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JUN 13 2022

MINERALS & MINING PROGRAM



APPENDIX N

VISUAL SIMULATION



The land within the proposed permit boundary is similar to the surrounding land. The predominant land use is evergreen forest with the remaining area consisting of minor amounts of shrubland, grassland, and mixed forest. The area encompassing the project site is dominantly ponderosa pine-covered slopes. Although the characteristics of this area provide aesthetic appeal, they are similar to surrounding lands and are not unique to the area.

In the past, mining activities at Wharf have been north of the Portland Ridge, which provided some topographical and vegetative screen. The proposed Boston Expansion will push back into the ridgeline and allow for minor increased visibility from public areas. Compared to existing mining disturbance, visual impacts of the expansion will be low. The Boston Expansion area may be slightly visible from Perkins Road but will not be visible from Highway 34 or Interstate 90. The residence areas consist of the Barefoot Condominium area and Lost Camp area, both of which are close to the existing Wharf operation and the Boston Expansion. However, the Boston Expansion should not be visible from the housing development because topography and vegetation currently provide visual screening. However, visual screening measures will not be feasible for all of the views of the Boston Expansion area.

A visual simulation analysis for the Wharf Boston Expansion was performed. Nine Vantage Points (VPs) were chosen to show the progress of the mine construction, including current permitted operations and reclamation and proposed operations and reclamation. Vantage points were chosen collaboratively by Stantec, Wharf, and RESPEC based on public access points where view of the existing mine and proposed expansion operations may exist. VPs are typically chosen based on areas of high public use, residences, and public facilities. The VPs chosen had the highest probability of having public visibility of the Boston Expansion; the direction of view was also selected using the same criteria.

Because of the exact location of the expansion and local topography, most vantage points evaluated do not show public views of the expansion but more so show views of the general Wharf Mine and views seen by residents and visitors as they approach the mine. Locations of VPs are shown in Figure 1 below and include the following sites:

- VP 1 NW - Terry Peak Summit overlooking Wharf
- VP 4 NNW - Top of Nevada Gulch Road and intersection of Stewart Road
- VP 7 N - Antelope and Last Chance intersection
- VP 8 NW - Toward Wharf/Thaler house
- VP 8 NE - Moose Trail and Last Chance intersection
- VP 9 S – Perkins Road

Only those images from VPs that are relevant to the Boston Expansion are included in Appendix D; figures show existing conditions, computer simulated post-build (or end of mining), and simulated reclaimed views. The VPs which demonstrated the most changes were VPs 1, 4, and 9. The rest of the VPs oriented toward the Boston Expansion show minimal changes. The visual impacts of mining will become greater as mining occurs and the elevation of the Portland Ridgeline is reduced. Because the



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VPs were located along public access points and have limited visibility, additional site photographs were obtained by Wharf.

VP 1 is located at the top of the Terry Peak ski resort and has a large field of view. The biggest visual change at VP 1 is the change in land cover between post-build and post-reclamation of existing permitted disturbance. The majority of the Boston Expansion is not visible, though small areas may be visible depending upon exact viewing location and vegetation screening.

VP 4 is located on Highway 473 (Nevada Gulch Road), higher in elevation, with a clear view of the Green Mountain Pit area and Deep Portland area. These areas also show a bigger change in land cover as opposed to topography. At VP 4 looking NNW, removal of a few trees along the ridgeline may be noticeable, but overall visual impacts from the Boston Expansion will be minimal.

Views from within the Lost Camp subdivision (VP 7 and VP 8) were from public roads rather than private residences, as is industry standard. These VPs just happen to face residences and demonstrate the amount of current vegetation and topography blocking visibility in these areas. The difference in view and visual impacts from VP 8 and the nearest residences are not anticipated to greatly vary. VP 9 is located on Perkins Road, looking south towards the American Eagle Pit. Visual changes are most apparent associated with changes permitted under an existing mine permit, though depending on exact viewpoint on Perkins Road, the change along the Portland Ridgeline resulting from mining within the Boston Expansion may be visible to residents or all-terrain vehicles (ATV) users on the road.

Coeur Wharf took field photographs from each vantage point with one or two field of views toward the mine site. Coeur Wharf and RESPEC also provided Stantec with a vantage point GIS shapefile, as well as CAD drawings of mine boundaries, current contours, post-build contours, and post-reclamation contours. The contours were converted to GIS shapefiles and used to build Triangulated Irregular Network (TIN) topography files. Using ArcGIS Pro, Stantec was able to model the current and post-build topography based on the TIN datasets. Each model (current and post-build) view was exported for each vantage point demonstrating the change in topography. The models were imported into Photoshop and overlaid onto the existing field photographs. Finally, Stantec was able to render the land cover for post-build and post-reclamation scenarios. Visual simulations of each VP are included as an attachment.

To supplement the visual assessment conducted by Stantec and assist in understanding the visual changes that may occur as a result of the proposed Boston Expansion, Stantec expanded our visual assessment to include oblique aerial views of the Boston Expansion and Wharf took photographs from their property fence line looking toward the residences as well as toward the mine. Because of the limited public views of the Boston Expansion, topographic surfaces, including an oblique view looking from the north to south, were developed (see Figures 2 through 11). These surfaces show current, post-build, and post-reclamation topography. The topographic impact of the Boston Expansion is most notably visible as a pushback to the current mining operations as shown in Figures 6b, 8, and 10.

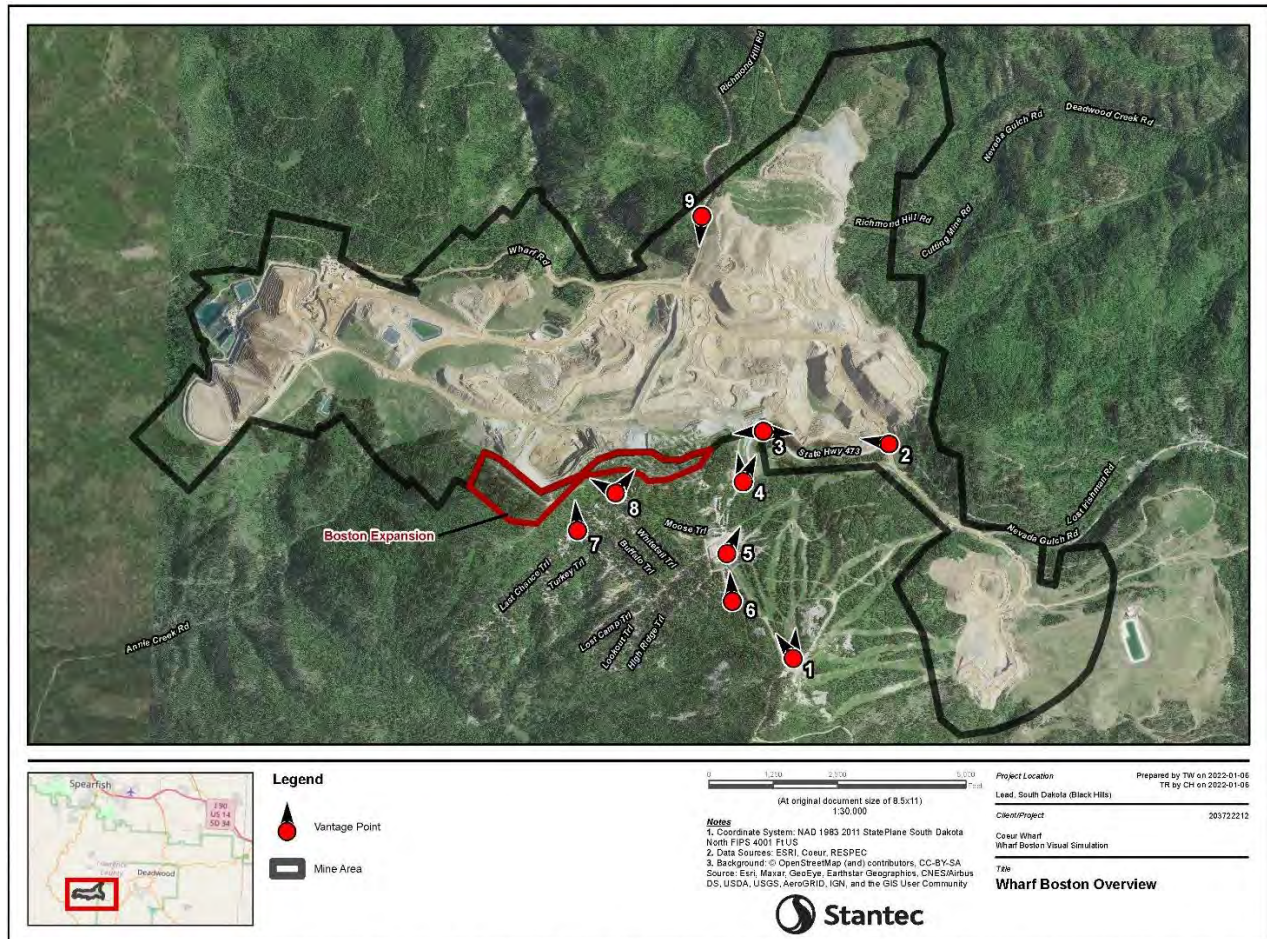


Figure 1. Vantage Point Locations

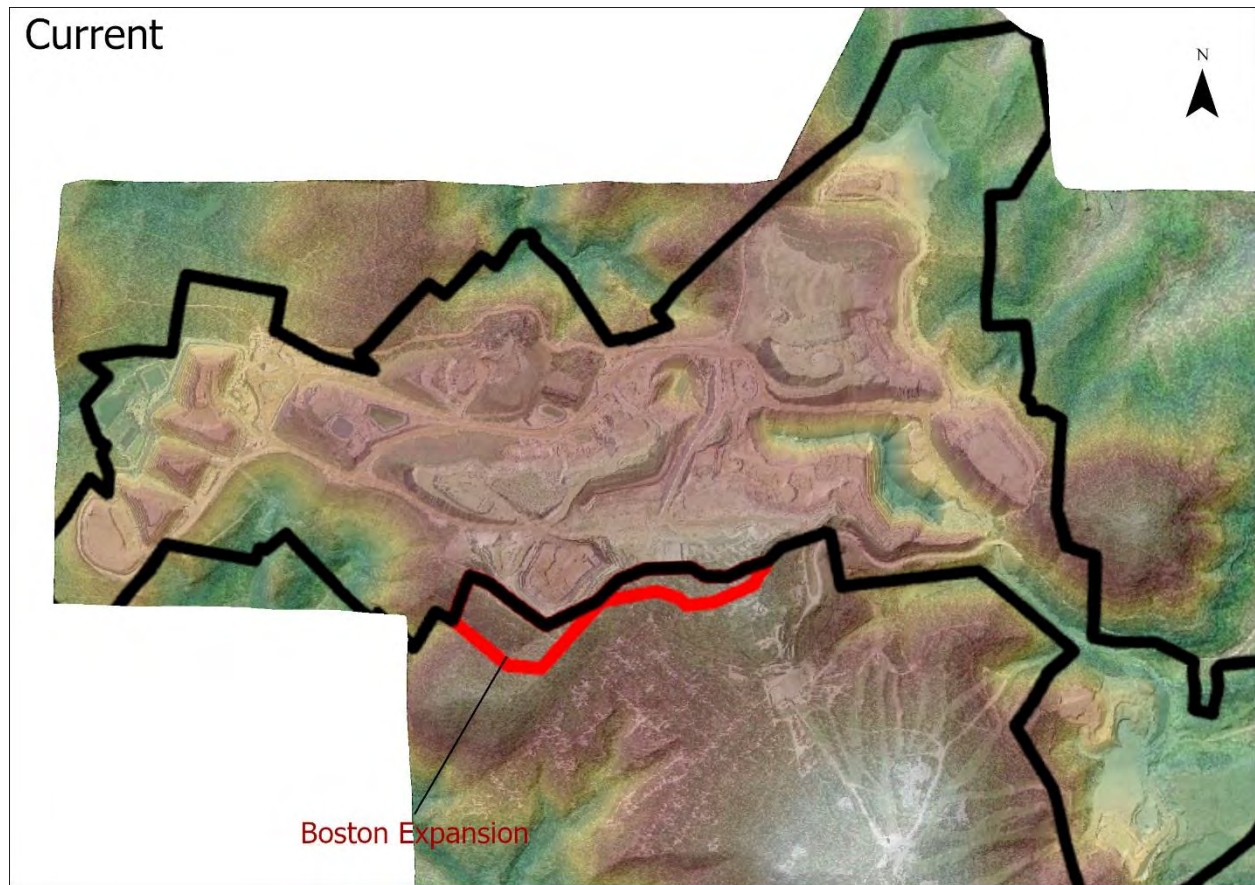


Figure 2. Current Contours Plan View

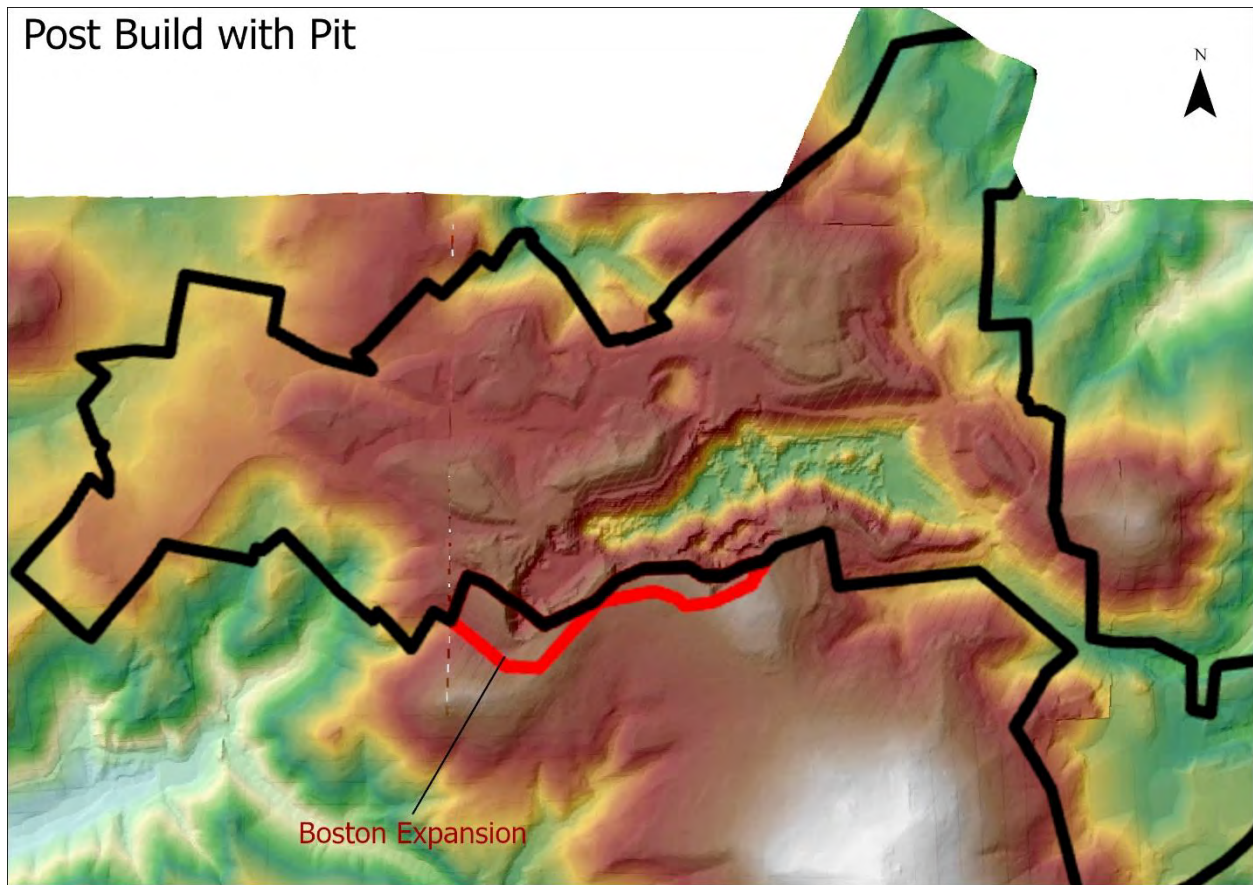


Figure 3. Maximum Pit / Post-Build Construction Contours Plan View

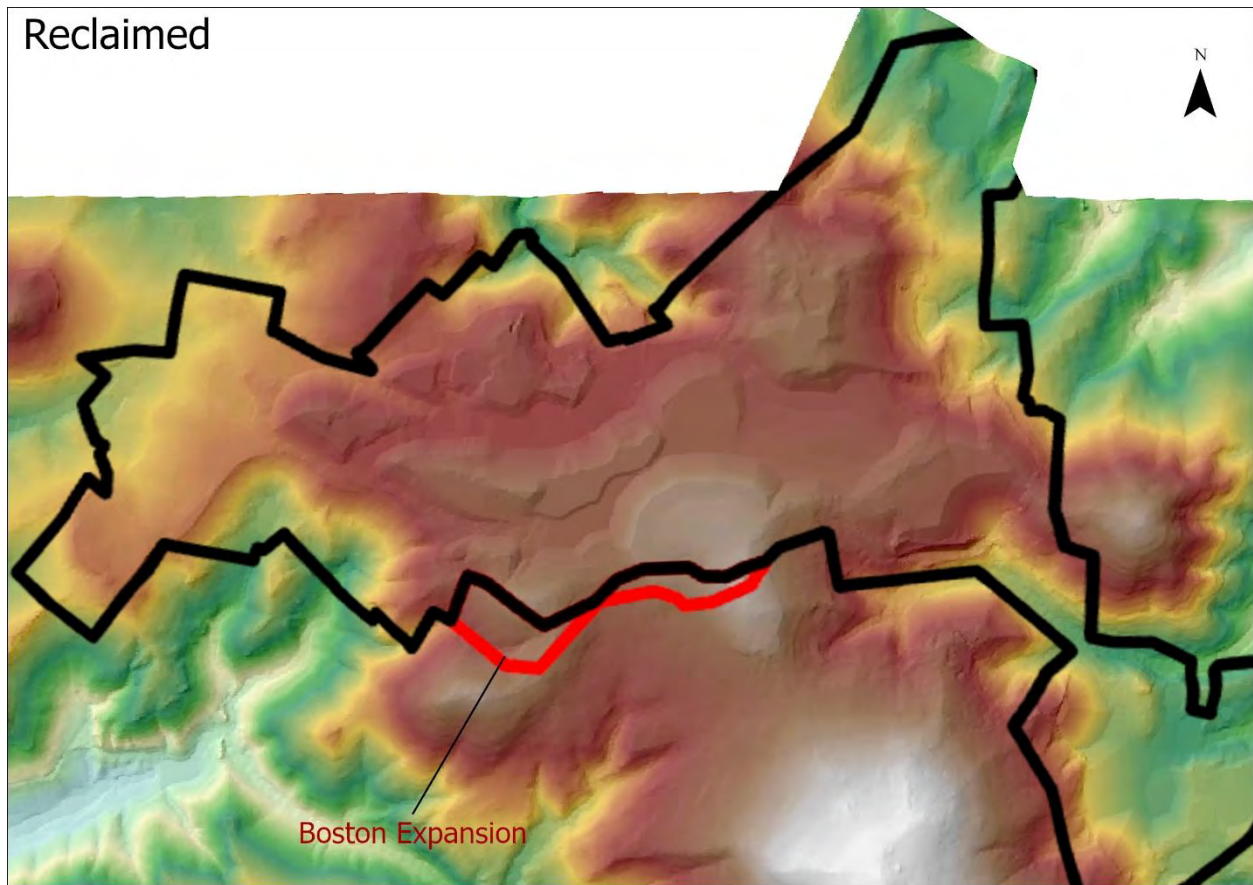


Figure 4. Reclaimed Contours Plan View

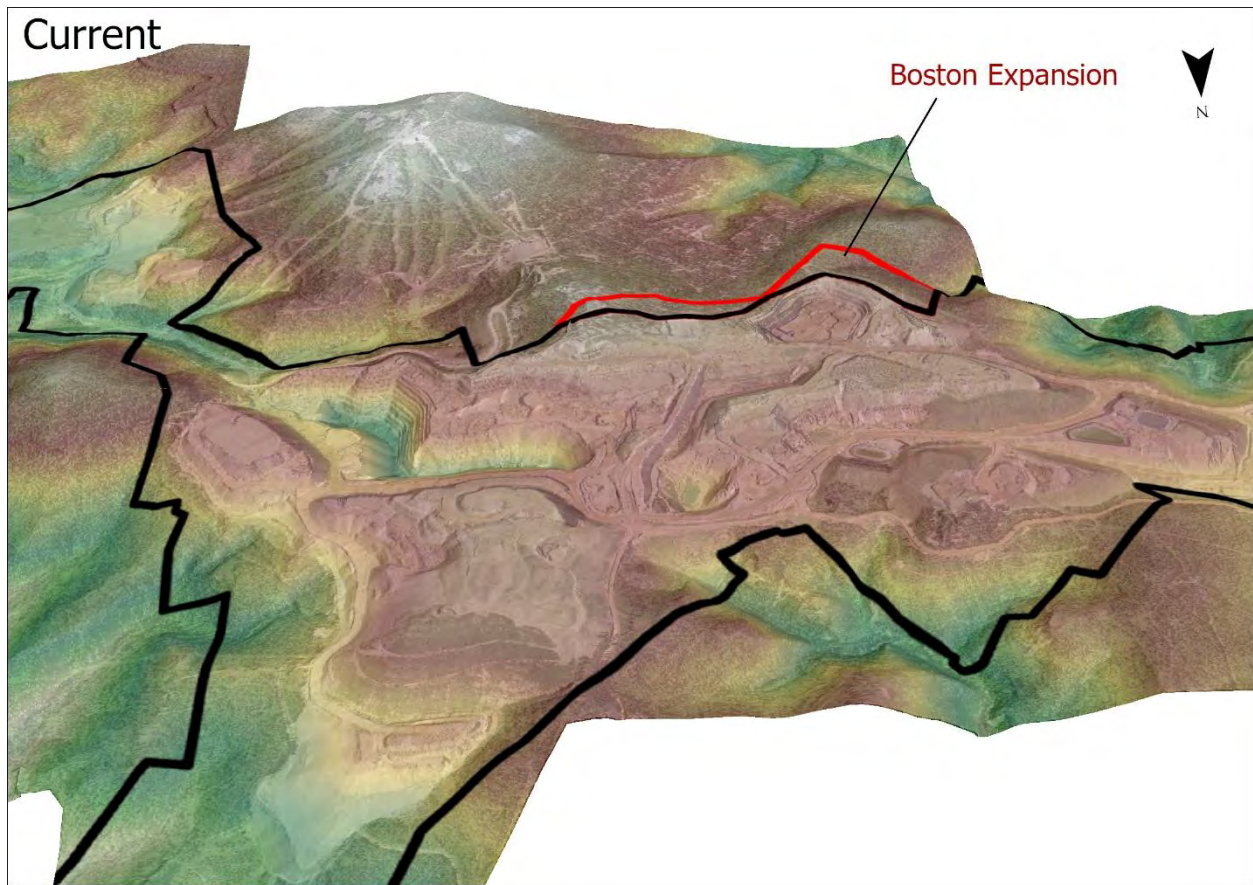


Figure 5. Current Contours Oblique View from North

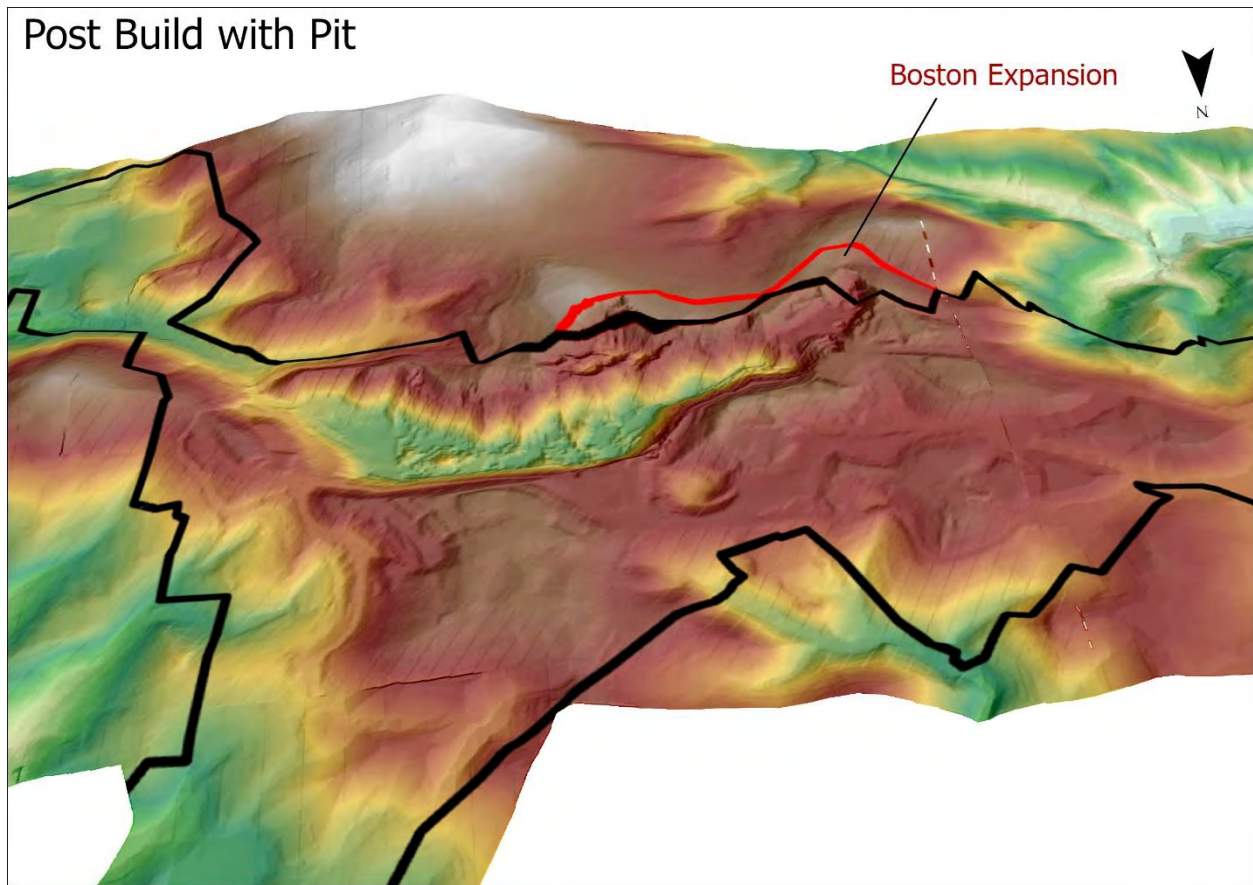


Figure 6a. Maximum Pit / Post-Build Construction Contours Oblique View from North



Figure 6b. Maximum Pit / Post-Build Construction Contours Oblique View from North Draped with Conceptual Imagery

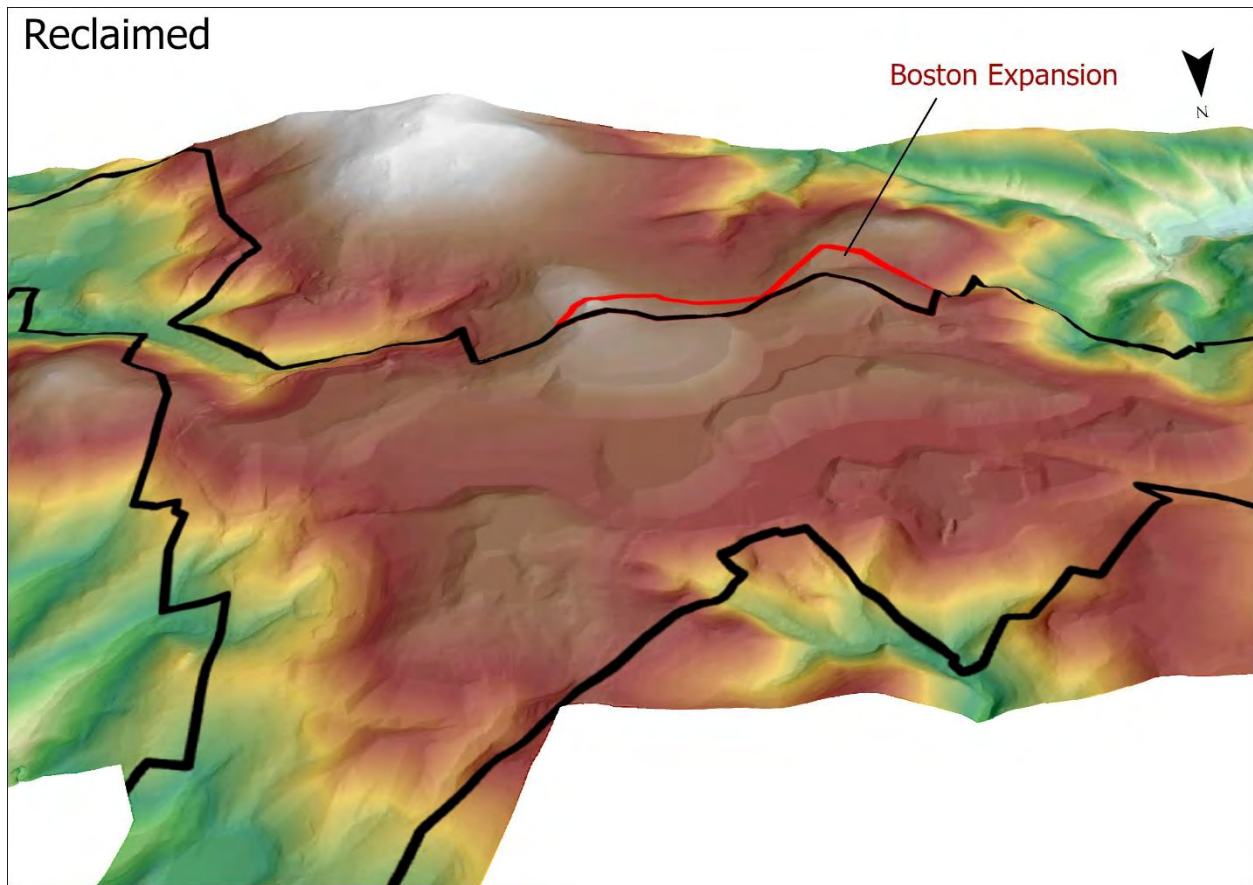


Figure 7a. Reclaimed Contours Oblique View from North

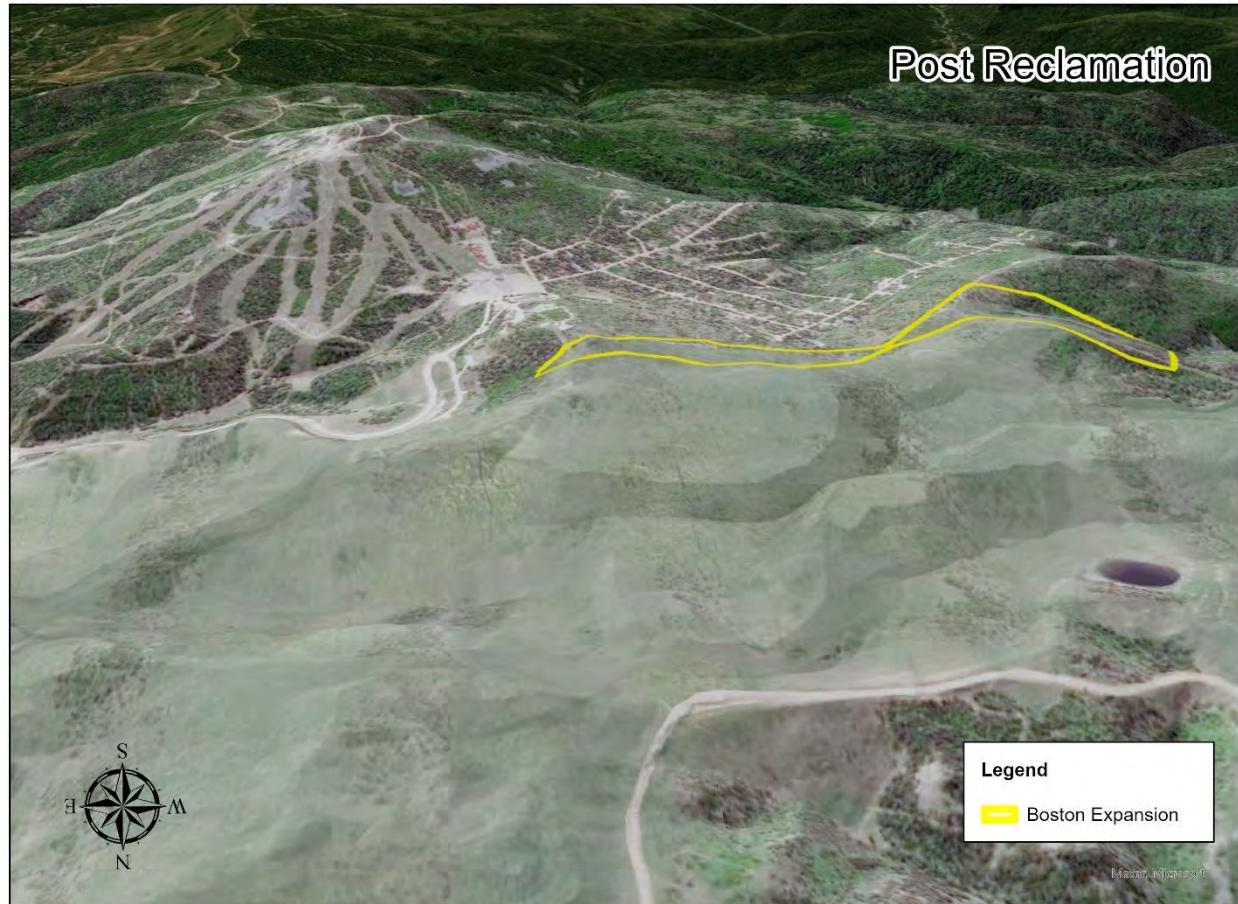


Figure 7b. Reclaimed Contours Oblique View from North Draped with Conceptual Imagery



Figure 8. Maximum Pit / Post-Build Construction Contours Oblique View from East Draped with Conceptual Imagery



Figure 9. Maximum Pit / Post-Build Construction Contours Oblique View from East Draped with Conceptual Imagery



Figure 10. Maximum Pit / Post-Build Construction Contours Oblique View from SouthEast Draped with Conceptual Imagery

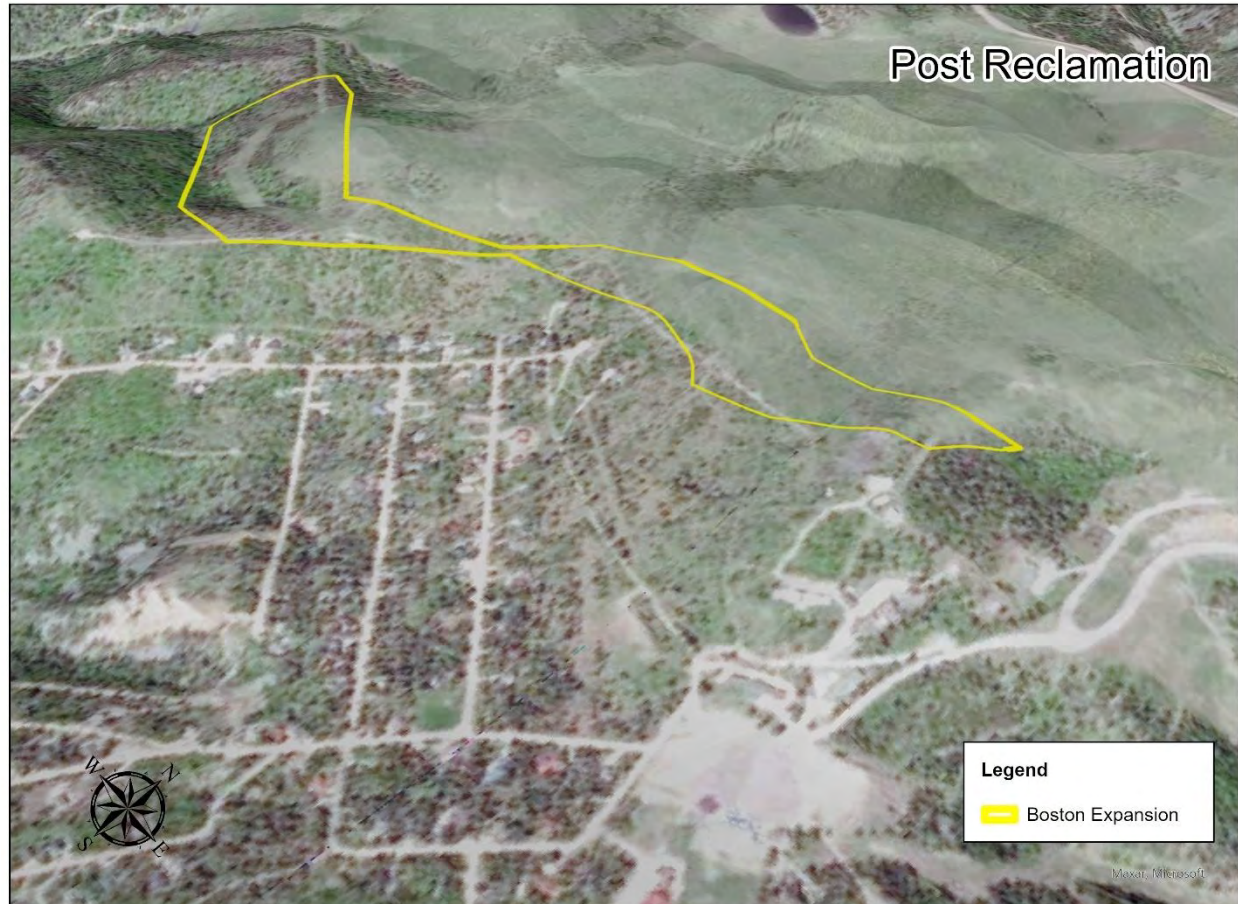
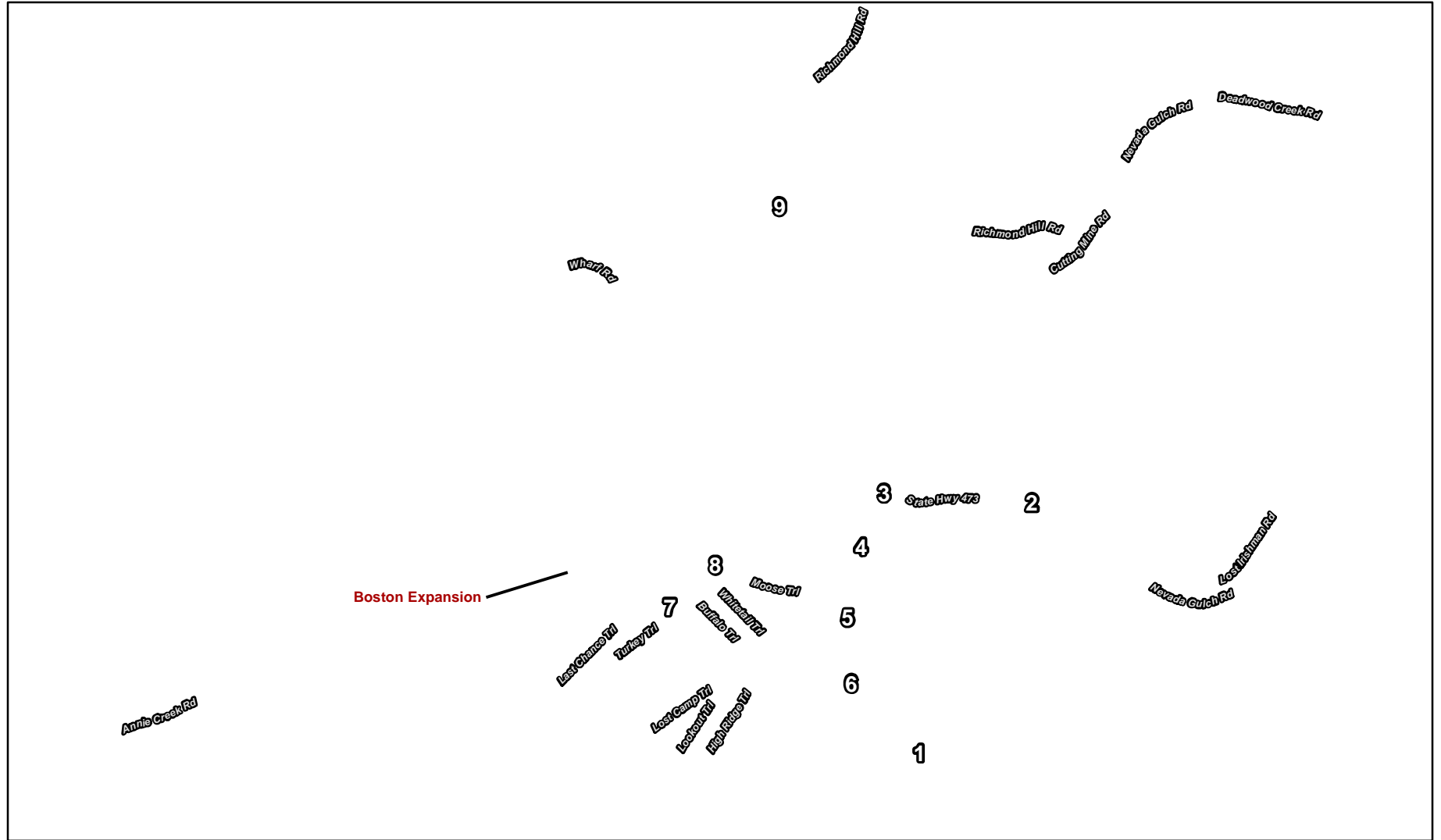

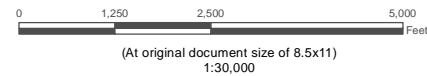


Figure 11. Reclaimed Contours Oblique View from SouthEast Draped with Conceptual Imagery



Legend

-  Vantage Point
-  Mine Area



Notes

1. Coordinate System: NAD 1983 2011 StatePlane South Dakota North FIPS 4001 Ft US
2. Data Sources: ESRI, Coeur, RESPEC
3. Background: © OpenStreetMap (and) contributors, CC-BY-SA Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Project Location Prepared by TW on 2022-01-06
TR by CH on 2022-01-06

Lead, South Dakota (Black Hills)

Client/Project 203722212

Coeur Wharf
Wharf Boston Visual Simulation

Title
Wharf Boston Overview



Existing Conditions - VP 1 NW (Terry Peak Summit overlooking Wharf)



Post Build Computer Simulation - VP 1 NW (Terry Peak Summit overlooking Wharf)



Reclaimed Computer Simulation - VP 1 NW (Terry Peak Summit overlooking Wharf)



Latitude (WGS 84): 44.329289
Longitude (WGS 84): -103.835139
Elevation (NAD 83/ft): 6,952.84
Camera Height (ft): 5.5
Orientation of View: NW
Distance to Project (mi): 1.20
Date of Photography: 2021-06-08

WHARF BOSTON
EXPANSION

VISUAL SIMULATION
VANTAGE POINT 1 NW
(Terry Peak Summit overlooking
Wharf)

2022-05-27

Existing Conditions - VP 4 NNW (Top of Nevada Gulch Road and intersection of Stewart Road)



Post Build Computer Simulation - VP 4 NNW (Top of Nevada Gulch Road and intersection of Stewart Road)



Reclaimed Computer Simulation - VVP 4 NNW (Top of Nevada Gulch Road and intersection of Stewart Road)



Latitude (WGS 84): 44.338535
Longitude (WGS 84): -103.839483
Elevation (NAD 83/ft): 6,459.90
Camera Height (ft): 5.5
Orientation of View: NNW
Distance to Project (mi): 0.29
Date of Photography: 2021-06-08

WHARF BOSTON
EXPANSION

VISUAL SIMULATION
VANTAGE POINT 4 NNW
(Top of Nevada Gulch Road and
intersection of Stewart Road)

2022-01-06

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Existing Conditions - VP 7 N (Antelope and Last Chance intersection)



Post Build Computer Simulation - VP 7 N (Antelope and Last Chance intersection)



Reclaimed Computer Simulation - VP 7 N (Antelope and Last Chance intersection)



Latitude (WGS 84): 44.335548
Longitude (WGS 84): -103.851599
Elevation (NAD 83/ft): 6,357.64
Camera Height (ft): 5.5
Orientation of View: N
Distance to Project (mi): 0.53
Date of Photography: 2021-06-08

WHARF BOSTON
EXPANSION

VISUAL SIMULATION
VANTAGE POINT 7 N
(Antelope and Last Chance intersection)

2022-01-06

Existing Conditions - VP 8 NW (Toward Wharf/Thaler house)



Post Build Computer Simulation - VP 8 NW (Toward Wharf/Thaler house)



Reclaimed Computer Simulation - VP 8 NW (Toward Wharf/Thaler house)



Latitude (WGS 84): 44.337615
Longitude (WGS 84): -103.848877
Elevation (NAD 83/ft): 6,419.77
Camera Height (ft): 5.5
Orientation of View: NW
Distance to Project (mi): 0.40
Date of Photography: 2021-06-10

WHARF BOSTON
EXPANSION

VISUAL SIMULATION
VANTAGE POINT 8 NW
(Toward Wharf/Thaler house)

2022-01-06

Existing Conditions - VP 8 NE (Moose Trial and Last Chance intersection)



Post Build Computer Simulation - VP 8 NE (Moose Trial and Last Chance intersection)



Reclaimed Computer Simulation - VP 8 NE (Moose Trial and Last Chance intersection)



Latitude (WGS 84): 44.337615
Longitude (WGS 84): -103.848877
Elevation (NAD 83/ft): 6,419.77
Camera Height (ft): 5.5
Orientation of View: NE
Distance to Project (mi): 0.60
Date of Photography: 2021-06-11

WHARF BOSTON
EXPANSION

VISUAL SIMULATION
VANTAGE POINT 8 NE
(Moose Trial and Last Chance
intersection)

2022-01-06

Existing Conditions - VP 9 S (Top of Perkins Road)



Post Build Computer Simulation - VP 9 S (Top of Perkins Road)



Reclaimed Computer Simulation - VP 9 S (Top of Perkins Road)



Latitude (WGS 84): 44.352618
Longitude (WGS 84): -103.843496
Elevation (NAD 83/ft): 6,368.15
Camera Height (ft): 5.5
Orientation of View: S
Distance to Project (mi): 0.01
Date of Photography: 2021-08-04

**WHARF BOSTON
EXPANSION**

VISUAL SIMULATION
VANTAGE POINT 9 S
(Top of Perkins Road)

2022-05-27

Wharf Fence-Line and Lost Camp Subdivision Photographs December 30, 2021 and January 20, 2022

Wharf personnel acquired several photographs along Wharf's southern fence line and the northwestern most portion of the Lost Camp Subdivision. The purpose of these photographs is to supplement the visual simulations conducted by Stantec, and show the current views experienced by residents. Not illustrated in these photographs of current site conditions is an 8-ft high berm that will be constructed on the edge of the proposed Boston Expansion that will act as a topographic visual barrier.

The first set of photographs (Photo Location 1) were taken north of the closest residents to the Boston Expansion (Thaler, Akrop, and Determan) as shown on Figure 1. Photographs were taken on December 30, 2021 and show current conditions as of that date. The second set of photographs were taken along Last Chance Trail oriented toward Wharf as well as along Wharf's nearby fence line. The approximate locations of photographs are shown in Figure 1. Photographs presented in Figures 8 through 15 were taken on January 20, 2022 and show current conditions as of that date. Photograph orientation is noted as towards or away from the proposed Boston Expansion. Select photographs have been edited by Stantec to show conceptual images of what the view point may look like following removal of trees and vegetation as a result of the Boston Expansion.

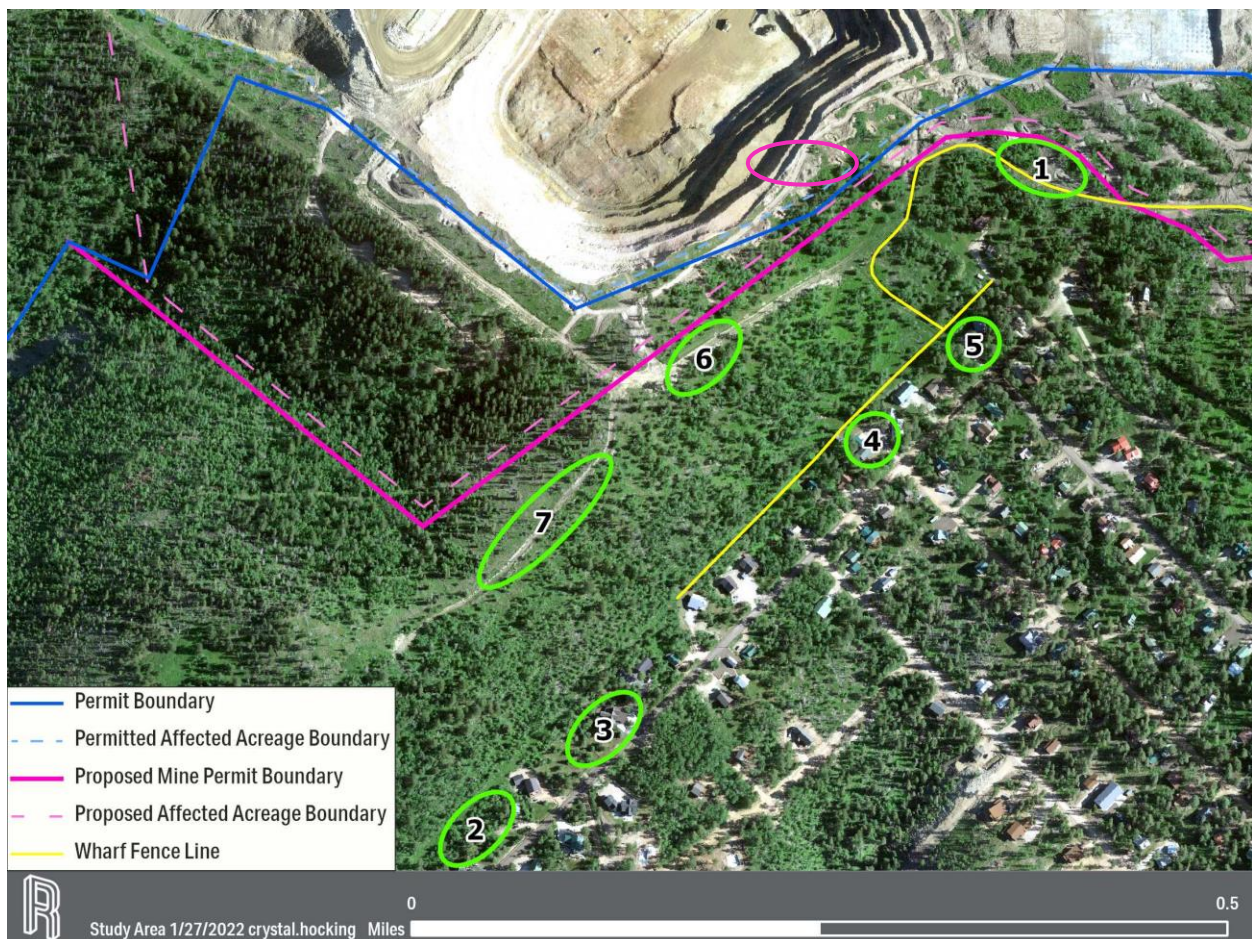


Figure 1. General Photograph Locations (green ovals) for photographs taken on December 30, 2021 and January 20, 2022.



Figure 2. Photo Location 1 - View looking southeast from Wharf fence toward nearby residents located on the north side of Moose Trail Rd. The proposed Boston Expansion boundary is located approximately 100-150 ft north of the fence line at this location.



Figure 3a. Photo Location 1 - View looking north from same location as Figure 2.



Figure 3b. Photo Location 1 – Conceptual Image Post-Vegetation Removal and Mining. At this location, several trees may be removed and the top elevation of the hillside will be decreased as part of the Boston Expansion. When standing at the fence line, residents will have early views of drilling and the berm along the ridgeline and that equipment will not be visible as mining progresses further.



Figure 4. Photo Location 1 - View Looking South. Fence line visible at distance.



Figure 5. Photo Location 1 - View looking south-southeast toward residential area. View of residential structures is greater in the winter; deciduous trees and other vegetation provide additional visual screening in the growing seasons.



Figure 6. Photo Location 1 - View looking south. From this vantage point, trees provide notable visual screening between the mine and nearby properties.



Figure 7a. Photo Location 1 - View looking north.



Figure 7b. Photo Location 1 - Conceptual Image Post-Vegetation Removal and Mining. Some vegetation in this area may be removed as part of the proposed Boston Expansion, and the elevation of the top of the hill will be reduced as the pit is pushed back to the south into the Boston area. Mine equipment and visual impacts will be greatest during construction of the uppermost one or two benches in this area, after which time view of the mine will be limited from this location. The new berm may be slightly visible.



Figure 8. Photo Location 2 – This site is located toward on Last Chance Trail oriented north in the direction of the proposed Boston Expansion. The expansion permit boundary is over 1,000 ft from Last Chance Trail here.



Figure 9. Photo Location 3 – This photo is located near the intersection of Last Chance Trail and Eagle Trail. The view is toward the northwest and shows the front of the private residence at this location.



Figure 10. Photo Location 4 – This photo is located at the intersection of Last Chance Trail and Buffalo Trail. This photograph is orientated toward the northwest towards Wharf's property.



Figure 11a. Photo Location 5 – This photo is located at the end of Whitetail Trail looking toward the northwest. A MDU gas line is visible in the foreground and power line along the utility corridor is visible in the background.



Figure 11b. Photo Location 5 – Conceptual Image Post-Vegetation Removal and Mining. Most vegetation between the fence and utility corridor will remain, though some vegetation may be altered based on utility relocation. At this location, mining should not be visible as the proposed Boston Expansion permit boundary is over 500 feet from this photo.



Figure 12. Photo Location 6 – This photo is located along the utility corridor (northwest of Antelope and Buffalo Trails) and oriented southeast toward the Lost Camp residential area.



Figure 13. Photo Location 7 – This photo is located along the utility corridor (Wharf’s fence line is located about 700 ft southeast of the proposed Boston Expansion permit boundary) northwest of Antelope Trail. The view is to the southeast toward the Lost Camp subdivision. Vegetation seen in this photograph will not be impacted as a result of mining.



Figure 14a. Photo Location 7 – This photo is along the local utility corridor line looking north towards the proposed Boston Expansion.



Figure 14b. Photo Location 7 – Conceptual Image Post-Vegetation Removal and Post-Reclamation. The downslope position of the expansion at this location serves as a topographic visual barrier, though many trees and vegetation will be removed.



Figure 15. Photo Location 7 – This photo is located along Wharf’s fence line northwest of Eagle Trail. The view is to the northwest toward the proposed Boston Expansion. This slope would remain and serves as a topographic barrier to views of potential mining operations at this location.