



## Alton Coal Development, LLC

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March 31, 2016

Daron R. Haddock  
Coal Program Manager  
Oil, Gas & Mining  
1594 West North Temple, Suite 1210  
Salt Lake City, UT 84114-5801

Subject: **Pit 10 Backfill Amendment, Appendix 5-2 and Drawing 5-26, Alton Coal Development, LLC, Coal Hollow Mine, C/025/0005**

Dear Mr. Haddock,

In response to NOV 21163, 21164 and request for inclusion of cross section and plan view drawings for the haulroad to the underground, Alton Coal Development, LLC,(ACD) has uploaded the amended MRP text and Drawings for review by the Division. In addition Appendix 5-2 and Drawing 5-26 have been revised.

Changes to the MRP associated with this amendment have been uploaded to the DOGM's server for review. PDF versions of the drawing are not certified. Upon approval, 2 (two) clean hard copies of the text and certified drawings for insertion into the MRP will be submitted. Please do not hesitate to contact me if you have any questions 435-691-1551.

Sincerely

B. Kirk Nicholes  
Environmental Specialist

## APPLICATION FOR COAL PERMIT PROCESSING

Permit Change  New Permit  Renewal  Exploration  Bond Release  Transfer

Permittee: Alton Coal Development, LLC

Mine: Coal Hollow Mine

Permit Number:

C/025/0005

Title: Revised Drawing 5-26 & Appendix 5-2

Description, Include reason for application and timing required to implement:

Addition of new topsoil analysis

**Instructions:** If you answer yes to any of the first eight questions, this application may require Public Notice publication.

- Yes  No 1. Change in the size of the Permit Area? Acres: \_\_\_\_\_ Disturbed Area: \_\_\_\_\_  increase  decrease.
- Yes  No 2. Is the application submitted as a result of a Division Order? DO# \_\_\_\_\_
- Yes  No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
- Yes  No 4. Does the application include operations in hydrologic basins other than as currently approved?
- Yes  No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes  No 6. Does the application require or include public notice publication?
- Yes  No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
- Yes  No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
- Yes  No 9. Is the application submitted as a result of a Violation? NOV # \_\_\_\_\_
- Yes  No 10. Is the application submitted as a result of other laws or regulations or policies?

*Explain:* \_\_\_\_\_

- Yes  No 11. Does the application affect the surface landowner or change the post mining land use?
- Yes  No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
- Yes  No 13. Does the application require or include collection and reporting of any baseline information?
- Yes  No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
- Yes  No 15. Does the application require or include soil removal, storage or placement?
- Yes  No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
- Yes  No 17. Does the application require or include construction, modification, or removal of surface facilities?
- Yes  No 18. Does the application require or include water monitoring, sediment or drainage control measures?
- Yes  No 19. Does the application require or include certified designs, maps or calculation?
- Yes  No 20. Does the application require or include subsidence control or monitoring?
- Yes  No 21. Have reclamation costs for bonding been provided?
- Yes  No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
- Yes  No 23. Does the application affect permits issued by other agencies or permits issued to other entities?
- Yes  No 24. Does the application include confidential information and is it clearly marked and separated in the plan?

**Please attach three (3) review copies of the application. If the mine is on or adjacent to Forest Service land please submit four (4) copies, thank you.** (These numbers include a copy for the Price Field Office)

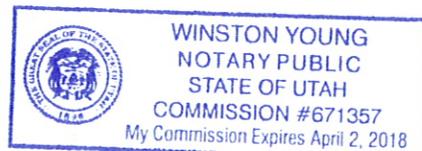
I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

B. Kirk Nicholes Resident Agent 03/31/2016 B. Kirk Nicholes  
 Print Name Position Date Signature (Right-click above choose certify then have notary sign below)

Subscribed and sworn to before me this 31<sup>st</sup> day of March, 2016

Notary Public: [Signature], state of Utah.

My commission Expires: 04/02/2018  
 Commission Number: 671357 } ss:  
 Address: 444 S. Main #B2  
 City: Cedar City State: Ut Zip: 84720



For Office Use Only:

Assigned Tracking Number:

Received by Oil, Gas & Mining



# Coal Hollow Mine – Sedimentation Structure Sizing

## Introduction

Protection of surface water quality at the Coal Hollow Mine is an important part of the mining process. By utilizing sedimentation structures for diversion and sediment impoundment, Alton Coal Development, LLC (ACD) will minimize the sediment that could potentially flow from active disturbance areas into drainages that are in and surrounding the proposed project area. Appropriate sizing of these structures is a necessary step toward ensuring that these controls function properly and serve the purpose of protecting the surrounding environment.

Therefore, ACD has completed a watershed analysis for appropriate sizing of four proposed sedimentation impoundments and four diversion ditches. This report will outline the methods used and results of this analysis.

## Sediment Impoundments

### Summary

The watersheds for the four proposed sedimentation impoundments have been evaluated mainly using the TR-55 method. This method of analysis was first issued by the Soil Conservation Service (SCS) in 1975. It has since been revised and updated numerous times. This method is applicable for evaluating small watersheds.

To assist with the calculations and mapping, Carlson 2007 Hydrology software has been utilized for this evaluation. A watershed analysis for this project includes: runoff flow paths, watershed boundaries, length and average grade for longest flow lines, runoff curve number classification, time of concentration and peak discharge. Information from this analysis was then used for sedimentation structure sizing. For the specifics associated with each of these parameters refer to the details section of this report.

The sedimentation structures were sized to impound the runoff associated with a 100-year frequency, 24-hour duration storm event. Using the Carlson rainfall map (assembled using TP-40 and TP-47 data), the rainfall intensity associated with this size of event for the Alton area is 3.1 inches. The following table summarizes the final results for each sedimentation structure:

<b>Sedimentation Impoundment Capacities</b>				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent above requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	12.6	200	6.3
3 PM**	10.4	12.6	121	2.2
4	3.8	5.5	224	1.7
1B	0.5	0.8	160	0.3

\*Design capacities include a minimum of 2 feet free board (spillway to top of embankment)

\*\*Required pond size after completion of mining and addition of 103 acres for backfill material.

Two 4" HDPE drainage pipes have been installed from the underground mining sump to the inlet end of Pond 3. Only one pipe is used, with the second in place as a backup. The pipe is expected to carry up to 100 gpm or 0.22 cfs. A 6" decant pipe has been installed in Pond 3, which will allow controlled decanting of the water in the event of a continuous mine water discharge. The pond can be decanted to an elevation of 6808, which is 3 feet below the spillway. At this elevation, the pond can still contain approximately 4.98 ac. ft. of runoff, which is slightly greater than the 4.95 ac. ft. of runoff from a 10-year / 24-hour event of 2.39"; therefore, the pond will still meet the requirement of treating a 10-year / 24-hour runoff event.

Upon completion of the underground mining, the portals will be sealed and the pit will be backfilled. Since it is expected that there will be a deficit of backfill material for this final pit, borrow material will be extracted from a total area of approximately 66.1 acres encompassing the current long term spoil pile and the hillsides directly adjacent to pond 3 to the northeast and southwest. Removing these hillsides will result in additional disturbance (and watershed area) of 30.9 acres. Removal of the borrow material will also result in the re-establishment of pre-mining drainage paths that will increase the watershed for Sediment Pond 3 by an additional 72 acres of undisturbed ground located outside of the permit boundary, as shown on Drawings 5-19, 5-26 and 5-37. Runoff from the additional area of 102.9 acres for a Watershed 3 total of 387.9 acres will all flow to Pond 3. Calculations show that an additional 4.1 acre feet of runoff is expected from this area for the 100 year – 24 hour storm. Since the mining will be completed at this time, the additional capacity presently required for the possible mine water discharge will no longer be required; therefore, the additional 4.1 ac. ft. for the extra area has been added to the required 6.3 ac. ft. for Pond 3, resulting in a required size of 10.4 ac. ft. for the post-mining pond, as shown in the previous table "Sediment Impoundment Capacities". The runoff details and calculations for the additional 103 acre area is shown as "3 PM" in the following tables.

The enclosed maps and cross sections detail the design and location for each structure (Drawings 5-25 through 5-34). These drawings also show proposed spillways, diversion ditches and watersheds associated with each structure.

## **Details**

Determining storage capacity requirements using the TR-55 method requires several steps. This section of the report will provide the details and assumptions associated with each step. These steps are: watershed boundaries/flow paths, runoff curve number classification, time of concentration, peak discharge and structure sizing.

- **Watershed Boundaries/Flow Paths**

The watershed boundaries were determined by first identifying the runoff flow paths for the entire project area. This was completed by creating a three dimensional model of the surface topography. This model was then used to draw flow paths for all the watersheds. Based on these flow paths, boundaries for each watershed are easily determined based on flow direction in combination with proposed control structures (ponds, diversion ditches, etc.).

Using this process, the project area (in conjunction with diversion ditch locations and berms) was found to be separated into seven distinct watersheds. The natural separations of watersheds in this area are Lower Robinson Creek to the north and Sink Valley Wash at the south end. In addition to these natural separations, the proposed diversion ditches and berms also provide definite boundaries as shown on Drawings 5-26 and 5-27. The following summarizes the watersheds:

<b>Sediment Impoundment Watersheds</b>		
<b>Watershed</b>	<b>Area (acres)</b>	<b>Description</b>
1	27	North end of project area where facilities are proposed.
2	74	Borders south edge of Lower Robinson Creek.
3	285	Main watershed through the center of permit area.
3 PM	103	Watershed expansion after completion of mining.
4	96	Southern most watershed bordered by Sink Valley Wash
*5	28	Isolated area between watersheds 3 and 4
*6	19	Area northwest of Lower Robinson Creek Reconstruction
7	5	Southwest end of facilities area, entrance/exit road

\* These watersheds will have silt fence or other appropriate control measures installed.

- **Rainfall Amount and Runoff Curve Number Classification**

First data required to begin estimating runoff for the watersheds is the rainfall amount and the runoff curve number classification. The rainfall amount is the precipitation associated with a 100 year frequency, 24 hour duration storm event. The runoff curve number classification is a classification of the soil and vegetation cover conditions for the watersheds.

In order to estimate runoff from rainfall, the rainfall amount for a 100 year frequency, 24 hour duration storm event was determined using the Carlson rainfall map. This map was assembled by Carlson software based on TP-40 and TP-47 data. The resulting rainfall amount for the Alton area using this map is 3.1 inches.

The runoff curve number was determined by matching the ground cover description and estimated hydrologic soil group for the project area to the descriptions available in Table 2-2d of TR-55. Based on visual observations of the project area and soils the following classifications were estimated:

1. Cover Description: The cover description that best fits watersheds 2, 3 and 4 is “Sagebrush with grass understory”. The hydrologic condition for this cover was estimated at “fair” which is defined as 30% to 70% ground cover. This estimation was based off the knowledge of current conditions and future disturbance/reclamation. Plans for this operation include sequenced disturbance combined with concurrent reclamation. This will minimize the area that will be disturbed at any one time.

This will be combined with a general vegetation coverage improvement within one to two growing seasons for reclamation compared to current conditions. In addition, a significant amount of runoff from the active mining area for this magnitude of storm event will be temporarily controlled within the active pit area and will not immediately report to the designed impoundments.

Watershed 1 and 7 have been classified differently since they includes the mine facilities area. This watershed is classified as “Gravel roads” since most the area will be stripped of vegetation and gravel spread for parking areas and roads. This results in a much higher runoff than the classification for the other three watersheds.

2. Hydrologic Soil Group: This classification was estimated to be Group C for the five watersheds evaluated, as outlined in Appendix A in TR-55. This classification is for soils having low infiltration rates thus producing high amounts of runoff. The soils in this classification typically have infiltration rates of 0.05 to 0.15 inches per hour.

The resulting curve number for watersheds 2, 3 and 4 is 63. Watershed 1 and 7 were assigned a curve number of 89. These classifications are intended to be conservative estimates (producing higher than expected runoff) to ensure that the sedimentation structures have more than sufficient storage capacity.

These classifications are used in the next step for determining the time of concentration.

- **Time of Concentration ( $T_c$ )**

$T_c$  is the time for runoff to travel from the furthest point in the watershed to the point that it meets the sedimentation structure. This figure is essential for calculating the peak flow which is used to determine the required size for the sedimentation structure. The SCS method for calculating  $T_c$  is used in this analysis. The following table summarizes the inputs for calculating the  $T_c$  along with the resulting outputs:

<b>Time of Concentration (<math>T_c</math>)</b>				
Watershed	Curve Number	Flow Length (ft)	Average Slope (%)	$T_c$ (hrs)
1	89	1,087	6.8	0.16
2	63	5,670	3.8	1.7
3	63	7,095	3.5	2.2
3 PM	63	2,900	2.3	0.8
4	63	3,805	2.9	1.8
7	89	750	3.9	0.08

The  $T_c$  for each watershed is used to calculate the peak discharge which is the final step leading to the structure sizing.

- **Peak Discharge**

The peak discharge for each watershed was calculated using the Graphical method. The inputs required for this method include:  $T_c$ , drainage area, 100 year 24 hour rainfall and the runoff curve number (CN). The following table outlines these inputs and the peak discharge:

<b>Peak Discharge (*Inflow)</b>					
Watershed	CN	Tc (hr)	Rainfall (in)	Drainage Area (ac)	Peak Discharge (cfs)
1	89	0.16	3.1	27	74.7
2	63	1.7	3.1	74	9.9
3	63	2.2	3.1	285	31.8
3 PM	63	0.8	3.1	103	18.8
4	63	1.8	3.1	96	14.8
7	89	0.8	3.1	5	15.6

\*The peak discharge from each watershed will also be the peak inflow to the sedimentation structures.

- **Sedimentation Impoundment Sizing**

The method used for this step is again from the TR-55 program. A sedimentation structure is required for each one of the five watersheds analyzed. Therefore, a size has been evaluated for the five proposed structures. The inputs for this calculation are the following: drainage area, peak inflow, desired outflow, and runoff depth (Q). The desired outflow in this situation is zero since we do not intend any discharge from the structures. The spillways for these structures are proposed for emergency use only and are not intended for regular discharges. The following table summarizes these inputs and the required storage capacity for each watershed:

<b>Sedimentation Impoundment Sizing</b>				
Watershed	Drainage Area (ac)	Inflow (cfs)	Q (in)	Storage Required (ac/ft)
1	27	74.7	2.00	2.6
2	74	9.9	0.48	1.7
3	285	31.8	0.48	6.3
3 PM	103	18.8	0.48	4.1
4	96	14.8	0.48	3.8
1B	5	15.6	2.00	0.5

The enclosed maps show the proposed design and locations for each one these structures.

## Conclusions

This analysis provides estimates of sufficient storage capacities for each watershed to impound water from a 100 year frequency, 24 hour duration storm event at the proposed Coal Hollow Mine. In addition to the required storage capacities, a minimum 15% additional storage capacity has been added to each structure design to account for sediment and any standing water that may occur. Spillways have also been included in the structure designs to provide a non-destructive route for discharge should these capacities ever be exceeded.

The one exception to the above is Pond 3. Although the pond size is 200% greater than required for the 100-year / 24-hour event, the pond may also receive water pumped from the underground mine. If a continuous discharge from the mine should occur, the pond is equipped with a decant which would allow for a static level 3' below the spillway. At this elevation, the pond would still have a retention capacity of 4.98 ac. ft., which is slightly greater than the 4.95 ac. ft. calculated runoff from a 10-year / 24 hour event.

Due to the isolated characteristics and the inability to effectively divert water from Watershed 5 and 6, the method of using silt fence or other appropriate control measures for sediment have been chosen and is included on the Drawing 5-26.

The structure designs established from this analysis will minimize impacts from sediment to the surrounding environment at the Coal Hollow Mine.

## Diversion Ditches

### Summary

The channel sizing for the four proposed diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 100 year, 24 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on flows during a 100 year, 24 hour storm event:

Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	17.4	0.6	7.2	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3

4	5.0	0.020	1.1	19.8	0.6	5.4	0.3
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\*All side slopes are 2h:1v

## Details

- **Watersheds**

The first step used for evaluating the diversions was to determine the peak flow during a 100 year, 24 hour storm event for each diversion. In order to determine this variable, the TR-55 method of watershed analysis was again utilized. This requires determining the watershed boundaries associated with each diversion.

The following table summarizes these watersheds:

<b>Diversion Watersheds</b>		
<b>Ditch</b>	<b>Area (acres)</b>	<b>Description</b>
1	158	Diverts water around project area
2	48	Diverts water along Robinson Creek to Pond 2
3	72	Diverts water around facilities area
4	169	Diverts water from project area into Pond 3

- **Rainfall Amount and Runoff Curve Number Classification**

The rainfall amount for a 100 year, 24 hour storm event was developed utilizing the same method as previously discussed in the impoundments section of this report. This number is 3.1 inches of precipitation.

The runoff curve number classification for all four watersheds was estimated to be 63. This classification is consistent with the classification and logic used for the impoundment analysis.

- **Time of Concentration ( $T_c$ )**

$T_c$  is the time for runoff to travel from the furthest point in the watershed to the point that it meets the sedimentation structure. This figure is essential for calculating the peak flow which is used to determine the required size for the diversion ditch. The SCS method for calculating  $T_c$  is used in this analysis. The following table summarizes the inputs for calculating the  $T_c$  along with the resulting outputs:

<b>Time of Concentration (<math>T_c</math>)</b>				
<b>Ditch</b>	<b>Curve Number</b>	<b>Flow Length (ft)</b>	<b>Average Slope (%)</b>	<b><math>T_c</math> (hrs)</b>
1	63	8,487	2.9	2.9
2	63	4,187	3.6	1.4
3	63	3,742	13.7	0.7
4	63	5,868	3.9	1.8

The  $T_c$  for each watershed is used to calculate the peak flow which is the final step leading to the diversion dimensions.

- **Peak Flow**

The peak flow for each diversion was calculated using the Graphical method. The inputs required for this method include:  $T_c$ , drainage area, 100 year 24 hour rainfall and the runoff curve number (CN). The following table outlines these inputs and the peak flow:

<b>Diversion Peak Flow</b>					
Ditch	CN	Tc (hr)	Rainfall (in)	Drainage Area (ac)	Peak Flow (cfs)
1	63	2.9	3.1	158	17.4
2	63	1.4	3.1	48	6.9
3	63	0.7	3.1	72	16.7
4	63	1.8	3.1	169	19.8

- **Diversion Dimensions**

The Manning's Equation (ME) equation was used to appropriately size the each diversion. Inputs into this equation are manning's coefficient, average diversion slope, peak flow and side slope angles. Outputs are the depth of flow, and base dimension for a trapezoidal channel design. The following table summarizes the inputs and results:

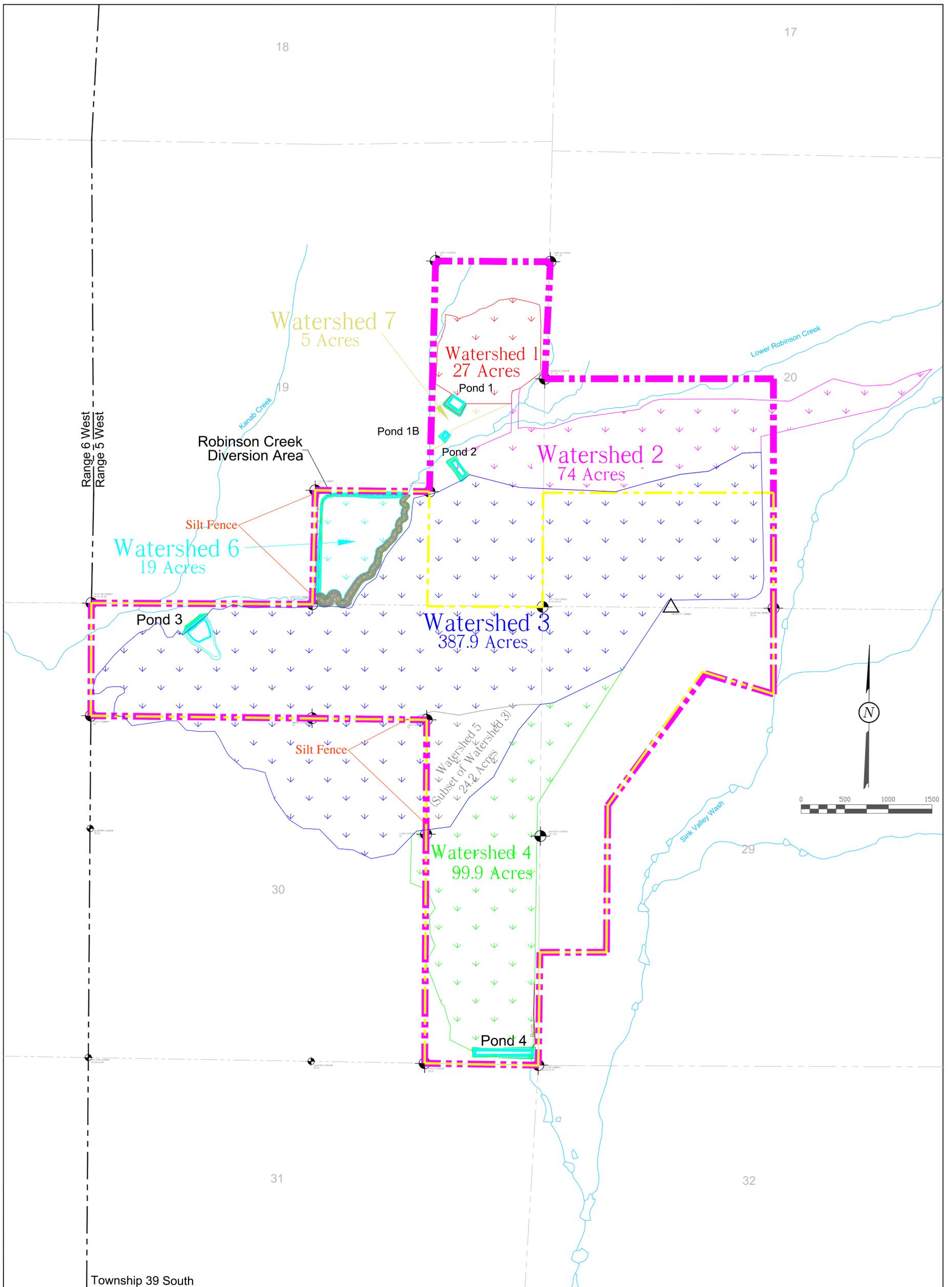
<b>Diversion Ditch Summary</b>							
Ditch	**Base (ft)	*Manning n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	17.4	0.6	7.2	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3
4	5.0	0.020	1.1	20.6	0.6	5.0	0.3

\*Manning n of 0.020 is for ordinary firm loam

\*\*All side slopes are 2h:1v

## **Conclusions**

These diversions have been sized in manner that will transport the necessary flows and minimize erosion during a 100 year, 24 hour storm event. These diversions will prevent runoff from up gradient watersheds from entering the active mining areas and will also assist in directing water from disturbed areas to the sediment impoundments.



**LEGEND:**

- PERMIT BOUNDARY
- PRIVATE COAL OWNERSHIP
- SECTION LINE
- FOUND SECTION CORNER
- FOUND PROPERTY CORNER
- ~ EXISTING DRAINAGES
- PROPOSED SEDIMENT IMPOUNDS
- SILT FENCE

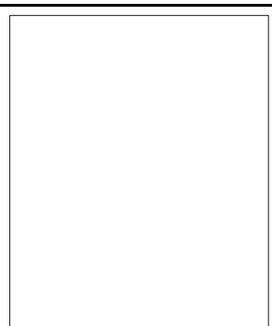
DRAWN BY: C. McCOURT	CHECKED BY: DWG
DRAWING: 5-26	DATE: 4/20/07
JOB NUMBER: 1400	SCALE: 1" = 500'
	SHEET

REVISIONS	
DATE:	BY:
12/02/08	CRM
08/12/13	KN
11/04/14	KN
3/22/16	AC

**SEDIMENT IMPOUND WATERSHEDS**

COAL HOLLOW PROJECT  
ALTON, UTAH

DRAWING: 5-26





**Coal Hollow Project**

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