

Neffs Canyon Debris Basin Feasibility Study

Performed for Millcreek

Presented by:

Bowen Collins & Associates and Millcreek

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Overview

- Purpose of Study
- History of Neffs Creek Flood Problems
- Alluvial Fan Flood Hazards
- Constraints for Mitigation Methods
- Flood Mitigation Alternatives
- Next Steps
- Answer Questions

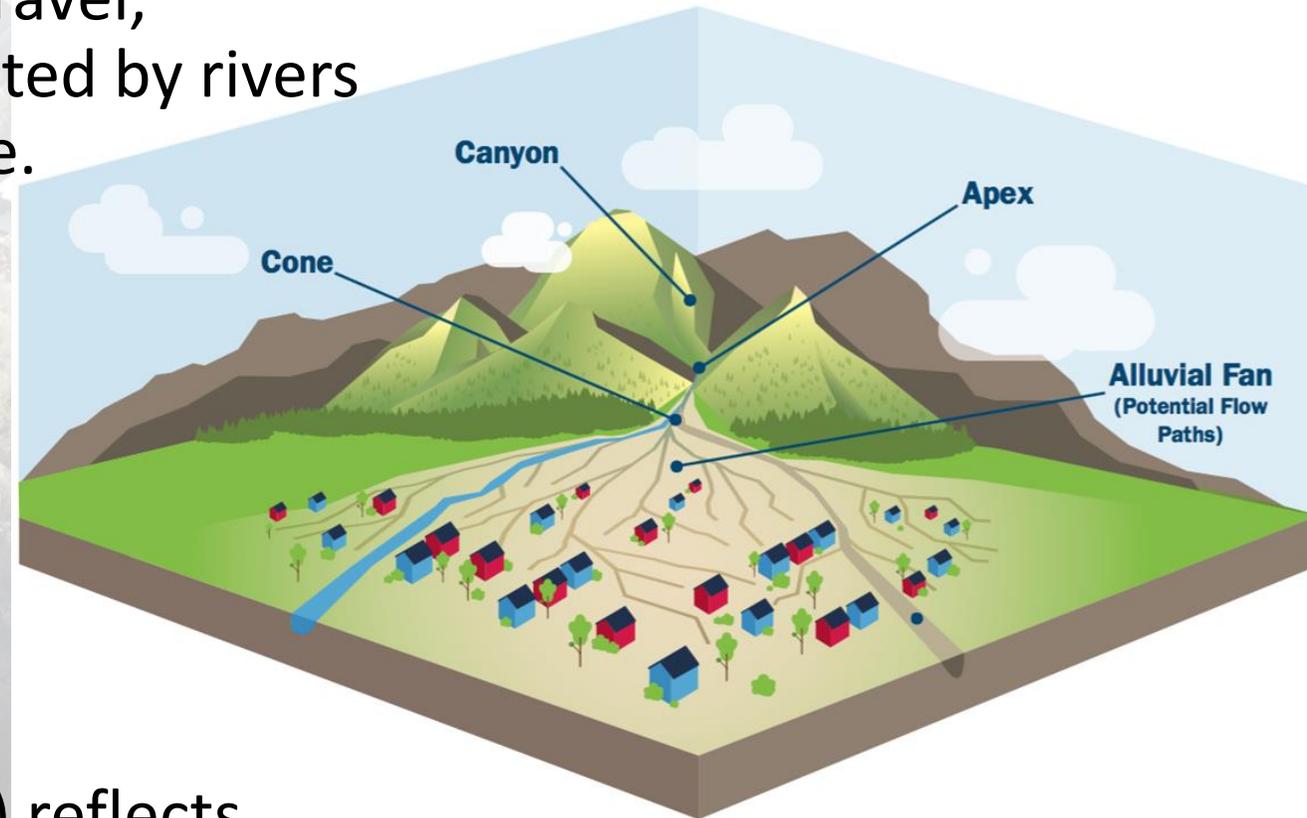
Purpose of Study

- Evaluate the feasibility of alternative methods to mitigate the reoccurring flood problems and possible debris flow hazards associated with the Neffs Creek alluvial fan.



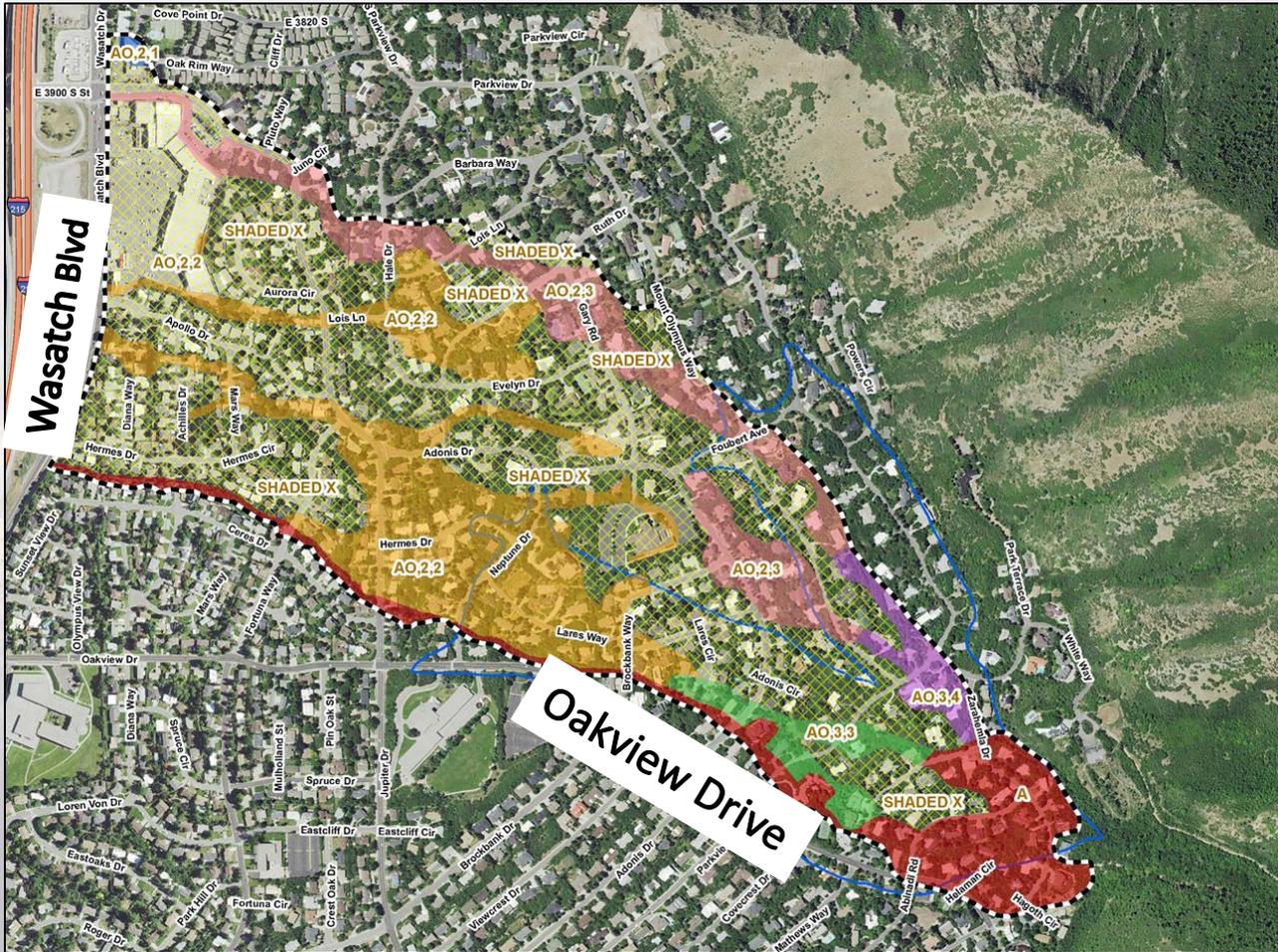
What is an Alluvial Fan

- “Fan”- shaped area where silt, sand, gravel, boulders and woody debris are deposited by rivers and streams over a long period of time.
- Associated Flood hazards
 - Braided, unpredictable flow paths
 - High-velocity flow
 - Erosion and scour
 - Sediment transport and deposition
 - Debris flow
 - Mud flow
 - Flash flooding
 - Sheet flow
- New Flood Insurance Rate Map (FIRM) reflects updated regulatory flood zones



Source: FEMA

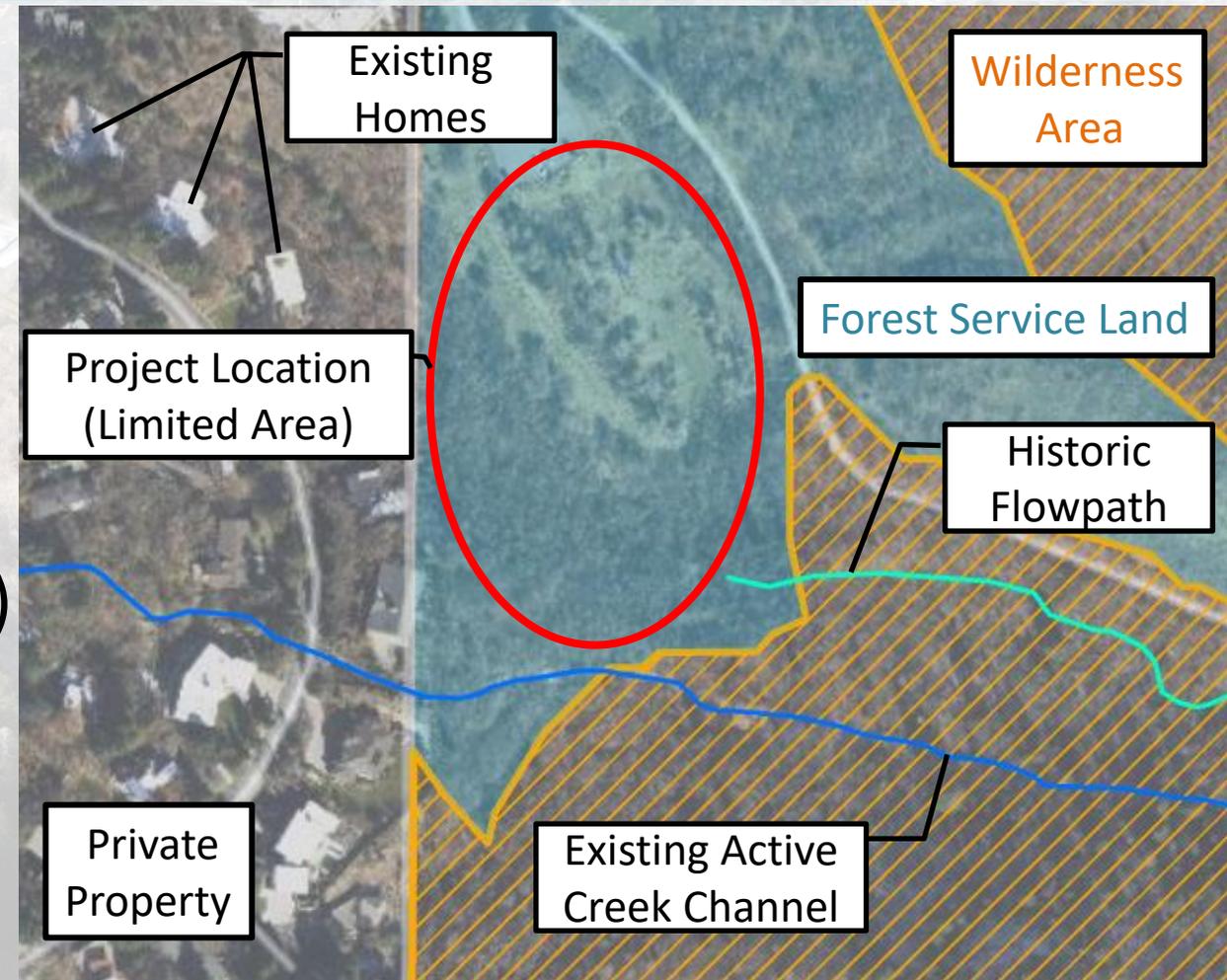
Visit the Neffs Creek Floodplain Webpage for More Information <https://millcreek.us/365/Neffs-Creek-Floodplain-Map-Changes>



FEMA-Based Flood Hazard Designation	Description of Mapped Flood Hazard
Zone X (shaded)	Average 100-year flow depth between 0.5' and 1.0'.
Zone A	Ultrahazardous zone near the alluvial fan topographic apex. Area subject to the highest degree of flowpath uncertainty. In other areas where the average flow depths are greater than 3 feet. Approximate 100-year floodplain. (No flood depths defined)
Zone AO2,1	100-year flow depth between 1.5 foot and 2.5 feet. Average flow velocities of 1 foot/second.
Zone AO2,2	100-year flow depth between 1.5 feet and 2.5 feet. Average flow velocities of 2 feet/second.
Zone AO2,3	100-year flow depth between 1.5 feet and 2.5 feet. Average flow velocities of 3 feet/second.
Zone AO3,3	100-year flow depth between 2.5 feet and 3.0 feet. Average flow velocities of 3 feet/second.
Zone AO3,4	100-year flow depth between 2.5 feet and 3.0 feet. Average flow velocities of 4 feet/second.

Constraints for Flood Mitigation Methods

- Safely convey runoff from 100-yr flood
- Avoid Improvements in USFS Wilderness Area
- Do Not Impact Existing Homes and Structures
- Meet USFS Requirements (Permitting, etc.)
- Maintain Existing Channel (up to 15 cfs)
- Address Geologic/Geotechnical Issues
 - Wasatch Fault
 - Landslide Potential
 - Regulatory Issues (Dam Safety)



Mitigation Alternatives (Based on Existing Watershed Conditions— No Post-Fire Analysis)

- *Design to solve two problems – reoccurring flooding and existing debris flow hazards*

Mitigation Alternatives include:

1. Debris Basin Dam and Storm Drain in Street
2. Debris Basin Dam and Improve Existing Channel
3. Below-Grade Debris Basin and Storm Drain in Street
4. Below-Grade Debris Basin and Improve Existing Channel
5. Debris Basin in Wilderness Area (Currently Not Feasible)

Or ...

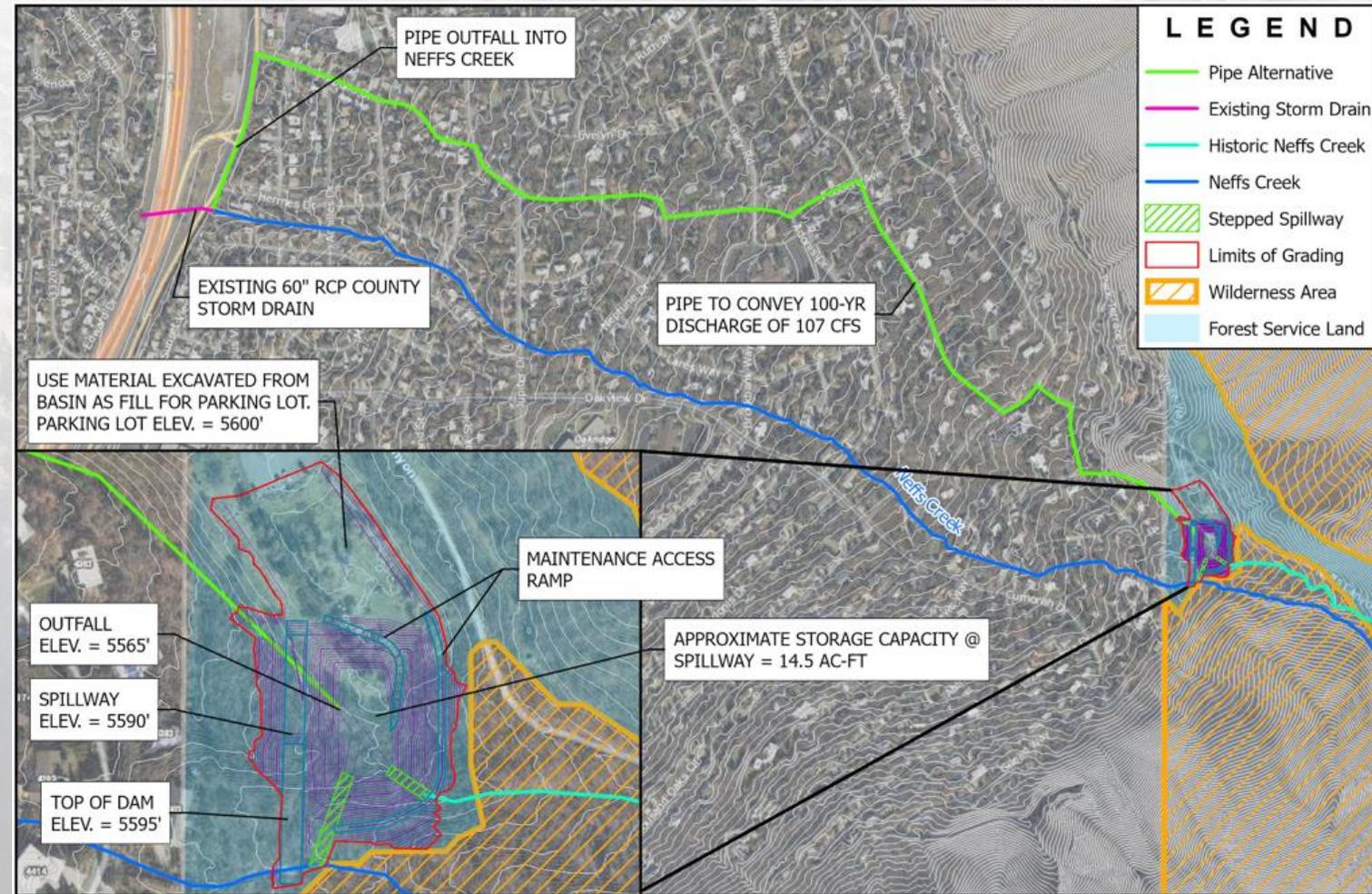
6. Do Nothing (No Mitigation)

Updated Hydrology (107 cfs vs. 300 cfs)

- The flood hazards on the new FEMA map are based on a 100-year flood discharge of 300 cubic ft per second (cfs)
- A new scientific analysis shows that the peak 100-year flood discharge should be reduced to about 107 cfs
- Lower number better matches discharges for nearby gaged streams
- Although the new 100-yr discharge is lower, updating the FEMA floodplain map with the lower discharge would not likely result in a smaller active fan floodplain footprint
- Alternative design is based on the 100-year design discharge of 107 cfs and 228 cfs for the 500-year flood event.

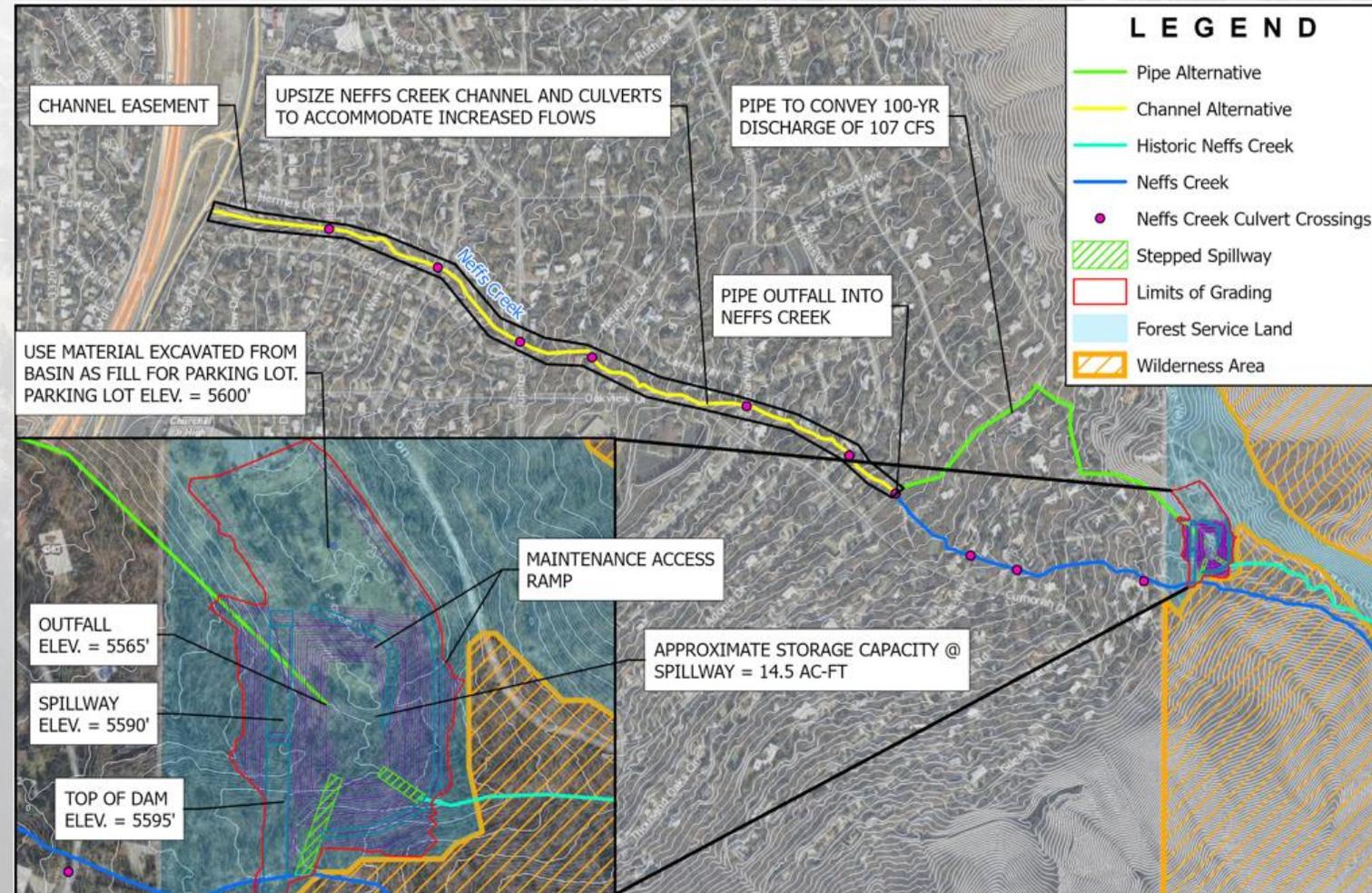
Mitigation Alternative #1 – Dam/Storm Drain

- Debris Basin Dam and Storm Drain
 - Dam at apex of alluvial fan
 - Debris basin outlet connects to new storm drain pipe
 - Storm drain follows road and discharges into Neffs Creek storm drain at Wasatch Blvd
 - Maintain discharges up to about 15 cfs in existing creek channel



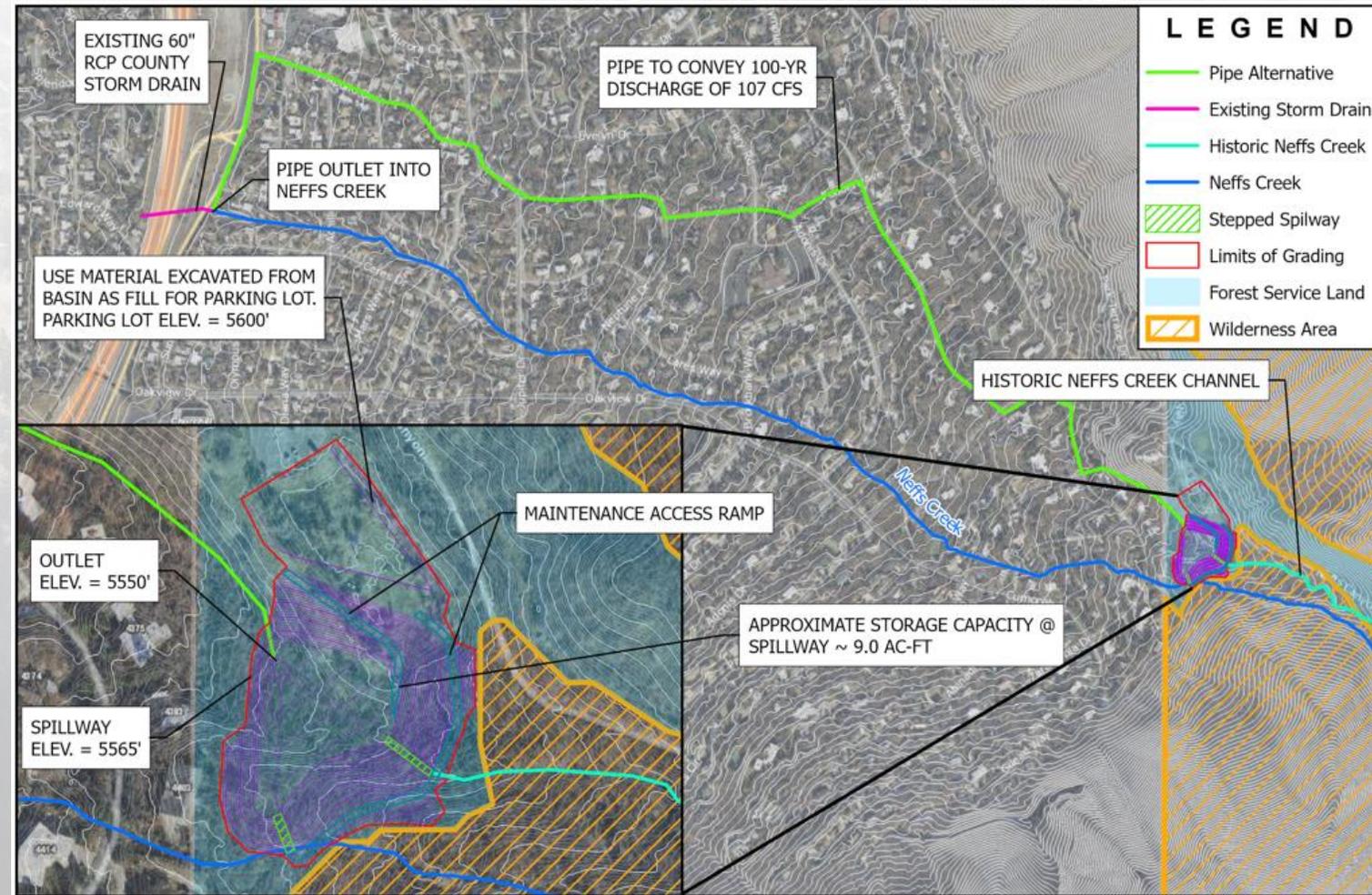
Mitigation Alternative #2 – Dam/Channel

- Debris Basin Dam and Channel Improvements
 - Dam at apex of alluvial fan
 - Debris basin outlet connects to storm drain pipe
 - Storm drain follows road and discharges into Neffs Creek at Parkview Drive
 - Channel Improvements below Parkview Drive
 - Maintain discharges up to about 15 cfs in downstream creek channel



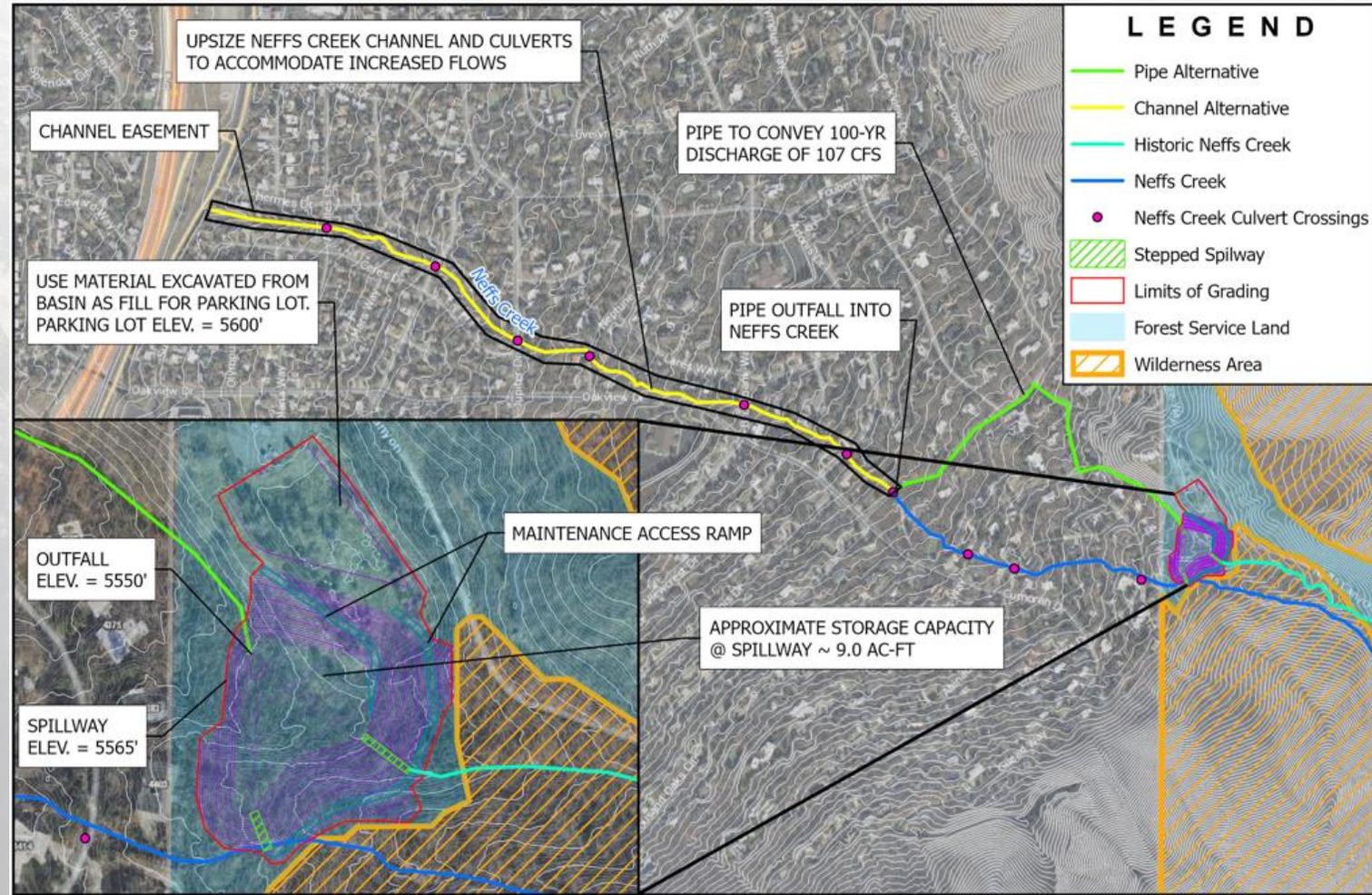
Mitigation Alternative #3 – Below-Grade/Storm Drain

- Below-Grade Debris Basin and Storm Drain
 - Basin at apex of alluvial fan
 - Outlet of debris basin connects to storm drain
 - Storm drain follows road and discharges into Neffs Creek storm drain at Wasatch Blvd
 - Maintain discharges up to about 15 cfs in existing creek channel



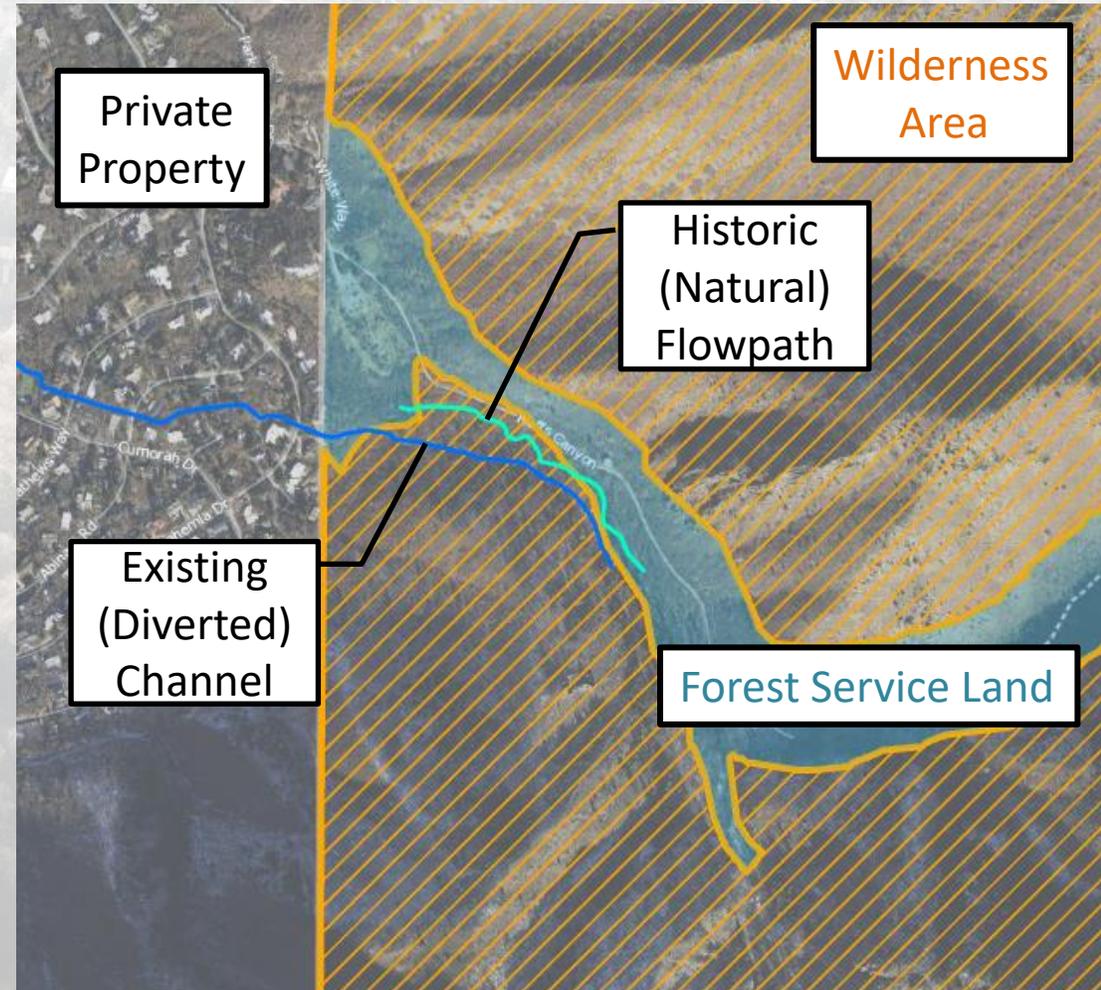
Mitigation Alternative #4 – Below-Grade/Channel

- **Below-Grade Debris Basin and Channel**
 - Basin at apex of alluvial fan
 - Outlet of basin connects to storm drain
 - Storm drain follows road and discharges into Neffs Creek at Parkview Drive
 - Channel Improvements below Parkview Drive
 - Maintain discharges up to about 15 cfs in downstream creek channel



Mitigation Alternative #5 – Basin in Wilderness Area

- Debris Basin in Wilderness Area
 - Not feasible without act of Congress
 - Still need improvements below the debris basin to convey flood flow safely past existing homes and to Neffs Creek storm drain.



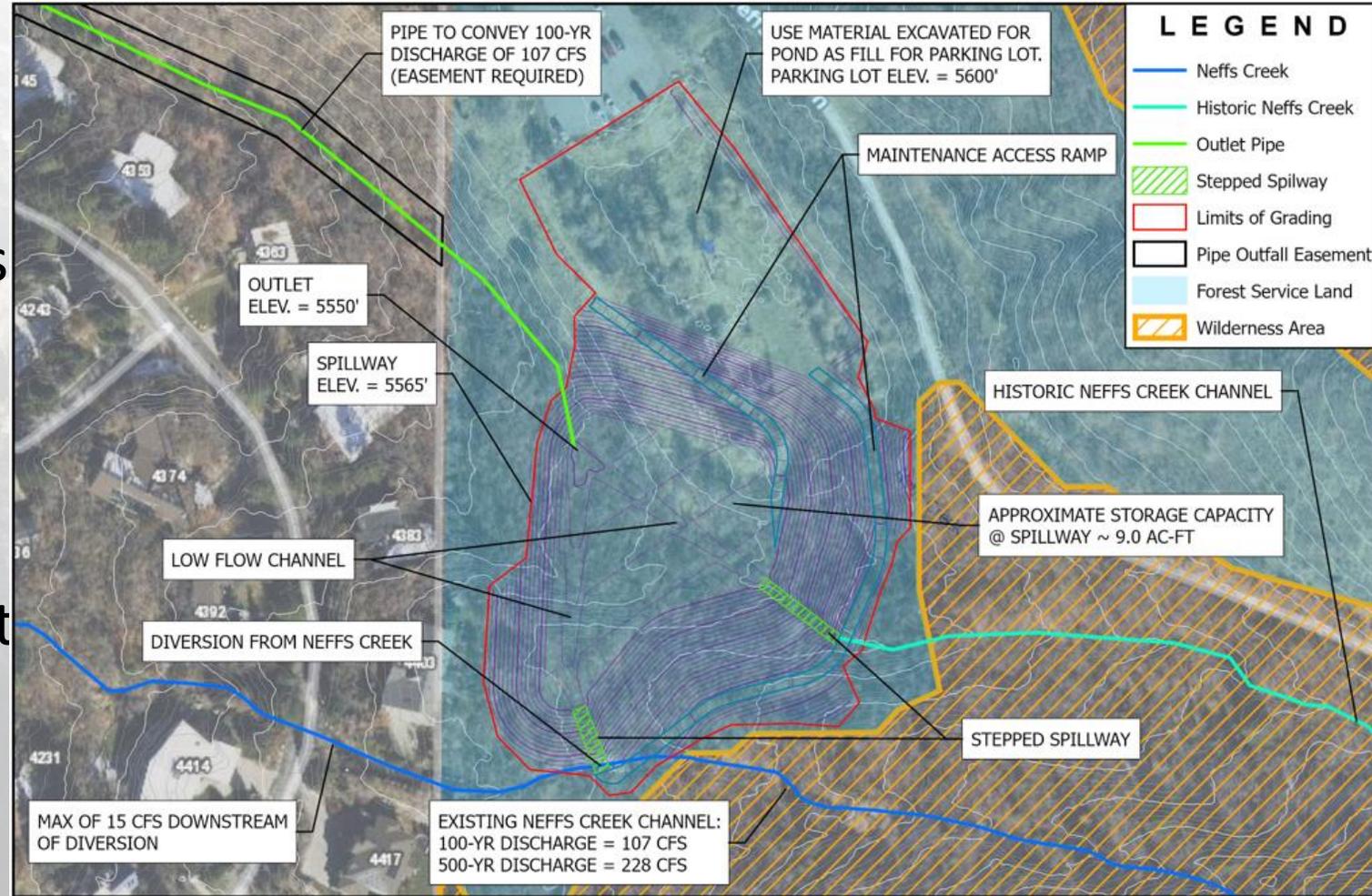
Mitigation Alternative #6 – Do Nothing

- Do Nothing
- Hazards stay the same
- Cannot revise floodplain maps
- Flood Insurance Requirements (\$\$\$)
- Restrictive Building requirements
- Rebuilds must meet new building restrictions
- Current Fire Station serving the Mount Olympus area cannot be replaced with a new building under current restrictions



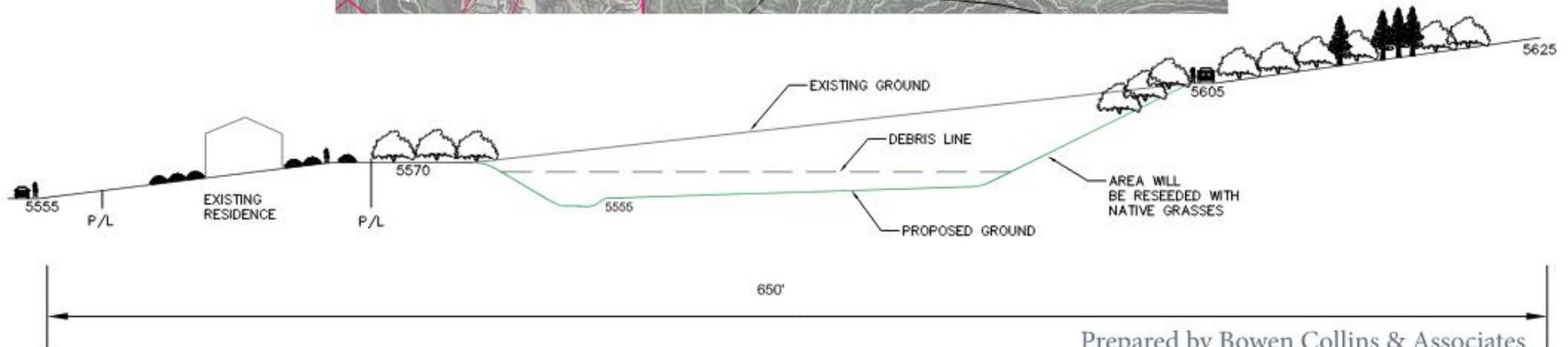
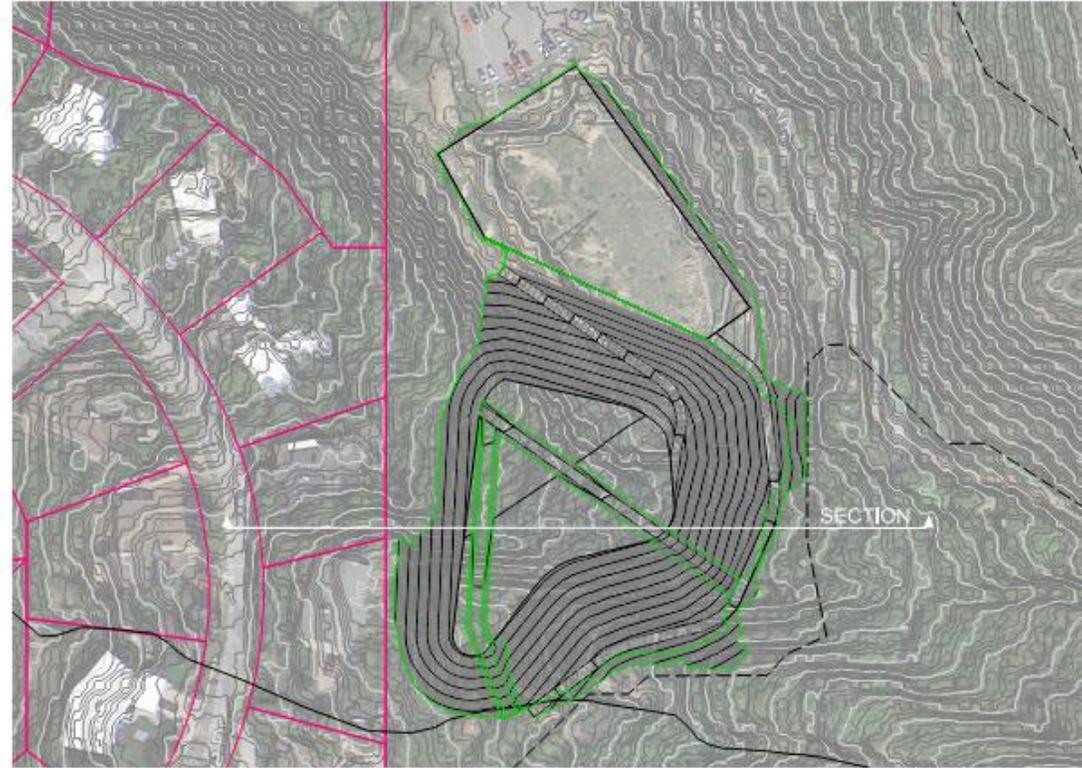
Recommended Alternative (Alternative #3)

- Below Grade Debris Basin and Storm Drain
 - Utilize available USFS land
 - Least impactful to properties along existing creek channel
 - Minimal visual impacts
 - Storm drain can pick up localized street runoff
 - Improve trailhead parking lot with fire fighting facilities
 - Least Alternative Estimated Cost: \$12,000,000



Millcreek Debris Basin

Section



Recommended Alternative

- View Renderings

Existing vs. Proposed



View from North



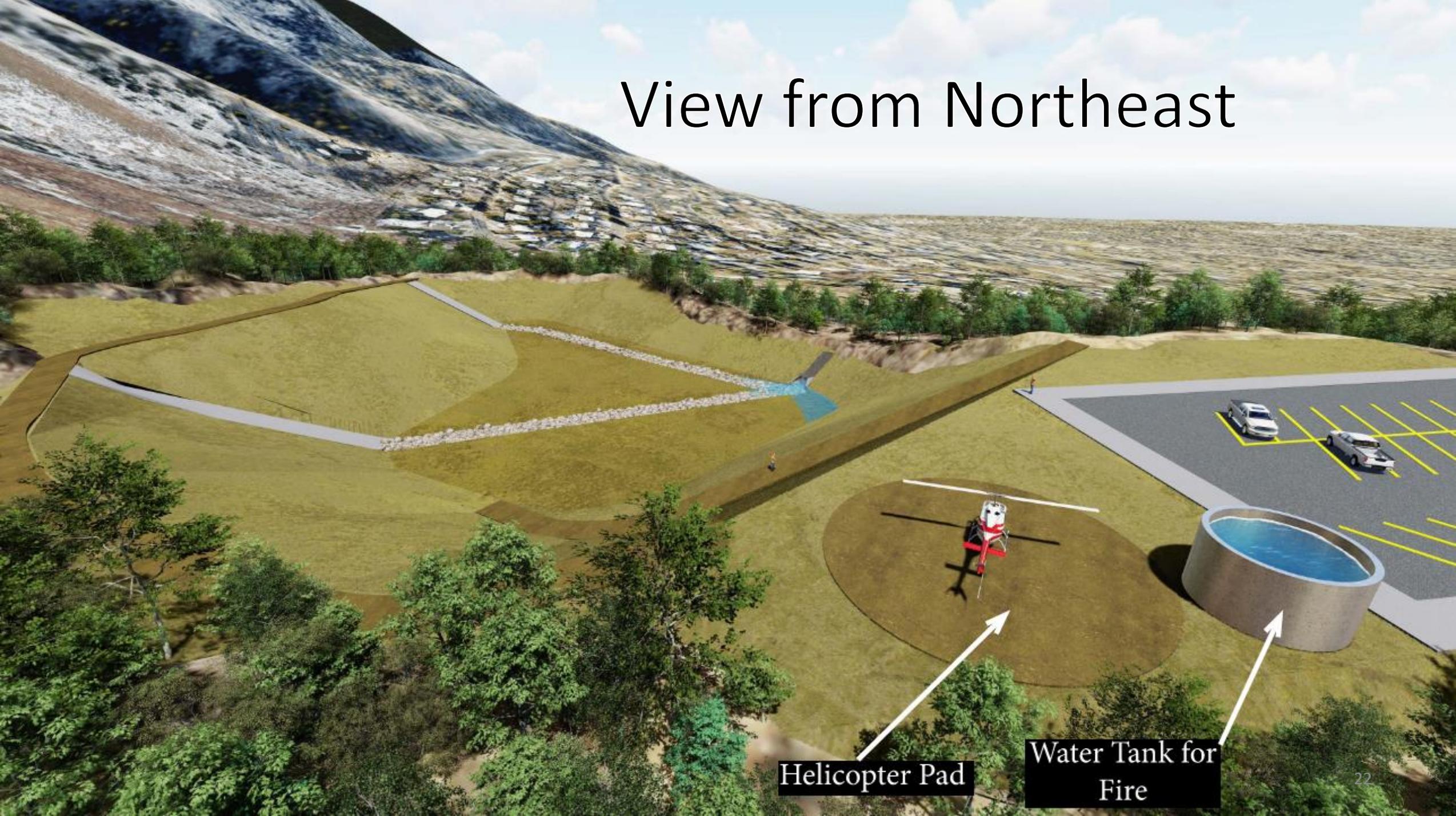
Future Parking

View from South



Storm Drain
Pipe (Buried)

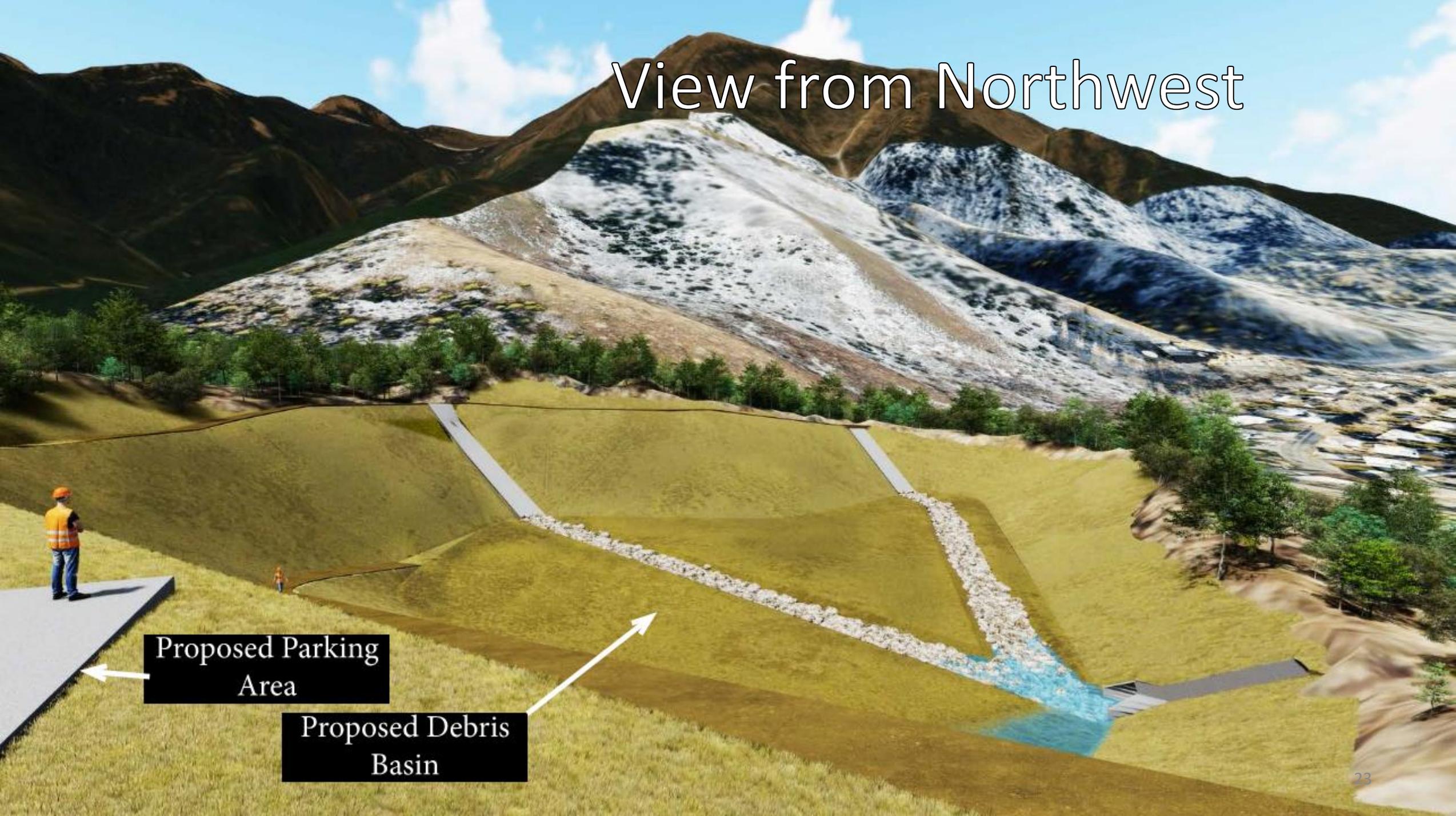
View from Northeast



Helicopter Pad

Water Tank for Fire

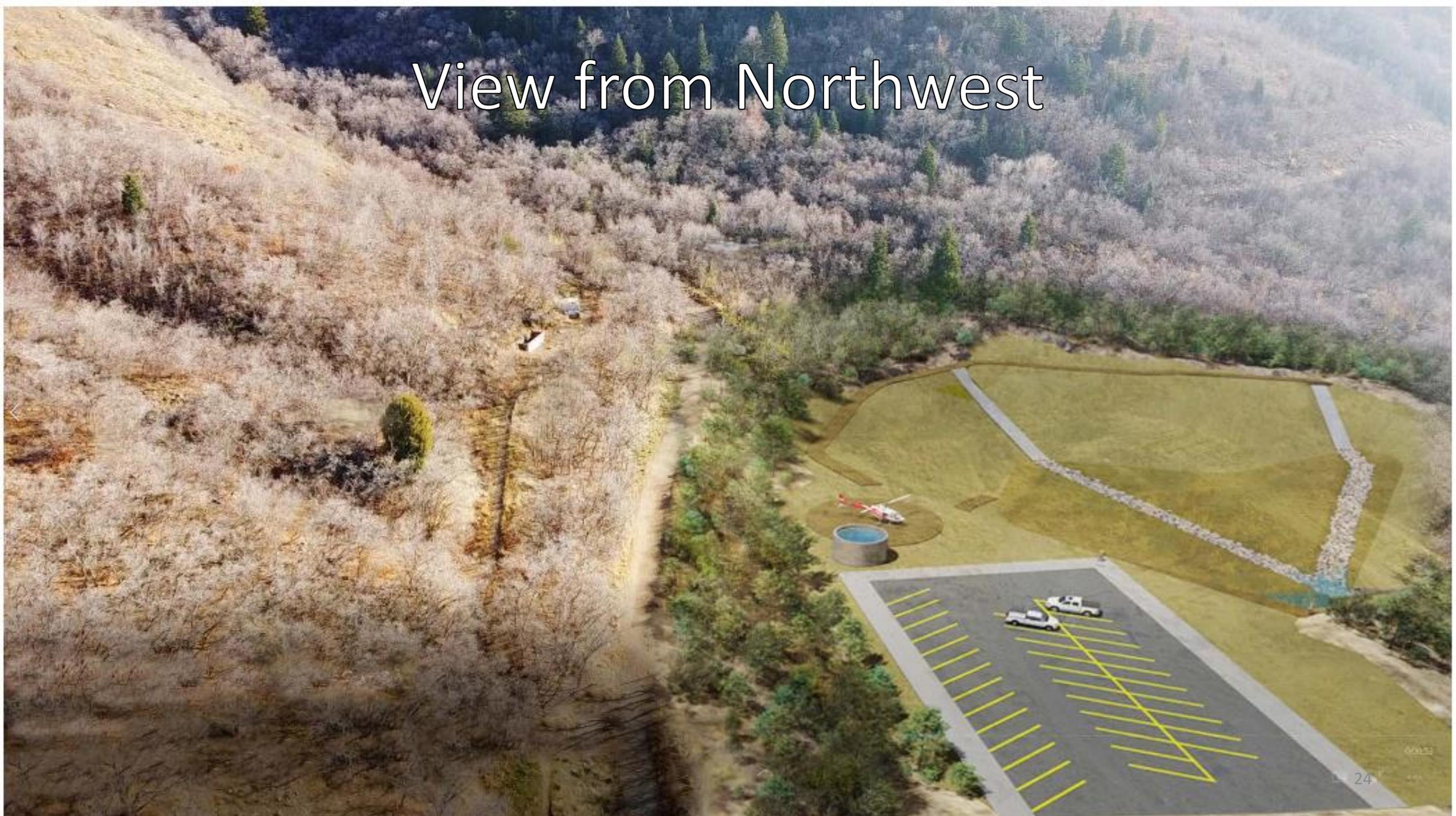
View from Northwest



Proposed Parking
Area

Proposed Debris
Basin

View from Northwest



View from East



Recommended Alternative

- Video of Below-Grade Debris Basin 3D Rendering

Study Limitations

- Fire – if a large fire occurs, the recommended basin may be undersized to protect homes from a debris flow
- While the debris basin may be undersized for a large post-fire runoff event, the available area is being utilized to the maximum extent that is practicable.



Next Steps

- Obtain conditional approval from FEMA that proposed improvements will mitigate the 100-year flood hazard
- Obtain funds for final design and construction
 - Complete an environmental assessment for the USFS
 - Work out permits/issues with USFS
 - Obtain needed pipeline easements on private property
 - Complete final design
- Perform a more detailed geologic/geotechnical analysis
- Construct the debris basin and storm drain
- Obtain a Letter of Map Revision from FEMA to eliminate alluvial fan 100-year flood hazard

Questions?

Or Email Dan Drumiler at:

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by end of February 2022

