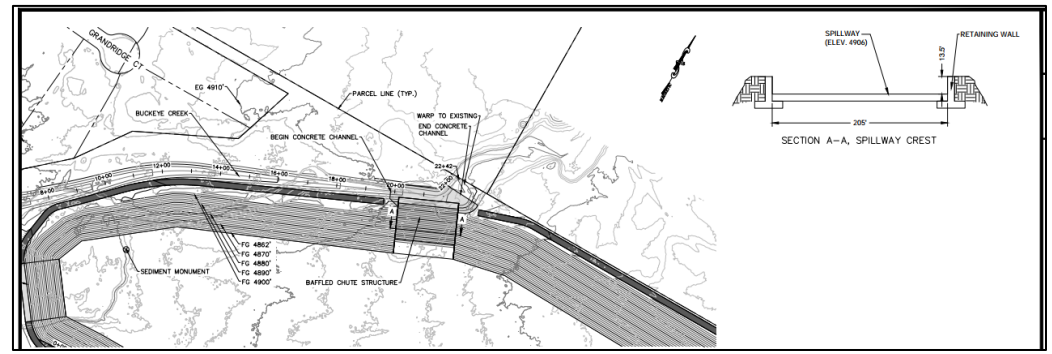
PRELIMINARY: NOT FOR CONSTRUCTION

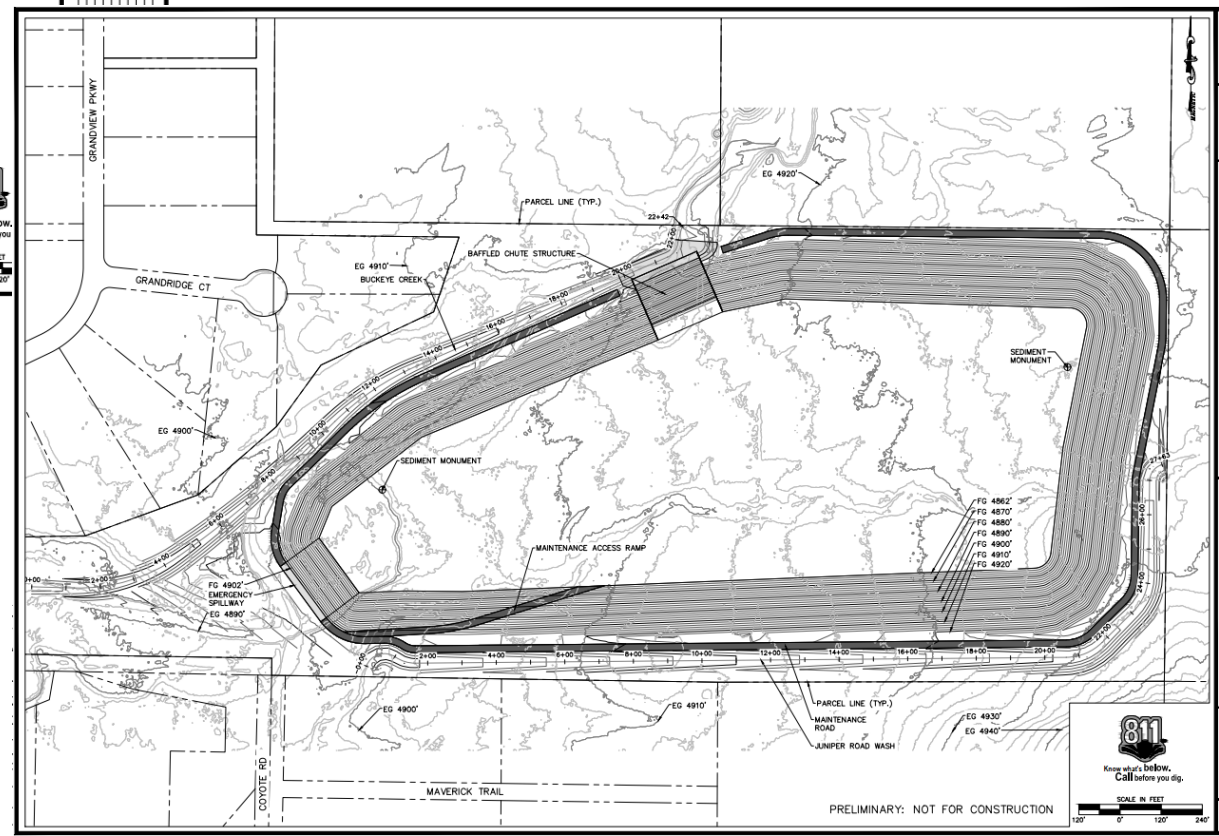
Know what's below. Call before you dig.

SCALE IN FEET

120' 0' 120'







PRELIMINARY: NOT FOR CONSTRUCTION

Know what's below. Call before you dig.

SCALE IN FEET

120' 0' 120' 240'

CA Group, Inc
An Employee Owned Company
8630 TECHNOLOGY WAY, SUITE C
Reno, NV 89521
PHONE: 775-393-3040

MAY 2023

REGIONAL TRANSPORATION COMMISSION OF WASHOE COUNTY

BUCKEYE CREEK RETENTION BASIN

BUCKEYE CREEK CHANNEL / PROFILE

PLAN VIEW

DOUGLAS COUNTY NEVADA

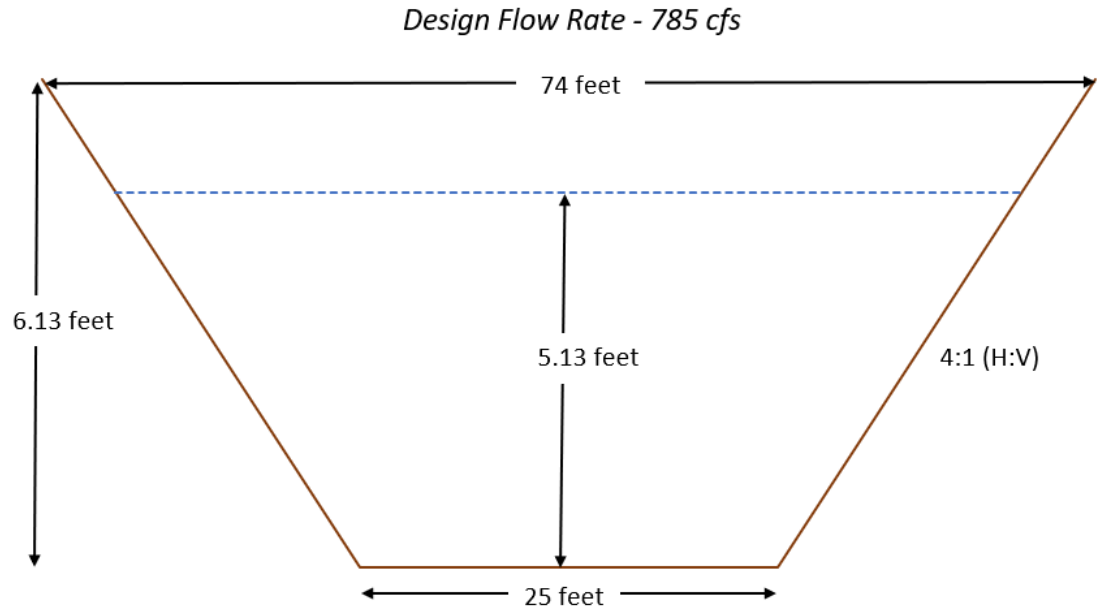
NO.	REVISIONS DESCRIPTION	DATE	BY

SCALE: AS SHOWN
DESIGN: JEF
DRAWN: TH
CHECKED: PF
APPROVED: CA
DATE: MAY 2023

SHEET P1
OF 5

Proposed Conditions

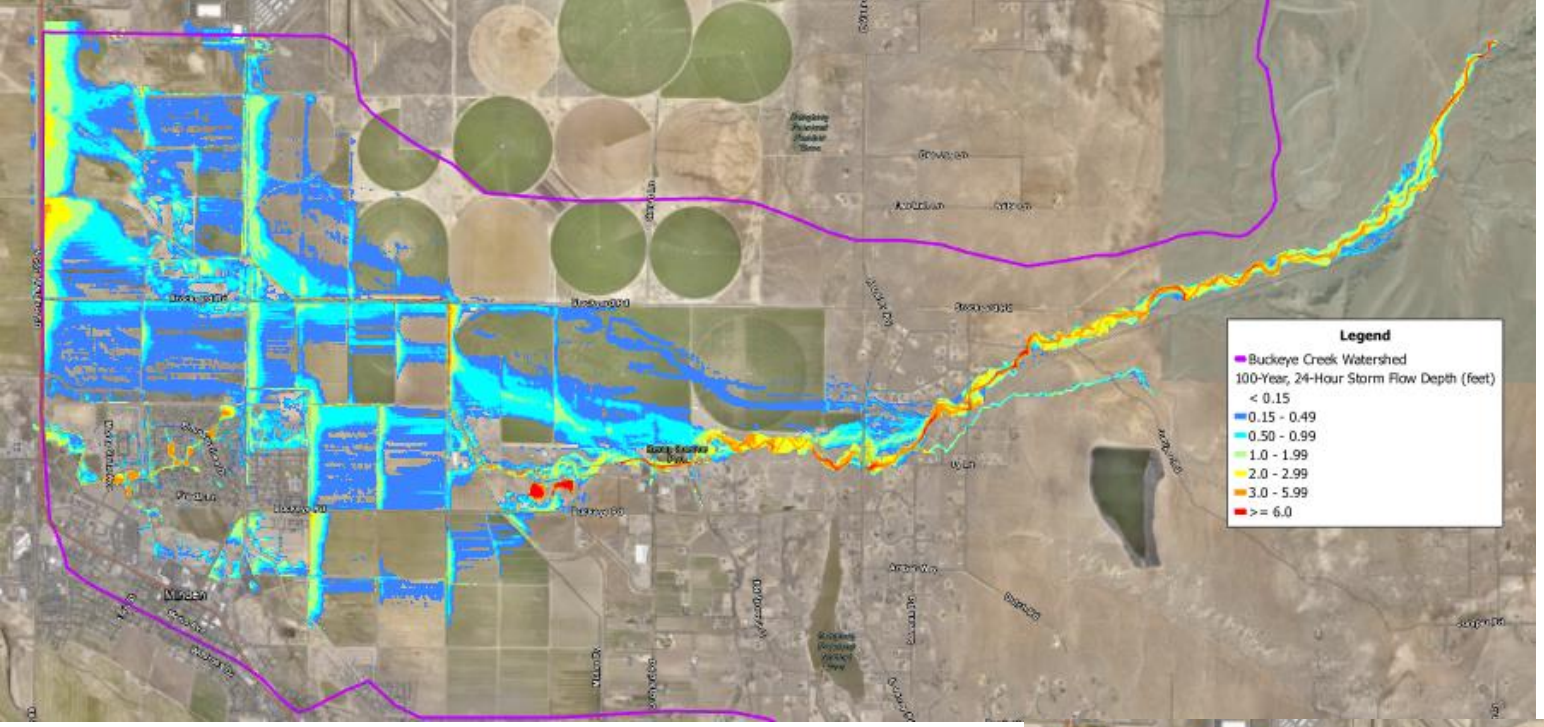
- Impact of flow reduction
  - 2,700 acres benefit from lower water surface elevation
  - 80% reduction in peak discharge downstream of basin
- Downstream Channel and Culvert Assessment



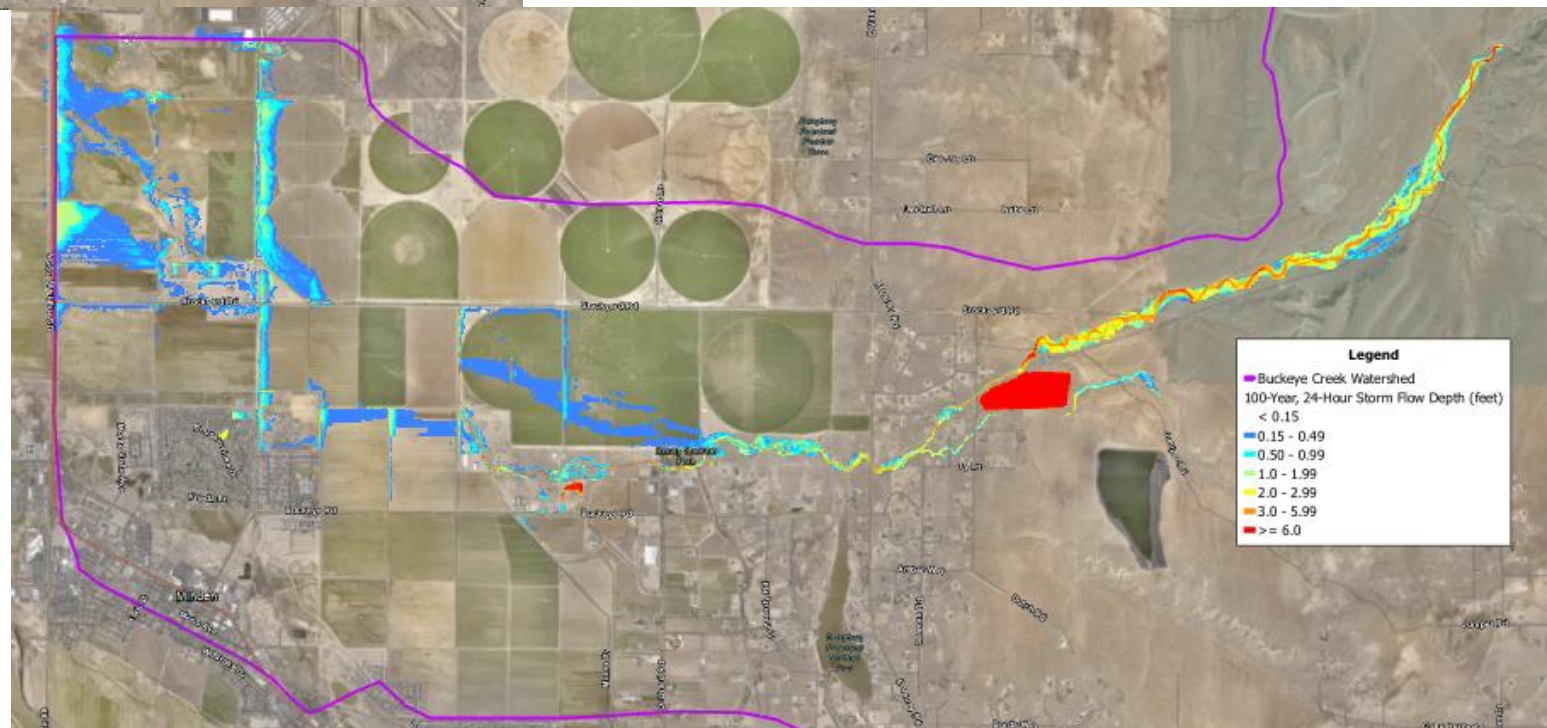
East Valley Road = OK

Heybourne Road = 3 x 10ft x 5ft Box Culverts

Existing Condition

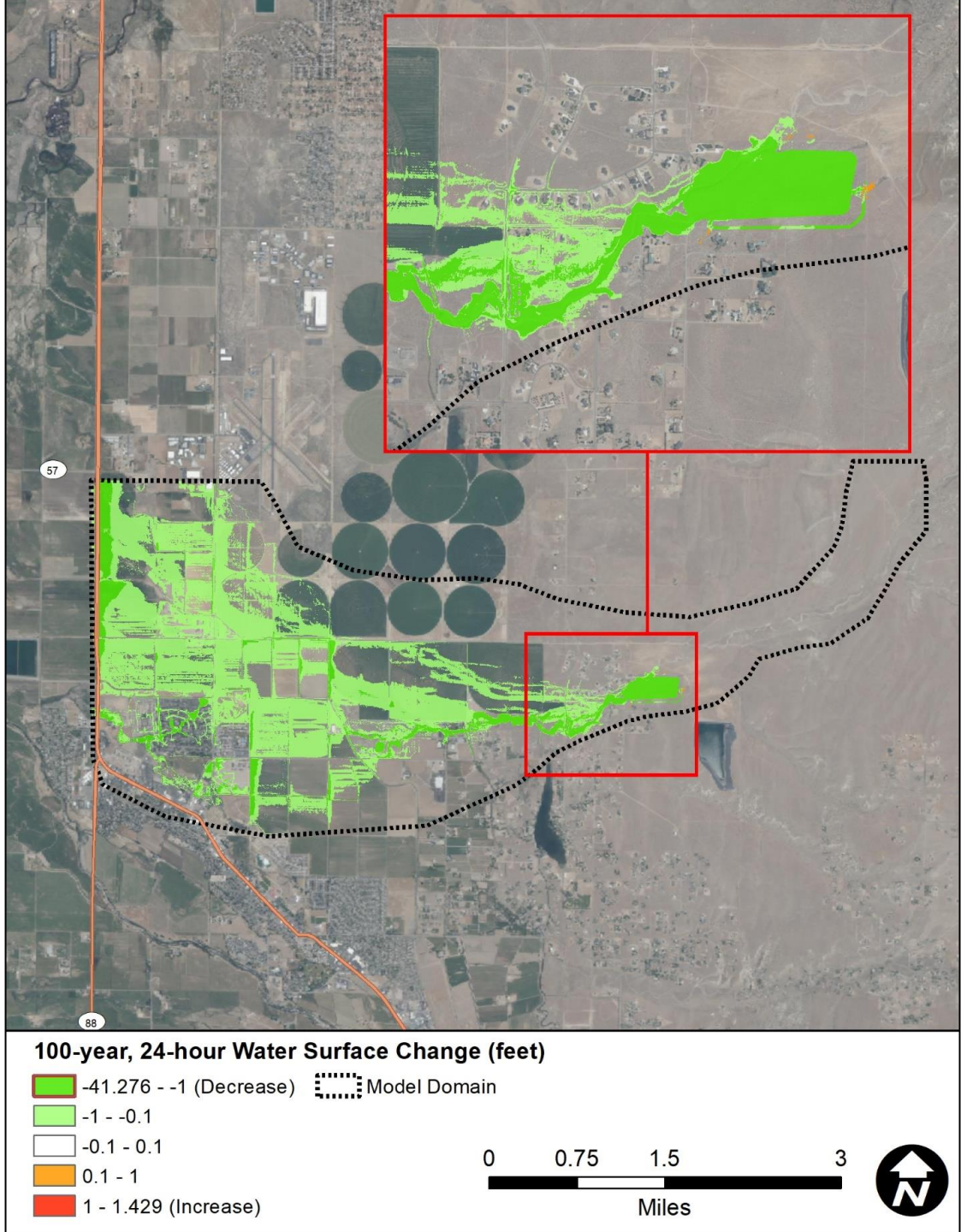


Proposed Condition

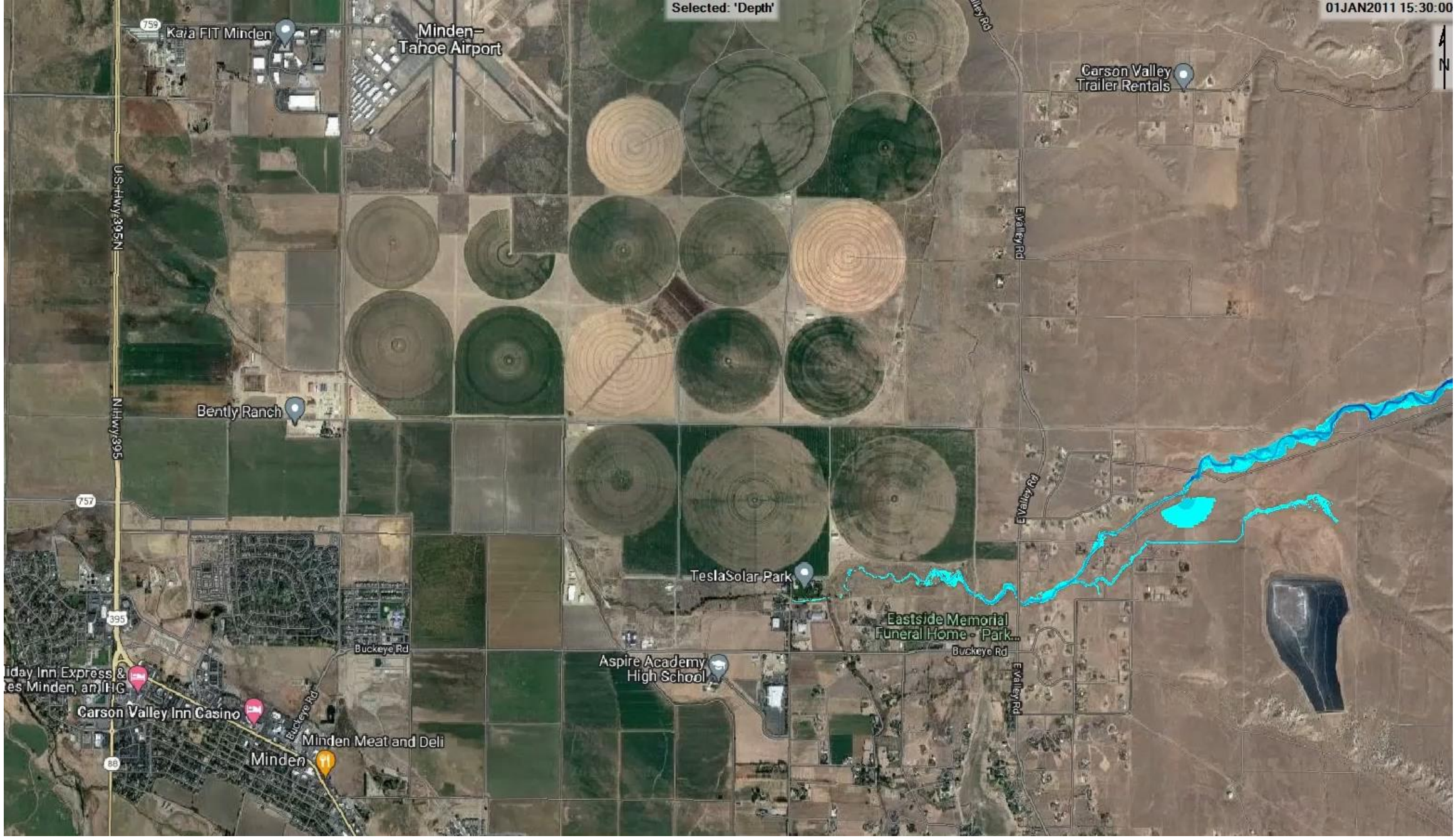


Proposed Condition

Water Surface Elevation Reduction




Selected: 'Depth'
01JAN2011 16:24:00
Kaia FIT Minden
Minden–Tahoe Airport
Carson Valley Trailer Rentals
U.S. Hwy 395 N
NHwy395
E Valley Rd
Bently Ranch
757
395
Buckeye Rd
Aspire Academy High School
Eastside Memorial Funeral Home - Park...
Carson Valley Inn Casino
Minden Meat and Deli
Minden
88


Selected: 'Depth'
01JAN2011 15:30:00
Kaia FIT Minden
Minden–Tahoe Airport
Carson Valley Trailer Rentals
U.S. Hwy 395 N
NHwy395
E Valley Rd
Bently Ranch
757
395
Buckeye Rd
TeslaSolar Park
Eastside Memorial Funeral Home - Park...
Aspire Academy High School
Carson Valley Inn Casino
Minden Meat and Deli
Minden
88
N

Concept Mitigation Design

20-Year Lifecycle Cost Assessment

Item	Cost ($)
Construction Costs	43,000,000
20-Year O&M*	1,062,000
Salvage Value	0
Total Cost	44,062,000

* Net Present Value

O&M Cost Assessment

	Recurrence (years)	Man/equipment Hours	unit	Cost/unit	Total	Avg/year
Channel maintenance – vegetation and debris removal	5	80	hours	$150	$12,000	$2,400
Retention basin slope maintenance – seeding, reshaping	5	40	hours	$150	$6,000	$1,200
Sediment Removal	1	12910	cubic yards	$7	$90,370	$90,370
Maintenance Road resurfacing	5	40	hours	$150	$6,000	$1,200
Fencing repairs	5	20	hours	$70	$1,400	$280
Total						$95,450

Maintenance hours include equipment and operator
Sediment removal assumes 8 acre feet of sediment annually
All unit costs are estimated from local contractor bid summaries and bid proposals

Questions?

JE FULLER
hydrology • geomorphology