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State of Utah
DEPARTMENT OF NATURAL RESOURCES

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Division of Oil, Gas and Mining
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Lieutenant Governor

October 28, 2011

Brian Harris, Manager
Price River Water Improvement District
5382 East Washer Plant Road
Wellington, Utah 84542

Subject: White Oak Mine Reclamation with Biosolids

Dear Mr. Harris:

I would like to thank you for your contribution to the White Oak Restoration Project. In particular, your cooperation with our late fall schedule was much appreciated. Due to inclement weather, the project was completed in two phases. The first phase, completed in November 2010, included grading of the slopes, creation of terraces, hauling and spreading biosolids, incorporation of straw into the soil, seeding and reconstruction of the steepest sections of the channel. The second phase, completed in August 2011, included final work on the channel, spreading remaining biosolids, seeding and hydromulching remaining areas, planting seedlings, and scattering wood straw on all the slopes. All the work has now been completed. I am enclosing a report on the project that you may find interesting. We have been impressed with the results of the biosolids.

Sincerely,

Dana Dean, Associate Director
Division of Oil, Gas & Mining

PWB/ss
cc: Price Field Office
H:\Word\letter2 to water treatment operators 10272011_2.docx

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UTAH DNR OIL, GAS & MINING

White Oak Stabilization Project Completion Report

State Procurement Solicitation #AR-1135

October 14, 2011

Priscilla Burton, Project Manager
Division of Oil, Gas, Mining

Location

The project is located in a side canyon to Eccles Canyon, approximately 4 miles south of Scofield on State Highway 264. From the State highway, there is a 1.5 mile paved access road leading up the Whiskey Creek drainage to the reclaimed mine site. The project is on privately owned land in T. 13 S., R. 7 E., NW ¼ Sec. 30 and SW ¼ Sec. 19. The area is shown on the Scofield Utah USGS 7.5 minute quadrangle and on the Nephi Q1919 USGS 30'x60' (1:100k) quadrangle.

Historical Background

The site was formerly an underground mine, known before the 1977 Surface Mining Control and Reclamation Act as the Belina Mine, and under Utah permit C/007/0001 as the Valley Camp Mine, and the White Oak Mine. In 2001, the portals to the lower and upper Hiawatha seams were sealed and the mining method was changed to surface mining. Surface mining was abandoned in 2003, when the mine operator and their bonding agent both filed for bankruptcy.

The site was reclaimed in 2005 using funds recaptured from bankruptcy court. Severe slope and channel erosion and sink holes were noted in 2008, which prompted the Division of Oil Gas and Mining to initiate this stabilization project. An area of approximately 20 acres on the 28% east-facing slope was identified as the project area. Run-off from the slope reported to the reclaimed Whiskey Creek channel, which was also in the project area. The work was undertaken in two field seasons, first beginning on October 11, 2010 and ending November 16, 2010; beginning again on July 11, 2011 and ending August 15, 2011.

Description of the Work

The White Oak Stabilization Project is described in the Technical Specifications of State Procurement Solicitation AR #11035. The specifications describe construction of three terraces on the east facing slope, the restoration of Reaches 3 & 4 of Whiskey Creek, and the backfilling of two sink holes. Change orders to the technical specifications changed the slope treatments as follows:

1 Ton/ac straw was applied prior to gouging.
9 acres on the east facing slope were surface roughened.
1500 lbs/acre wood fiber mulch was applied as hydromulch to 20 acres.
Biosol Forte was applied at a rate of 800 lbs/ac to 4 acres that could not be reached by the biosolids application equipment.

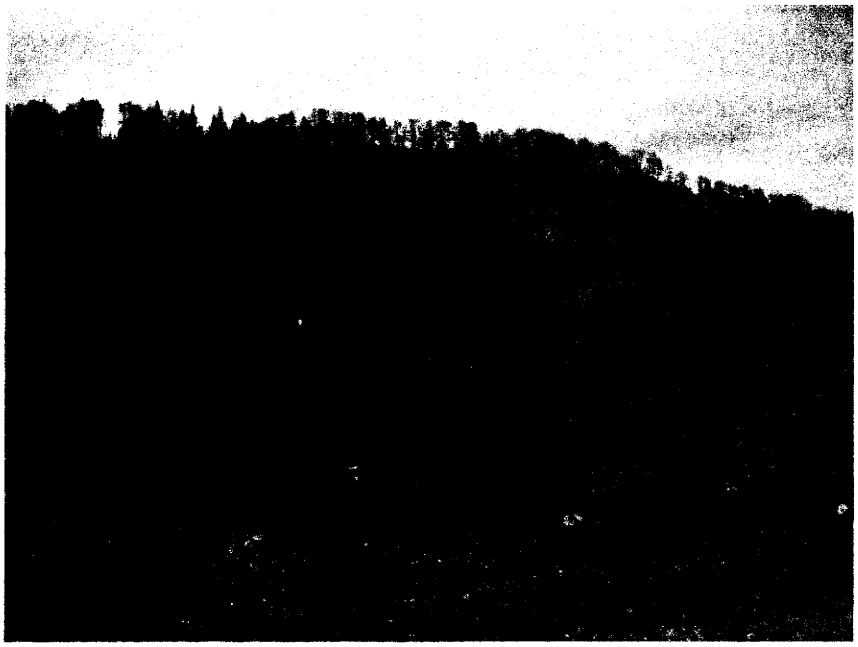
The east facing slope was divided into three shorter slopes by the construction of terraces. Terraces allowed water to be held longer on the slope and also conveyed excess water to an existing, constructed side channel. Three access roads were temporarily constructed for equipment access. Map WO-8 in Attachment 1 shows the location of the terraces and access roads.

Track equipment traveled all over the 900 foot long x 900 ft. wide east-facing slope to collect riprap for use in channel stabilization. In the process, large gullies that ran the length of the slope were filled in and the need for erosion control log installation was eliminated.

The specifications describe the application of 20 dry MT biosolids/acre to the east facing slopes, and incorporation into the soil along with one ton/acre straw. Biosolids were hauled from either the Spanish Fork Waste Water Treatment Facility (SFWWTF), 2160 North 175 East, Spanish Fork or from the Price River Water Improvement District (PRWID), 5382 East Washer Plant Road, Wellington. Brian Harris, PRWID, estimated the dry weight of the 550 cubic yards hauled from PRWID at 4MT/8cu yd or 0.5MT/cu yd. Based upon that measurement, the total weight of the PRWID biosolids hauled was 225 MT. Dennis Sorenson estimated the weight of the 264 cubic yards hauled from SFWWTF at 1.5 MT/cu yd, with 20% solids. Based upon this estimate a total of 79 dry MT were hauled from Spanish Fork.

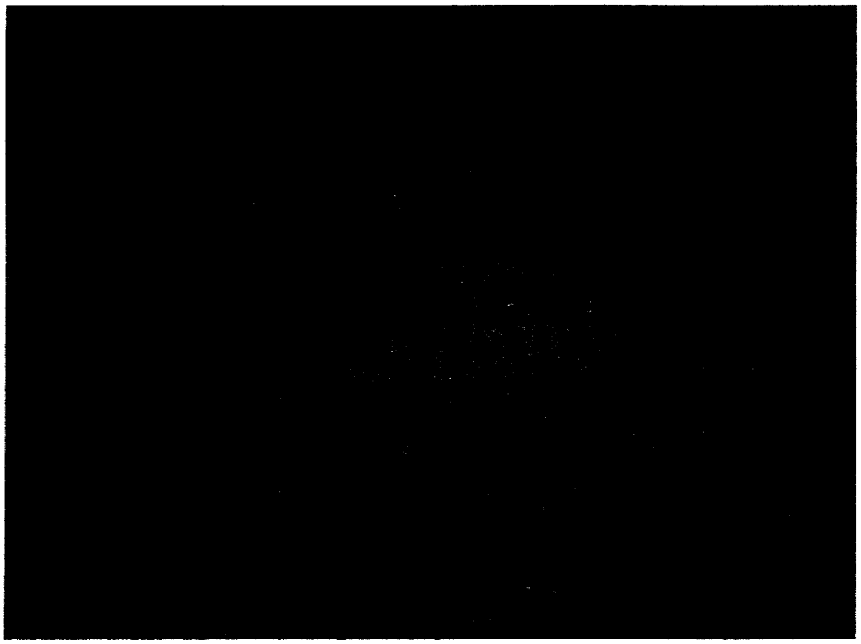
A total of 304 dry MT of biosolids, weight determined as above, were spread on to the slopes with a rock-chucker in 2010 over approximately 12 acres (not on terraces or near drainages) and in 2011, the remaining biosolids were spread with a bull dozer on approximately 3 acres in the vicinity of access R1 and R2. That is a rate of 20 dry MT/ac. After biosolids application, straw was applied and the surface was roughened. Biosolids were not spread on terraces or near drainages or on areas inaccessible to the rock chucker. Biosol, an organic fertilizer, was applied with hydroseeding and hydromulching to 4 acres that were inaccessible to the rock chucker.) The upland seed mix was hand broadcast onto the snow covered slopes ten days after biosolids application, and the site was shut down for winter.

Also in the fall of 2010, the channel was widened and five of eight drop structures and pools were constructed in the steepest Reaches 3 & 4 , see map WO-9 in Attachment 1. Three more drop structures were constructed in 2011. Approximately 19 logs (greater than 10 inches in. diameter) were imbedded in the lower reaches of the channel and a dozen were scattered on the banks of the upper reaches. A riparian seed mix was seeded along both sides of the channel. Riparian species were planted in the ephemeral channel and along the banks. Dryland species were planted on the slopes. The seed mixes and plant species tables are found in Attachment 1.



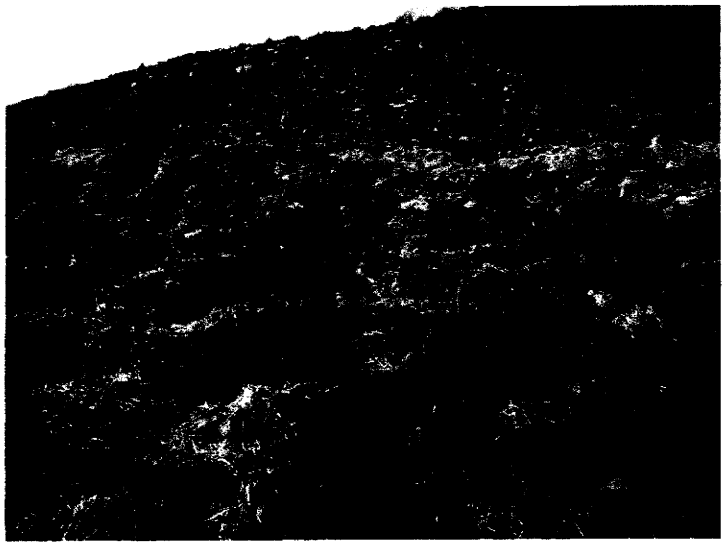
This photograph , taken November 6, 2010, shows the progress made in the first field season. The three terraces are evident in the photograph. The green slopes immediately above and below the upper terrace have just been treated with Biosol, hydroseeded and hydromulched. The remainder of the slope was seeded by hand due to snow. A track hoe can be seen (far left of the photograph) reclaiming the access road R3 to the upper terrace. A rock-chucker can be seen on the lowest terrace (just below center of the photograph) distributing the biosolids to the prepared slopes. The darkened slopes above the rock chucker indicate the location of biosolids distribution and surface roughening. At the very bottom of the photograph is a temporary access road. This temporary access road looks darker than the surrounding soil due to moisture in the disturbed soil. Biosolids were not applied to this road.

The photograph below was taken from the same vantage point, on August 11, 2011, shows the three terraces in the second field season, with vegetation. Vegetation provided the most cover where biosolids or Biosol were applied. There is visibly more vegetation within reach of the rock chucker spray from the terraces.



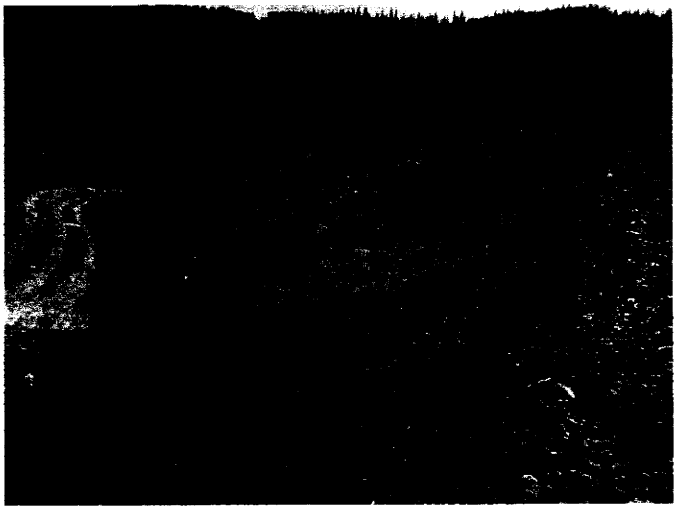
November 6, 2010. An operator (standing on the berm) controls the distribution of the biosolids spray from the rock-chucker using remote control.

The photo to the left shows the surface appearance of the biosolid application.



Biosolids were incorporated into the soil with surface roughening to inoculate the soil, stimulate existing soil micro-organisms, and to ensure that the biosolids were retained on the slope.

November 6, 2010. Biosolids applied to roughened slope between middle and lower terrace.

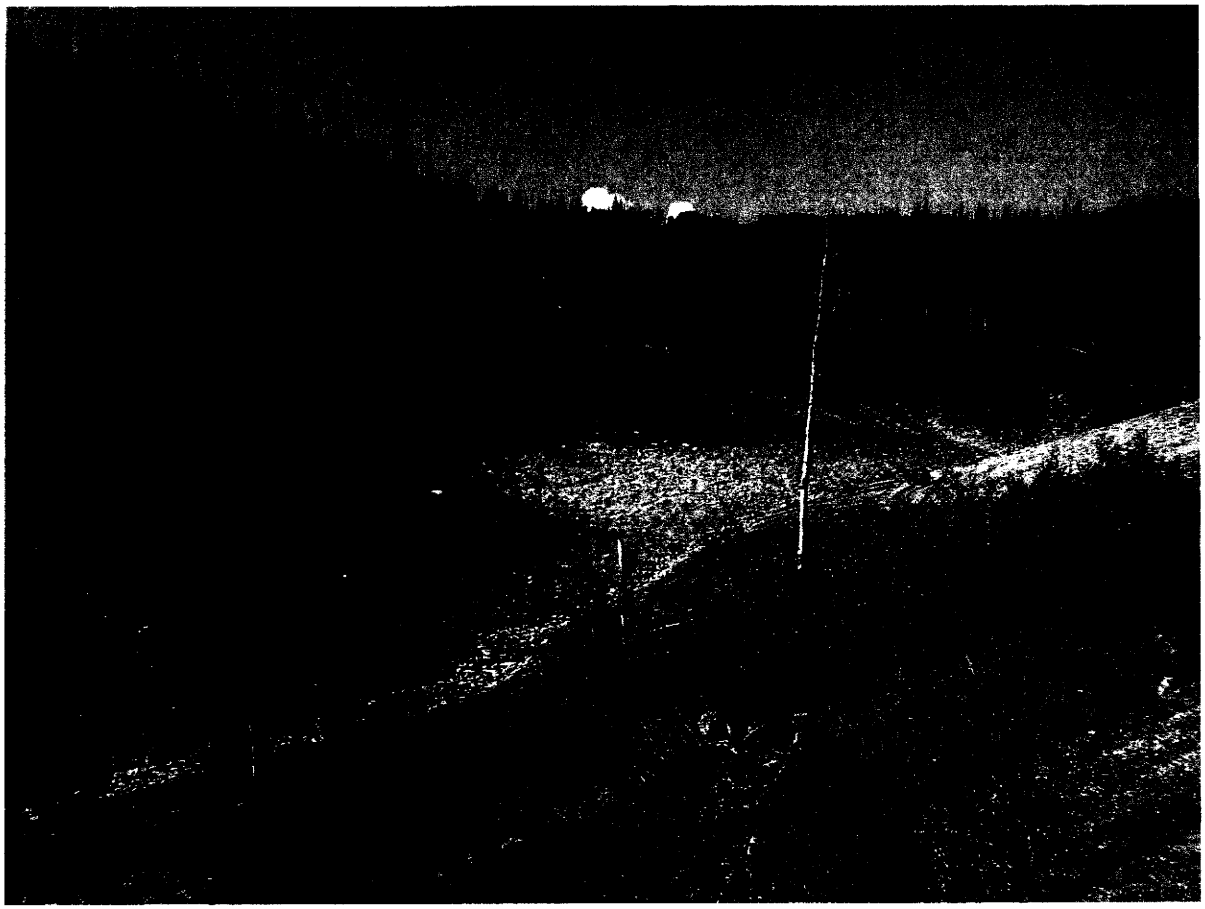


August 9, 2011. This photo is taken from the same vantage point as above, and shows the vegetative cover between the lowest and middle terrace in the first growing season.

August 9, 2011. Triticale is the dominant cover species.

2009. Pre-construction. Reach 4.

08/18/2011. Post Construction. Reach 4.



8/18/2001. Seeding and hydromulching along Reaches 1 and 2, Whiskey Creek reclaimed channel. Restored Reach 3 is in the lower left of photo.

Findings for Future Biosolids Applications:

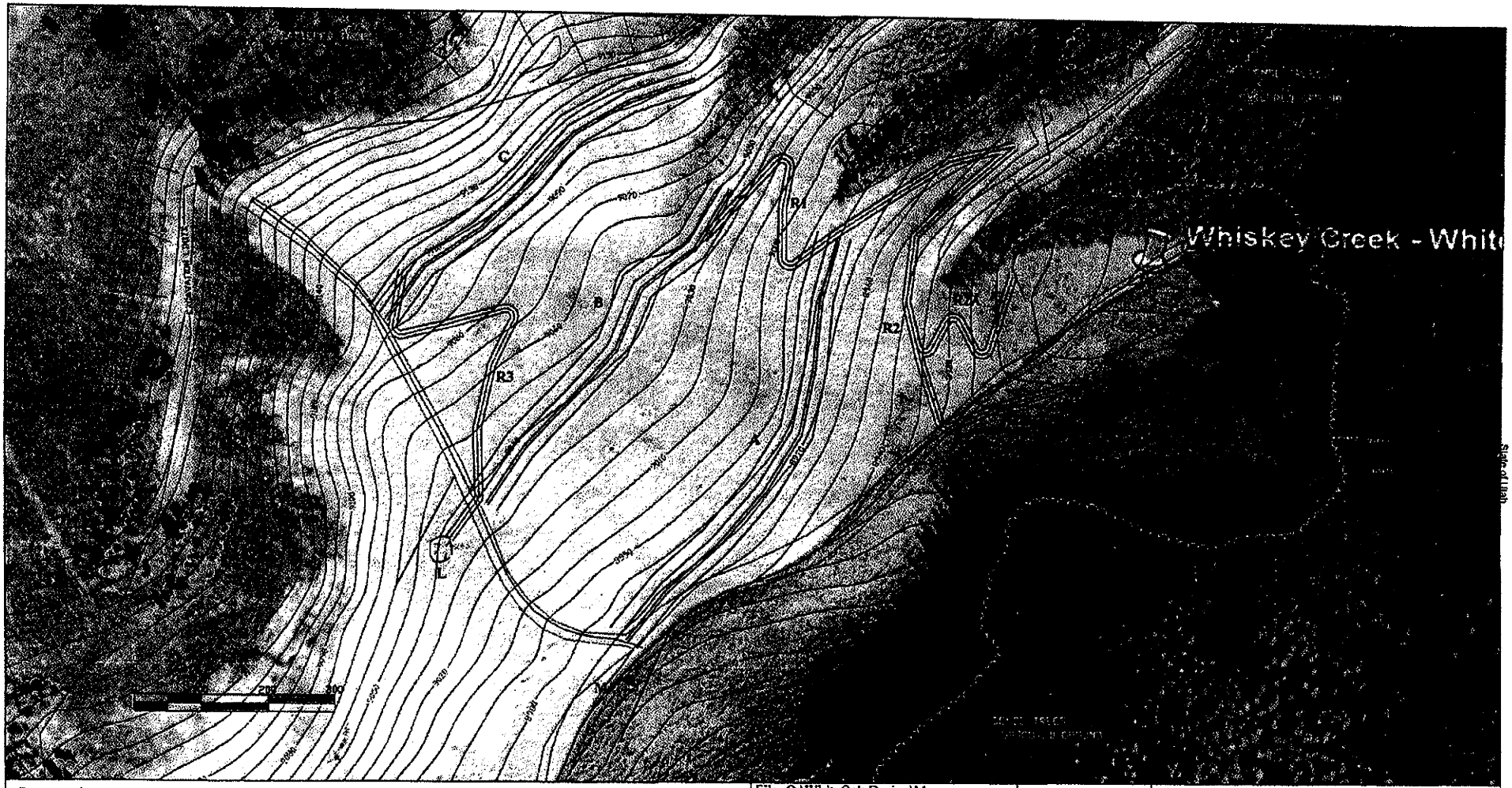
The 20 dry MT/ac application rate was determined in consultation with the Division of Water Quality, based upon the nitrogen concentration of the biosolids. Although this was a scant surface application, a positive response to this application rate was confirmed by the visible increase in seedling germination and vigor within reach of the rock chucker spray from the terraces. Baseline quantitative vegetation assessment and spoils analysis was completed by the Division of Oil, Gas and Mining prior to biosolids application. The site will be monitored again in two growing seasons to provide a quantitative comparison with the baseline data.

The rock chucker was suitable for distributing granular, dried, digested biosolids, such as that produced by PRWID. However, the addition of polyacrilamide (PAM) to the Spanish Fork biosolids made it very difficult to scatter the biosolids using this method. The PAM created a jello mass that clogged the machinery. A bull dozer was more suitable for distribution of the PAM treated biosolids. Biosol is an option for difficult to reach slopes.

Triticale was included in the seed mix as a fast growing, sterile cover crop. Triticale germinates quickly. In the first growing season, it was robust and reached 24 inches tall. Triticale provided erosion control and protection for the native species that are slower to emerge. The dried Triticale stalks will provide a layer of mulch in the second growing season. The barley straw not only provided erosion control, but also contributed to the first year cover.

Winter closure of the site delayed wood fiber mulch and wood straw applications until the second season. Native species growth should benefit from the added surface protection. Wood fiber and straw will provide additional soil erosion protection, improve soil moisture retention, and provide a food source for soil microbes.

ATTACHMENT 1



Legend:

Terrace
Access Road
Ditch
Sinkhole

Comments:

File: O:\WhiteOak Design\Maps	
DWG: WO-8.dwg	
Drawn By: J.Owen	
Checked By:	
Date: 6-30-2010	
Revision: 5	

State of Utah
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WO-8	**Terraces & Access Roads**