



**Progress Presentation**

**Hellwinkel Flood Channel  
and  
Pedestrian Pathway**

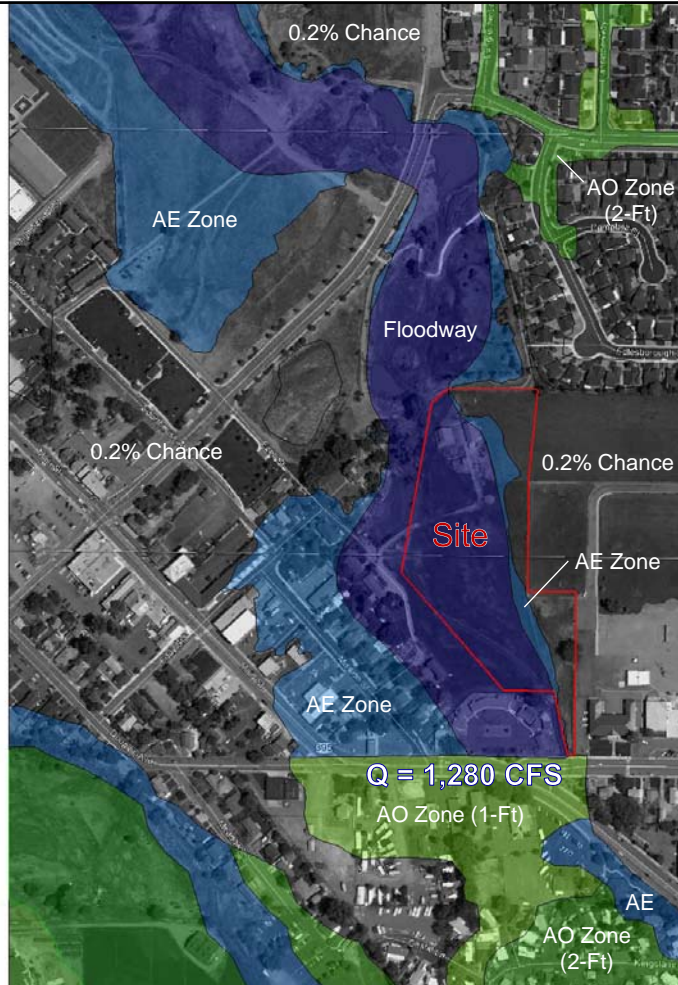
**2-Dimensional  
FLO-2D Flood Modeling**

**Town of Gardnerville, Nevada**

**December 3, 2013**

**By:  
Denny Peters, PE, PH**





## FEMA Flood Hazard Zones 2012 LOMR



**Previous  
1-Dimension  
Modeling**



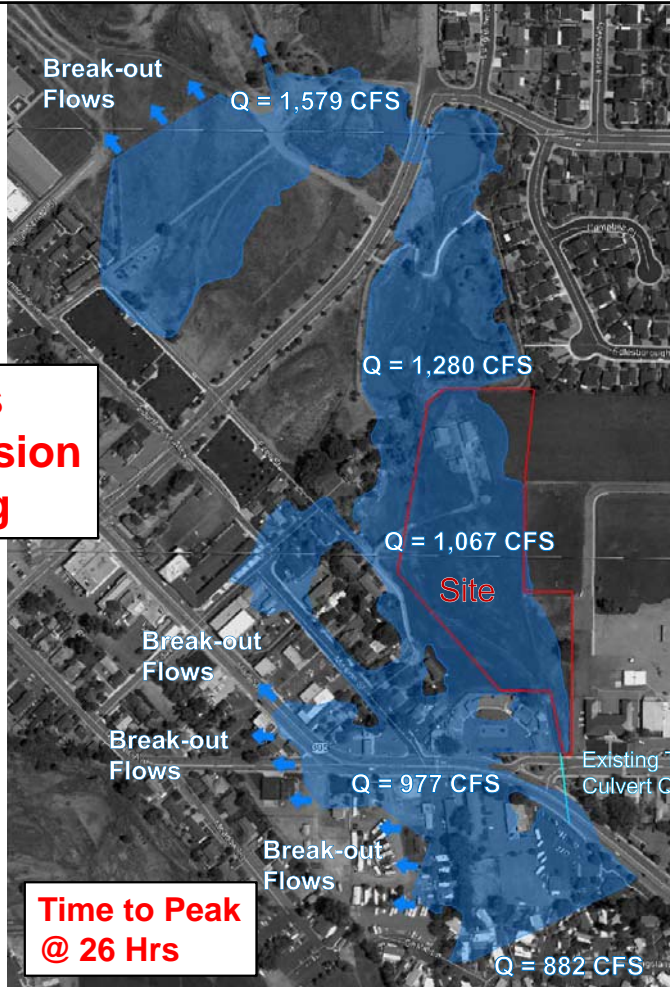
Pine Nut Creek Flood Flows



**10-Year  
Flood Map  
Ex. Conditions**



**Previous  
1-Dimension  
Modeling**



**Time to Peak  
@ 17 Hrs**

Pine Nut Creek Flood Flows



**100-Year  
Flood Map  
Ex. Conditions**

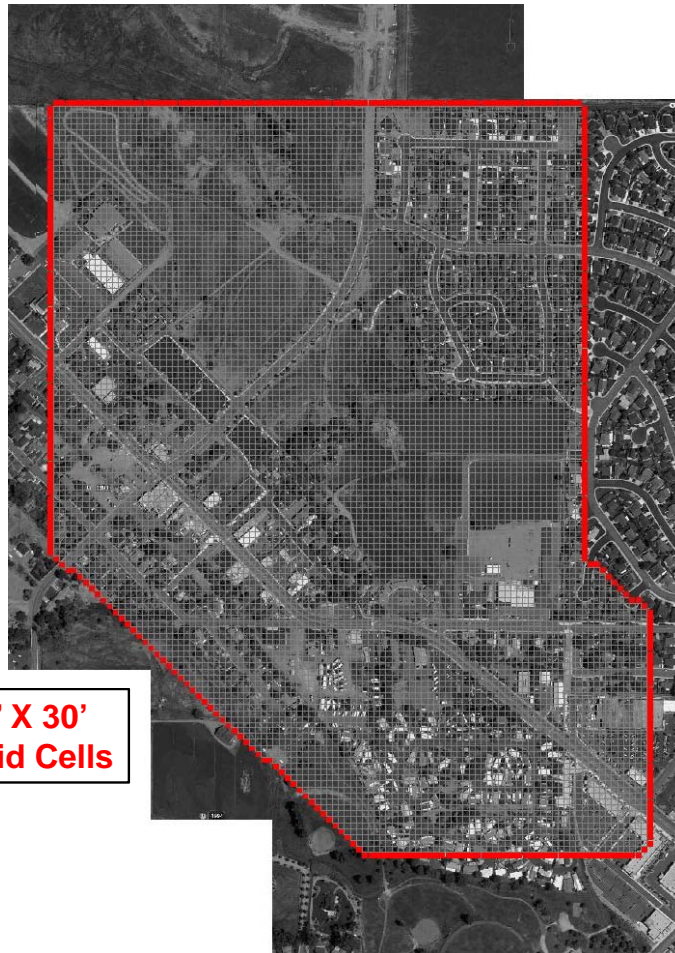




**Background  
Aerial Photo  
Images**



**FLO-2D  
Model  
Ex. Conditions**

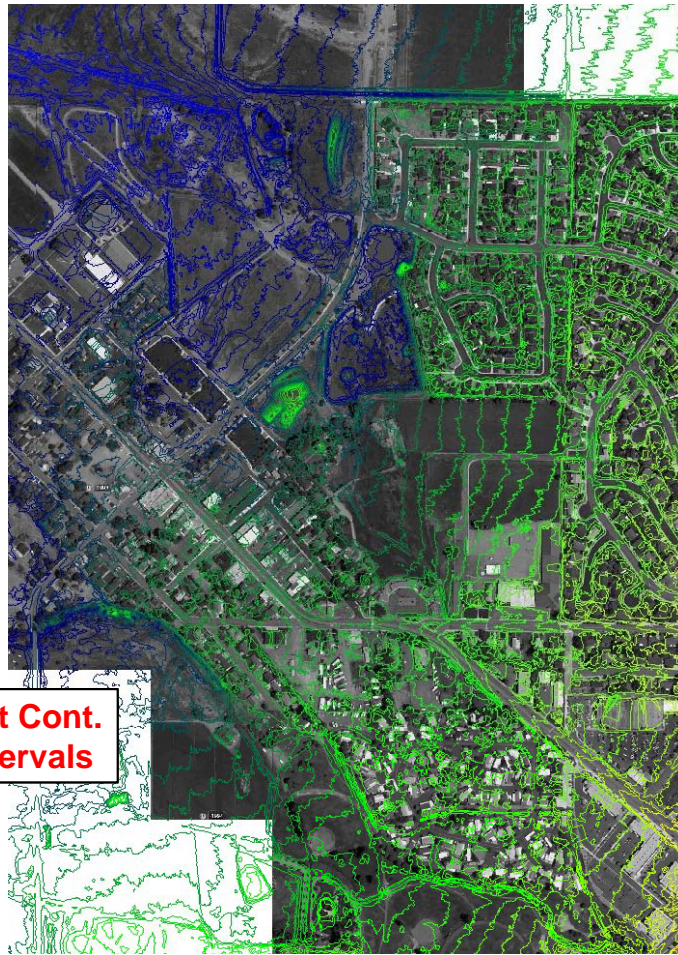


**30' X 30'  
Grid Cells**

**Model Grid  
Cells and  
Boundary**

**FLO-2D  
Model  
Ex. Conditions**





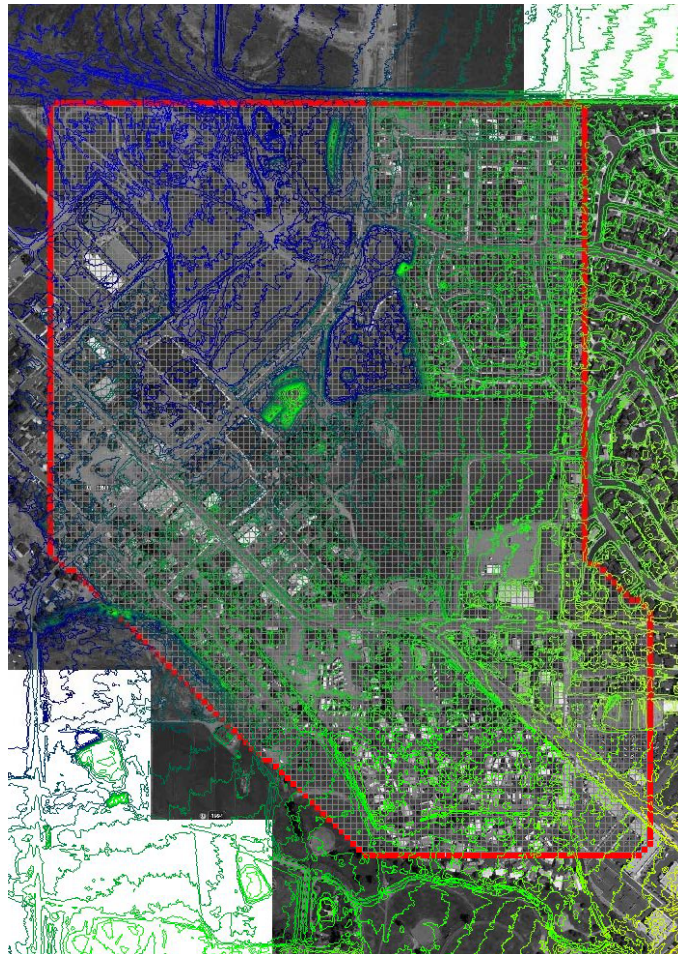
**LiDAR  
Topography  
Data**

**1-ft Cont.  
Intervals**

**FLO-2D  
Model  
Ex. Conditions**



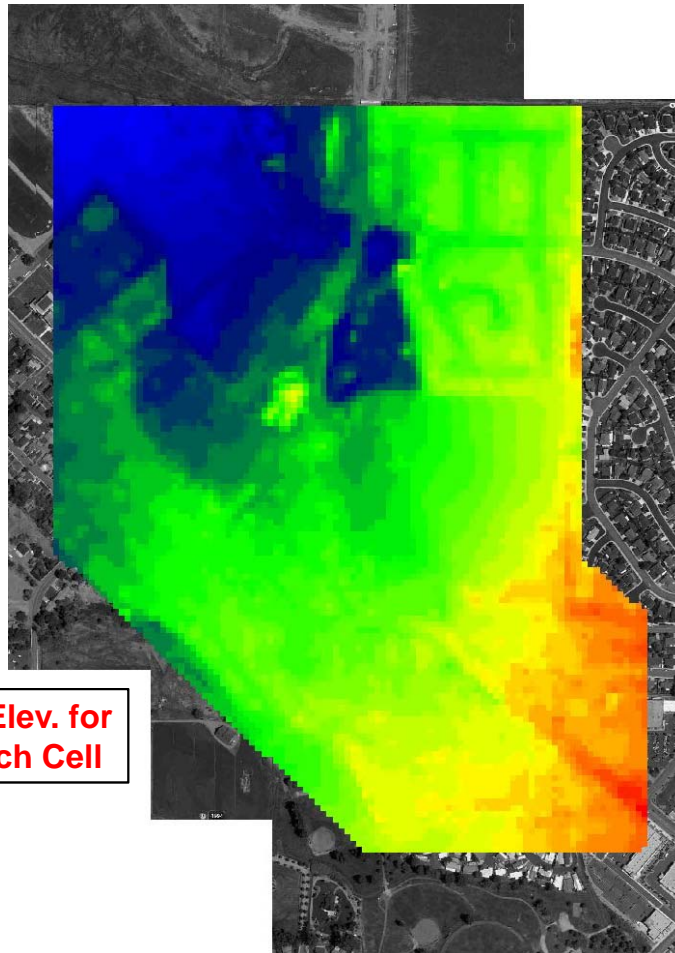




**LiDAR  
Topography  
Data**

**FLO-2D  
Model  
Ex. Conditions**





1 Elev. for  
each Cell

Grid/Cell  
Elevation  
Data



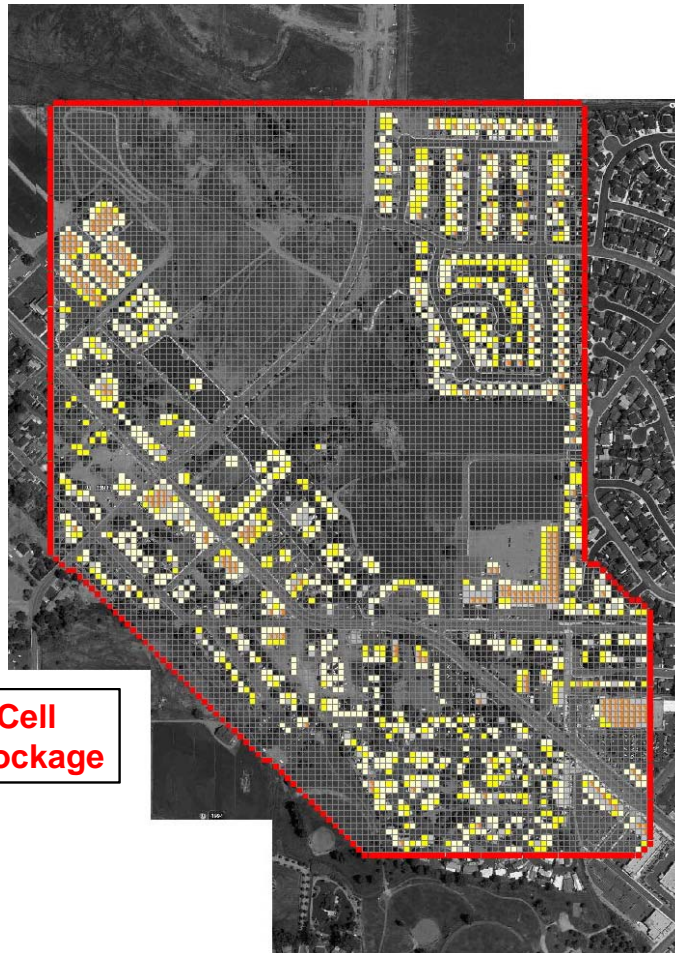
**FLO-2D  
Model  
Ex. Conditions**



**Cell Area  
Reduction  
Data**



**FLO-2D  
Model  
Ex. Conditions**



**Cell Area  
Reduction  
Data**

**% Cell  
Blockage**



**FLO-2D  
Model  
Ex. Conditions**



**Major Streets  
and  
Channels**

**FLO-2D  
Model  
Ex. Conditions**



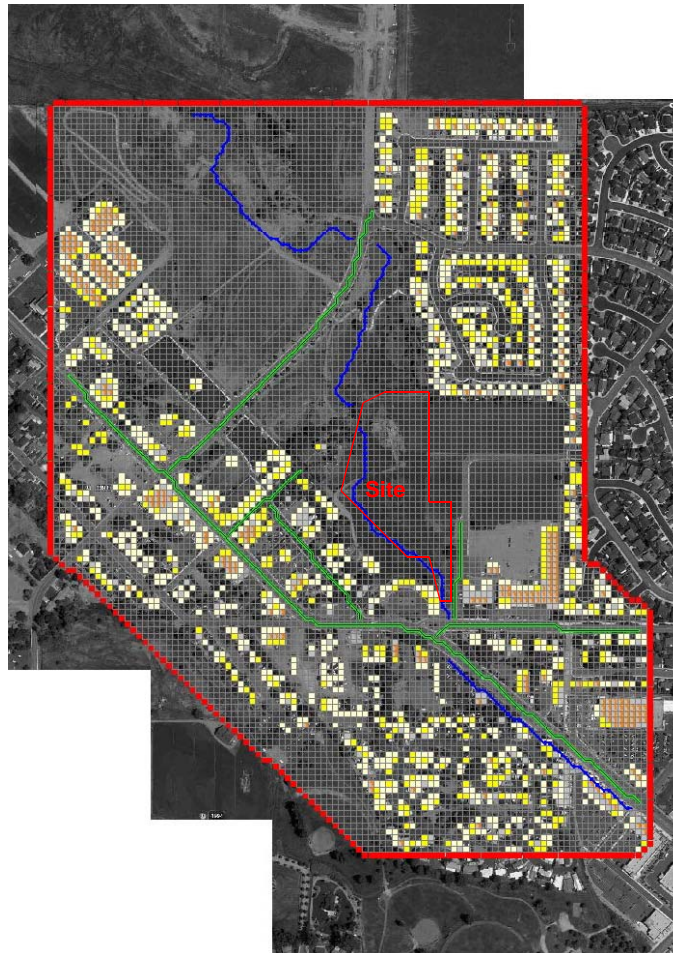




**Major Streets  
and  
Channels**



**FLO-2D  
Model  
Ex. Conditions**



**All  
Surface  
Features**

**FLO-2D  
Model  
Ex. Conditions**



**Surface  
Roughness  
Factors**

**FLO-2D  
Model  
Ex. Conditions**

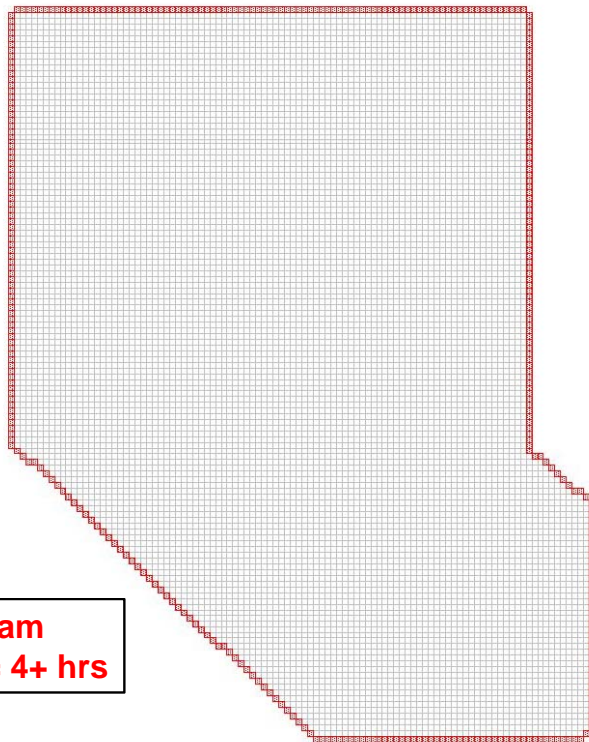




**Surface  
Roughness  
Factors**

**FLO-2D  
Model  
Ex. Conditions**



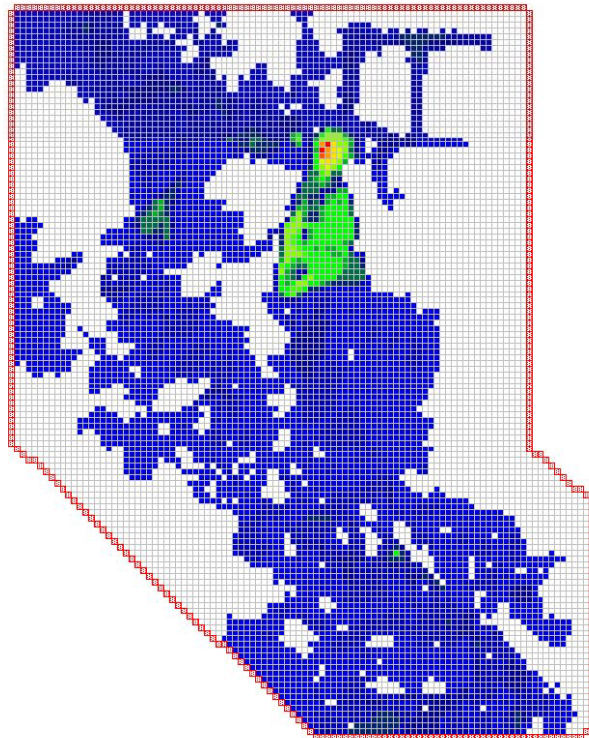
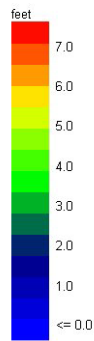


**Maximum  
Cell  
Depths**

**Program  
Run = 4+ hrs**



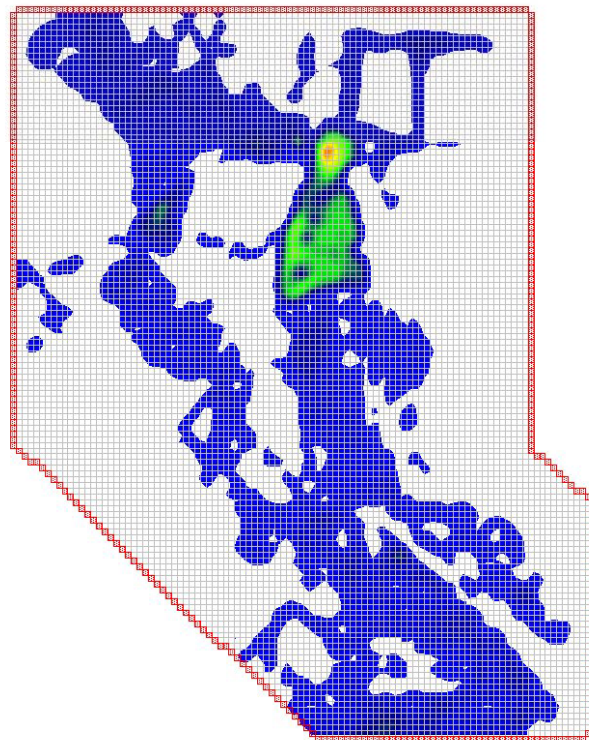
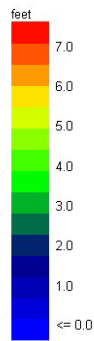
**10-Year  
Model Results  
Ex. Conditions**



**Maximum  
Cell  
Depths**



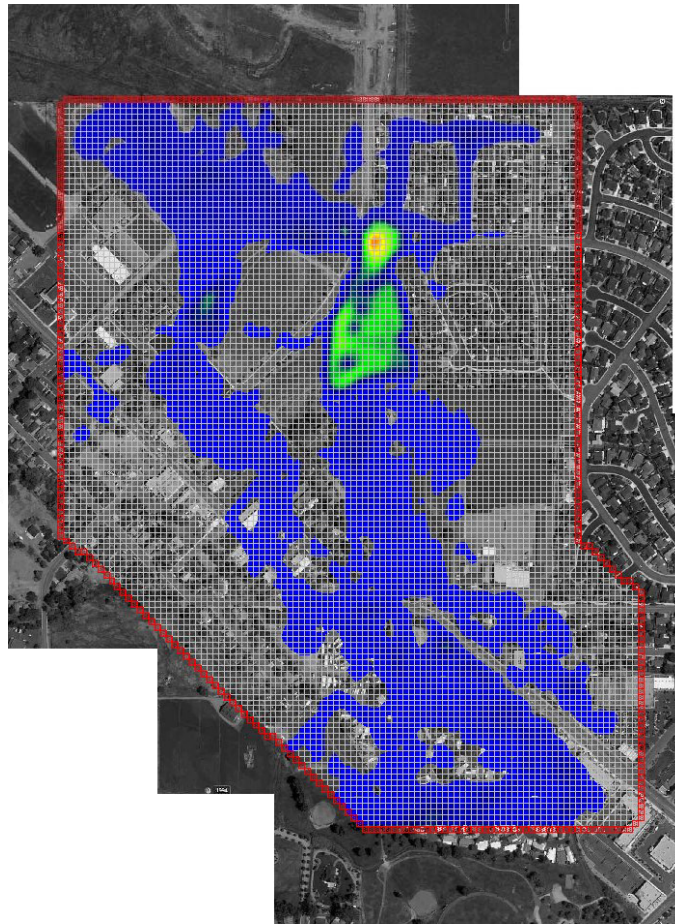
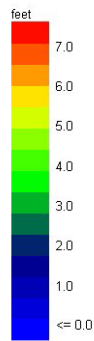
**10-Year  
Model Results  
Ex. Conditions**



**Maximum  
Depth  
Contours**



**10-Year  
Model Results  
Ex. Conditions**

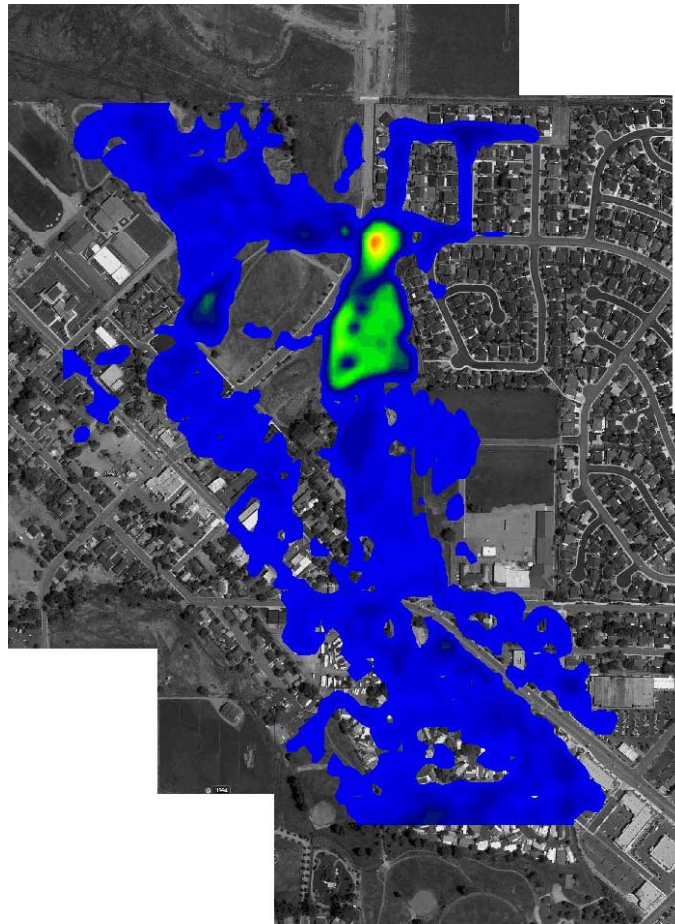
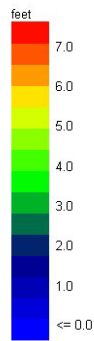


**Maximum  
Depth  
Contours**

**10-Year  
Model Results  
Ex. Conditions**



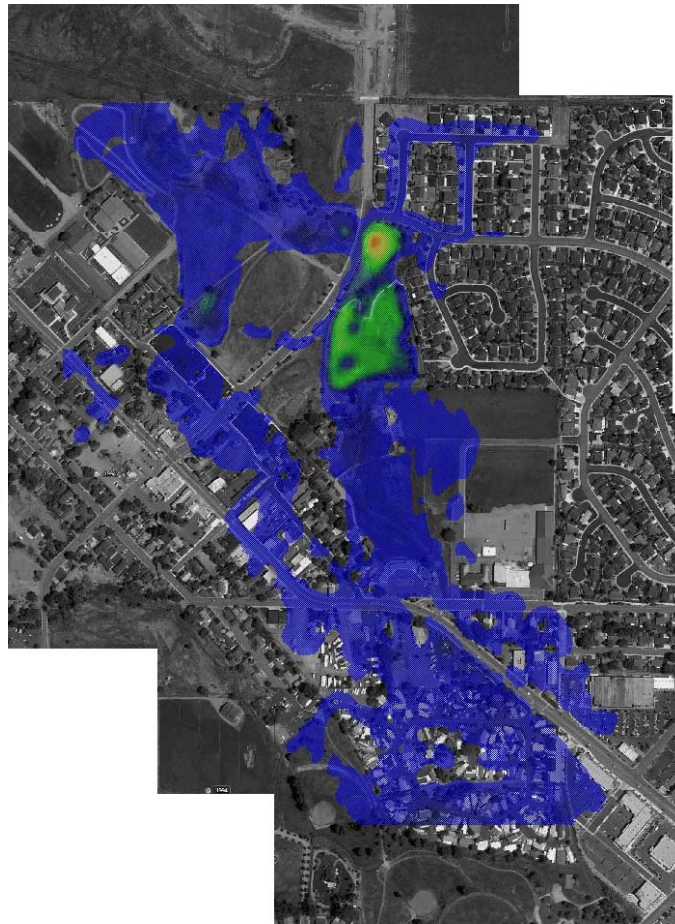
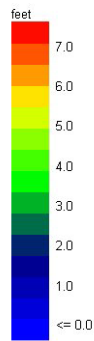




**Maximum  
Depth  
Contours**



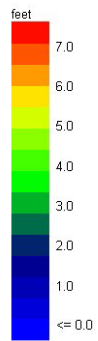
**10-Year  
Model Results  
Ex. Conditions**



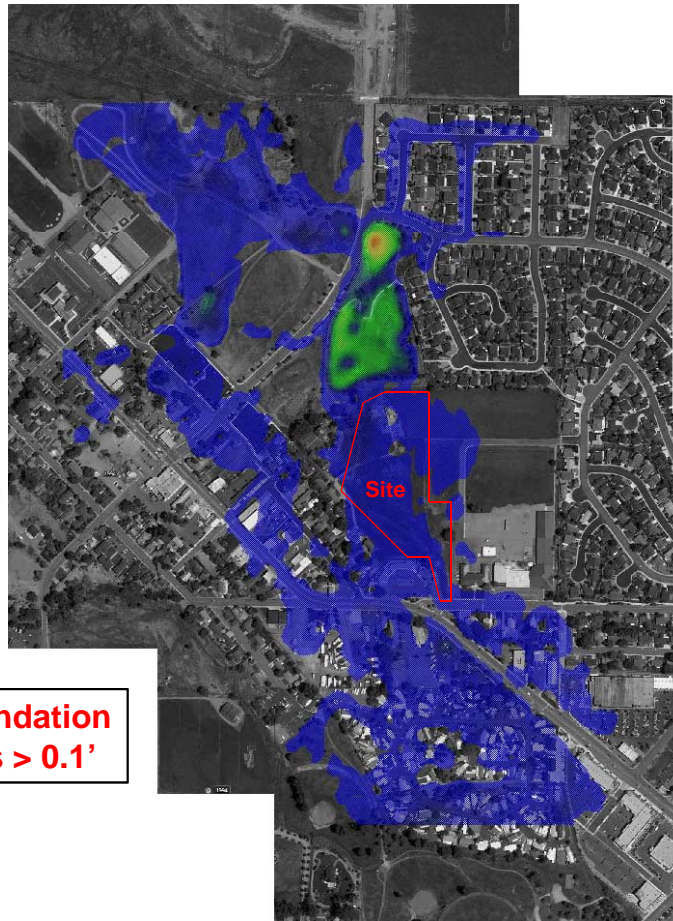
**Maximum  
Depth  
Contours**



**10-Year  
Model Results  
Ex. Conditions**



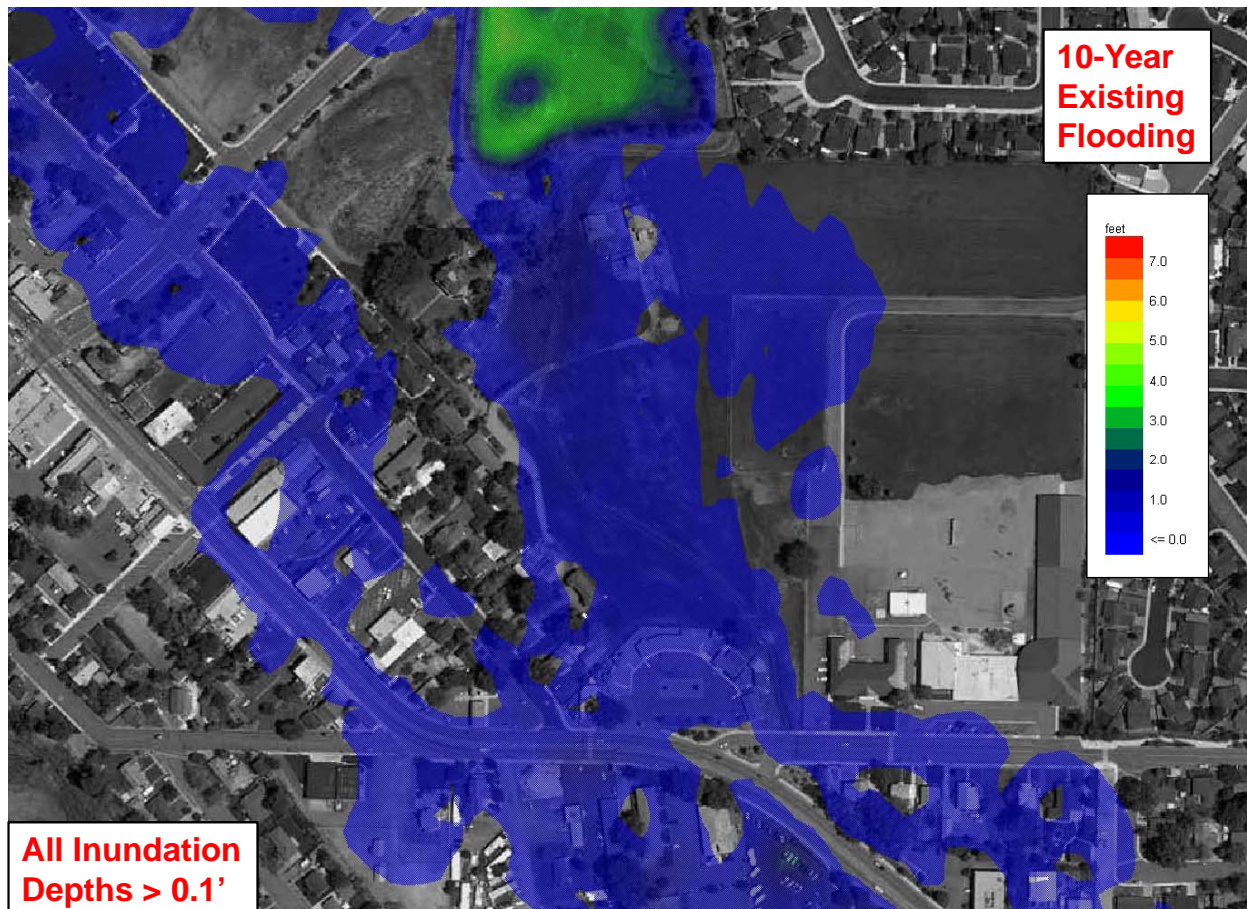
**All Inundation  
Depths > 0.1'**

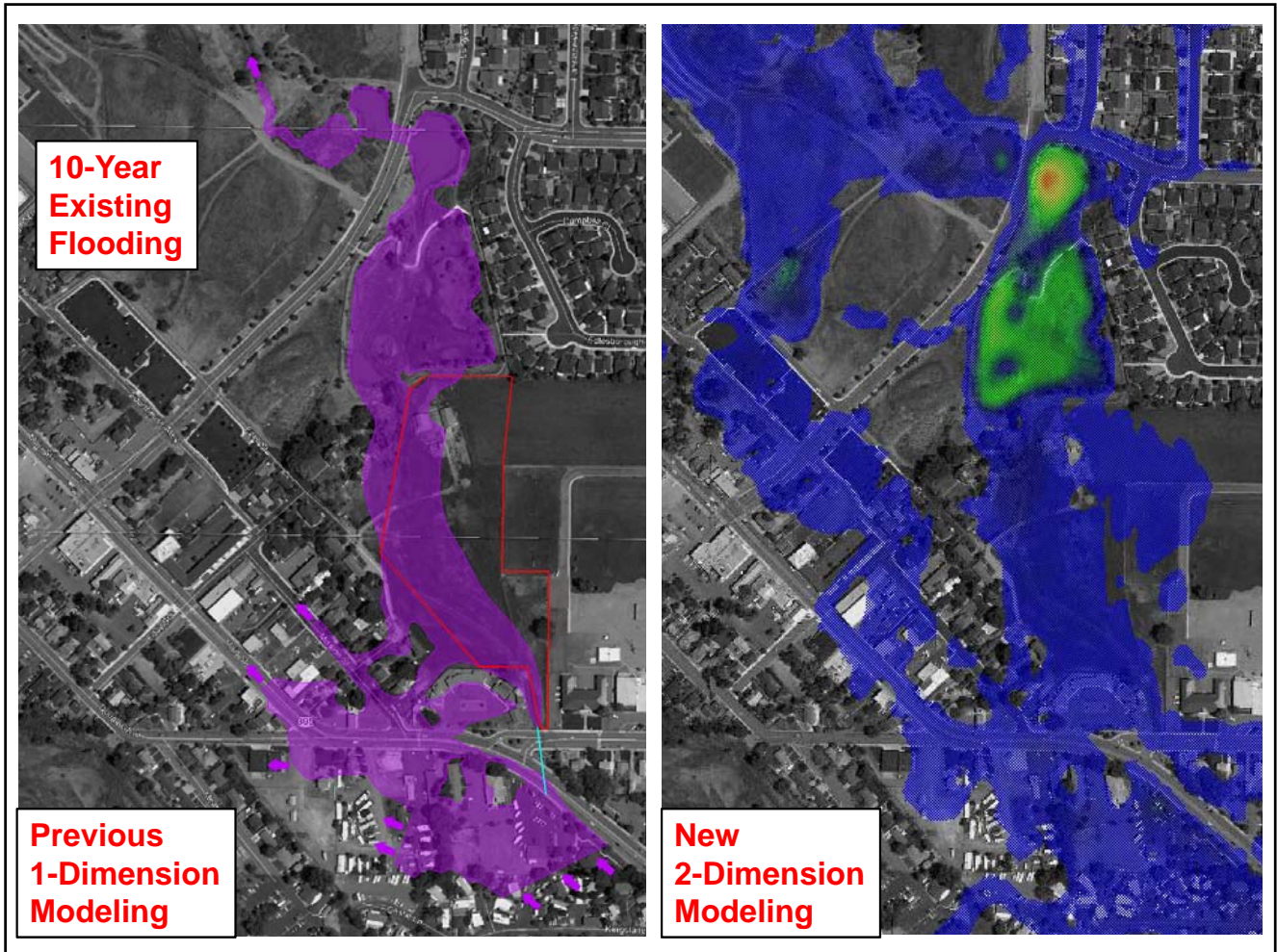


**Maximum  
Depth  
Contours**

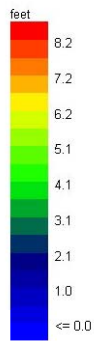
**10-Year  
Model Results  
Ex. Conditions**



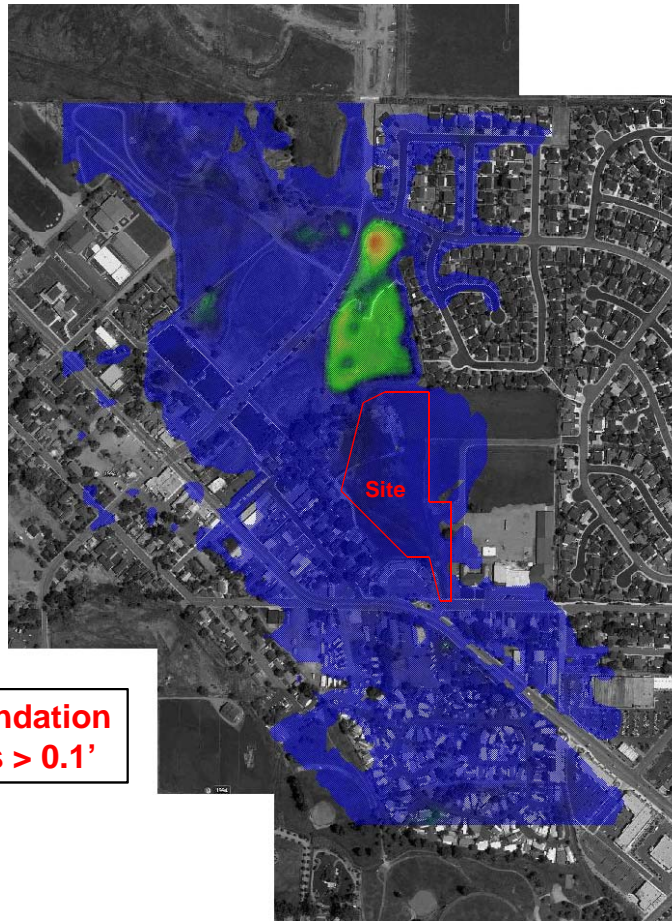








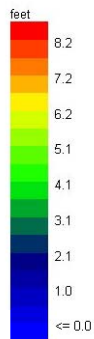
**All Inundation  
Depths > 0.1'**



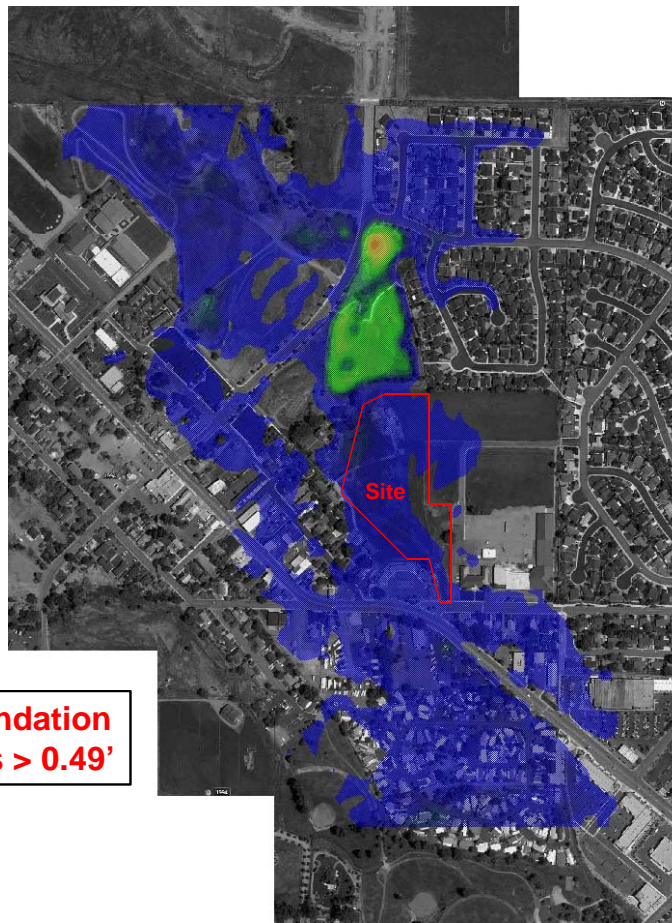
**Maximum  
Depth  
Contours**

**100-Year  
Model Results  
Ex. Conditions**



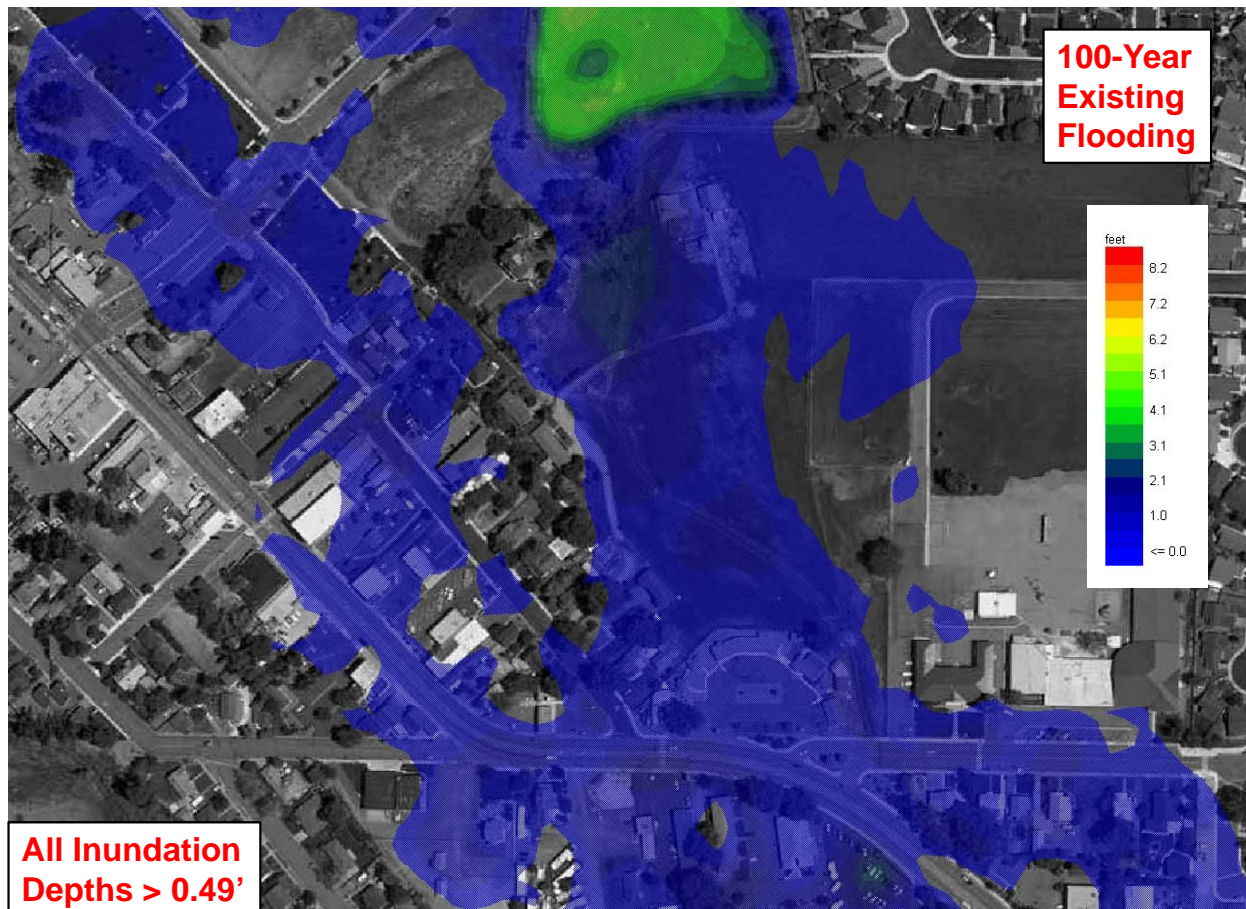


**All Inundation  
Depths > 0.49'**

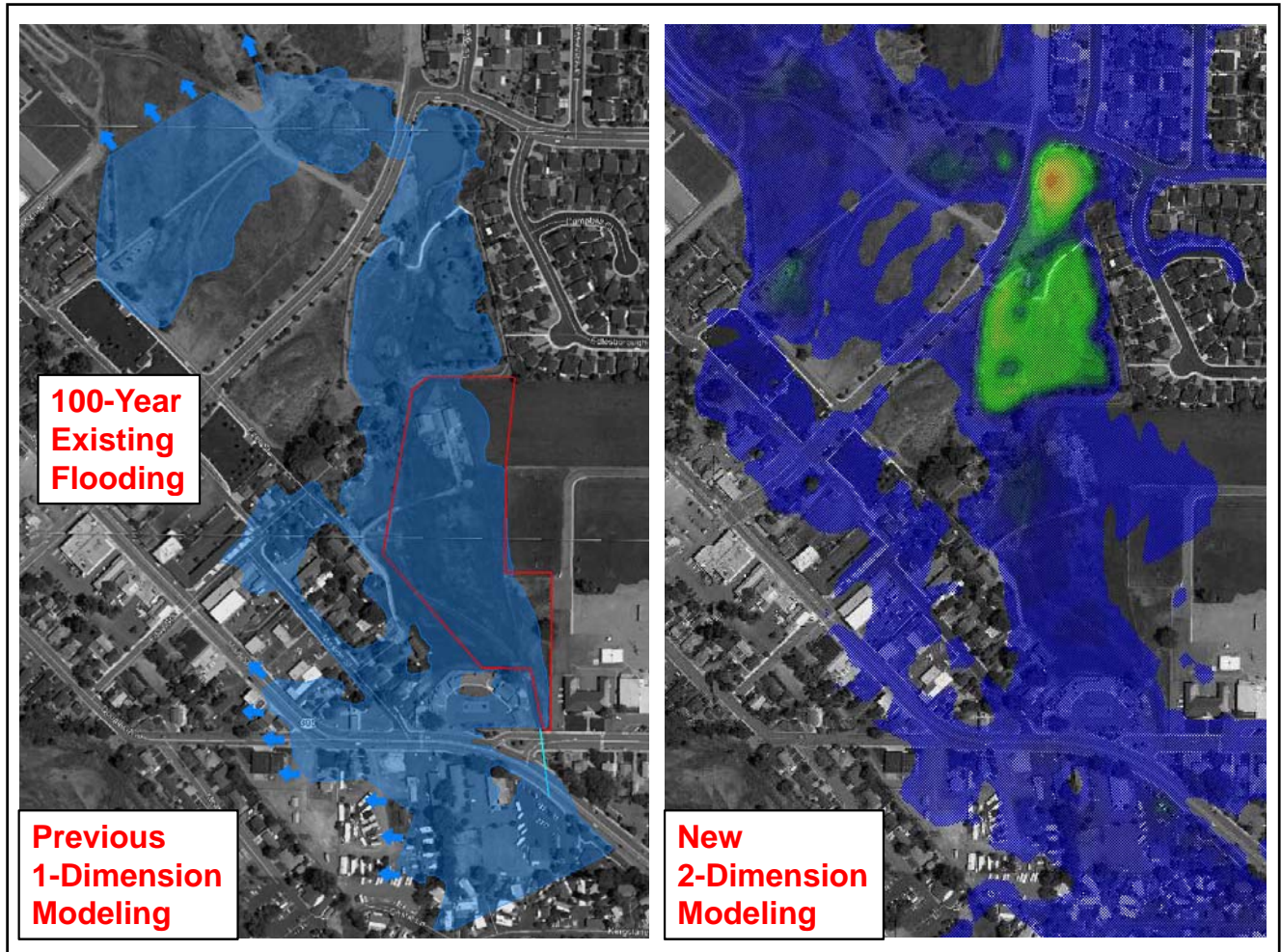


**Maximum  
Depth  
Contours**

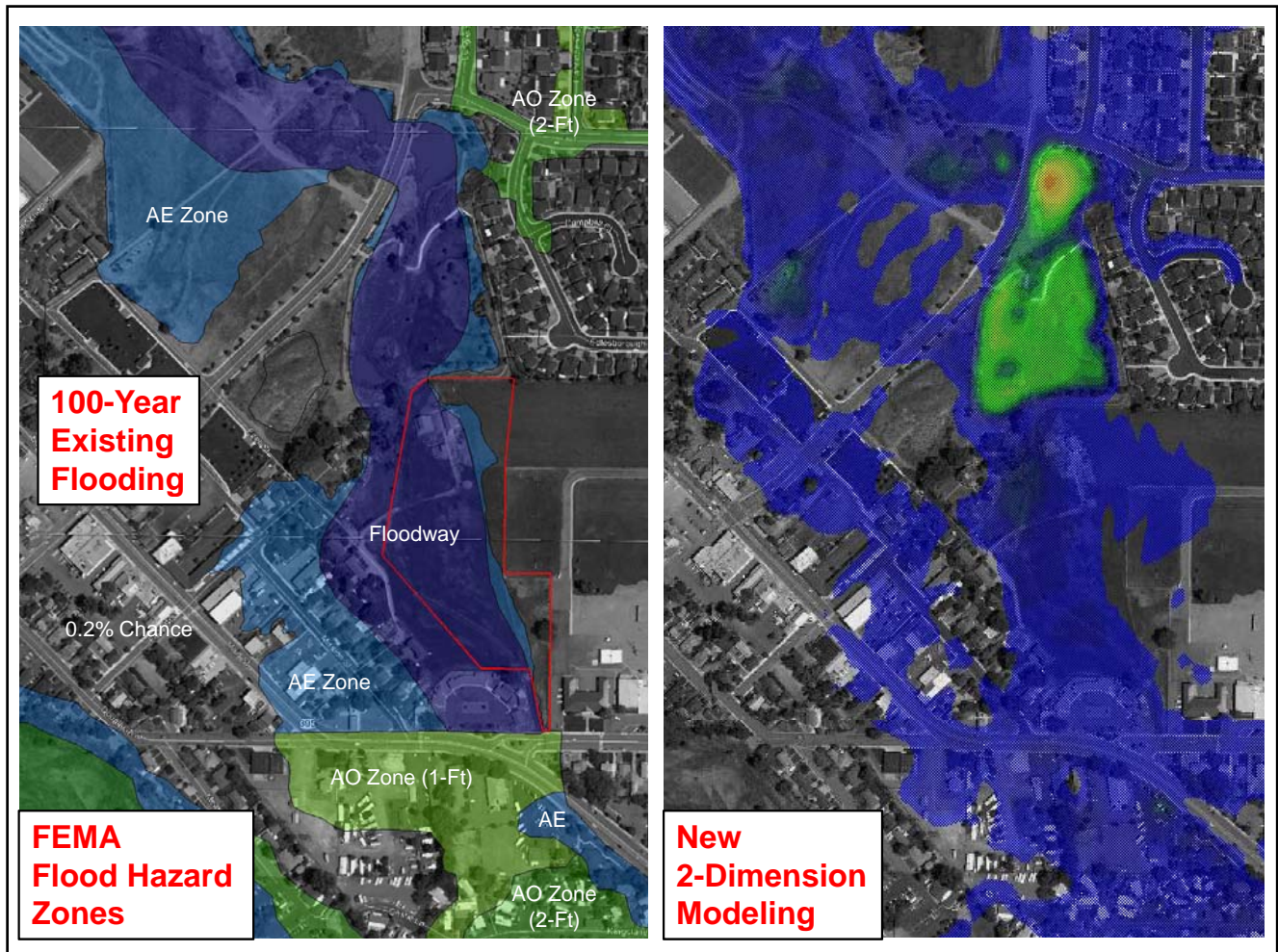
**100-Year  
Model Results  
Ex. Conditions**





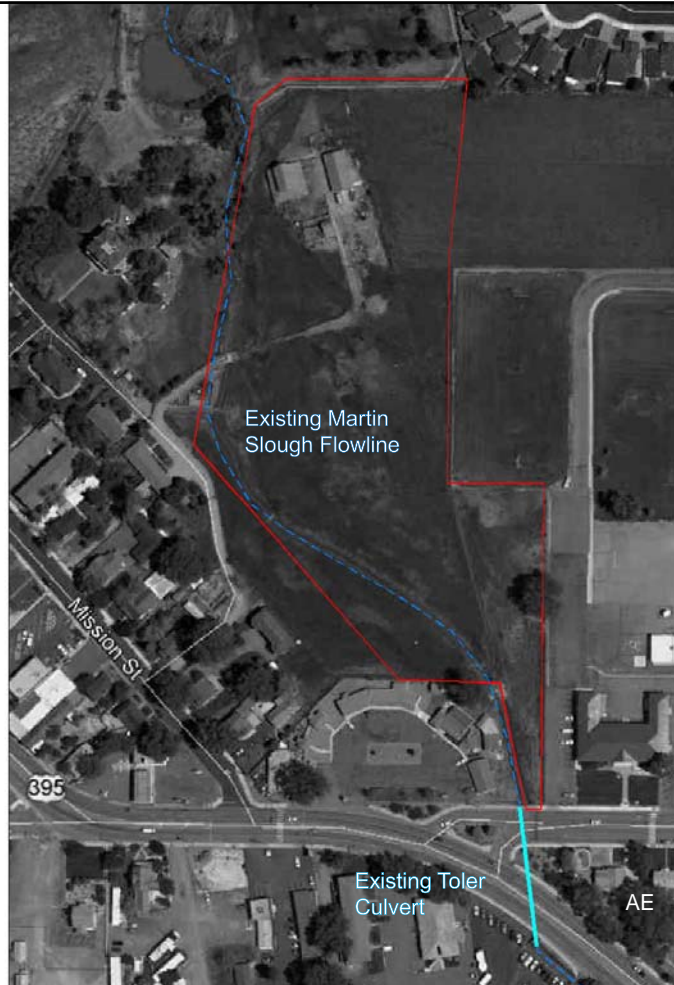








**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**



**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**





**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**



**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**

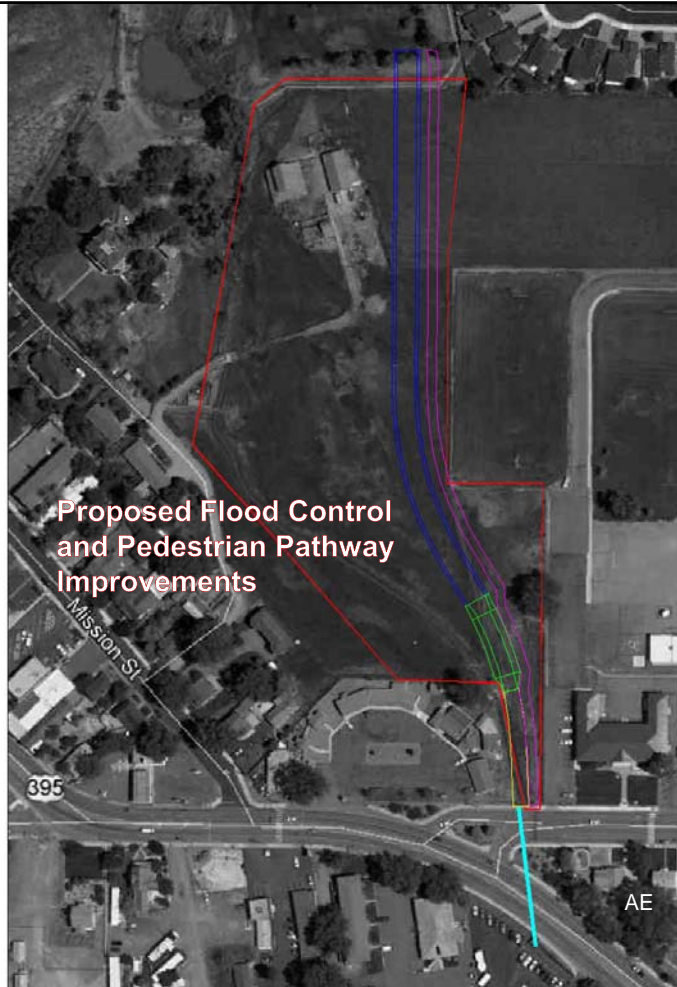


**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**





**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**



Proposed Flood Control  
and Pedestrian Pathway  
Improvements

**80% Design  
Flood Channel  
and  
Pedestrian  
Pathway**

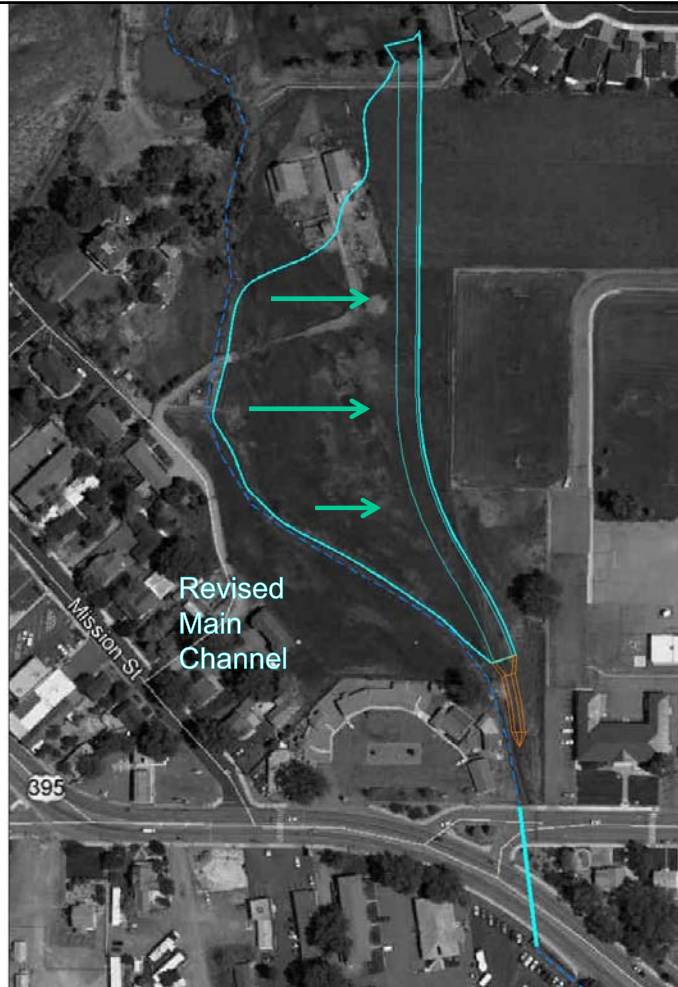


**Preliminary  
95% Design  
Revision**

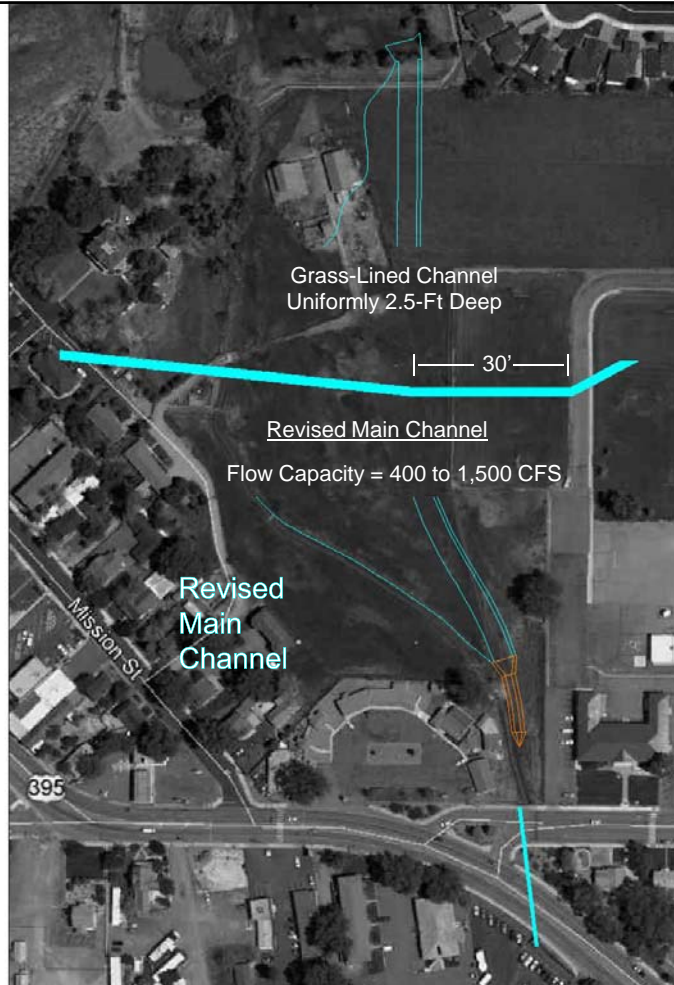




**Preliminary  
95% Design  
Revision**



**Preliminary  
95% Design  
Revision**

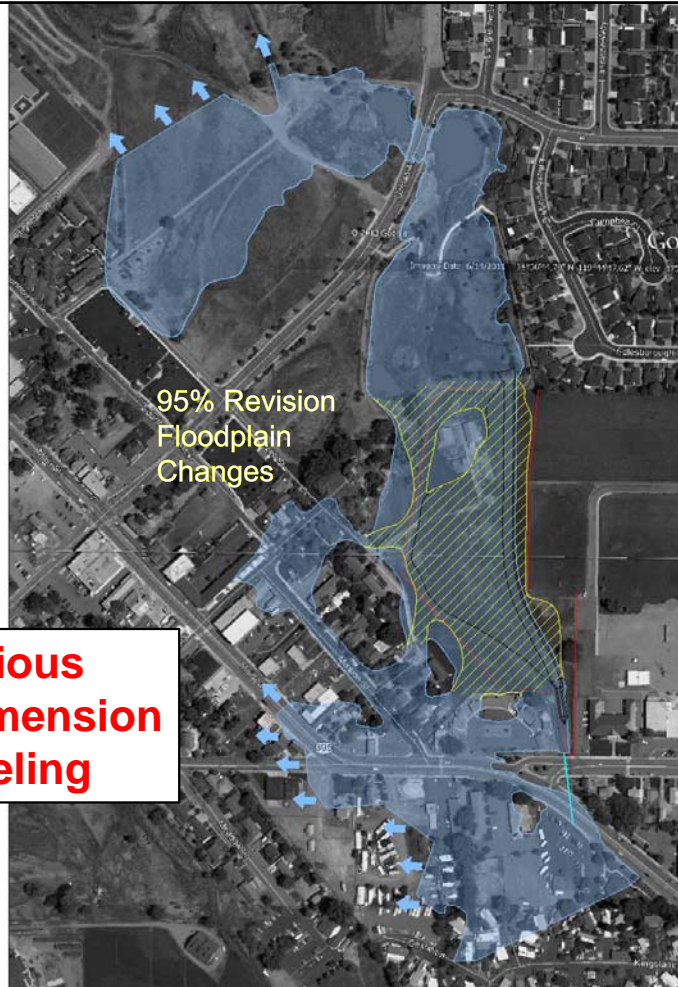


**Preliminary  
95% Design  
Revision**





**Preliminary  
95% Design  
Revision**

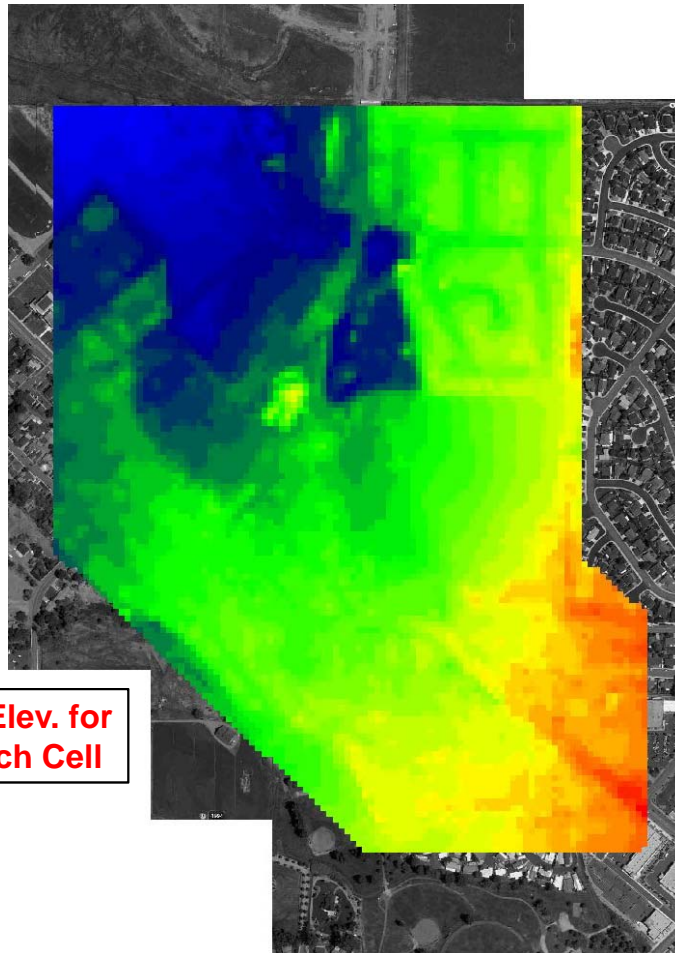


95% Revision  
Floodplain  
Changes

**Previous  
1-Dimension  
Modeling**

**100-Year  
Flood Map  
w/ 80% and  
95% Design  
Revision  
Conditions**





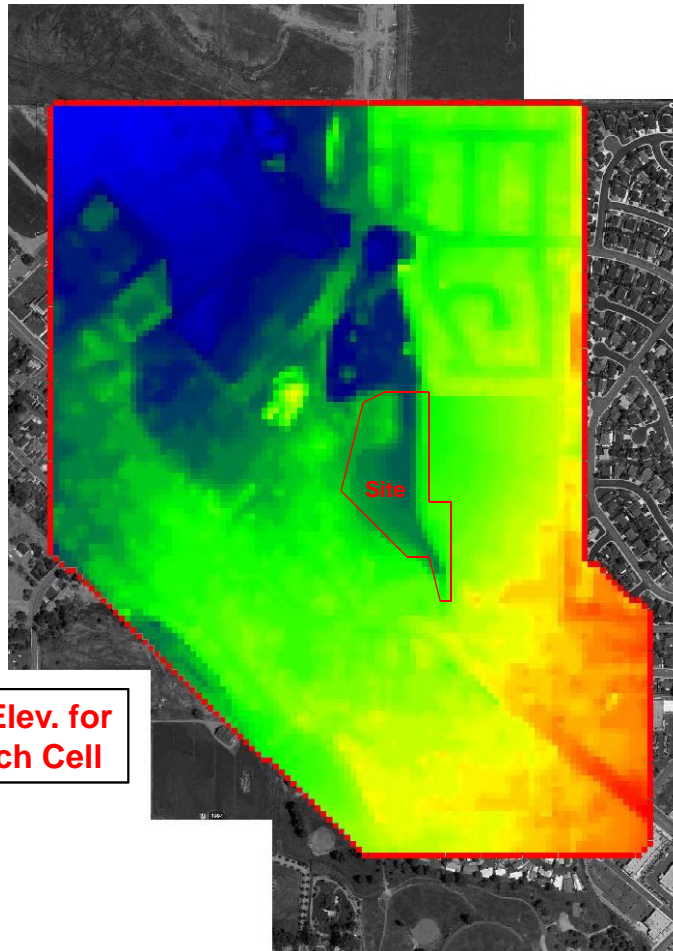
1 Elev. for  
each Cell

Grid/Cell  
Elevation  
Data

**FLO-2D  
Model  
Ex. Conditions**







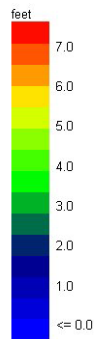
1 Elev. for  
each Cell

Grid/Cell  
Elevation  
Data

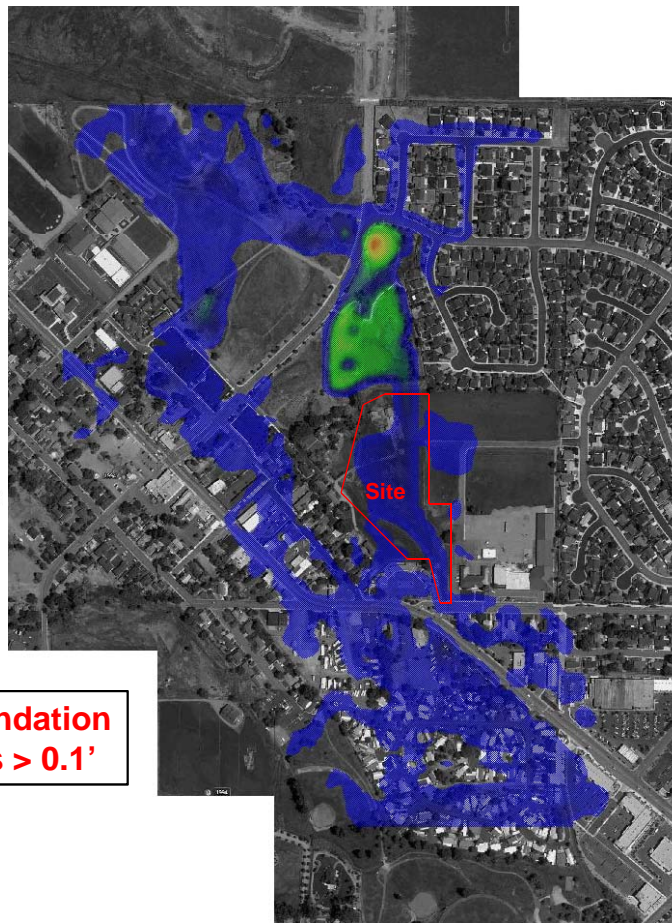
95%  
Design  
Revisions

**FLO-2D  
Proposed  
Conditions**





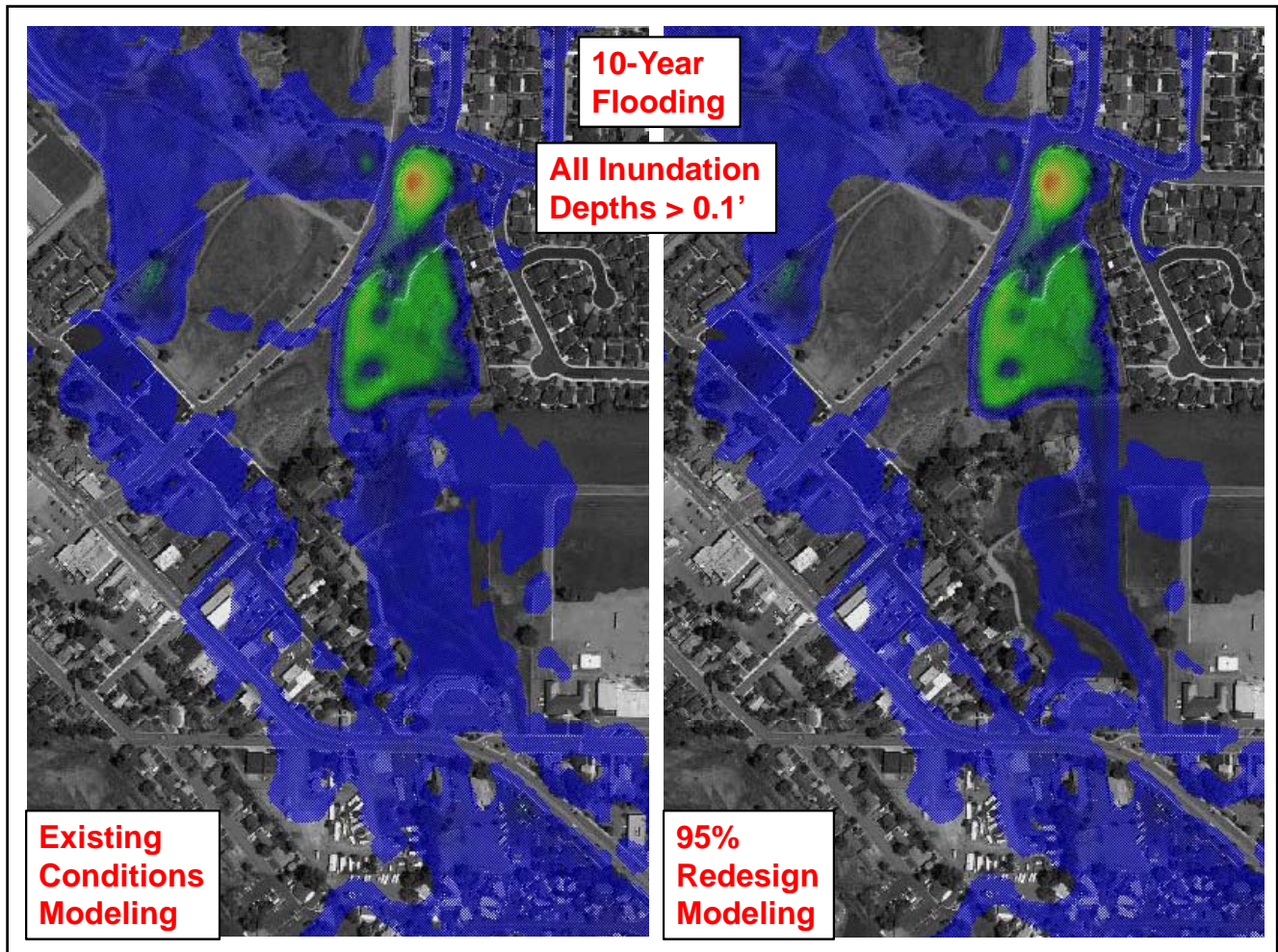
**All Inundation  
Depths > 0.1'**



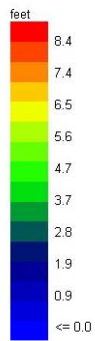
**Maximum  
Depth  
Contours**

**95%  
Design  
Revisions**

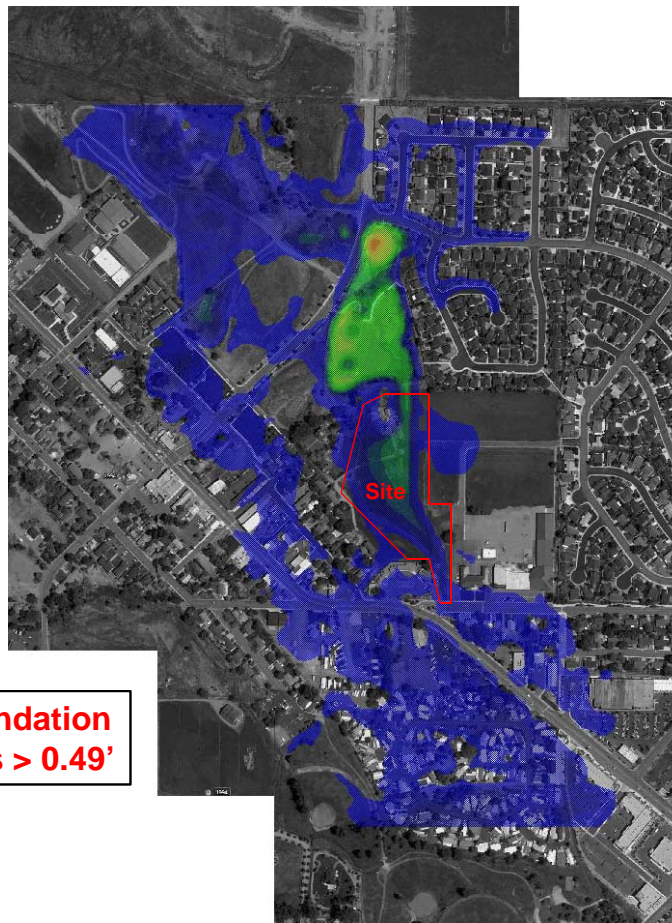
**10-Year  
Proposed  
Conditions**







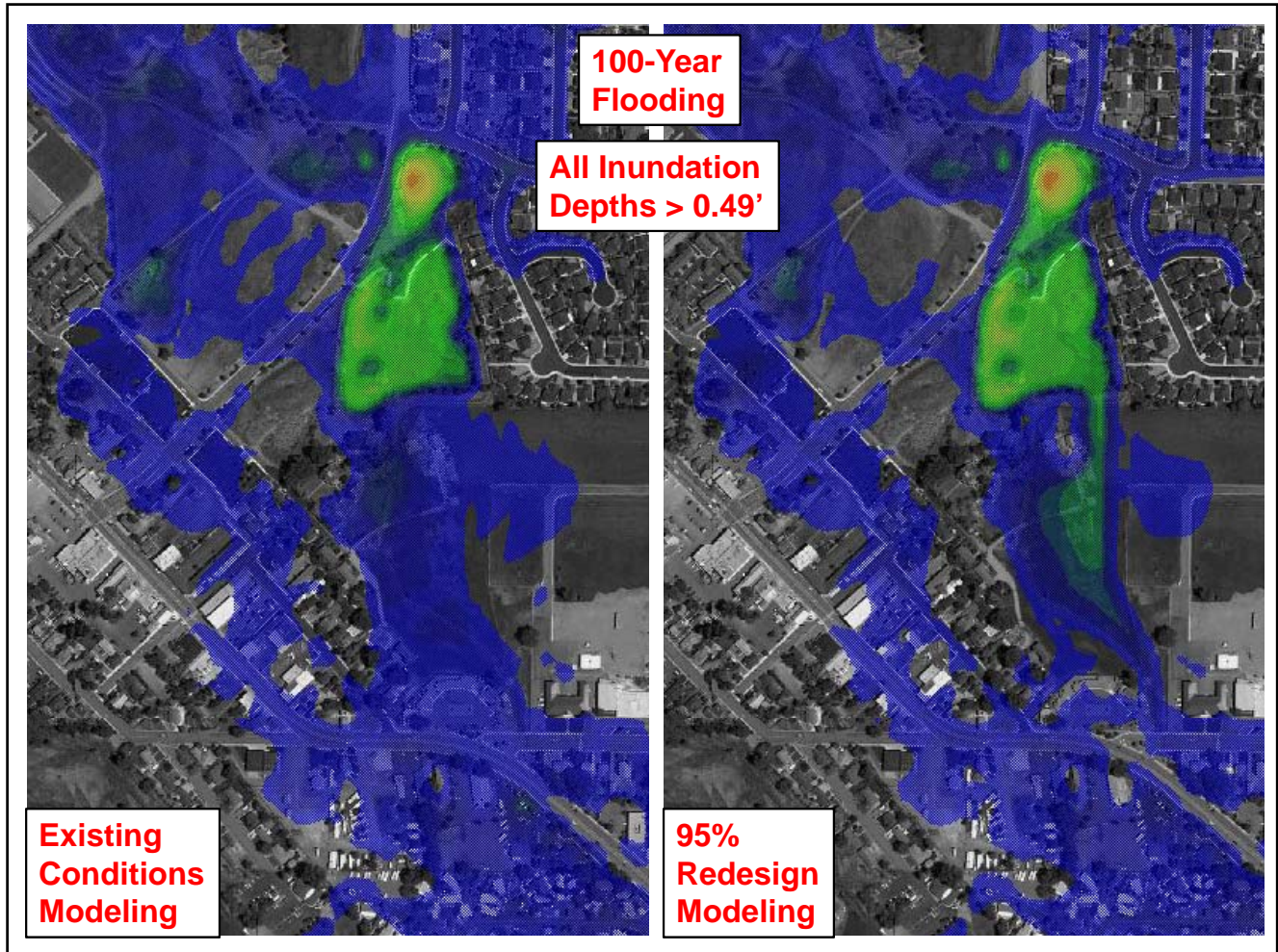
**All Inundation  
Depths > 0.49'**



**Maximum  
Depth  
Contours**

**95%  
Design  
Revisions**

**100-Year  
Proposed  
Conditions**





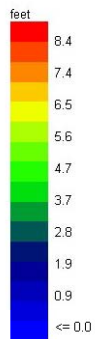


**Original  
Channel  
Design**

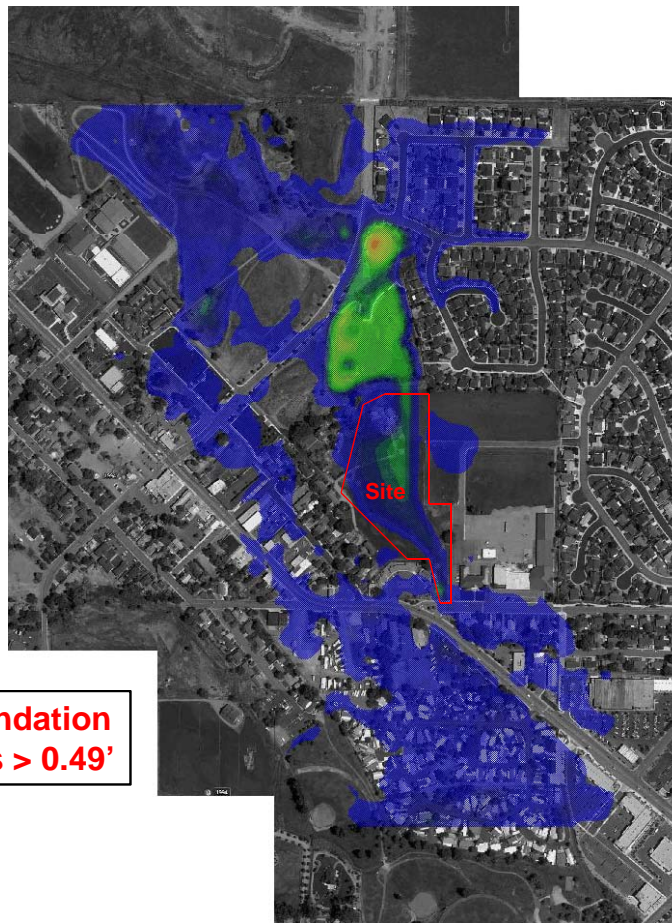
**NEW Double  
10' X 2' Box  
Culvert**

AE





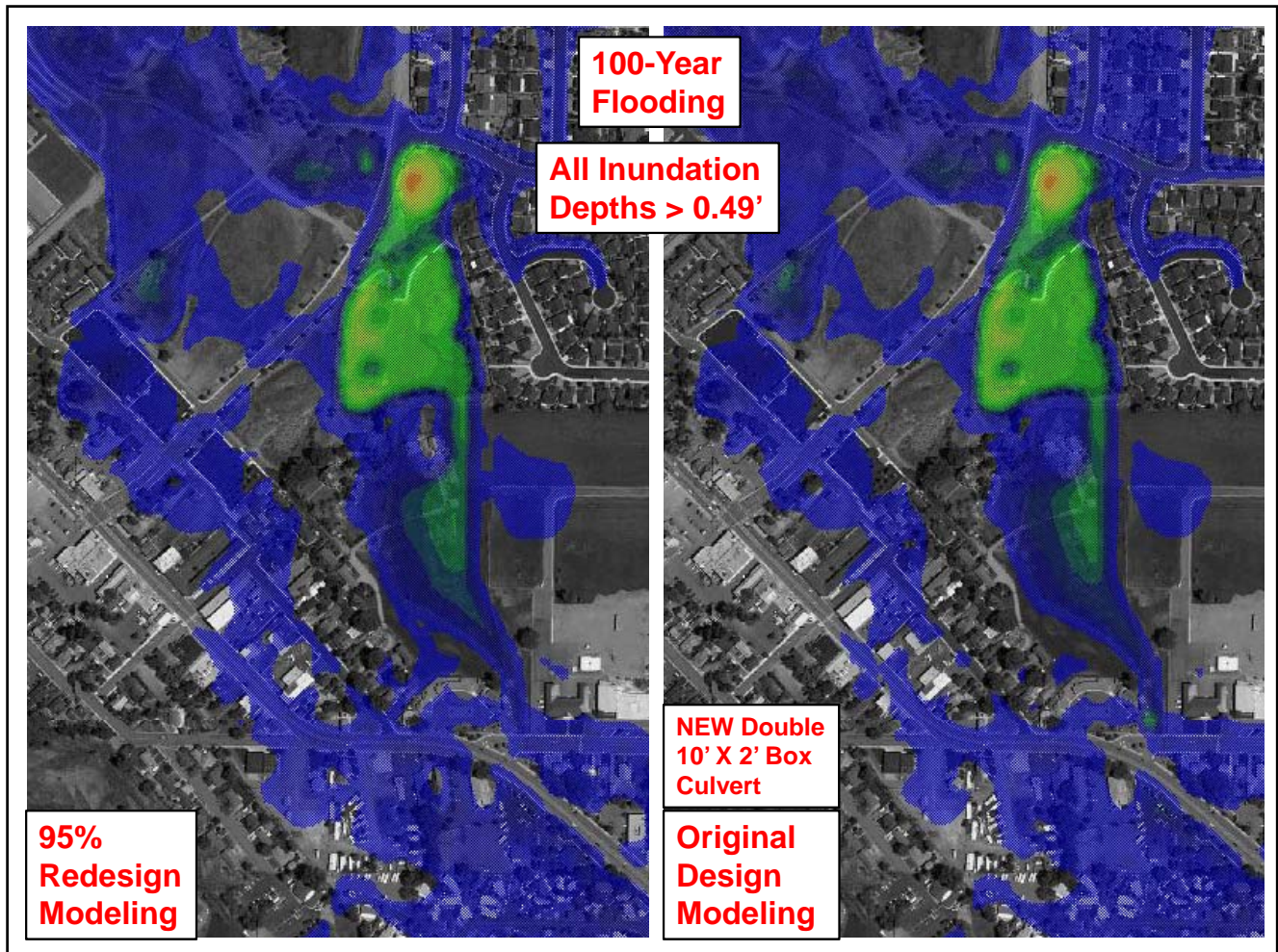
**All Inundation  
Depths > 0.49'**

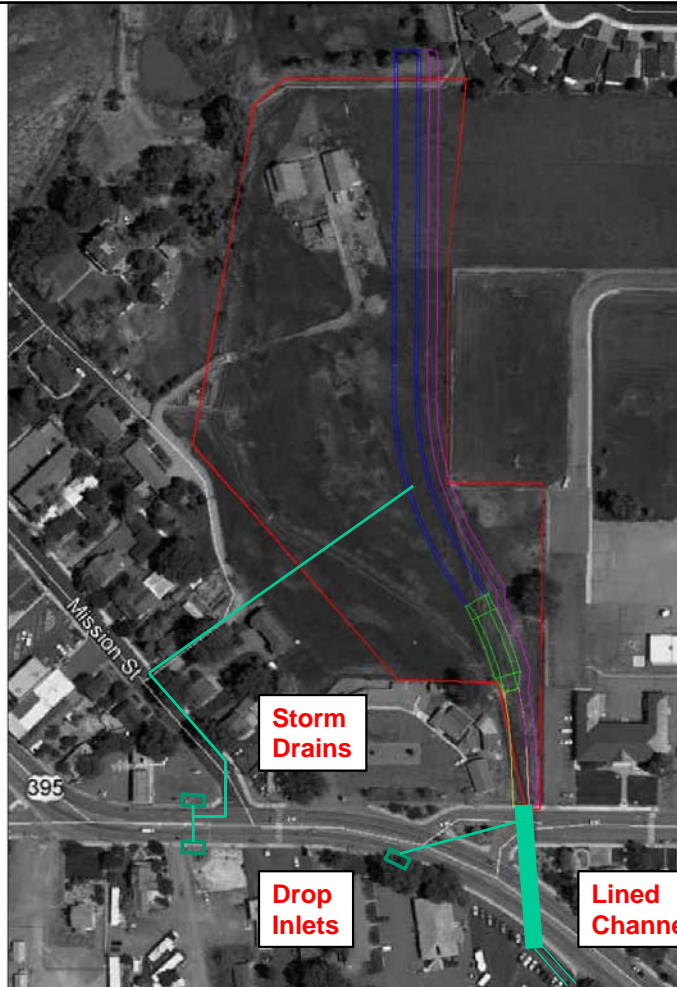


**Maximum  
Depth  
Contours**

**Full Original  
Design with  
Toler Culvert  
Upgrade**

**100-Year  
Future  
Conditions**



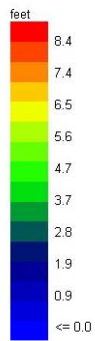


## Potential Storm Drain Improvements

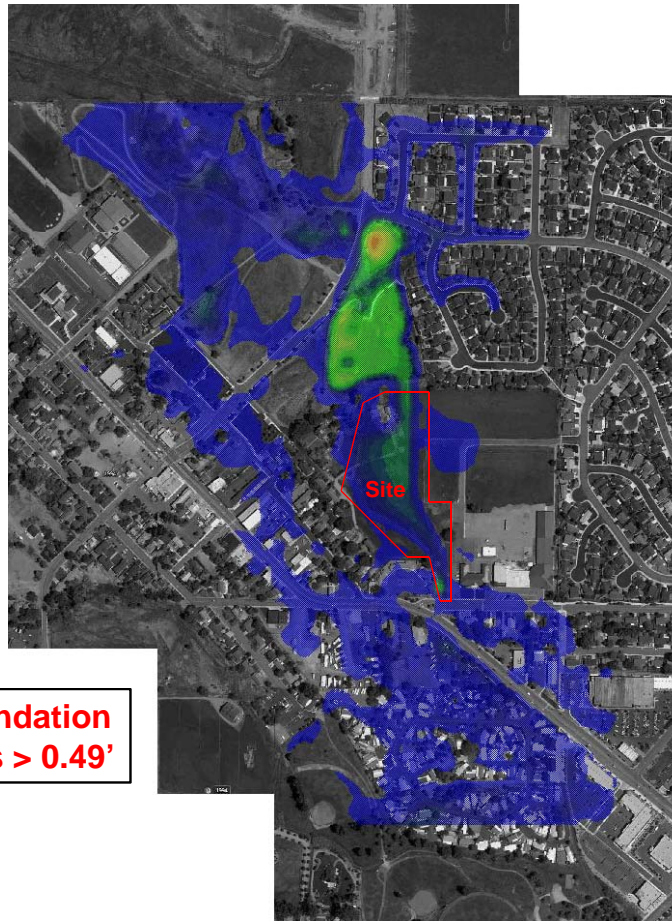
## Drop Inlets

**Lined Channel**





**All Inundation  
Depths > 0.49'**



**Maximum  
Depth  
Contours**

**Original  
Design with  
Toler Culvert  
Upgrade and  
Potential SD  
Improvements**

**100-Year  
Master  
Planning**

