Final Environmental Impact Statement

Rosebud Mine Area B AM5
Colstrip, Montana

Appendices

May 2022

DEQ
Montana Department of Environmental Quality

PLAINTIFFS' EXHIBIT
P228

P-0041666

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APPENDICES

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Appendix A – List of Westmoreland Rosebud's Area B AM5 Permit (C1984003B) Application Package Documents

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Appendix A – List of Western Energy's Area B AM5 Permit (C1984003B) Application Package Documents

Table 1. Area B AM5 Permit (C1984003B) MSUMRA Completeness and Acceptability Review Documents

Document Name[1]	Date	Author
Permit Amendment Application Package (Application)	February 17, 2017	Western Energy
1st Round Completeness Deficiency	March 28, 2017	DEQ
1st Round Completeness Deficiency Response	April 20, 2017	Western Energy
2nd Round Completeness Deficiency	May 23, 2017	DEQ
2nd Round Completeness Deficiency Response	May 23, 2017	Western Energy
Completeness Determination	May 24, 2017	DEQ
1st Round Acceptability Deficiency	September 20, 2017	DEQ
1st Round Acceptability Deficiency Response	December 6, 2017	Western Energy
2nd Round Acceptability Deficiency	April 5, 2018	DEQ
2nd Round Acceptability Deficiency Response	July 30, 2018	Western Energy
3rd Round Acceptability Deficiency	November 26, 2018	DEQ
3rd Round Acceptability Deficiency Response	March 22, 2019	Western Energy
4th Round Acceptability Deficiency	July 12, 2019	DEQ
4th Round Acceptability Deficiency Response	November 5, 2019	Western Energy
5th Round Acceptability Deficiency	February 24, 2020	DEQ
5th Round Acceptability Deficiency Response	April 28, 2020	Western Energy
6th Round Acceptability Deficiency	July 24, 2020	DEQ
6th Round Acceptability Deficiency Response	January 7, 2021	Western Energy
Significant Change Completeness Determination	February 24, 2021	DEQ
7th Round Acceptability Deficiency	April 27, 2021	DEQ
7th Round Acceptability Deficiency Response	May 21, 2021	Westmoreland Rosebud
8th Round Acceptability Deficiency	August 13, 2021	DEQ
8th Round Acceptability Deficiency Response	October 6, 2021	Westmoreland Rosebud
9th Round Acceptability Deficiency	December 6, 2021	DEQ
9th Round Acceptability Deficiency Response	March 16, 2022	Westmoreland Rosebud
Application Acceptability Determination	April 12, 2022	DEQ

[1]***View permit documents by going to:*** http://svc.mt.gov/deq/myCOALPublic/ ***or request from DEQ:*** http://deq.mt.gov/Public/RequestPublicRecords

Table 2. Area B AM5 Permit (C1984003B) Permit Application Package (PAP) Documents

PAP Component	Contents
Permit (Note: Permit subchapters correspond to subchapters of MSUMRA's implementing regulations, ARM 17.24.301-1309)	
Subchapter 3	Definitions and Strip Mine Permit Application Requirements
Subchapter 4	Mine Permit and Test Pit Prospecting Permit Procedures
Subchapter 5	Backfilling and Grading Requirements
Subchapter 6	Transportation Facilities, Use of Explosives and Hydrology
Subchapter 7	Topsoiling, Revegetation, and Protection of Wildlife and Air Resources
Subchapter 8	Alluvial Valley Floors, Prime Farmlands, Alternate Reclamation and Auger Mining
Subchapter 9	Underground Coal and Uranium Mining
Subchapter 10	Prospecting
Subchapter 11	Bonding, Insurance, Reporting, and Special Areas
Subchapter 12	Special Departmental Procedures and Programs
Subchapter 13	Miscellaneous Provisions
Appendices	
Appendix A	Cultural Resources A-1: Area F - Class III Cultural & Paleontological Resource Inventory 2010-10 A-2: Additional Area - Class III Cultural & Paleontological Resource Inventory 2012-01 A-3: Area F NRHP report 46 Archaeological Properties 2013-11
Appendix B	Hydrology
Appendix C	Climatology
Appendix D	Overburden Quality
Appendix E	Baseline Vegetation Report and Wetland Delineation Report E-1: Area F – 2006 Baseline Vegetation Survey E-2: Area F – 2013 Rosebud Mine Wetlands Delineation Maps
Appendix F	Wildlife
Appendix G	Baseline Soils
Appendix H	Leases (Confidential)
Appendix I	Groundwater Model I-A: Rosebud Mine Groundwater model I-B: Area F Groundwater Model
Appendix J	Protection of the Hydrologic Balance
Appendix K	Geology
Appendix L	Well Logs
Appendix M	Facilities Sampling Plan
Appendix N	Fish and Wildlife N-1: Fish and Wildlife Report
Appendix O	Probable Hydrologic Consequences (PHC) O-1: Sediment Yield Modeling
Appendix P	Monitoring and Quality Assurance Plan

Table 2. Area B AM5 Permit (C1984003B) Permit Application Package (PAP) Documents	
PAP Component	**Contents**
Appendix Q	Alluvial Valley Floors (AVF) Q-1: Baseline Evaluation for Alluvial Valley Floor Determination Q-2: Alluvial Valley Floor Determination
Appendix R	Aquatic Survey
Appendix S	Steep Slope Inventory
Appendix T	Pond Designs and As-Builts
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A	Approximate Mine Plan
B	Approximate Postmine Topography with Drainage Basins (500 scale)
C	Approximate Revegetation and Wildlife Enhancement Plan
D	Approximate Hydrologic Control Plan
E	Premine Vegetation Survey
F	Cultural Resource Sites (Confidential)
G1, G2, G3, G4, and G5	Reclamation Bond and Bond Calculations
H	Surface and Groundwater Monitoring Sites
I and I1	Reclamation Cross Sections and Locations
J	Approximate Reclamation Plan
K	Aerial Photograph
L1 and L2	Surface and Mineral Ownership Maps
M	Coal Conservation Plan Map
N1 and N2	Premine and Postmine Drainage Profiles
O	Haul Road Design Plan, Profile, and Details
P1 and P2	Phase I and Phase II County Road Relocations
Q1, Q2, and Q3	Drill Hole and Geological Cross Sections and Locations
R1, R2, R3, R4, and R5	Overburden Isopach, Rosebud Coal Isopach and Bottom Elevation, and McKay Coal Isopach and Bottom Elevation
S	Surface Geology
T1 and T2	Premine and Postmine Slope Histogram and Slope Aspect Wire Diagram
U and U1	Premine Topography with Drainage Basins (1000 scale and 5000 scale)

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Appendix B – Water Resources Data

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BASELINE SURFACE WATER QUALITY TABLES

Springs

Table 1. Water Quality of Spring SP-300 (Richard Coulee Mainstem).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	37	0	1	1	5	NS
Aluminum, diss	mg/L	37	36	0.004	0.0303	0.0763	NS
Ammonia, as N	mg/L	37	30	0.0073	0.383	1.4	NS
Arsenic, diss	mg/L	37	36	0.0005	0.00225	**0.0253**	0.01
Bicarbonate alkalinity	mg/L	37	37	427	549	779	NS
Boron, diss	mg/L	37	37	0.177	0.275	1	NS
Cadmium, diss	mg/L	37	26	0.00004	0.0005	0.0005	0.005
Calcium, diss	mg/L	37	37	189	214	254	NS
Carbonate alkalinity	mg/L	37	4	1	1	32	NS
Chloride	mg/L	37	37	5.8	17	25.3	NS
Copper, diss	mg/L	37	22	0.000018	0.002	0.00402	1.3
Fluoride	mg/L	37	30	0.004	0.585	1.79	4
Hydroxide alkalinity	mg/L	37	0	1	1	5	NS
Iron, diss	mg/L	37	36	0.02	1.64	14.8	NS
Laboratory conductivity	µS/cm	37	37	2680	4260	4870	NS
Laboratory pH	s.u.	37	37	7.5	8.15	8.4	NS
Lead, diss	mg/L	37	15	0.0000023	0.0000365	0.0005	0.015
Magnesium, diss	mg/L	37	37	212	244	279	NS
Manganese, diss	mg/L	37	37	0.058	2.06	5.06	NS
Nickel, diss	mg/L	37	30	0.000605	0.003	0.00812	0.1
Nitrate+nitrite	mg/L	37	15	0.003	0.0066	1.1	10
Potassium, diss	mg/L	37	37	8	13.3	27	NS
Selenium, diss	mg/L	37	27	0.000182	0.001	0.0025	0.05
Sodium, diss	mg/L	37	37	40.6	616	683	NS
Sulfate	mg/L	37	37	1290	2220	2570	NS
Total alkalinity	mg/L	37	37	427	551	779	NS
Total dissolved solids	mg/L	37	37	2370	4040	4530	NS
Total hardness	mg/L	37	37	1340	1540	1770	NS
Vanadium, diss	mg/L	37	32	0.000043	0.01	0.01	NS
Zinc, diss	mg/L	37	4	0.000855	0.00146	0.025	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 2. Water Quality of Spring SP-301 (Richard Coulee Mainstem).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	20	0	1	1	1	NS
Aluminum, diss	mg/L	20	20	0.009	0.012	0.03	NS
Ammonia, as N	mg/L	20	7	0.005	0.031	0.148	NS
Arsenic, diss	mg/L	20	7	0.000035	0.000314	0.001	0.01
Bicarbonate alkalinity	mg/L	20	20	371	399.5	555	NS
Boron, diss	mg/L	20	20	0.0745	0.08845	0.321	NS
Cadmium, diss	mg/L	20	14	0.00004	0.0005	0.0005	0.005
Calcium, diss	mg/L	20	20	72	77.4	253	NS
Carbonate alkalinity	mg/L	20	15	1	13.3	31	NS
Chloride	mg/L	20	20	4.94	5.395	23.2	NS
Copper, diss	mg/L	20	11	0.000018	0.002	0.00202	1.3
Fluoride	mg/L	20	18	0.004	0.248	0.456	4
Hydroxide alkalinity	mg/L	20	0	1	1	1	NS
Iron, diss	mg/L	20	5	0.0005	0.00265	0.0806	NS
Laboratory conductivity	µS/cm	20	20	1160	1275	5330	NS
Laboratory pH	s.u.	20	20	8.2	8.345	8.5	NS
Lead, diss	mg/L	20	8	0.0000023	0.0000365	0.0003	0.015
Magnesium, diss	mg/L	20	20	95	103.5	224	NS
Manganese, diss	mg/L	20	15	0.000173	0.005	0.205	NS
Nickel, diss	mg/L	20	8	0.000605	0.000995	0.002	0.1
Nitrate+nitrite	mg/L	20	19	0.0046	0.3835	0.461	10
Potassium, diss	mg/L	20	20	3.96	4.12	11.1	NS
Selenium, diss	mg/L	20	20	0.001	0.001305	0.00219	0.05
Sodium, diss	mg/L	20	20	64.6	70.1	822	NS
Sulfate	mg/L	20	20	330	353.5	2630	NS
Total alkalinity	mg/L	20	20	394	410.5	555	NS
Total dissolved solids	mg/L	20	20	886	927	4790	NS
Total hardness	mg/L	20	20	573	618	1550	NS
Vanadium, diss	mg/L	20	15	0.0000136	0.01	0.01	NS
Zinc, diss	mg/L	20	0	0.000855	0.00146	0.00547	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 3. Water Quality of Spring SP-302 (Richard Coulee Mainstem).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	26	0	1	1	5	NS
Aluminum, diss	mg/L	26	26	0.009	0.046	0.144	NS
Ammonia, as N	mg/L	26	19	0.005	0.0572	2.93	NS
Arsenic, diss	mg/L	26	24	0.000314	0.00113	**0.044**	0.01
Bicarbonate alkalinity	mg/L	26	26	209	520	948	NS
Boron, diss	mg/L	26	26	0.247	0.469	1.76	NS
Cadmium, diss	mg/L	26	16	0.00004	0.0005	0.00322	0.005
Calcium, diss	mg/L	26	26	172	284	568	NS
Carbonate alkalinity	mg/L	26	13	1	5	161	NS
Chloride	mg/L	26	26	12.9	19.85	194	NS
Copper, diss	mg/L	26	20	0.0000224	0.002	0.0131	1.3
Fluoride	mg/L	26	11	0.004	0.00834	**4.02**	4
Hydroxide alkalinity	mg/L	26	0	1	1	5	NS
Iron, diss	mg/L	26	24	0.0005	0.0378	1.83	NS
Laboratory conductivity	µS/cm	26	26	4720	5830	26400	NS
Laboratory pH	s.u.	26	26	7.4	8.305	9.1	NS
Lead, diss	mg/L	26	14	0.000004	0.0003	0.00201	0.015
Magnesium, diss	mg/L	26	26	157	311	2870	NS
Manganese, diss	mg/L	26	26	0.031	0.13	6.29	NS
Nickel, diss	mg/L	26	14	0.000605	0.002	0.0281	0.1
Nitrate+nitrite	mg/L	26	5	0.003	0.0056	0.03	10
Potassium, diss	mg/L	26	26	10.5	15	132	NS
Selenium, diss	mg/L	26	22	0.000394	0.001	0.00603	0.05
Sodium, diss	mg/L	26	26	582	1010	8510	NS
Sulfate	mg/L	26	26	2150	3590	28100	NS
Total alkalinity	mg/L	26	26	355	550	948	NS
Total dissolved solids	mg/L	26	26	3650	6170	37400	NS
Total hardness	mg/L	26	26	1080	1970	13200	NS
Vanadium, diss	mg/L	26	23	0.000043	0.01	0.0111	NS
Zinc, diss	mg/L	26	1	0.000855	0.00146	0.025	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 4. Water Quality of Spring SP-304 (Richard Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	12	0	1	1	1	NS
Aluminum, diss	mg/L	12	12	0.0121	0.02725	0.0761	NS
Ammonia, as N	mg/L	12	10	0.005	0.05	0.217	NS
Arsenic, diss	mg/L	12	11	0.000314	0.001	0.00232	0.01
Bicarbonate alkalinity	mg/L	12	12	245	514.5	577	NS
Boron, diss	mg/L	12	12	0.0912	0.1115	0.169	NS
Cadmium, diss	mg/L	12	8	0.00004	0.0005	0.0005	0.005
Calcium, diss	mg/L	12	12	81.1	132.5	173	NS
Carbonate alkalinity	mg/L	12	3	1	1	19.5	NS
Chloride	mg/L	12	12	4.43	7.975	27.2	NS
Copper, diss	mg/L	12	8	0.0000224	0.002	0.00466	1.3
Fluoride	mg/L	12	12	0.3	0.4245	1	4
Hydroxide alkalinity	mg/L	12	0	1	1	1	NS
Iron, diss	mg/L	12	12	0.02	0.05205	0.821	NS
Laboratory conductivity	µS/cm	12	12	1140	1655	2090	NS
Laboratory pH	s.u.	12	12	7.93	8.235	8.5	NS
Lead, diss	mg/L	12	6	0.000004	0.00016825	0.0003	0.015
Magnesium, diss	mg/L	12	12	51.4	95.6	130	NS
Manganese, diss	mg/L	12	12	0.052	0.545	1.09	NS
Nickel, diss	mg/L	12	12	0.002	0.002885	0.0056	0.1
Nitrate+nitrite	mg/L	12	2	0.003	0.0066	0.033	10
Potassium, diss	mg/L	12	12	5	7.96	20.4	NS
Selenium, diss	mg/L	12	4	0.000135	0.00076	0.001	0.05
Sodium, diss	mg/L	12	12	61.9	154	219	NS
Sulfate	mg/L	12	12	307	528.5	760	NS
Total alkalinity	mg/L	12	12	245	516.5	577	NS
Total dissolved solids	mg/L	12	12	682	1260	1680	NS
Total hardness	mg/L	12	12	450	726	950	NS
Vanadium, diss	mg/L	12	9	0.0000136	0.01	0.01	NS
Zinc, diss	mg/L	12	1	0.00108	0.00146	0.008	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 5. Water Quality of Spring SP-305 (Richard Coulee Mainstem).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	16	0	1	1	1	NS
Aluminum, diss	mg/L	16	16	0.019	0.05725	0.104	NS
Ammonia, as N	mg/L	16	12	0.005	0.05	0.33	NS
Arsenic, diss	mg/L	16	16	0.001	0.001115	**0.239**	0.01
Bicarbonate alkalinity	mg/L	16	16	293	621.5	841	NS
Boron, diss	mg/L	16	16	0.36	0.5235	2.16	NS
Cadmium, diss	mg/L	16	11	0.00004	0.0005	0.00238	0.005
Calcium, diss	mg/L	16	16	235	369	491	NS
Carbonate alkalinity	mg/L	16	4	1	1	51.7	NS
Chloride	mg/L	16	16	13.5	19.1	131	NS
Copper, diss	mg/L	16	9	0.000018	0.002	0.0024	1.3
Fluoride	mg/L	16	11	0.0054	0.3	**4.05**	4
Hydroxide alkalinity	mg/L	16	0	1	1	1	NS
Iron, diss	mg/L	16	16	0.0382	0.425	2.2	NS
Laboratory conductivity	µS/cm	16	16	5430	6545	18700	NS
Laboratory pH	s.u.	16	16	7.9	8.16	8.52	NS
Lead, diss	mg/L	16	7	0.0000023	0.0000365	0.0016	0.015
Magnesium, diss	mg/L	16	16	256	317	1410	NS
Manganese, diss	mg/L	16	16	1.13	1.975	5.58	NS
Nickel, diss	mg/L	16	10	0.000764	0.005	0.0275	0.1
Nitrate+nitrite	mg/L	16	4	0.003	0.0066	4.17	10
Potassium, diss	mg/L	16	16	7.86	11.45	111	NS
Selenium, diss	mg/L	16	12	0.00028	0.001	0.00803	0.05
Sodium, diss	mg/L	16	16	894	1135	5480	NS
Sulfate	mg/L	16	16	3080	3725	14800	NS
Total alkalinity	mg/L	16	16	329	642	841	NS
Total dissolved solids	mg/L	16	16	5660	6505	21800	NS
Total hardness	mg/L	16	16	1820	2245	6970	NS
Vanadium, diss	mg/L	16	13	0.000048	0.01	0.01	NS
Zinc, diss	mg/L	16	1	0.00146	0.00307	0.008	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 6. Water Quality of Spring SP-306 (Lee Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	15	0	1	1	1	NS
Aluminum, diss	mg/L	15	15	0.009	0.018	0.287	NS
Ammonia, as N	mg/L	15	11	0.005	0.05	11.6	NS
Arsenic, diss	mg/L	15	15	0.001	0.003	**0.0337**	0.01
Bicarbonate alkalinity	mg/L	15	15	41.2	195	1190	NS
Boron, diss	mg/L	15	15	0.0434	0.13	0.51	NS
Cadmium, diss	mg/L	15	9	0.00004	0.0005	0.000672	0.005
Calcium, diss	mg/L	15	15	22	47.7	102	NS
Carbonate alkalinity	mg/L	15	14	1	79	237	NS
Chloride	mg/L	15	15	5.31	27.2	88.6	NS
Copper, diss	mg/L	15	13	0.000358	0.002	0.004	1.3
Fluoride	mg/L	15	15	0.1	0.435	1.37	4
Hydroxide alkalinity	mg/L	15	0	1	1	1	NS
Iron, diss	mg/L	15	14	0.00177	0.0367	0.358	NS
Laboratory conductivity	µS/cm	15	15	613	1550	4070	NS
Laboratory pH	s.u.	15	15	8.1	8.8	9.88	NS
Lead, diss	mg/L	15	9	0.0000023	0.0003	0.00047	0.015
Magnesium, diss	mg/L	15	15	47	136	436	NS
Manganese, diss	mg/L	15	15	0.005	0.00956	0.178	NS
Nickel, diss	mg/L	15	14	0.000764	0.003	0.015	0.1
Nitrate+nitrite	mg/L	15	0	0.003	0.0066	0.0066	10
Potassium, diss	mg/L	15	15	8.76	21.9	105	NS
Selenium, diss	mg/L	15	13	0.00076	0.001	0.002	0.05
Sodium, diss	mg/L	15	15	37	114	411	NS
Sulfate	mg/L	15	15	177	435	1750	NS
Total alkalinity	mg/L	15	15	141	213	1430	NS
Total dissolved solids	mg/L	15	15	500	1220	3480	NS
Total hardness	mg/L	15	15	271	706	1890	NS
Vanadium, diss	mg/L	15	13	0.0000136	0.01	0.01	NS
Zinc, diss	mg/L	15	0	0.00146	0.00307	0.00547	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 7. Water Quality of Spring SP-307 (Richard Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	13	0	1	1	1	NS
Aluminum, diss	mg/L	13	13	0.013	0.017	0.049	NS
Ammonia, as N	mg/L	13	12	0.005	0.05	0.146	NS
Arsenic, diss	mg/L	13	12	0.000314	0.001	0.00151	0.01
Bicarbonate alkalinity	mg/L	13	13	409	452	1350	NS
Boron, diss	mg/L	13	13	0.23	0.266	0.435	NS
Cadmium, diss	mg/L	13	7	0.00004	0.0005	0.000804	0.005
Calcium, diss	mg/L	13	13	86	109	119	NS
Carbonate alkalinity	mg/L	13	5	1	1	61.8	NS
Chloride	mg/L	13	13	5	6	141	NS
Copper, diss	mg/L	13	7	0.000018	0.002	0.002	1.3
Fluoride	mg/L	13	12	0.00834	0.516	0.823	4
Hydroxide alkalinity	mg/L	13	0	1	1	1	NS
Iron, diss	mg/L	13	13	0.02	0.17	0.27	NS
Laboratory conductivity	µS/cm	13	13	1700	1870	4490	NS
Laboratory pH	s.u.	13	13	8.06	8.27	8.58	NS
Lead, diss	mg/L	13	6	0.0000023	0.0000365	0.0009	0.015
Magnesium, diss	mg/L	13	13	107	118	172	NS
Manganese, diss	mg/L	13	13	0.0177	0.105	0.389	NS
Nickel, diss	mg/L	13	6	0.000764	0.000995	0.002	0.1
Nitrate+nitrite	mg/L	13	4	0.003	0.0066	0.035	10
Potassium, diss	mg/L	13	13	7.49	9	351	NS
Selenium, diss	mg/L	13	1	0.000135	0.000394	0.001	0.05
Sodium, diss	mg/L	13	13	150	169	321	NS
Sulfate	mg/L	13	13	600	651	866	NS
Total alkalinity	mg/L	13	13	431	457	1350	NS
Total dissolved solids	mg/L	13	13	1320	1410	3310	NS
Total hardness	mg/L	13	13	696	752	1000	NS
Vanadium, diss	mg/L	13	10	0.000828	0.01	0.01	NS
Zinc, diss	mg/L	13	0	0.00146	0.00146	0.00547	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 8. Water Quality of Spring SP-308 (Richard Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	11	0	1	1	1	NS
Aluminum, diss	mg/L	11	11	0.0127	0.0213	0.176	NS
Ammonia, as N	mg/L	11	6	0.005	0.05	0.09	NS
Arsenic, diss	mg/L	11	11	0.001	0.001	0.004	0.01
Bicarbonate alkalinity	mg/L	11	11	381	538	674	NS
Boron, diss	mg/L	11	11	0.11	0.17	0.31	NS
Cadmium, diss	mg/L	11	7	0.00004	0.0005	0.000636	0.005
Calcium, diss	mg/L	11	11	93	105	205	NS
Carbonate alkalinity	mg/L	11	8	1	22.7	54.8	NS
Chloride	mg/L	11	11	5.74	9	15	NS
Copper, diss	mg/L	11	8	0.000358	0.002	0.002	1.3
Fluoride	mg/L	11	11	0.3	0.5	1.08	4
Hydroxide alkalinity	mg/L	11	0	1	1	1	NS
Iron, diss	mg/L	11	11	0.02	0.0641	1.66	NS
Laboratory conductivity	µS/cm	11	11	1270	1790	2670	NS
Laboratory pH	s.u.	11	11	8.2	8.4	8.5	NS
Lead, diss	mg/L	11	4	0.0000023	0.0000365	0.0003	0.015
Magnesium, diss	mg/L	11	11	106	151	231	NS
Manganese, diss	mg/L	11	11	0.044	0.798	1.75	NS
Nickel, diss	mg/L	11	11	0.002	0.002	0.00457	0.1
Nitrate+nitrite	mg/L	11	2	0.003	0.0066	0.04	10
Potassium, diss	mg/L	11	11	4.18	7.29	11.2	NS
Selenium, diss	mg/L	11	4	0.000171	0.00076	0.00332	0.05
Sodium, diss	mg/L	11	11	62.8	101	154	NS
Sulfate	mg/L	11	11	370	489	1340	NS
Total alkalinity	mg/L	11	11	409	550	727	NS
Total dissolved solids	mg/L	11	11	1020	1270	2400	NS
Total hardness	mg/L	11	11	689	953	1410	NS
Vanadium, diss	mg/L	11	9	0.0000136	0.01	0.01	NS
Zinc, diss	mg/L	11	0	0.00146	0.00146	0.00547	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 9. Water Quality of Spring SP-309 (Richard Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	9	0	1	1	1	NS
Aluminum, diss	mg/L	9	9	0.016	0.024	0.586	NS
Ammonia, as N	mg/L	9	6	0.0073	0.05	0.1	NS
Arsenic, diss	mg/L	9	8	0.000299	0.001	0.00204	0.01
Bicarbonate alkalinity	mg/L	9	9	382	596	814	NS
Boron, diss	mg/L	9	9	0.18	0.23	0.39	NS
Cadmium, diss	mg/L	9	4	0.00004	0.000294	0.0007	0.005
Calcium, diss	mg/L	9	9	119	186	244	NS
Carbonate alkalinity	mg/L	9	8	1	17	66	NS
Chloride	mg/L	9	9	11	18.4	31	NS
Copper, diss	mg/L	9	7	0.000358	0.002	0.00432	1.3
Fluoride	mg/L	9	9	0.3	0.788	1.5	4
Hydroxide alkalinity	mg/L	9	0	1	1	1	NS
Iron, diss	mg/L	9	9	0.02	0.02	0.647	NS
Laboratory conductivity	µS/cm	9	9	2740	3340	4920	NS
Laboratory pH	s.u.	9	9	8.3	8.32	8.6	NS
Lead, diss	mg/L	9	5	0.0000023	0.0003	0.0013	0.015
Magnesium, diss	mg/L	9	9	218	291	421	NS
Manganese, diss	mg/L	9	9	0.005	0.038	0.375	NS
Nickel, diss	mg/L	9	7	0.000995	0.00298	0.00786	0.1
Nitrate+nitrite	mg/L	9	0	0.003	0.0066	0.0066	10
Potassium, diss	mg/L	9	9	6	10.4	24	NS
Selenium, diss	mg/L	9	3	0.000171	0.00076	0.001	0.05
Sodium, diss	mg/L	9	9	308	388	514	NS
Sulfate	mg/L	9	9	1330	1750	2570	NS
Total alkalinity	mg/L	9	9	426	611	824	NS
Total dissolved solids	mg/L	9	9	2480	3530	4620	NS
Total hardness	mg/L	9	9	1190	1660	2340	NS
Vanadium, diss	mg/L	9	7	0.000828	0.01	0.01	NS
Zinc, diss	mg/L	9	2	0.00146	0.00307	0.008	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 10. Water Quality of Spring SP-310 (Rape Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	20	0	1	1	1	NS
Aluminum, diss	mg/L	20	20	0.0199	0.07745	1.13	NS
Ammonia, as N	mg/L	20	12	0.005	0.05	0.0618	NS
Arsenic, diss	mg/L	20	19	0.000314	0.001	0.00373	0.01
Bicarbonate alkalinity	mg/L	20	20	386	661.5	796	NS
Boron, diss	mg/L	20	20	0.77	1.105	1.74	NS
Cadmium, diss	mg/L	20	19	0.0000658	0.00055	0.00207	0.005
Calcium, diss	mg/L	20	20	320	429	478	NS
Carbonate alkalinity	mg/L	20	4	1	1	50.7	NS
Chloride	mg/L	20	20	9.73	18.7	28	NS
Copper, diss	mg/L	20	16	0.0000224	0.002	0.00261	1.3
Fluoride	mg/L	20	13	0.0054	0.3	1.71	4
Hydroxide alkalinity	mg/L	20	0	1	1	1	NS
Iron, diss	mg/L	20	16	0.000688	0.02	0.5	NS
Laboratory conductivity	µS/cm	20	20	5630	7690	9490	NS
Laboratory pH	s.u.	20	20	7.8	8.2	8.42	NS
Lead, diss	mg/L	20	10	0.0000023	0.00018575	0.0009	0.015
Magnesium, diss	mg/L	20	20	374	534	673	NS
Manganese, diss	mg/L	20	20	0.0103	0.182	1.09	NS
Nickel, diss	mg/L	20	14	0.000764	0.003435	0.00737	0.1
Nitrate+nitrite	mg/L	20	3	0.003	0.0066	0.701	10
Potassium, diss	mg/L	20	20	9.73	15	19.4	NS
Selenium, diss	mg/L	20	18	0.000171	0.001	0.00329	0.05
Sodium, diss	mg/L	20	20	690	1135	1590	NS
Sulfate	mg/L	20	20	3320	4885	5870	NS
Total alkalinity	mg/L	20	20	415	661.5	796	NS
Total dissolved solids	mg/L	20	20	5980	8355	10400	NS
Total hardness	mg/L	20	20	2340	3280	3920	NS
Vanadium, diss	mg/L	20	16	0.0000136	0.01	0.01	NS
Zinc, diss	mg/L	20	0	0.00146	0.00146	0.00547	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Table 11. Water Quality of Spring BGDSG (Lee Coulee Tributary).

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard
Acidity	mg/L	7	4	1	6	10	NS
Aluminum, diss	mg/L	7	2	0.012	0.03	0.03	NS
Ammonia, as N	mg/L	7	0	0.0073	0.05	0.05	NS
Arsenic, diss	mg/L	7	0	0.000314	0.001	0.001	0.01
Bicarbonate alkalinity	mg/L	7	7	333	394	423	NS
Boron, diss	mg/L	7	7	0.09	0.12	0.13	NS
Cadmium, diss	mg/L	7	0	0.0000658	0.001	0.001	0.005
Calcium, diss	mg/L	7	7	88	90	105	NS
Carbonate alkalinity	mg/L	7	3	6.7	6.7	36	NS
Chloride	mg/L	7	7	10	10	13	NS
Copper, diss	mg/L	7	0	0.000358	0.005	0.005	1.3
Fluoride	mg/L	7	7	0.4	0.5	0.6	4
Hydroxide alkalinity	mg/L	2	0	1	1	1	NS
Iron, diss	mg/L	7	0	0.00265	0.02	0.02	NS
Laboratory conductivity	µS/cm	7	7	1190	1200	1400	NS
Laboratory pH	s.u.	7	7	7.6	7.7	8.6	NS
Lead, diss	mg/L	7	0	0.0000365	0.001	0.001	0.015
Magnesium, diss	mg/L	7	7	92	96	105	NS
Manganese, diss	mg/L	7	1	0.000214	0.001	0.005	NS
Nickel, diss	mg/L	7	0	0.000995	0.005	0.005	0.1
Nitrate+nitrite	mg/L	7	5	0.0066	0.02	0.09	10
Potassium, diss	mg/L	7	7	3	3	3	NS
Selenium, diss	mg/L	7	7	0.004	0.006	0.006	0.05
Sodium, diss	mg/L	7	7	52	55	64	NS
Sulfate	mg/L	7	7	295	313	421	NS
Total alkalinity	mg/L	7	7	363	395	424	NS
Total dissolved solids	mg/L	7	7	819	877	1030	NS
Total hardness	mg/L	7	7	596	623	693	NS
Vanadium, diss	mg/L	7	2	0.01	0.01	0.01	NS
Zinc, diss	mg/L	7	0	0.00307	0.01	0.01	2

NS = no numeric standard. µS/cm = micro Siemens/centimeter; s.u. = standard units.
All metals are dissolved.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard for ground water.

Streams

Table 12. Water Quality of Surface Water at SW-302.

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	26	0	1	1	5	NS	NS	NS
Aluminum, diss	mg/L	26	25	0.00316	0.035	0.0775	NS	0.75	0.087
Aluminum, total	mg/L	26	26	0.009	0.221	1.7	NS	NS	NS
Ammonia, as N[1]	mg/L	26	18	0.005	0.05	0.884	NS	T/pH dependent	
Arsenic, diss	mg/L	26	23	0.000082	0.001	0.00313	NS	NS	NS
Arsenic, total	mg/L	26	26	0.00054	0.00154	0.00754	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	26	26	298	509	710	NS	NS	NS
Boron, diss	mg/L	26	26	0.241	0.4545	0.647	NS	NS	NS
Boron, total	mg/L	26	26	0.279	0.589	4.26	NS	NS	NS
Cadmium, diss	mg/L	26	13	0.000005	0.000397	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	26	10	0.0000514	0.0001135	0.000592	0.005	Hardness dependent	
Calcium, diss	mg/L	26	26	101	300.5	396	NS	NS	NS
Carbonate alkalinity	mg/L	26	18	1	23.2	50	NS	NS	NS
Chloride	mg/L	26	26	7.24	19	33.3	NS	NS	NS
Chromium, diss	mg/L	12	4	0.000253	0.0003205	0.00369	NS	NS	NS
Chromium, total[2]	mg/L	12	8	0.000222	0.001435	0.0147	0.1	Hardness dependent	
Copper, diss	mg/L	26	17	0.000041	0.002	0.00794	NS	NS	NS
Copper, total[2]	mg/L	26	24	0.000319	0.002225	0.022	1.3	Hardness dependent	
Fluoride	mg/L	26	20	0.004	0.2	1.22	4	NS	NS
Hydroxide alkalinity	mg/L	26	0	1	1	5	NS	NS	NS
Iron, diss	mg/L	26	21	0.0005	0.02	0.0557	NS	NS	NS
Iron, total	mg/L	26	25	0.05	0.305	**3**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	26	26	**2070**	**5985**	**7740**	500		
Laboratory pH	s.u.	28	28	8.04	8.345	8.66	NS	NS	NS
Lead, diss	mg/L	26	7	0.000004	0.0000216	0.001	NS	NS	NS
Lead, total[2]	mg/L	26	15	0.000003	0.0003	0.0022	0.015	Hardness dependent	
Magnesium, diss	mg/L	26	26	119	295	404	NS	NS	NS
Manganese, diss	mg/L	26	26	0.0033	0.0541	1.03	NS	NS	NS
Manganese, total	mg/L	26	26	0.002	0.0905	1.48	NS	NS	NS
Mercury, diss	mg/L	12	0	0.000008	0.0000265	0.00003	NS	NS	NS
Mercury, total	mg/L	12	0	0.000014	0.00003	0.00003	0.00005	0.0017	0.0009
Nickel, diss	mg/L	26	14	0.000605	0.002	0.00413	NS	NS	NS
Nickel, total[2]	mg/L	26	23	0.000757	0.00323	0.03	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	26	5	0.003	0.0066	0.071	10	NS	NS
Orthophosphate as P	mg/L	11	0	0.00616	0.007	0.022	NS	NS	NS

Table 12. Water Quality of Surface Water at SW-302.

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Potassium, diss	mg/L	26	26	8.87	15.05	30.8	NS	NS	NS
Selenium, diss	mg/L	26	14	0.00028	0.00088	0.00139	NS	NS	NS
Selenium, total	mg/L	26	19	0.000378	0.001	0.00417	0.05	0.02	0.005
Sodium, diss	mg/L	26	26	199	1015	1400	NS	NS	NS
Sodium Absorption Ratio[3]		26	26	**3.17**	**9.895**	**12.2**	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	26	26	852	3500	4600	NS	NS	NS
Total alkalinity	mg/L	26	26	342	546	710	NS	NS	NS
Total dissolved solids	mg/L	28	28	594	6030	7610	NS	NS	NS
Total hardness	mg/L	26	26	743	1955	2590	NS	NS	NS
Total nitrogen	mg/L	24	24	0.45	0.8875	1.71	NS	NS	NS
Total phosphate	mg/L	26	24	0.00354	0.04125	0.22	NS	NS	NS
Total suspended sediments	mg/L	52	51	1	12.15	3660	NS	NS	NS
Turbidity	NTU	12	12	0.822	6.295	33.9	NS	NS	NS
Vanadium, diss	mg/L	26	23	0.00033	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	26	19	0.000332	0.01	0.01	NS	NS	NS
Zinc, diss	mg/L	26	1	0.000855	0.00146	0.008	NS	NS	NS
Zinc, total[2]	mg/L	26	14	0.00119	0.008	0.133	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. No exceedances occurred during the monitoring period.
[2] Aquatic Life Standards for specific parameters are hardness dependent. No exceedances occurred during the monitoring period.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed noted standards.

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Table 13. Water Quality of Surface Water at SW-304.

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	11	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	11	11	0.013	0.022	**0.281**	NS	0.75	0.087
Aluminum, total	mg/L	11	11	0.094	0.55	4.03	NS	NS	NS
Ammonia, as N[1]	mg/L	11	4	0.005	0.0073	0.1	NS	T/pH dependent	
Arsenic, diss	mg/L	11	11	0.001	0.001	0.002	NS	NS	NS
Arsenic, total	mg/L	11	11	0.001	0.002	0.00515	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	11	11	365	372	523	NS	NS	NS
Boron, diss	mg/L	11	11	0.136	0.177	0.22	NS	NS	NS
Boron, total	mg/L	11	11	0.14	0.194	0.26	NS	NS	NS
Cadmium, diss	mg/L	11	5	0.000048	0.000294	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	11	7	0.0000923	0.0005	0.00112	0.005	Hardness dependent	
Calcium, diss	mg/L	11	11	75	83	106	NS	NS	NS
Carbonate alkalinity	mg/L	11	11	11	48.8	91	NS	NS	NS
Chloride	mg/L	11	11	5.45	7	8	NS	NS	NS
Chromium, diss	mg/L	0	0	---	---	---	NS	NS	NS
Chromium, total[2]	mg/L	0	0	---	---	---	0.1	Hardness dependent	
Copper, diss	mg/L	11	9	0.000358	0.002	0.00272	NS	NS	NS
Copper, total[2]	mg/L	11	9	0.000319	0.002	0.0129	1.3	Hardness dependent	
Fluoride	mg/L	11	11	0.4	0.6	0.7	4	NS	NS
Hydroxide alkalinity	mg/L	11	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	11	11	0.02	0.02	0.43	NS	NS	NS
Iron, total	mg/L	11	11	0.21	**1.22**	**8.73**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	11	11	**1200**	**1400**	**1650**	1000-1500 (seasonal, monthly average)		
Laboratory pH	s.u.	11	11	8.4	8.59	8.7	NS	NS	NS
Lead, diss	mg/L	11	4	0.00000507	0.0000365	0.000728	NS	NS	NS
Lead, total[2]	mg/L	11	10	0.0000627	0.0007	0.00666	0.015	Hardness dependent	
Magnesium, diss	mg/L	11	11	92.8	112	138	NS	NS	NS
Manganese, diss	mg/L	11	11	0.005	0.0255	0.096	NS	NS	NS
Manganese, total	mg/L	11	11	0.0388	0.078	0.341	NS	NS	NS
Mercury, diss	mg/L	0	0	---	---	---	NS	NS	NS
Mercury, total	mg/L	0	0	---	---	---	0.00005	0.0017	0.0009
Nickel, diss	mg/L	11	11	0.002	0.002	0.00299	NS	NS	NS
Nickel, total[2]	mg/L	11	11	0.002	0.003	0.0114	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	11	3	0.003	0.0066	0.089	10	NS	NS
Orthophosphate as P	mg/L	0	0	---	---	---	NS	NS	NS
Potassium, diss	mg/L	11	11	10	12.9	14	NS	NS	NS
Selenium, diss	mg/L	11	7	0.00076	0.001	0.001	NS	NS	NS
Selenium, total	mg/L	11	7	0.000521	0.001	0.00103	0.05	0.02	0.005

Table 13. Water Quality of Surface Water at SW-304.

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	11	11	63.6	95	138	NS	NS	NS
Sodium Absorption Ratio[3]		11	11	1.14	1.61	2.19	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	11	11	312	419	609	NS	NS	NS
Total alkalinity	mg/L	11	11	379	433	550	NS	NS	NS
Total dissolved solids	mg/L	11	11	876	1100	1420	NS	NS	NS
Total hardness	mg/L	11	11	587	648	834	NS	NS	NS
Total nitrogen	mg/L	11	11	0.33	0.553	3.8	NS	NS	NS
Total phosphate	mg/L	11	11	0.02	0.07	0.3	NS	NS	NS
Total suspended sediments	mg/L	11	11	6	49	390	NS	NS	NS
Turbidity	NTU	0	0	---	---	---	NS	NS	NS
Vanadium, diss	mg/L	11	11	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	11	10	0.00323	0.01	0.0149	NS	NS	NS
Zinc, diss	mg/L	11	0	0.00146	0.00146	0.00307	NS	NS	NS
Zinc, total[2]	mg/L	11	8	0.00143	0.01	0.0408	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. No exceedances occurred during the monitoring period.
[2] Aquatic Life Standards for specific parameters are hardness dependent. No exceedances occurred during the monitoring period.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed noted standards.

Table 14. Water Quality of Surface Water at SW-305.

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	19	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	19	19	0.011	0.0176	**0.268**	NS	0.75	0.087
Aluminum, total	mg/L	19	19	0.077	0.425	5.65	NS	NS	NS
Ammonia, as N[1]	mg/L	19	10	0.005	0.05	0.12	NS	T/pH dependent	
Arsenic, diss	mg/L	19	19	0.001	0.001	0.00224	NS	NS	NS
Arsenic, total	mg/L	19	19	0.001	0.002	0.00531	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	19	19	321	366	479	NS	NS	NS
Boron, diss	mg/L	19	19	0.1	0.17	0.22	NS	NS	NS
Boron, total	mg/L	19	19	0.11	0.2	0.26	NS	NS	NS
Cadmium, diss	mg/L	19	8	0.000048	0.0000658	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	19	9	0.0000514	0.000183	0.00106	0.005	Hardness dependent	
Calcium, diss	mg/L	19	19	64	80.7	100	NS	NS	NS
Carbonate alkalinity	mg/L	19	19	9	56	77	NS	NS	NS
Chloride	mg/L	19	19	5.28	7	8	NS	NS	NS
Chromium, diss	mg/L	0	0	---	---	---	NS	NS	NS
Chromium, total[2]	mg/L	0	0	---	---	---	0.1	Hardness dependent	
Copper, diss	mg/L	19	13	0.000358	0.002	0.00281	NS	NS	NS
Copper, total[2]	mg/L	19	15	0.000319	0.002	0.0149	1.3	Hardness dependent	
Fluoride	mg/L	19	19	0.4	0.6	0.6	4	NS	NS
Hydroxide alkalinity	mg/L	19	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	19	19	0.02	0.02	0.683	NS	NS	NS
Iron, total	mg/L	19	19	0.19	0.9	**11**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	19	19	991	1320	**1570**	1000-1500 (seasonal, monthly average)		
Laboratory pH	s.u.	19	19	8.4	8.6	8.8	NS	NS	NS
Lead, diss	mg/L	19	6	0.00000507	0.0000365	0.00105	NS	NS	NS
Lead, total[2]	mg/L	19	17	0.0000627	0.0006	0.00781	0.015	Hardness dependent	
Magnesium, diss	mg/L	19	19	79	106	128	NS	NS	NS
Manganese, diss	mg/L	19	19	0.00602	0.032	0.074	NS	NS	NS
Manganese, total	mg/L	19	19	0.0363	0.071	0.429	NS	NS	NS
Mercury, diss	mg/L	0	0	---	---	---	NS	NS	NS
Mercury, total	mg/L	0	0	---	---	---	0.00005	0.0017	0.0009
Nickel, diss	mg/L	19	16	0.000995	0.002	0.003	NS	NS	NS
Nickel, total[2]	mg/L	19	18	0.000574	0.00263	0.013	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	19	6	0.003	0.0066	0.074	10	NS	NS
Orthophosphate as P	mg/L	0	0	---	---	---	NS	NS	NS
Potassium, diss	mg/L	19	19	9.64	13	14	NS	NS	NS
Selenium, diss	mg/L	19	11	0.00076	0.001	0.001	NS	NS	NS
Selenium, total	mg/L	19	11	0.000521	0.001	0.001	0.05	0.02	0.005

Table 14. Water Quality of Surface Water at SW-305.

Parameter	Unit	Number Samples	Number Detects	Minimum	Median	Maximum	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	19	19	56	85	119	NS	NS	NS
Sodium Absorption Ratio[3]		19	19	1.06	1.4	1.96	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	19	19	237	397	525	NS	NS	NS
Total alkalinity	mg/L	19	19	330	426	553	NS	NS	NS
Total dissolved solids	mg/L	19	19	760	1000	1290	NS	NS	NS
Total hardness	mg/L	19	19	487	630	775	NS	NS	NS
Total nitrogen	mg/L	19	18	0.0081	0.63	3.49	NS	NS	NS
Total phosphate	mg/L	19	19	0.02	0.06	0.415	NS	NS	NS
Total suspended sediments	mg/L	19	19	6	35	437	NS	NS	NS
Turbidity	NTU	0	0	---	---	---	NS	NS	NS
Vanadium, diss	mg/L	19	19	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	19	16	0.00155	0.01	0.0165	NS	NS	NS
Zinc, diss	mg/L	19	0	0.00146	0.00307	0.00307	NS	NS	NS
Zinc, total[2]	mg/L	19	14	0.00143	0.009	0.0389	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. No exceedances occurred during the monitoring period.
[2] Aquatic Life Standards for specific parameters are hardness dependent. No exceedances occurred during the monitoring period.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed noted standards.

Ponds

Table 15. Water Quality of Pond PO-300.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	38	0	1	1	5	NS	NS	NS
Aluminum, diss	mg/L	38	36	0.004	**0.1565**	**2.55**	NS	0.75	0.087
Aluminum, total	mg/L	38	38	0.1	0.5815	4.83	NS	NS	NS
Ammonia, as N[1]	mg/L	38	24	0.005	0.06345	1.8	NS	T/pH dependent	
Arsenic, diss	mg/L	38	38	0.001	0.00949	0.0379	NS	NS	NS
Arsenic, total	mg/L	38	38	0.001	**0.0139**	**0.0402**	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	38	38	5	249	421	NS	NS	NS
Boron, diss	mg/L	38	38	0.03	0.13	0.251	NS	NS	NS
Boron, total	mg/L	38	38	0.0307	0.14	0.473	NS	NS	NS
Cadmium, diss	mg/L	38	18	0.000005	0.00018755	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	38	15	0.000032	0.000129	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	38	38	15.8	33.95	170	NS	NS	NS
Carbonate alkalinity	mg/L	38	34	1	41.9	279	NS	NS	NS
Chloride	mg/L	38	38	1.92	11.85	25.9	NS	NS	NS
Chromium, diss	mg/L	20	5	0.000253	0.000388	0.000793	NS	NS	NS
Chromium, total[2]	mg/L	20	14	0.000222	0.00134	0.00401	0.1	Hardness dependent	
Copper, diss	mg/L	38	34	0.000358	0.002	0.00492	NS	NS	NS
Copper, total[2]	mg/L	38	37	0.000488	0.00395	0.0132	1.3	Hardness dependent	
Fluoride	mg/L	38	35	0.004	0.5125	1.34	4	NS	NS
Hydroxide alkalinity	mg/L	38	0	1	1	5	NS	NS	NS
Iron, diss	mg/L	38	36	0.02	0.155	1.52	NS	NS	NS
Iron, total	mg/L	38	38	0.145	**1.135**	**8.78**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	38	38	273	**2390**	**3670**	500		
Laboratory pH	s.u.	38	38	8.03	8.81	10.4	NS	NS	NS
Lead, diss	mg/L	38	31	0.000004	0.0003	0.00136	NS	NS	NS
Lead, total[2]	mg/L	38	37	0.000088	0.001485	0.00881	0.015	Hardness dependent	
Magnesium, diss	mg/L	38	38	8.25	16.7	102	NS	NS	NS
Manganese, diss	mg/L	38	38	0.005	0.02975	0.45	NS	NS	NS
Manganese, total	mg/L	38	38	0.0161	0.0964	0.496	NS	NS	NS
Mercury, diss	mg/L	20	0	0.000008	0.000008	0.00003	NS	NS	NS
Mercury, total	mg/L	20	1	0.000008	0.00003	**0.0002**	0.00005	0.0017	0.0009
Nickel, diss	mg/L	38	27	0.000605	0.002	0.00502	NS	NS	NS
Nickel, total[2]	mg/L	38	34	0.000717	0.00281	0.01	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	38	7	0.003	0.0046	0.349	10	NS	NS
Orthophosphate as P	mg/L	20	5	0.00616	0.022	0.221	NS	NS	NS

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Table 15. Water Quality of Pond PO-300.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Potassium, diss	mg/L	38	38	7.22	15.35	27.8	NS	NS	NS
Selenium, diss	mg/L	38	24	0.000182	0.001	0.001	NS	NS	NS
Selenium, total	mg/L	38	19	0.000378	0.000785	0.00111	0.05	0.02	0.005
Sodium, diss	mg/L	38	38	3.49	514.5	868	NS	NS	NS
Sodium Absorption Ratio[3]		38	38	0.1	**19**	**37.7**	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	38	38	61	827.5	1370	NS	NS	NS
Total alkalinity	mg/L	38	38	63.8	354.5	549	NS	NS	NS
Total dissolved solids	mg/L	38	38	192	1710	2690	NS	NS	NS
Total hardness	mg/L	38	38	85.7	146.5	840	NS	NS	NS
Total nitrogen	mg/L	36	35	0.0081	2.38	4.81	NS	NS	NS
Total phosphate	mg/L	38	38	0.0156	0.2415	0.959	NS	NS	NS
Total suspended sediments	mg/L	38	38	2	24.25	84.4	NS	NS	NS
Turbidity	NTU	20	20	2.47	21.35	114	NS	NS	NS
Vanadium, diss	mg/L	38	34	0.000043	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	38	34	0.000332	0.01	0.0114	NS	NS	NS
Zinc, diss	mg/L	38	2	0.000855	0.00146	0.008	NS	NS	NS
Zinc, total[2]	mg/L	38	24	0.00119	0.008	0.0355	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 16. Water Quality of Pond PO-301.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	22	0	1	1	5	NS	NS	NS
Aluminum, diss	mg/L	22	22	0.011	0.03	**0.302**	NS	0.75	0.087
Aluminum, total	mg/L	22	22	0.056	0.3205	13.8	NS	NS	NS
Ammonia, as N[1]	mg/L	22	11	0.0073	0.0474	0.8	NS	T/pH dependent	
Arsenic, diss	mg/L	22	22	0.001	0.002	0.007	NS	NS	NS
Arsenic, total	mg/L	22	22	0.001	0.00285	**0.017**	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	22	22	26.3	85.15	171	NS	NS	NS
Boron, diss	mg/L	22	21	0.0137	0.031	0.0956	NS	NS	NS
Boron, total	mg/L	22	22	0.03	0.0497	0.108	NS	NS	NS
Cadmium, diss	mg/L	22	9	0.00004	0.0000811	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	22	8	0.0000514	0.0001135	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	22	22	26.5	44.2	88.1	NS	NS	NS
Carbonate alkalinity	mg/L	22	10	1	5	38.6	NS	NS	NS
Chloride	mg/L	22	22	1	2.36	7	NS	NS	NS
Chromium, diss	mg/L	10	3	0.000228	0.000253	0.000878	NS	NS	NS
Chromium, total[2]	mg/L	10	8	0.000222	0.0009195	0.021	0.1	Hardness dependent	
Copper, diss	mg/L	22	19	0.000358	0.002	0.00453	NS	NS	NS
Copper, total[2]	mg/L	22	22	0.002	0.00236	0.0409	1.3	Hardness dependent	
Fluoride	mg/L	22	21	0.008	0.1715	0.385	4	NS	NS
Hydroxide alkalinity	mg/L	22	0	1	1	5	NS	NS	NS
Iron, diss	mg/L	22	21	0.02	0.045	0.21	NS	NS	NS
Iron, total	mg/L	22	22	0.117	0.539	**24.1**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	22	22	333	**557.5**	**1040**	500		
Laboratory pH	s.u.	22	22	7.6	8.35	9.82	NS	NS	NS
Lead, diss	mg/L	22	13	0.0000023	0.0003	0.00951	NS	NS	NS
Lead, total[2]	mg/L	22	19	0.0000627	0.0004695	**0.0249**	0.015	Hardness dependent	
Magnesium, diss	mg/L	22	22	15	27.75	66	NS	NS	NS
Manganese, diss	mg/L	22	22	0.005	0.0102	0.798	NS	NS	NS
Manganese, total	mg/L	22	22	0.00868	0.0347	0.841	NS	NS	NS
Mercury, diss	mg/L	10	0	0.000008	0.00003	0.00003	NS	NS	NS
Mercury, total	mg/L	10	0	0.000008	0.00003	0.00003	0.00005	0.0017	0.0009
Nickel, diss	mg/L	22	12	0.000605	0.002	0.0032	NS	NS	NS
Nickel, total[2]	mg/L	22	19	0.000574	0.002	0.0265	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	22	6	0.003	0.0066	0.37	10	NS	NS
Orthophosphate as P	mg/L	9	1	0.00616	0.007	0.022	NS	NS	NS
Potassium, diss	mg/L	22	22	5.3	12	19.3	NS	NS	NS
Selenium, diss	mg/L	22	9	0.000171	0.00076	0.00142	NS	NS	NS
Selenium, total	mg/L	22	10	0.000378	0.00057	0.00177	0.05	0.02	0.005

Table 16. Water Quality of Pond PO-301.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	22	22	10.4	29	58	NS	NS	NS
Sodium Absorption Ratio[3]		22	22	0.29	0.845	1.3	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	22	22	82.5	185.5	433	NS	NS	NS
Total alkalinity	mg/L	22	22	40	98.2	171	NS	NS	NS
Total dissolved solids	mg/L	22	22	232	391	740	NS	NS	NS
Total hardness	mg/L	22	22	132	205.5	398	NS	NS	NS
Total nitrogen	mg/L	20	20	0.517	1.07	2.54	NS	NS	NS
Total phosphate	mg/L	22	22	0.0251	0.08405	0.929	NS	NS	NS
Total suspended sediments	mg/L	22	22	1	12.55	477	NS	NS	NS
Turbidity	NTU	10	10	4.86	21.3	341	NS	NS	NS
Vanadium, diss	mg/L	22	17	0.0000136	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	22	16	0.000164	0.01	0.0332	NS	NS	NS
Zinc, diss	mg/L	22	0	0.000855	0.00146	0.00547	NS	NS	NS
Zinc, total[2]	mg/L	22	12	0.0011	0.008	0.0896	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 17. Water Quality of Pond PO-302.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	27	0	1	1	5	NS	NS	NS
Aluminum, diss	mg/L	27	27	0.0083	0.03	**0.416**	NS	0.75	0.087
Aluminum, total	mg/L	27	27	0.0554	0.256	18.8	NS	NS	NS
Ammonia, as N[1]	mg/L	27	14	0.005	0.05	3.08	NS	T/pH dependent	
Arsenic, diss	mg/L	27	27	0.001	0.00344	0.016	NS	NS	NS
Arsenic, total	mg/L	27	27	0.001	0.00463	**0.018**	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	27	26	1	188	608	NS	NS	NS
Boron, diss	mg/L	27	27	0.0979	0.32	1.17	NS	NS	NS
Boron, total	mg/L	27	27	0.111	0.32	1.74	NS	NS	NS
Cadmium, diss	mg/L	27	11	0.00004	0.0000811	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	27	9	0.000032	0.000129	0.000958	0.005	Hardness dependent	
Calcium, diss	mg/L	27	27	19.1	59	319	NS	NS	NS
Carbonate alkalinity	mg/L	27	27	5	96	273	NS	NS	NS
Chloride	mg/L	27	27	2.95	10	52.5	NS	NS	NS
Chromium, diss	mg/L	12	4	0.000253	0.000388	0.000793	NS	NS	NS
Chromium, total[2]	mg/L	12	10	0.0005	0.001225	0.00354	0.1	Hardness dependent	
Copper, diss	mg/L	27	24	0.000358	0.002	0.0167	NS	NS	NS
Copper, total[2]	mg/L	27	27	0.002	0.00304	0.034	1.3	Hardness dependent	
Fluoride	mg/L	27	24	0.004	0.2	2.03	4	NS	NS
Hydroxide alkalinity	mg/L	27	0	1	1	5	NS	NS	NS
Iron, diss	mg/L	27	24	0.00265	0.02	0.457	NS	NS	NS
Iron, total	mg/L	27	27	0.0503	0.452	**31.9**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	27	27	**802**	**2320**	**6380**	500		
Laboratory pH	s.u.	27	27	8.29	9.2	10.6	NS	NS	NS
Lead, diss	mg/L	27	17	0.000004	0.0003	0.000506	NS	NS	NS
Lead, total[2]	mg/L	27	22	0.0000122	0.000411	**0.021**	0.015	Hardness dependent	
Magnesium, diss	mg/L	27	27	45.7	167	425	NS	NS	NS
Manganese, diss	mg/L	27	27	0.005	0.0104	0.624	NS	NS	NS
Manganese, total	mg/L	27	27	0.00602	0.0254	1.03	NS	NS	NS
Mercury, diss	mg/L	12	0	0.000008	0.000014	0.00003	NS	NS	NS
Mercury, total	mg/L	12	0	0.000008	0.00003	0.00003	0.00005	0.0017	0.0009
Nickel, diss	mg/L	27	19	0.000605	0.002	0.00545	NS	NS	NS
Nickel, total[2]	mg/L	27	26	0.000898	0.0027	0.032	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	27	4	0.003	0.0066	2.32	10	NS	NS
Orthophosphate as P	mg/L	10	0	0.00616	0.007	0.022	NS	NS	NS
Potassium, diss	mg/L	27	27	6.71	16	93.7	NS	NS	NS
Selenium, diss	mg/L	27	17	0.000178	0.001	0.00723	NS	NS	NS
Selenium, total	mg/L	27	14	0.000236	0.00066	**0.00775**	0.05	0.02	0.005

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Table 17. Water Quality of Pond PO-302.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	27	27	70.9	304	855	NS	NS	NS
Sodium Absorption Ratio[3]		27	27	1.88	**4.7**	**8.95**	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	27	27	204	1190	3740	NS	NS	NS
Total alkalinity	mg/L	27	27	126	273	674	NS	NS	NS
Total dissolved solids	mg/L	27	27	510	1940	6290	NS	NS	NS
Total hardness	mg/L	27	27	236	777	2390	NS	NS	NS
Total nitrogen	mg/L	25	25	0.529	1.29	10.1	NS	NS	NS
Total phosphate	mg/L	27	27	0.024	0.08	0.777	NS	NS	NS
Total suspended sediments	mg/L	27	26	1	13.3	1720	NS	NS	NS
Turbidity	NTU	12	12	1.71	10.195	89.7	NS	NS	NS
Vanadium, diss	mg/L	27	26	0.000828	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	27	24	0.000332	0.01	0.038	NS	NS	NS
Zinc, diss	mg/L	27	1	0.000855	0.00146	0.008	NS	NS	NS
Zinc, total[2]	mg/L	27	16	0.0011	0.008	0.097	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 18. Water Quality of Pond PO-303.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	18	0	1	1	5	NS	NS	NS
Aluminum, diss	mg/L	18	17	0.00316	0.032	**0.75**	NS	0.75	0.087
Aluminum, total	mg/L	18	17	0.0051	0.2475	9.3	NS	NS	NS
Ammonia, as N[1]	mg/L	18	11	0.0073	0.0535	0.311	NS	T/pH dependent	
Arsenic, diss	mg/L	18	18	0.001	0.001105	0.00515	NS	NS	NS
Arsenic, total	mg/L	18	18	0.001	0.001285	0.0095	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	18	18	88.6	212	623	NS	NS	NS
Boron, diss	mg/L	18	18	0.0786	0.365	0.754	NS	NS	NS
Boron, total	mg/L	18	18	0.08	0.407	1.18	NS	NS	NS
Cadmium, diss	mg/L	18	7	0.00004	0.0000811	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	18	7	0.0000514	0.0001135	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	18	18	51.3	160	304	NS	NS	NS
Carbonate alkalinity	mg/L	18	8	1	3	40	NS	NS	NS
Chloride	mg/L	18	18	2.45	9.09	28	NS	NS	NS
Chromium, diss	mg/L	6	2	0.000228	0.000253	0.00062	NS	NS	NS
Chromium, total[2]	mg/L	6	6	0.0005	0.00145	0.00408	0.1	Hardness dependent	
Copper, diss	mg/L	18	17	0.000358	0.002	0.0041	NS	NS	NS
Copper, total[2]	mg/L	18	16	0.0000476	0.004935	0.023	1.3	Hardness dependent	
Fluoride	mg/L	18	15	0.004	0.2	0.302	4	NS	NS
Hydroxide alkalinity	mg/L	18	0	1	1	5	NS	NS	NS
Iron, diss	mg/L	18	17	0.000688	0.03265	1.3	NS	NS	NS
Iron, total	mg/L	18	18	0.0526	0.423	**16.7**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	18	18	**1070**	**3115**	**6680**	500		
Laboratory pH	s.u.	18	18	7.4	8.295	8.42	NS	NS	NS
Lead, diss	mg/L	18	7	0.0000023	0.00003485	0.0011	NS	NS	NS
Lead, total[2]	mg/L	18	15	0.0000122	0.000348	0.012	0.015	Hardness dependent	
Magnesium, diss	mg/L	18	18	55.2	198	429	NS	NS	NS
Manganese, diss	mg/L	18	18	0.005	0.0433	0.559	NS	NS	NS
Manganese, total	mg/L	18	18	0.0143	0.08305	0.671	NS	NS	NS
Mercury, diss	mg/L	6	0	0.000008	0.00003	0.00003	NS	NS	NS
Mercury, total	mg/L	6	0	0.000008	0.00003	0.00003	0.00005	0.0017	0.0009
Nickel, diss	mg/L	18	15	0.000605	0.002	0.00751	NS	NS	NS
Nickel, total[2]	mg/L	18	16	0.000574	0.0045	0.0195	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	18	4	0.003	0.0066	0.312	10	NS	NS
Orthophosphate as P	mg/L	6	0	0.00616	0.007	0.022	NS	NS	NS
Potassium, diss	mg/L	18	18	6.33	16.4	34	NS	NS	NS
Selenium, diss	mg/L	18	10	0.00028	0.001	0.00121	NS	NS	NS
Selenium, total	mg/L	18	11	0.000521	0.001	0.00185	0.05	0.02	0.005

Table 18. Water Quality of Pond PO-303.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	18	18	77.7	386	846	NS	NS	NS
Sodium Absorption Ratio[3]		18	18	1.8	**4.83**	**7.38**	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	18	18	458	1770	4100	NS	NS	NS
Total alkalinity	mg/L	18	18	88.6	214.5	663	NS	NS	NS
Total dissolved solids	mg/L	18	18	812	2950	6950	NS	NS	NS
Total hardness	mg/L	18	18	355	1235	2530	NS	NS	NS
Total nitrogen	mg/L	17	17	0.57	1.41	3.44	NS	NS	NS
Total phosphate	mg/L	18	18	0.0261	0.0905	1.2	NS	NS	NS
Total suspended sediments	mg/L	18	18	2	11	666	NS	NS	NS
Turbidity	NTU	6	6	2.12	18.9	133	NS	NS	NS
Vanadium, diss	mg/L	18	14	0.0000136	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	18	13	0.000332	0.01	0.021	NS	NS	NS
Zinc, diss	mg/L	18	2	0.000855	0.00146	0.008	NS	NS	NS
Zinc, total[2]	mg/L	18	12	0.00143	0.008	0.061	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 19. Water Quality of Pond PO-304.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	2	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	2	2	0.054	**0.1035**	**0.153**	NS	0.75	0.087
Aluminum, total	mg/L	2	2	0.187	0.5255	0.864	NS	NS	NS
Ammonia, as N[1]	mg/L	2	1	0.0073	0.04365	0.08	NS	T/pH dependent	
Arsenic, diss	mg/L	2	2	0.001	0.001	0.001	NS	NS	NS
Arsenic, total	mg/L	2	2	0.001	0.00135	0.0017	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	2	2	70.6	75.3	80	NS	NS	NS
Boron, diss	mg/L	2	2	0.03	0.03	0.03	NS	NS	NS
Boron, total	mg/L	2	2	0.03	0.03	0.03	NS	NS	NS
Cadmium, diss	mg/L	2	1	0.000294	0.000397	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	2	1	0.000183	0.0003415	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	2	2	21.3	21.65	22	NS	NS	NS
Carbonate alkalinity	mg/L	2	0	1	1	1	NS	NS	NS
Chloride	mg/L	2	2	1.67	4.835	8	NS	NS	NS
Chromium, diss	mg/L	0	0	---	---	---	NS	NS	NS
Chromium, total[2]	mg/L	0	0	---	---	---	0.1	Hardness dependent	
Copper, diss	mg/L	2	2	0.002	0.002	0.002	NS	NS	NS
Copper, total[2]	mg/L	2	2	0.003	0.00307	0.00314	1.3	Hardness dependent	
Fluoride	mg/L	2	1	0.0292	0.0646	0.1	4	NS	NS
Hydroxide alkalinity	mg/L	2	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	2	2	0.07	0.099	0.128	NS	NS	NS
Iron, total	mg/L	2	2	0.2	0.675	**1.15**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	2	2	198	199	200	500		
Laboratory pH	s.u.	2	2	7.7	7.73	7.76	NS	NS	NS
Lead, diss	mg/L	2	2	0.0003	0.0003	0.0003	NS	NS	NS
Lead, total[2]	mg/L	2	2	0.0003	0.000835	0.00137	0.015	Hardness dependent	
Magnesium, diss	mg/L	2	2	5.11	5.555	6	NS	NS	NS
Manganese, diss	mg/L	2	2	0.005	0.079	0.153	NS	NS	NS
Manganese, total	mg/L	2	2	0.007	0.09	0.173	NS	NS	NS
Mercury, diss	mg/L	0	0	---	---	---	NS	NS	NS
Mercury, total	mg/L	0	0	---	---	---	0.00005	0.0017	0.0009
Nickel, diss	mg/L	2	1	0.000764	0.001382	0.002	NS	NS	NS
Nickel, total[2]	mg/L	2	2	0.002	0.0025	0.003	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	2	1	0.0066	0.3233	0.64	10	NS	NS
Orthophosphate as P	mg/L	0	0	---	---	---	NS	NS	NS
Potassium, diss	mg/L	2	2	11.5	13.75	16	NS	NS	NS
Selenium, diss	mg/L	2	1	0.00028	0.00064	0.001	NS	NS	NS
Selenium, total	mg/L	2	1	0.00057	0.000785	0.001	0.05	0.02	0.005

Table 19. Water Quality of Pond PO-304.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	2	2	1	1.415	1.83	NS	NS	NS
Sodium Absorption Ratio[3]		2	2	0.05	0.07	0.09	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	2	2	9	15.4	21.8	NS	NS	NS
Total alkalinity	mg/L	2	2	70.6	75.3	80	NS	NS	NS
Total dissolved solids	mg/L	2	2	120	133	146	NS	NS	NS
Total hardness	mg/L	2	2	74.1	78.05	82	NS	NS	NS
Total nitrogen	mg/L	2	2	1.57	2.685	3.8	NS	NS	NS
Total phosphate	mg/L	2	2	0.7	0.725	0.75	NS	NS	NS
Total suspended sediments	mg/L	2	2	15	31	47	NS	NS	NS
Turbidity	NTU	0	0	---	---	---	NS	NS	NS
Vanadium, diss	mg/L	2	2	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	2	1	0.00323	0.006615	0.01	NS	NS	NS
Zinc, diss	mg/L	2	0	0.00146	0.002265	0.00307	NS	NS	NS
Zinc, total[2]	mg/L	2	2	0.008	0.008	0.008	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 20. Water Quality of Pond PO-305.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	19	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	19	19	0.009	0.0129	0.0306	NS	0.75	0.087
Aluminum, total	mg/L	19	19	0.0113	0.0277	0.998	NS	NS	NS
Ammonia, as N[1]	mg/L	19	10	0.005	0.05	0.336	NS	T/pH dependent	
Arsenic, diss	mg/L	19	17	0.000035	0.00101	0.00231	NS	NS	NS
Arsenic, total	mg/L	19	17	0.000246	0.00197	0.00316	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	19	19	43.5	274	324	NS	NS	NS
Boron, diss	mg/L	19	19	0.03	0.17	0.202	NS	NS	NS
Boron, total	mg/L	19	19	0.03	0.19	0.246	NS	NS	NS
Cadmium, diss	mg/L	19	12	0.000005	0.0005	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	19	11	0.0000514	0.0005	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	19	19	12	62.7	86	NS	NS	NS
Carbonate alkalinity	mg/L	19	17	1	22	45.4	NS	NS	NS
Chloride	mg/L	19	19	1	6	7.2	NS	NS	NS
Chromium, diss	mg/L	6	3	0.000228	0.000444	0.000677	NS	NS	NS
Chromium, total[2]	mg/L	6	5	0.00035	0.0005	0.00108	0.1	Hardness dependent	
Copper, diss	mg/L	19	10	0.0000224	0.002	0.00501	NS	NS	NS
Copper, total[2]	mg/L	19	11	0.0000476	0.002	0.00587	1.3	Hardness dependent	
Fluoride	mg/L	19	19	0.1	0.1	0.406	4	NS	NS
Hydroxide alkalinity	mg/L	19	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	19	13	0.00177	0.02	0.0419	NS	NS	NS
Iron, total	mg/L	19	19	0.02	0.049	**1.65**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	19	19	238	**1960**	**2240**	500		
Laboratory pH	s.u.	19	19	8.03	8.5	8.77	NS	NS	NS
Lead, diss	mg/L	19	9	0.0000023	0.0000715	0.0003	NS	NS	NS
Lead, total[2]	mg/L	19	9	0.000003	0.0000627	0.00134	0.015	Hardness dependent	
Magnesium, diss	mg/L	19	19	15.6	217	252	NS	NS	NS
Manganese, diss	mg/L	19	19	0.005	0.011	0.0271	NS	NS	NS
Manganese, total	mg/L	19	19	0.005	0.0199	0.0666	NS	NS	NS
Mercury, diss	mg/L	6	0	0.000008	0.000011	0.000023	NS	NS	NS
Mercury, total	mg/L	6	0	0.000008	0.0000185	0.00003	0.00005	0.0017	0.0009
Nickel, diss	mg/L	19	7	0.000661	0.000995	0.002	NS	NS	NS
Nickel, total[2]	mg/L	19	13	0.000574	0.002	0.004	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	19	0	0.003	0.0066	0.0075	10	NS	NS
Orthophosphate as P	mg/L	5	0	0.00616	0.00616	0.022	NS	NS	NS
Potassium, diss	mg/L	19	19	1.31	10	12.3	NS	NS	NS
Selenium, diss	mg/L	19	6	0.000135	0.00076	0.001	NS	NS	NS
Selenium, total	mg/L	19	1	0.000192	0.00057	0.001	0.05	0.02	0.005

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Table 20. Water Quality of Pond PO-305.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	19	19	9.91	103	123	NS	NS	NS
Sodium Absorption Ratio[3]		19	19	0.44	1.39	1.65	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	19	19	70.3	968	1110	NS	NS	NS
Total alkalinity	mg/L	19	19	43.5	296	359	NS	NS	NS
Total dissolved solids	mg/L	19	19	132	1720	1860	NS	NS	NS
Total hardness	mg/L	19	19	93.9	1050	1240	NS	NS	NS
Total nitrogen	mg/L	19	18	0.05	0.38	1.4	NS	NS	NS
Total phosphate	mg/L	19	19	0.00784	0.0131	0.0853	NS	NS	NS
Total suspended sediments	mg/L	19	18	1	2.4	47	NS	NS	NS
Turbidity	NTU	6	6	0.426	1.1835	3.31	NS	NS	NS
Vanadium, diss	mg/L	19	14	0.0000136	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	19	12	0.000182	0.01	0.01	NS	NS	NS
Zinc, diss	mg/L	19	1	0.00108	0.00146	0.008	NS	NS	NS
Zinc, total[2]	mg/L	19	7	0.0011	0.00143	0.014	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 21. Water Quality of Pond PO-307.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	1	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	1	1	0.042	0.042	0.042	NS	0.75	0.087
Aluminum, total	mg/L	1	1	0.221	0.221	0.221	NS	NS	NS
Ammonia, as N[1]	mg/L	1	1	0.05	0.05	0.05	NS	T/pH dependent	
Arsenic, diss	mg/L	1	1	0.001	0.001	0.001	NS	NS	NS
Arsenic, total	mg/L	1	1	0.001	0.001	0.001	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	1	1	30.1	30.1	30.1	NS	NS	NS
Boron, diss	mg/L	1	1	0.03	0.03	0.03	NS	NS	NS
Boron, total	mg/L	1	1	0.03	0.03	0.03	NS	NS	NS
Cadmium, diss	mg/L	1	0	0.00004	0.00004	0.00004	NS	NS	NS
Cadmium, total[2]	mg/L	1	1	0.0005	0.0005	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	1	1	7.12	7.12	7.12	NS	NS	NS
Carbonate alkalinity	mg/L	1	0	1	1	1	NS	NS	NS
Chloride	mg/L	1	1	1.34	1.34	1.34	NS	NS	NS
Chromium, diss	mg/L	1	1	0.000624	0.000624	0.000624	NS	NS	NS
Chromium, total[2]	mg/L	1	1	0.000636	0.000636	0.000636	0.1	Hardness dependent	
Copper, diss	mg/L	1	1	0.002	0.002	0.002	NS	NS	NS
Copper, total[2]	mg/L	1	1	0.00248	0.00248	0.00248	1.3	Hardness dependent	
Fluoride	mg/L	1	1	0.1	0.1	0.1	4	NS	NS
Hydroxide alkalinity	mg/L	1	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	1	1	0.0379	0.0379	0.0379	NS	NS	NS
Iron, total	mg/L	1	1	0.212	0.212	0.212	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	1	1	69	69	69	500		
Laboratory pH	s.u.	1	1	7.83	7.83	7.83	NS	NS	NS
Lead, diss	mg/L	1	1	0.0003	0.0003	0.0003	NS	NS	NS
Lead, total[2]	mg/L	1	1	0.0003	0.0003	0.0003	0.015	Hardness dependent	
Magnesium, diss	mg/L	1	1	1.84	1.84	1.84	NS	NS	NS
Manganese, diss	mg/L	1	1	0.005	0.005	0.005	NS	NS	NS
Manganese, total	mg/L	1	1	0.0067	0.0067	0.0067	NS	NS	NS
Mercury, diss	mg/L	1	0	0.000023	0.000023	0.000023	NS	NS	NS
Mercury, total	mg/L	1	0	0.000023	0.000023	0.000023	0.00005	0.0017	0.0009
Nickel, diss	mg/L	1	1	0.002	0.002	0.002	NS	NS	NS
Nickel, total[2]	mg/L	1	1	0.002	0.002	0.002	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	1	1	0.05	0.05	0.05	10	NS	NS
Orthophosphate as P	mg/L	1	1	0.179	0.179	0.179	NS	NS	NS
Potassium, diss	mg/L	1	1	6.42	6.42	6.42	NS	NS	NS
Selenium, diss	mg/L	1	0	0.000171	0.000171	0.000171	NS	NS	NS
Selenium, total	mg/L	1	0	0.00057	0.00057	0.00057	0.05	0.02	0.005

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Table 21. Water Quality of Pond PO-307.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	1	1	1	1	1	NS	NS	NS
Sodium Absorption Ratio[3]		1	0	0.1	0.1	0.1	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	1	1	1.84	1.84	1.84	NS	NS	NS
Total alkalinity	mg/L	1	1	30.1	30.1	30.1	NS	NS	NS
Total dissolved solids	mg/L	1	1	66	66	66	NS	NS	NS
Total hardness	mg/L	1	1	25.3	25.3	25.3	NS	NS	NS
Total nitrogen	mg/L	1	1	0.978	0.978	0.978	NS	NS	NS
Total phosphate	mg/L	1	1	0.276	0.276	0.276	NS	NS	NS
Total suspended sediments	mg/L	1	1	9.2	9.2	9.2	NS	NS	NS
Turbidity	NTU	1	1	12.6	12.6	12.6	NS	NS	NS
Vanadium, diss	mg/L	1	1	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	1	1	0.01	0.01	0.01	NS	NS	NS
Zinc, diss	mg/L	1	0	0.00146	0.00146	0.00146	NS	NS	NS
Zinc, total[2]	mg/L	1	1	0.008	0.008	0.008	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 22. Water Quality of Pond PO-308.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	2	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	2	2	0.017	0.052	**0.087**	NS	0.75	0.087
Aluminum, total	mg/L	2	2	0.199	0.306	0.413	NS	NS	NS
Ammonia, as N[1]	mg/L	2	1	0.0073	0.02865	0.05	NS	T/pH dependent	
Arsenic, diss	mg/L	2	2	0.001	0.0025	0.004	NS	NS	NS
Arsenic, total	mg/L	2	2	0.001	0.0025	0.004	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	2	2	46	148	250	NS	NS	NS
Boron, diss	mg/L	2	2	0.03	0.04	0.05	NS	NS	NS
Boron, total	mg/L	2	2	0.04	0.04	0.04	NS	NS	NS
Cadmium, diss	mg/L	2	0	0.0000658	0.0001799	0.000294	NS	NS	NS
Cadmium, total[2]	mg/L	2	0	0.0000923	0.00013765	0.000183	0.005	Hardness dependent	
Calcium, diss	mg/L	2	2	12	39.5	67	NS	NS	NS
Carbonate alkalinity	mg/L	2	1	1	3	5	NS	NS	NS
Chloride	mg/L	2	2	3	3.5	4	NS	NS	NS
Chromium, diss	mg/L	0	0	---	---	---	NS	NS	NS
Chromium, total[2]	mg/L	0	0	---	---	---	0.1	Hardness dependent	
Copper, diss	mg/L	2	1	0.000358	0.001179	0.002	NS	NS	NS
Copper, total[2]	mg/L	2	2	0.002	0.002	0.002	1.3	Hardness dependent	
Fluoride	mg/L	2	1	0.0292	0.0646	0.1	4	NS	NS
Hydroxide alkalinity	mg/L	2	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	2	2	0.07	0.115	0.16	NS	NS	NS
Iron, total	mg/L	2	2	0.18	0.975	**1.77**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	2	2	123	291	459	500		
Laboratory pH	s.u.	2	2	7.2	7.75	8.3	NS	NS	NS
Lead, diss	mg/L	2	1	0.0000365	0.00016825	0.0003	NS	NS	NS
Lead, total[2]	mg/L	2	2	0.0003	0.0005	0.0007	0.015	Hardness dependent	
Magnesium, diss	mg/L	2	2	4	10.5	17	NS	NS	NS
Manganese, diss	mg/L	2	2	0.01	0.131	0.252	NS	NS	NS
Manganese, total	mg/L	2	2	0.015	0.2485	0.482	NS	NS	NS
Mercury, diss	mg/L	0	0	---	---	---	NS	NS	NS
Mercury, total	mg/L	0	0	---	---	---	0.00005	0.0017	0.0009
Nickel, diss	mg/L	2	1	0.000995	0.0014975	0.002	NS	NS	NS
Nickel, total[2]	mg/L	2	2	0.002	0.0025	0.003	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	2	0	0.0066	0.0066	0.0066	10	NS	NS
Orthophosphate as P	mg/L	0	0	---	---	---	NS	NS	NS
Potassium, diss	mg/L	2	2	14	14.5	15	NS	NS	NS
Selenium, diss	mg/L	2	1	0.00076	0.00088	0.001	NS	NS	NS
Selenium, total	mg/L	2	1	0.000521	0.0007605	0.001	0.05	0.02	0.005

Table 22. Water Quality of Pond PO-308.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	2	2	1	1.5	2	NS	NS	NS
Sodium Absorption Ratio[3]		2	1	0.01	0.03	0.05	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	2	2	3	8.5	14	NS	NS	NS
Total alkalinity	mg/L	2	2	46	149	252	NS	NS	NS
Total dissolved solids	mg/L	2	2	190	325	460	NS	NS	NS
Total hardness	mg/L	2	2	44	139.5	235	NS	NS	NS
Total nitrogen	mg/L	2	2	3.5	4.05	4.6	NS	NS	NS
Total phosphate	mg/L	2	2	0.64	0.705	0.77	NS	NS	NS
Total suspended sediments	mg/L	2	2	16	40	64	NS	NS	NS
Turbidity	NTU	0	0	---	---	---	NS	NS	NS
Vanadium, diss	mg/L	2	0	0.000828	0.000828	0.000828	NS	NS	NS
Vanadium, total	mg/L	2	0	0.000914	0.002072	0.00323	NS	NS	NS
Zinc, diss	mg/L	2	1	0.00307	0.005535	0.008	NS	NS	NS
Zinc, total[2]	mg/L	2	1	0.00225	0.005125	0.008	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 23. Water Quality of Pond PO-937.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	3	0	1	1	1	NS	NS	NS
Aluminum, diss	mg/L	3	3	0.0245	0.0263	0.0377	NS	0.75	0.087
Aluminum, total	mg/L	3	3	0.0443	0.206	0.227	NS	NS	NS
Ammonia, as N[1]	mg/L	3	3	0.0711	0.613	0.902	NS	T/pH dependent	
Arsenic, diss	mg/L	3	3	0.00106	0.00148	0.00308	NS	NS	NS
Arsenic, total	mg/L	3	3	0.00134	0.00161	**0.0118**	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	3	3	69	345	434	NS	NS	NS
Boron, diss	mg/L	3	3	0.293	0.355	0.402	NS	NS	NS
Boron, total	mg/L	3	3	0.397	0.5	0.524	NS	NS	NS
Cadmium, diss	mg/L	3	2	0.00004	0.0005	0.0005	NS	NS	NS
Cadmium, total[2]	mg/L	3	2	0.000113	0.0005	0.0005	0.005	Hardness dependent	
Calcium, diss	mg/L	3	3	140	169	276	NS	NS	NS
Carbonate alkalinity	mg/L	3	3	19.6	21.3	29.2	NS	NS	NS
Chloride	mg/L	3	3	14.1	15.9	59.5	NS	NS	NS
Chromium, diss	mg/L	3	2	0.000388	0.0005	0.0005	NS	NS	NS
Chromium, total[2]	mg/L	3	3	0.000512	0.00181	0.00353	0.1	Hardness dependent	
Copper, diss	mg/L	3	3	0.002	0.002	0.002	NS	NS	NS
Copper, total[2]	mg/L	3	3	0.002	0.002	0.00914	1.3	Hardness dependent	
Fluoride	mg/L	3	2	0.00834	0.399	0.44	4	NS	NS
Hydroxide alkalinity	mg/L	3	0	1	1	1	NS	NS	NS
Iron, diss	mg/L	3	3	0.02	0.02	0.0464	NS	NS	NS
Iron, total	mg/L	3	3	0.303	0.334	0.384	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	3	3	**2810**	**3160**	**4950**	500		
Laboratory pH	s.u.	3	3	8.43	8.43	8.84	NS	NS	NS
Lead, diss	mg/L	3	1	0.0000023	0.000004	0.0003	NS	NS	NS
Lead, total[2]	mg/L	3	3	0.0003	0.00038	0.000385	0.015	Hardness dependent	
Magnesium, diss	mg/L	3	3	329	348	508	NS	NS	NS
Manganese, diss	mg/L	3	3	0.062	0.102	0.121	NS	NS	NS
Manganese, total	mg/L	3	3	0.0686	0.142	0.193	NS	NS	NS
Mercury, diss	mg/L	3	0	0.000008	0.000008	0.000008	NS	NS	NS
Mercury, total	mg/L	3	0	0.000008	0.00003	0.00003	0.00005	0.0017	0.0009
Nickel, diss	mg/L	3	3	0.002	0.002	0.002	NS	NS	NS
Nickel, total[2]	mg/L	3	2	0.000898	0.002	0.00512	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	3	1	0.003	0.003	0.029	10	NS	NS
Orthophosphate as P	mg/L	3	0	0.00616	0.022	0.022	NS	NS	NS
Potassium, diss	mg/L	3	3	17.2	18.5	54.3	NS	NS	NS
Selenium, diss	mg/L	3	2	0.000394	0.001	0.001	NS	NS	NS
Selenium, total	mg/L	3	2	0.000462	0.001	0.00218	0.05	0.02	0.005

Table 23. Water Quality of Pond PO-937.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	3	3	222	232	317	NS	NS	NS
Sodium Absorption Ratio[3]		3	3	2.33	2.34	2.61	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	3	3	1630	1680	3470	NS	NS	NS
Total alkalinity	mg/L	3	3	90.3	364	463	NS	NS	NS
Total dissolved solids	mg/L	3	3	2920	3160	4950	NS	NS	NS
Total hardness	mg/L	3	3	1700	1850	2780	NS	NS	NS
Total nitrogen	mg/L	3	3	0.725	0.908	4.13	NS	NS	NS
Total phosphate	mg/L	3	3	0.0432	0.048	0.159	NS	NS	NS
Total suspended sediments	mg/L	3	3	7.6	9.87	11.5	NS	NS	NS
Turbidity	NTU	3	3	4.13	6.59	10.3	NS	NS	NS
Vanadium, diss	mg/L	3	3	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	3	2	0.000289	0.01	0.01	NS	NS	NS
Zinc, diss	mg/L	3	0	0.00108	0.00108	0.00547	NS	NS	NS
Zinc, total[2]	mg/L	3	1	0.0012	0.0012	0.008	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 24. Water Quality of Pond BBIO1.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	6	6	12	26.5	46	NS	NS	NS
Aluminum, diss	mg/L	6	0	0.03	0.03	0.03	NS	0.75	0.087
Aluminum, total	mg/L	6	5	0.03	0.07	48.8	NS	NS	NS
Ammonia, as N[1]	mg/L	6	3	0.05	0.21	0.41	NS	T/pH dependent	
Arsenic, diss	mg/L	6	6	0.002	0.004	0.025	NS	NS	NS
Arsenic, total	mg/L	6	6	0.002	0.007	0.056	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	6	6	470	734.5	1196	NS	NS	NS
Boron, diss	mg/L	6	6	0.17	0.29	0.45	NS	NS	NS
Boron, total	mg/L	6	6	0.19	0.3	0.69	NS	NS	NS
Cadmium, diss	mg/L	6	0	0.001	0.001	0.001	NS	NS	NS
Cadmium, total[2]	mg/L	6	1	0.001	0.001	0.001	0.005	Hardness dependent	
Calcium, diss	mg/L	6	6	169	227.5	258	NS	NS	NS
Carbonate alkalinity	mg/L	6	1	6	6	6.7	NS	NS	NS
Chloride	mg/L	6	6	11	16	27	NS	NS	NS
Chromium, diss	mg/L	0	0	---	---	---	NS	NS	NS
Chromium, total[2]	mg/L	0	0	---	---	---	0.1	Hardness dependent	
Copper, diss	mg/L	6	0	0.005	0.005	0.005	NS	NS	NS
Copper, total[2]	mg/L	6	1	0.005	0.005	0.105	1.3	Hardness dependent	
Fluoride	mg/L	6	6	0.1	0.15	0.2	4	NS	NS
Hydroxide alkalinity	mg/L	0	0	---	---	---	NS	NS	NS
Iron, diss	mg/L	6	6	0.05	0.23	4.23	NS	NS	NS
Iron, total	mg/L	6	6	0.36	**5.825**	**153**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	6	6	**3060**	**4130**	**4850**	500		
Laboratory pH	s.u.	6	6	7.5	7.8	8	NS	NS	NS
Lead, diss	mg/L	6	0	0.001	0.001	0.001	NS	NS	NS
Lead, total[2]	mg/L	6	2	0.001	0.001	**0.071**	0.015	Hardness dependent	
Magnesium, diss	mg/L	6	6	280	404	563	NS	NS	NS
Manganese, diss	mg/L	6	6	0.055	1.555	4.01	NS	NS	NS
Manganese, total	mg/L	6	6	0.169	2.725	43.2	NS	NS	NS
Mercury, diss	mg/L	0	0	---	---	---	NS	NS	NS
Mercury, total	mg/L	0	0	---	---	---	0.00005	0.0017	0.0009
Nickel, diss	mg/L	6	0	0.005	0.005	0.005	NS	NS	NS
Nickel, total[2]	mg/L	6	1	0.005	0.005	**0.103**	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	6	4	0.01	0.025	0.04	10	NS	NS
Orthophosphate as P	mg/L	0	0	---	---	---	NS	NS	NS
Potassium, diss	mg/L	6	6	9	14	29	NS	NS	NS
Selenium, diss	mg/L	6	3	0.001	0.005	0.018	NS	NS	NS
Selenium, total	mg/L	6	1	0.001	0.001	0.002	0.05	0.02	0.005

Table 24. Water Quality of Pond BBIO1.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	6	6	188	261.5	408	NS	NS	NS
Sodium Absorption Ratio[3]		6	6	1.76	2.52	**3.32**	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	6	6	1580	2335	2790	NS	NS	NS
Total alkalinity	mg/L	6	6	471	735.5	1200	NS	NS	NS
Total dissolved solids	mg/L	6	6	2650	3930	4570	NS	NS	NS
Total hardness	mg/L	6	6	1570	2290	2850	NS	NS	NS
Total nitrogen	mg/L	6	6	0.4	1.35	2	NS	NS	NS
Total phosphate	mg/L	6	6	0.043	0.433	6.16	NS	NS	NS
Total suspended sediments	mg/L	6	6	13	47	3320	NS	NS	NS
Turbidity	NTU	0	0	---	---	---	NS	NS	NS
Vanadium, diss	mg/L	6	0	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	6	1	0.01	0.01	0.1	NS	NS	NS
Zinc, diss	mg/L	6	0	0.01	0.01	0.01	NS	NS	NS
Zinc, total[2]	mg/L	6	2	0.01	0.01	0.39	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

Table 25. Water Quality of Pond BBIO2.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Acidity	mg/L	6	6	0	6	24	NS	NS	NS
Aluminum, diss	mg/L	6	1	0.03	0.03	**0.13**	NS	0.75	0.087
Aluminum, total	mg/L	6	3	0.03	0.04	1.31	NS	NS	NS
Ammonia, as N[1]	mg/L	6	1	0.05	0.05	0.06	NS	T/pH dependent	
Arsenic, diss	mg/L	6	4	0.001	0.0035	0.011	NS	NS	NS
Arsenic, total	mg/L	6	4	0.001	0.0035	**0.013**	0.01	0.34	0.15
Bicarbonate alkalinity	mg/L	6	6	172	271	543	NS	NS	NS
Boron, diss	mg/L	6	6	0.06	0.29	0.49	NS	NS	NS
Boron, total	mg/L	6	6	0.06	0.29	0.52	NS	NS	NS
Cadmium, diss	mg/L	6	0	0.001	0.001	0.001	NS	NS	NS
Cadmium, total[2]	mg/L	6	0	0.001	0.001	0.001	0.005	Hardness dependent	
Calcium, diss	mg/L	6	6	63	130	192	NS	NS	NS
Carbonate alkalinity	mg/L	6	2	6	6	47	NS	NS	NS
Chloride	mg/L	6	6	6	15.5	34	NS	NS	NS
Chromium, diss	mg/L	0	0	---	---	---	NS	NS	NS
Chromium, total[2]	mg/L	0	0	---	---	---	0.1	Hardness dependent	
Copper, diss	mg/L	6	0	0.005	0.005	0.005	NS	NS	NS
Copper, total[2]	mg/L	6	0	0.005	0.005	0.005	1.3	Hardness dependent	
Fluoride	mg/L	6	1	0.1	0.1	0.4	4	NS	NS
Hydroxide alkalinity	mg/L	0	0	---	---	---	NS	NS	NS
Iron, diss	mg/L	6	6	0.02	0.075	0.08	NS	NS	NS
Iron, total	mg/L	6	6	0.08	0.295	**2.71**	NS	NS	1.0
Laboratory conductivity[3]	µS/cm	6	6	**1050**	**3515**	**5500**	500		
Laboratory pH	s.u.	6	6	7.7	7.8	8.8	NS	NS	NS
Lead, diss	mg/L	6	0	0.001	0.001	0.001	NS	NS	NS
Lead, total[2]	mg/L	6	1	0.001	0.001	0.002	0.015	Hardness dependent	
Magnesium, diss	mg/L	6	6	69	375	589	NS	NS	NS
Manganese, diss	mg/L	6	6	0.392	0.6705	1.13	NS	NS	NS
Manganese, total	mg/L	6	6	0.382	0.4825	1.23	NS	NS	NS
Mercury, diss	mg/L	0	0	---	---	---	NS	NS	NS
Mercury, total	mg/L	0	0	---	---	---	0.00005	0.0017	0.0009
Nickel, diss	mg/L	6	0	0.005	0.005	0.005	NS	NS	NS
Nickel, total[2]	mg/L	6	0	0.005	0.005	0.005	0.1	Hardness dependent	
Nitrate+nitrite	mg/L	6	2	0.01	0.01	0.01	10	NS	NS
Orthophosphate as P	mg/L	0	0	---	---	---	NS	NS	NS
Potassium, diss	mg/L	6	6	6	20.5	31	NS	NS	NS
Selenium, diss	mg/L	6	3	0.001	0.0015	0.159	NS	NS	NS
Selenium, total	mg/L	6	0	0.001	0.001	0.001	0.05	0.02	0.005

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Table 25. Water Quality of Pond BBIO2.

Parameter	Unit	Number Samples	Number Detects	Min	Median	Max	Human Health Standard	Aquatic Life Std (acute)	Aquatic Life Std (chronic)
Sodium, diss	mg/L	6	6	67	336.5	549	NS	NS	NS
Sodium Absorption Ratio[3]		6	6	1.39	**3.28**	**4.6**	3.0-5.0 (seasonal, monthly average)		
Sulfate	mg/L	6	6	396	2095	3850	NS	NS	NS
Total alkalinity	mg/L	6	6	172	294.5	544	NS	NS	NS
Total dissolved solids	mg/L	6	6	718	3205	5490	NS	NS	NS
Total hardness	mg/L	6	6	441	1945	2820	NS	NS	NS
Total nitrogen	mg/L	6	6	0.4	1.1	2.6	NS	NS	NS
Total phosphate	mg/L	6	6	0.048	0.089	0.218	NS	NS	NS
Total suspended sediments	mg/L	6	5	3	11.5	209	NS	NS	NS
Turbidity	NTU	0	0	---	---	---	NS	NS	NS
Vanadium, diss	mg/L	6	0	0.01	0.01	0.01	NS	NS	NS
Vanadium, total	mg/L	6	0	0.01	0.01	0.01	NS	NS	NS
Zinc, diss	mg/L	6	0	0.01	0.01	0.01	NS	NS	NS
Zinc, total[2]	mg/L	6	0	0.01	0.01	0.01	7.4	Hardness dependent	

NS = no numeric standard.
diss = dissolved; µS/cm = micro Siemens/centimeter; s.u. = standard units; NTU = nephelometric turbidity units.
[1] Aquatic Life Standards for Ammonia are temperature and pH dependent. Any exceedances are noted in text narrative.
[2] Aquatic Life Standards for specific parameters are hardness dependent. Any exceedances are noted in text narrative.
[3] Standards for Laboratory Conductivity and Sodium Absorption Ratio are referenced from ARM 17.30.670.
For less than detection limit concentrations, detection limit used to calculate summary statistics.
Concentrations in bold exceed the Human Health Standard or Aquatic Life Standards.

BASELINE GROUND WATER QUALITY TABLES

Table 26. Ground Water Quality in the Project Area Alluvium.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	193	18	1.0	1.0	40	NS
Aluminum (mg/L)	206	180	0.00221	0.040	2.86	NS
Ammonia (mg/L)	193	98	0.004	0.050	7.57	NS
Arsenic (mg/L)	206	119	0.000035	0.0010	**0.0581**	0.01
Bicarbonate alkalinity (mg/L)	206	206	240	532	1,170	NS
Boron (mg/L)	206	200	0.0010	0.32	1.3	NS
Cadmium (mg/L)	206	111	0.000040	0.00050	**0.00714**	0.005
Calcium (mg/L)	193	193	60.8	214	446	NS
Carbonate alkalinity (mg/L)	199	26	0	1.0	65	NS
Chloride (mg/L)	206	206	4.68	16.1	217	NS
Copper (mg/L)	193	133	0.000018	0.0020	0.192	1.3
Fluoride (mg/L)	206	175	0.0040	0.300	1.69	4.0
Hydroxide alkalinity (mg/L)	182	0	1.0	1.0	5.0	NS
Iron (mg/L)	206	138	0.00050	0.020	2.09	NS
Laboratory conductivity (µS/cm)	206	206	752	4,235	6,950	NS
Laboratory pH (s.u.)	206	206	5.63	8.12	8.50	NS
Lead (mg/L)	206	74	0.0000023	0.0000858	0.00701	0.015
Magnesium (mg/L)	193	193	26	249	578	NS
Manganese (mg/L)	206	180	0.0000867	0.00651	1.8	NS
Nickel (mg/L)	193	94	0.00050	0.002	0.043	0.1
Nitrate+nitrite (mg/L)	206	140	0.0030	0.116	2.7	10
Potassium (mg/L)	193	192	3.0	11.9	18.4	NS
Selenium (mg/L)	193	138	0.000135	0.0010	**0.11**	0.05
Sodium (mg/L)	193	193	10	583	1,140	NS
Sulfate (mg/L)	206	206	84	2,165	3,790	NS
Total alkalinity (mg/L)	206	206	240	532	962	NS
Total dissolved solids (mg/L)	206	206	470	3,890	9,140	NS
Total hardness (mg/L)	206	206	298	1,615	3,200	NS
Total phosphate (mg/L)	8	8	0.0098	0.027	2.9	NS
Vanadium (mg/L)	193	130	0.0000136	0.01	0.01	NS
Zinc (mg/L)	206	54	0.00070	0.0031	0.046	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BAL2011, BAL2321, BAL2411, BAL9031, BAL9041, P-03, P-04, P-05, WA-104, WA-114, WA-124, WA-171, WA-214, WA-215, WA-228, WA-229, WA-235, WA-237, WA-238, WA-239, and WA-240.
All metals are dissolved.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

Table 27. Ground Water Quality in the Project Area Overburden.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	130	4	1.0	1.0	22	NS
Aluminum (mg/L)	131	126	0.00221	0.053	0.455	NS
Ammonia (mg/L)	130	114	0.0050	0.453	1.62	NS
Arsenic (mg/L)	131	94	0.000035	0.0010	0.00771	0.01
Bicarbonate alkalinity (mg/L)	135	135	281	550	1050	NS
Boron (mg/L)	131	131	0.058	0.30	0.592	NS
Cadmium (mg/L)	131	75	0.000005	0.0005	**0.007**	0.005
Calcium (mg/L)	130	130	22.5	172	309	NS
Carbonate alkalinity (mg/L)	132	13	0	1.0	50	NS
Chloride (mg/L)	135	133	2.0	10	39	NS
Copper (mg/L)	126	107	0.000018	0.0020	0.0106	1.3
Fluoride (mg/L)	135	102	0.0040	0.20	**4.09**	4.0
Hydroxide alkalinity (mg/L)	129	0	1.0	1.0	5.0	NS
Iron (mg/L)	135	127	0.000688	0.24	4.52	NS
Laboratory conductivity (µS/cm)	135	135	600	4,170	6,580	NS
Laboratory pH (s.u.)	135	135	7.0	8.0	8.7	NS
Lead (mg/L)	131	72	0.0000023	0.00030	0.0070	0.015
Magnesium (mg/L)	130	130	9.29	158	431	NS
Manganese (mg/L)	135	135	0.0022	0.090	0.508	NS
Nickel (mg/L)	126	82	0.00058	0.0020	0.0271	0.1
Nitrate+nitrite (mg/L)	135	56	0.0030	0.0066	**15.7**	10
Potassium (mg/L)	130	128	3.0	10.7	17.3	NS
Selenium (mg/L)	126	69	0.000135	0.0010	0.0378	0.05
Sodium (mg/L)	130	130	14.6	771	1,250	NS
Sulfate (mg/L)	135	135	48.4	1,930	2,980	NS
Total alkalinity (mg/L)	135	135	281	554	1050	NS
Total dissolved solids (mg/L)	135	135	337	3,580	6,300	NS
Total hardness (mg/L)	135	135	94.5	1,140	2,480	NS
Total phosphate	4	4	0.018	0.082	0.231	NS
Vanadium (mg/L)	126	91	0.0000136	0.010	0.010	NS
Zinc (mg/L)	131	93	0.000855	0.010	0.0702	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BOV112, BOV212, BOV412, BOV512, WO-160, WO-162, WO-171, WO-173, WO-188, WO-190, WO-191, WO-195, WO-196, and WO-197.
All metals are dissolved.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

Table 28. Ground Water Quality in the Project Area Spoil.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	45	15	1.0	1.0	170	NS
Aluminum (mg/L)	52	35	0.0040	0.030	0.701	NS
Ammonia (mg/L)	45	44	0.0448	0.99	3.19	NS
Arsenic (mg/L)	52	35	0.000035	0.001	**0.014**	0.01
Bicarbonate alkalinity (mg/L)	52	52	400	603	926	NS
Boron (mg/L)	52	52	0.12	0.30	1.02	NS
Cadmium (mg/L)	52	16	0.00004	0.0005	0.001	0.005
Calcium (mg/L)	45	45	159	365	555	NS
Carbonate alkalinity (mg/L)	50	3	0	1.0	6.7	NS
Chloride (mg/L)	52	52	9.0	28.7	191	NS
Copper (mg/L)	45	21	0.000018	0.0020	0.045	1.3
Fluoride (mg/L)	52	30	0.0040	0.10	2.0	4.0
Hydroxide alkalinity (mg/L)	33	0	1.0	1.0	5.0	NS
Iron (mg/L)	52	49	0.019	0.11	8.38	NS
Laboratory conductivity (µS/cm)	52	52	2,490	3,355	7,830	NS
Laboratory pH (s.u.)	52	52	6.60	7.53	8.29	NS
Lead (mg/L)	52	25	0.0000023	0.00030	0.00679	0.015
Magnesium (mg/L)	45	45	168	310	720	NS
Manganese (mg/L)	52	52	0.264	0.704	4.53	NS
Nickel (mg/L)	45	28	0.0005	0.005	0.02	0.1
Nitrate+nitrite (mg/L)	52	14	0.0030	0.0083	0.020	10
Potassium (mg/L)	45	45	9.0	14.3	22.2	NS
Selenium (mg/L)	45	11	0.000135	0.0010	0.00165	0.05
Sodium (mg/L)	45	45	93	253	751	NS
Sulfate (mg/L)	52	52	1,160	1,815	5,110	NS
Total alkalinity (mg/L)	52	52	400	590	923	NS
Total dissolved solids (mg/L)	52	52	2,230	3,185	8,200	NS
Total hardness (mg/L)	52	52	1,290	2,000	4,230	NS
Total phosphate (mg/L)	5	5	0.030	0.052	0.66	NS
Vanadium (mg/L)	45	23	0.00002	0.01	0.01	NS
Zinc (mg/L)	52	20	0.000855	0.0100	0.0684	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BSP1216, BSP9946R, BSP9966, BSP9976, T-5B-P, WS-118, WS-157, WS-158, WS-159, WS-184, and WS-191.
All metals are dissolved.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

Table 29. Ground Water Quality in the Project Area Rosebud Coal.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	218	3	1.0	1.0	37	NS
Aluminum (mg/L)	223	215	0.00221	0.048	3.96	NS
Ammonia (mg/L)	218	208	0.0050	0.53	2.61	NS
Arsenic (mg/L)	223	148	0.000035	0.0010	**0.0191**	0.01
Bicarbonate alkalinity (mg/L)	226	226	297	470	838	NS
Boron (mg/L)	223	223	0.040	0.23	0.702	NS
Cadmium (mg/L)	223	110	0.0000050	0.000294	0.00086	0.005
Calcium (mg/L)	218	218	11	117	432	NS
Carbonate alkalinity (mg/L)	222	84	0	1.0	69	NS
Chloride (mg/L)	226	226	1.0	6.91	51.5	NS
Copper (mg/L)	215	164	0.000018	0.0020	0.0588	1.3
Fluoride (mg/L)	226	204	0.0040	0.30	1.97	4.0
Hydroxide alkalinity (mg/L)	218	0	1.0	1.0	5.0	NS
Iron (mg/L)	226	224	0.000688	0.0892	21.2	NS
Laboratory conductivity (µS/cm)	226	226	902	2,940	5,710	NS
Laboratory pH (s.u.)	226	226	6.8	8.2	8.8	NS
Lead (mg/L)	223	124	0.0000023	0.00030	**0.0458**	0.015
Magnesium (mg/L)	218	218	4.0	73.9	415	NS
Manganese (mg/L)	226	226	0.0050	0.098	1.66	NS
Nickel (mg/L)	215	126	0.00050	0.0020	0.036	0.1
Nitrate+nitrite (mg/L)	226	104	0.0030	0.0066	8.54	10
Potassium (mg/L)	218	216	3.70	7.79	21.9	NS
Selenium (mg/L)	215	89	0.000094	0.00076	0.00568	0.05
Sodium (mg/L)	218	218	25.7	422	1,230	NS
Sulfate (mg/L)	226	226	131	1,175	2,590	NS
Total alkalinity (mg/L)	226	226	297	474	838	NS
Total dissolved solids (mg/L)	227	227	506	2,200	6,460	NS
Total hardness (mg/L)	226	226	46	600	2,430	NS
Total phosphate (mg/L)	6	6	0.025	0.041	0.17	NS
Vanadium (mg/L)	215	159	0.0000136	0.010	0.0128	NS
Zinc (mg/L)	223	135	0.000855	0.0080	0.108	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BRC113, BRC213, BRC513, BRC9163, S-19, S-21, S-24, WR-108, WR-124, WR-125, WR-160, WR-162, WR-164, WR-173, WR-205, WR-240, WR-241, WR-242, WR-243, WR-244, WR-246, WR-247, WR-248, and WR-249.
All metals are dissolved.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

Table 30. Ground Water Quality in the Project Area Interburden.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	53	3	1.0	1.0	10	NS
Aluminum (mg/L)	61	57	0.00221	0.0300	1.67	NS
Ammonia (mg/L)	53	46	0.0073	0.18	3.4	NS
Arsenic (mg/L)	61	34	0.000035	0.0010	0.0030	0.01
Bicarbonate alkalinity (mg/L)	64	64	315	423	3,280	NS
Boron (mg/L)	61	61	0.083	0.21	0.79	NS
Cadmium (mg/L)	61	19	0.00004	0.00008	0.0005	0.005
Calcium (mg/L)	53	53	66.5	107	464	NS
Carbonate alkalinity (mg/L)	62	9	0	1.0	33	NS
Chloride (mg/L)	64	64	1.0	4.2	40	NS
Copper (mg/L)	50	37	0.000018	0.0020	0.0060	1.3
Fluoride (mg/L)	64	54	0.0040	0.20	0.984	4.0
Hydroxide alkalinity (mg/L)	53	0	1.0	1.0	5.0	NS
Iron (mg/L)	64	63	0.0049	0.12	2.3	NS
Laboratory conductivity (µS/cm)	64	64	878	1,675	4,590	NS
Laboratory pH (s.u.)	64	64	6.80	7.97	8.50	NS
Lead (mg/L)	61	37	0.0000023	0.00030	0.00288	0.015
Magnesium (mg/L)	53	53	70.6	83.1	352	NS
Manganese (mg/L)	64	64	0.0050	0.041	1.34	NS
Nickel (mg/L)	50	38	0.00050	0.0020	0.017	0.1
Nitrate+nitrite (mg/L)	64	36	0.0030	0.010	1.69	10
Potassium (mg/L)	53	53	3.0	5.1	19.7	NS
Selenium (mg/L)	50	16	0.000094	0.00050	0.00167	0.05
Sodium (mg/L)	53	53	19	28	404	NS
Sulfate (mg/L)	64	64	124	462	2,460	NS
Total alkalinity (mg/L)	64	64	315	422	897	NS
Total dissolved solids (mg/L)	64	64	427	1,180	4,460	NS
Total hardness (mg/L)	64	64	460	808	2,740	NS
Total phosphate (mg/L)	9	9	0.024	0.037	0.62	NS
Vanadium (mg/L)	50	41	0.0000136	0.010	0.010	NS
Zinc (mg/L)	61	48	0.000855	0.0080	0.098	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BIN1317, S-23, WI-157, WI-159, WI-160, WI-162, WI-164, WI-171, WI-173, WI-184, WI-185, and WI-187.
All metals are dissolved.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

Table 31. Ground Water Quality in the Project Area McKay Coal.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	198	4	1.0	1.0	20	NS
Aluminum (mg/L)	206	198	0.0040	0.037	0.407	NS
Ammonia (mg/L)	198	178	0.0050	0.43	2.55	NS
Arsenic (mg/L)	206	124	0.000035	0.0010	0.0030	0.01
Bicarbonate alkalinity (mg/L)	210	210	257	389	994	NS
Boron (mg/L)	206	206	0.0491	0.17	0.875	NS
Cadmium (mg/L)	206	96	0.0000050	0.000081	0.000647	0.005
Calcium (mg/L)	198	198	17	72	376	NS
Carbonate alkalinity (mg/L)	204	93	0	5.0	66	NS
Chloride (mg/L)	210	210	1.0	8.24	26	NS
Copper (mg/L)	194	153	0.000018	0.0020	0.0123	1.3
Fluoride (mg/L)	210	189	0.0040	0.362	1.83	4.0
Hydroxide alkalinity (mg/L)	201	0	1.0	1.0	5.0	NS
Iron (mg/L)	210	205	0.020	0.132	4.9	NS
Laboratory conductivity (µS/cm)	210	210	814	2,840	6,100	NS
Laboratory pH (s.u.)	210	210	7.0	8.2	8.8	NS
Lead (mg/L)	206	99	0.0000023	0.00010	1.0*	0.015
Magnesium (mg/L)	198	198	4.0	61	324	NS
Manganese (mg/L)	210	210	0.0027	0.044	1.09	NS
Nickel (mg/L)	194	120	0.00050	0.0020	0.0631	0.1
Nitrate+nitrite (mg/L)	210	116	0.0030	0.014	1.05	10
Potassium (mg/L)	198	195	3.2	6.4	19.5	NS
Selenium (mg/L)	194	88	0.000094	0.00076	0.034	0.05
Sodium (mg/L)	198	198	23.4	608	1130	NS
Sulfate (mg/L)	210	210	163	1,150	3,020	NS
Total alkalinity (mg/L)	210	210	267	394	971	NS
Total dissolved solids (mg/L)	211	211	550	2,150	5,090	NS
Total hardness (mg/L)	210	210	61	481	1,920	NS
Total phosphate (mg/L)	9	9	0.011	0.046	0.181	NS
Vanadium (mg/L)	194	142	0.0000136	0.010	0.010	NS
Zinc (mg/L)	206	135	0.000855	0.0080	0.468	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BMC114, BMC214, BMC414, BMC514, BMC9154, S-18, S-20, S-22, WM-139, WM-158, WM-159, WM-162, WM-164, WM-173, WM-184, WM-185, WM-191, WM-202, WM-203, WM-204, WM-207, WM-210, WM-212, WM-213, and WM-214.
All metals are dissolved.
* = Lead maximum result of 1.0 represents elevated reporting limit; analyte was not detected at reporting limit listed.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

Table 32. Ground Water Quality in the Project Area Sub-McKay.

Parameter	Number of Samples	Number of Detections	Minimum	Median	Maximum	Water Quality Standard
Acidity (mg/L)	185	10	1.0	1.0	26	NS
Aluminum (mg/L)	193	185	0.00316	0.0558	3.19	NS
Ammonia (mg/L)	185	178	0.0073	0.562	7.8	NS
Arsenic (mg/L)	193	116	0.000035	0.0010	**0.019**	0.01
Bicarbonate alkalinity (mg/L)	196	196	87.1	373	1,130	NS
Boron (mg/L)	193	193	0.047	0.22	0.69	NS
Cadmium (mg/L)	193	81	0.0000050	0.000081	0.00143	0.005
Calcium (mg/L)	185	185	8.0	79	241	NS
Carbonate alkalinity (mg/L)	190	109	0	6.7	44	NS
Chloride (mg/L)	196	196	2.59	8.4	29	NS
Copper (mg/L)	182	147	0.000018	0.0020	0.0131	1.3
Fluoride (mg/L)	196	175	0.004	0.58	**5.11**	4.0
Hydroxide alkalinity (mg/L)	181	0	1.0	1.0	5.0	NS
Iron (mg/L)	196	195	0.020	0.24	4.76	NS
Laboratory conductivity (µS/cm)	196	196	391	2,750	6,440	NS
Laboratory pH (s.u.)	196	196	6.6	8.3	8.9	NS
Lead (mg/L)	193	113	0.0000023	0.00030	0.0018	0.015
Magnesium (mg/L)	185	185	2.0	34.4	307	NS
Manganese (mg/L)	196	196	0.0060	0.035	1.2	NS
Nickel (mg/L)	182	101	0.00050	0.0020	0.024	0.1
Nitrate+nitrite (mg/L)	196	65	0.0030	0.0066	3.5	10
Potassium (mg/L)	185	184	3.0	8.8	15.8	NS
Selenium (mg/L)	182	57	0.000094	0.00076	0.0237	0.05
Sodium (mg/L)	185	185	41.7	603	1,180	NS
Sulfate (mg/L)	196	196	35.3	1,035	2,720	NS
Total alkalinity (mg/L)	196	196	87.1	378	1,130	NS
Total dissolved solids (mg/L)	196	196	177	1,990	4,960	NS
Total hardness (mg/L)	196	196	30	338	1,620	NS
Total phosphate (mg/L)	8	8	0.0032	3.02	15	NS
Vanadium (mg/L)	182	130	0.0000136	0.010	0.01	NS
Zinc (mg/L)	193	106	0.000855	0.0080	0.17	2.0

Application Appendix B.
Data range is January 2008 to February 2020.
Wells included: BSM115, BSM1215R, BSM215, BSM2415, BSM415, BSM515, WD-159, WD-160, WD-184, WD-185, WD-195, WD-196, WD-203, WD-204, WD-205, WD-209, WD-211, WD-215, WD-216, and WD-217.
All metals are dissolved.
NS = no numeric standard or recommended concentration. µS/cm = micro Siemens/centimeter; s.u. = standard units.
For less than detection limit concentrations, detection limits are used to calculate summary statistics.
Concentrations in bold exceed Montana numeric ground water quality standards.

WATER RIGHTS

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
205	GROUNDWATER	UNKNOWN	FARLEY INC	STOCK	Rosebud	1N40E	13	NENENWNE	N				
212	GROUNDWATER	18991230	FARLEY RANCH	DOMESTIC	Rosebud	1N40E	14	NWNWNWNW	N				40
213	GROUNDWATER	18991230	FARLEY INC	DOMESTIC	Rosebud	1N40E	14	NWNWNWNW	N				
216	GROUNDWATER	18991230	FARLEY INC	STOCK	Rosebud	1N40E	15	NWSWNWNW	N				
229	GROUNDWATER	19600101	FARLEY'S INC	STOCK	Rosebud	1N40E	29	NWNWSWNE	N	5			232
231	GROUNDWATER	UNKNOWN	L FARLEY	STOCK	Rosebud	1N40E	35	SWNWNWSE	N	3			30
7024	GROUNDWATER	UNKNOWN	BAILERY J	STOCK	Rosebud	1S41E	2	NWNWNENE	N				81
7025	GROUNDWATER	UNKNOWN	BAILEY J	STOCK	Rosebud	1S41E	5	NENESESW	N	2			80
11984	GROUNDWATER	19630101	FARLEYS INC	STOCK, DOMESTIC	Rosebud	1N40E	18	SESWNWNE	N	20			20
11986	GROUNDWATER	19840209	FARLEYS INC	STOCK	Rosebud	1N40E	18	SWSW	N	15			110
11988	GROUNDWATER	19630101	FARLEYS INC	STOCK, DOMESTIC	Rosebud	1N40E	18	NWSWSESE	N	20			225
12020	GROUNDWATER	19470101	NORTHERN PACIFIC RAILWAY COMPANY	STOCK	Rosebud	1N41E	31	NESENENE	N	10			150
139748	GROUNDWATER	19910801	MCRAE DOUG	UNKNOWN	Rosebud	1N41E	20	NWNE	N				320
212086	GROUNDWATER	20040518	ASHENHURST RANCH INC	STOCK	Rosebud	1N40E	22	NENE	N	8			480
212090	GROUNDWATER	20040518	ASHENHURST RANCH INC	STOCK	Rosebud	1N40E	28	SENE	N	15			65
42A 108275 00	UNNAMED TRIBUTARY OF LEE COULEE	19481201	WPP LLC	STOCK	Rosebud	1N41E	19	SENESW	Y				
42A 108296 00	GROUNDWATER	19451231	WPP LLC	STOCK	Rosebud	1S41E	5	NESESW	N	10			150
42A 108301 00	GROUNDWATER	19491231	WPP LLC	STOCK	Rosebud	1N41E	33	SWSWNW	N	20			70
42A 108302 00	LEE COULEE	19481201	WPP LLC	STOCK	Rosebud	1N41E	33	SWSENW	Y				
42A 108357 00	GROUNDWATER	19601231	WPP LLC	STOCK	Rosebud	1N40E	29	SWNWNE	N	8			
42A 108358 00	GROUNDWATER	19571231	WPP LLC	STOCK	Rosebud	1N40E	23	NWSENW	N	6			100
42A 108359 00	SPRING, UNNAMED TRIBUTARY OF RICHARD COULEE	19111231	WESTERN ENERGY CO	STOCK	Rosebud	1N40E	19	SWSWSE	N				

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42A 108402 00	SPRING, UNNAMED TRIBUTARY OF RAPE COULEE	19111231	WPP LLC	STOCK	Rosebud	1S40E	1	NENWSW	N				
42A 108403 00	SPRING, UNNAMED TRIBUTARY OF RICHARD COULEE	19111231	GREAT NORTHERN PROPERTIES LTD PRTNRSHP	STOCK	Rosebud	1S40E	1	NENENE	N				
42A 145437 00	UNNAMED TRIBUTARY OF LEE COULEE	19411231	WESTERN ENERGY COMPANY	STOCK	Rosebud	1N40E	26	NWNESE	Y				
42A 145438 00	UNNAMED TRIBUTARY OF RICHARD COULEE	19421231	WESTERN ENERGY COMPANY	STOCK	Rosebud	1N40E	21	SESWSW	Y				
42A 145439 00	UNNAMED TRIBUTARY OF RICHARD COULEE	19421231	WESTERN ENERGY COMPANY	STOCK	Rosebud	1N40E	27	SENWNW	Y				
42A 145440 00	LEE COULEE	19421231	WESTERN ENERGY COMPANY	STOCK	Rosebud	1N40E	22	SWNWNW	Y				
42A 145441 00	UNNAMED TRIBUTARY OF RICHARD COULEE	19401231	WESTERN ENERGY COMPANY	STOCK	Rosebud	1N40E	28	SENWSW	Y				
42A 145442 00	UNNAMED TRIBUTARY OF RAPE COULEE	19461231	WESTERN ENERGY COMPANY	STOCK	Rosebud	1N40E	33	NESESW	Y				
42A 172068 00	GROUNDWATER	19300601	SCOTT BRADAC	STOCK	Rosebud	1S41E	3	NWNENW	N	2			
42A 172075 00	UNNAMED TRIBUTARY OF LEE COULEE	19300601	BIG SKY COAL CO	STOCK	Rosebud	1N41E	32	SESWSE	Y				
42A 172076 00	UNNAMED TRIBUTARY OF LEE COULEE	19400601	SCOTT BRADAC	STOCK	Rosebud	1S41E	2	SENENE	Y				
42A 181539 00	RAPE COULEE	19471231	BROADUS INC	STOCK	Rosebud	1S40E	2	SWNWSE	Y				
42A 181540 00	SPRING, UNNAMED TRIBUTARY OF RAPE COULEE	19471231	BROADUS INC	STOCK	Rosebud	1S40E	2	NWSENE	N	1			

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42A 181541 00	GROUNDWATER	19530606	BROADUS INC	STOCK	Rosebud	1S40E	2	SWNESW	N	6			
42A 181542 00	UNNAMED TRIBUTARY OF RAPE COULEE	19471231	BROADUS INC	STOCK	Rosebud	1S41E	8	NESWNW	Y				
42A 181543 00	GROUNDWATER	19471231	BROADUS INC	STOCK	Rosebud	1S41E	8	SWSWNE	N	6			
42A 181544 00	RICHARD COULEE	19471231	BROADUS INC	STOCK	Rosebud	1S41E	8	NESENE	Y				
42A 183337 00	UNNAMED TRIBUTARY OF RICHARD COULEE	19540930	WESTERN ENERGY CO	STOCK	Rosebud	1N40E	30	NENESW	Y				
42A 183488 00	SPRING, UNNAMED TRIBUTARY OF RICHARD COULEE	19460430	WESTERN ENERGY CO	STOCK	Rosebud	1N40E	20	SENESE	N	10			
42A 183489 00	GROUNDWATER	19600701	BOOTH LAND & LIVESTOCK CO	STOCK	Rosebud	1N40E	29	SWNWNE	N	8			
42A 183490 00	SPRING, UNNAMED TRIBUTARY OF RICHARD COULEE	19420331	WESTERN ENERGY CO	STOCK	Rosebud	1N40E	30	SWNWNW	N				
42A 183491 00	SPRING, UNNAMED TRIBUTARY OF RICHARD COULEE	19420531	WESTERN ENERGY CO	STOCK	Rosebud	1N40E	30	NENENW	N	10			
42A 27204 00	UNNAMED TRIBUTARY OF LEE COULEE	19160720	BIG SKY COAL CO	IRRIGATION	Rosebud	1N41E	31	NENENE	N			10	
42A 27210 00	LEE COULEE	19090610	BIG SKY COAL CO	IRRIGATION	Rosebud	1N41E	32	NENENW	N	1360		80	
42A 27316 00	UNNAMED TRIBUTARY OF LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	30	SW	N				
42A 27316 00	UNNAMED TRIBUTARY OF LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	32	NW	N				
42A 27317 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N40E	24	S2	N				

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42A 27317 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N40E	25	NE	N				
42A 27317 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	29	SW	N				
42A 27317 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	30	NW	N				
42A 27317 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	30	S2	N				
42A 27317 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	32	N2	N				
42A 27318 00	SPRING, UNNAMED TRIBUTARY OF LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	28	NWSWSW	N				
42A 27319 00	SPRING, UNNAMED TRIBUTARY OF LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	30	SWSWNE	N				
42A 27320 00	UNNAMED TRIBUTARY OF LEE COULEE	19391231	BIG SKY COAL CO	STOCK	Rosebud	1N41E	32	SESWSE	Y				
42A 27321 00	UNNAMED TRIBUTARY OF LEE COULEE	19261231	BIG SKY COAL CO	STOCK	Rosebud	1N41E	32	NWSWNE	Y				
42A 27332 00	MILLER COULEE	18831001	GREENLEAF LAND AND LIVESTOCK CO	STOCK	Rosebud	1N41E	20	NE	N				
42A 27333 00	SPRING, UNNAMED TRIBUTARY OF LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	28	SWSESE	N				
42A 27335 00	MILLER COULEE	19441231	GREENLEAF LAND AND LIVESTOCK CO	STOCK	Rosebud	1N41E	20	SENENE	Y				
42A 27337 00	GROUNDWATER	19461001	BIG SKY COAL CO	STOCK	Rosebud	1N41E	30	SENWNW	N	3			90
42A 27338 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N40E	24	SW	N				
42A 27338 00	LEE COULEE	18831001	BIG SKY COAL CO	STOCK	Rosebud	1N40E	25	NE	N				
42A 27339 00	GROUNDWATER	19451231	BIG SKY COAL CO	STOCK	Rosebud	1N40E	24	SESWSW	N	3			

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Townshi p Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42A 27340 00	UNNAMED TRIBUTARY OF LEE COULEE	19671231	BIG SKY COAL CO	STOCK	Rosebud	1N40E	24	SWNENE	Y				
42A 27341 00	UNNAMED TRIBUTARY OF LEE COULEE	19381231	BIG SKY COAL CO	STOCK	Rosebud	1N40E	24	SWNESW	Y				
42A 27342 00	UNNAMED TRIBUTARY OF LEE COULEE	19381231	BIG SKY COAL CO	STOCK	Rosebud	1N40E	25	SWNWSE	Y				
42A 27343 00	GROUNDWATER	19531231	BROADUS INC	STOCK	Rosebud	1S41E	6	SWSWSW	N	5			
42A 27344 00	GROUNDWATER	19531231	BROADUS INC	STOCK	Rosebud	1S41E	6	NENENE	N	5			
42A 27345 00	SPRING, UNNAMED TRIBUTARY OF RICHARD COULEE	18831001	SCOTT BRADAC	STOCK	Rosebud	1S41E	4	NWNWSE	N				
42A 27346 00	RICHARD COULEE	18831001	BROADUS INC	STOCK	Rosebud	1S41E	6	E2NE	N				
42A 27347 00	RAPE COULEE	18831001	BROADUS INC	STOCK	Rosebud	1S41E	6	SWSW	N				
42A 42803 00	GROUNDWATER	19830319	WPP LLC	STOCK	Rosebud	1N40E	35	NWNWSE	N	5	1.5		
42A 44177 00	GROUNDWATER	19820406	FARLEYS INC	STOCK	Rosebud	1N40E	35	SWSWNE	N	12	4.5		
42A 47132 00	GROUNDWATER	19820510	SCOTT BRADAC	STOCK	Rosebud	1S41E	2	NWNENE	N	15	1.3		
42A 52220 00	GROUNDWATER	19830321	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	14	SWSWSW	N	10	1.68		
42A 58905 00	GROUNDWATER	19850322	BIG SKY COAL CO	STOCK	Rosebud	1N40E	30	SESW	N	25	3.4		120
42A 58906 00	GROUNDWATER	19850322	BIG SKY COAL CO	STOCK, INDUSTRIAL	Rosebud	1N41E	30	NESE	N	35	9.01		97
42A 5967 00	MILLER COULEE	19750715	GREAT NORTHERN PROPERTIES LTD PRTNRSHP, WPP LLC	STOCK, IRRIGATION, FLOOD CONTROL	Rosebud	1N41E	21	SWNESE	Y	198	6.21	2	

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42A 8206 00	SPRING, UNNAMED TRIBUTARY OF LEE COULEE	19400415	MONTANA, STATE OF BOARD OF LAND COMMISSIONERS TRUST LAND MANAGEMENT DIVISION	STOCK	Rosebud	1N40E	36	NENWSE	N				
42A 8207 00	UNNAMED TRIBUTARY OF LEE COULEE	19400415	MONTANA, STATE OF BOARD OF LAND COMMISSIONERS TRUST LAND MANAGEMENT DIVISION	STOCK	Rosebud	1N40E	36	NWNENE	Y				
42KJ 108499 00	GROUNDWATER	19811230	BNSF RAILWAY CO	STOCK	Rosebud	1N40E	15	SWNWNW	N	5			
42KJ 162808 00	UNNAMED TRIBUTARY OF UNNAMED TRIBUTARY OF EAST FORK ARMELLS CREEK	19351231	WESTERN ENERGY CO	STOCK	Rosebud	1N41E	17	NWNWNW	Y				
42KJ 183242 00	SPRING, UNNAMED TRIBUTARY OF UNNAMED TRIBUTARY OF EAST FORK ARMELLS CREEK	19210303	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	18	NENWNW	N				
42KJ 183290 00	GROUNDWATER	19460930	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	17	NENENW	N	8			145
42KJ 183306 00	UNNAMED TRIBUTARY OF ARMELLS CREEK, EAST FORK	19360828	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	17	SENESE	Y				

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42KJ 183322 00	GROUNDWATER	19501231	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	12	SESWSE	N	20			
42KJ 183326 00	ARMELLS CREEK, EAST FORK	19180618	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	14	N2NW	N				
42KJ 183327 00	UNNAMED TRIBUTARY OF UNNAMED TRIBUTARY OF EAST FORK ARMELLS CREEK	19500831	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	14	SWNWNW	Y				
42KJ 183328 00	GROUNDWATER	19141231	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	14	NWNWNW	N	50			
42KJ 183487 00	GROUNDWATER	19541220	BOOTH BROS LAND & LIVESTOCK	STOCK	Rosebud	1N40E	18	SESESE	N	10			220
42KJ 183536 00	GROUNDWATER	19141231	BOOTH BROS LAND & LIVESTOCK	DOMESTIC	Rosebud	1N40E	14	NWNWNW	N	50	3	1	
42KJ 183541 00	UNNAMED TRIBUTARY OF UNNAMED TRIBUTARY OF EAST FORK ARMELLS CREEK	19470831	BOOTH BROS LAND & LIVESTOCK	IRRIGATION	Rosebud	1N40E	18	SWSESE	N		27.6	12	
42KJ 183542 00	UNNAMED TRIBUTARY OF ARMELLS CREEK, EAST FORK	19160515	BOOTH BROS LAND & LIVESTOCK	IRRIGATION	Rosebud	1N40E	18	SWNESW	Y		50.0	25	
42KJ 183553 00	SPRING, UNNAMED TRIBUTARY OF ARMELLS CREEK	19210303	BOOTH BROS LAND & LIVESTOCK	IRRIGATION	Rosebud	1N40E	18	NENWNW	N		23	10	
42KJ 42802 00	GROUNDWATER	19820319	WPP LLC	STOCK	Rosebud	1N40E	15	SWNWNW	N	5	2.25		
42KJ 68082 00	GROUNDWATER	19880705	STEVEN C PEMBLE	DOMESTIC, LAWN & GARDEN	Rosebud	1N40E	18	SWSE	N	10	7.25	2.5	300
42KJ 80635 00	GROUNDWATER	19920615	GARY J EERNISSE	DOMESTIC, STOCK	Rosebud	1N40E	18	SESWSE	N	14	1.03		120

Table 33. List of Surface Water and Ground Water Rights in the Project Area

Water Rights Number	Source	Priority Date (yr/mo/day)	Owner	Purpose	County	Township Range	Section	Quarter Section	Reservoir?	Maximum Flow Rate (gpm)	Maximum Volume (Ac-ft)	Maximum Acreage (Acres)	Well Depth (feet)
42KJ 8204 00	UNNAMED TRIBUTARY OF ARMELLS CREEK, EAST FORK	19400415	MONTANA, STATE OF BOARD OF LAND COMMISSIONERS TRUST LAND MANAGEMENT DIVISION	STOCK	Rosebud	1N40E	16	SWNESE	Y				
42KJ 8205 00	GROUNDWATER	19400415	MONTANA, STATE OF BOARD OF LAND COMMISSIONERS TRUST LAND MANAGEMENT DIVISION	STOCK	Rosebud	1N40E	16	NWNESE	N	8			
42KJ 8209 00	UNNAMED TRIBUTARY OF ARMELLS CREEK, EAST FORK	19400415	MONTANA, STATE OF BOARD OF LAND COMMISSIONERS TRUST LAND MANAGEMENT DIVISION	STOCK	Rosebud	1N40E	16	E2SWNE	Y				
42KJ 8210 00	GROUNDWATER	19400415	MONTANA, STATE OF BOARD OF LAND COMMISSIONERS TRUST LAND MANAGEMENT DIVISION	STOCK	Rosebud	1N40E	16	NENENE	N	10			
BUN9100	GROUNDWATER	UNKNOWN	UNKNOWN	STOCK	Rosebud	1N40E	24		N				
BUN9120	GROUNDWATER	UNKNOWN	UNKNOWN	STOCK	Rosebud	1N40E	26		N				
BUN9200	GROUNDWATER	UNKNOWN	UNKNOWN	UNKNOWN	Rosebud	1N40E	14		N				
BUN9210	GROUNDWATER	UNKNOWN	UNKNOWN	STOCK	Rosebud	1N40E	26		N				

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Appendix C – Rosebud Coal Mine Greater Sage-Grouse Mitigation Plan

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ROSEBUD COAL MINE
AM5 GREATER SAGE-GROUSE MITIGATION PLAN

PROJECT ID NUMBER: 2750

PREPARED FOR:

Western Energy Company
P.O. Box 99
Colstrip, Montana 59323
Contact: Richard Spang
406/748-5189

PREPARED BY:

ICF
405 West Boxelder Road, Suite A-5
Gillette, Wyoming 82718
Contact: Roy Fenster
307/468-4762

December 2018

ICF

ICF. 2018. Rosebud Mine, AM5, Greater Sage-Grouse Mitigation. November. (ICF P0968.18) Gillette, Wyoming. Prepared for Western Energy Company.

Contents

Tables

Figures

Acronyms and Abbreviations

°F	Fahrenheit
AM5 or Area B Extension South	Proposed Amendment to Area B SMP 1984003B
MDEQ	Montana Department of Environmental Quality
MFWP	Montana Fish, Wildlife, & Parks
mi^2	square miles
MNHP	Montana Natural Heritage Program
Western Energy	Western Energy Company

Introduction

Western Energy Company (Western Energy) operates the Rosebud coal mine in southeastern Montana near the town of Colstrip. The Rosebud Mine is a surface mine that has been in operation since 1968. The proposed amendment to the Area B Surface Mine Permit (SMP C1984003B), AM5, is located in Rosebud County, adjacent to the southern boundary of the existing Rosebud Mine permit area and approximately 5 miles southwest of Colstrip in Rosebud County, Montana. The proposed tract overlaps all or portions of Sections 13, 17, 20–29, and 33–36, T1N:R40E. AM5 would increase the Area B permit area by 9,108 acres and the disturbance area by 5,547 acres, this results in a total permit area of 15,161 acres and 11,202 acres of disturbance. The wildlife survey area included the entire proposed AM5 tract and a surrounding perimeter that encompasses 54.3 mi^2 or 34,789 acres.

Generally, the process of mining and reclamation at the Rosebud Mine follows the following sequence:

1. vegetation is cleared
2. topsoil is salvaged and either directly hauled to regraded areas or stockpiled for future use
3. blasting techniques are employed to loosen and move some of the overburden to the previous open pit
4. dragline removes remainder of overburden and exposes coal
5. blasting techniques are employed to fracture coal
6. coal is extracted by a truck and loader fleet
7. open pit is backfilled with spoil (blasted overburden)
8. surface is graded to approximate original contour
9. topsoil is placed
10. revegetation by seeding and hand planting

Surface ownership within the wildlife survey area is a mixture of private and state land. The area is relatively remote and only accessed via old mine roads associated with the Big Sky Mine from the east, extended mine roads on the Rosebud Mine from the north, or numerous rural dirt roads associated with the other surrounding ranches and private lands. Current principal land uses in the general vicinity include a long history of mining, as well as recreation (e.g., hunting), ranching, and agriculture.

Wildlife monitoring based on guidance from the Montana Department of Environmental Quality (MDEQ) is ongoing and has been conducted annually in portions of the Rosebud Mine from 1973 through 2018. The proposed Area B Extension South tract overlaps the south-central extent of the current Rosebud Mine annual wildlife monitoring area (permit areas and a 1.0-mile perimeter) and the western portion of the no longer active Big Sky Mine and its historical 1.0-mile wildlife survey area. Monitoring was conducted at the Big Sky Mine annually from 1974 through 2015, after which monitoring was no longer required by MDEQ due to the mine's inactive status. Monitoring included standardized wildlife surveys for big game, game birds, breeding birds, and nesting raptors. However, all animal species (including any federally listed species and other species of concern listed with the Montana Fish, Wildlife, & Parks [MFWP] and Montana Natural Heritage Program [MNHP]) were also incidentally recorded in all years.

Study Area Habitat Characteristics

The proposed AM5 tract is within the Northwestern Great Plains Ecoregion.[1] The climate is semi-arid, averaging 15.0 inches of precipitation annually, with the majority occurring between April and October. The 50-year mean maximum and minimum temperatures in July and January were 88.1 degrees Fahrenheit (°F) and 9.5°F, respectively.

AM5 lies near the base and to the east of the Little Wolf Mountains, and elevation ranges from approximately 3,160 to 3,820 feet above sea level. Topography is a series of alternating drainages and prominent ridgelines, primarily running northwest to southeast. Topography in the southwestern and southern extent is composed of taller steeper slopes and narrower valleys. More open valleys and rolling topography occur in the central-western, extreme northern, and northeastern portions of the area.

Minor ridgelines and hillsides border drainages found in these areas as well. Ridgelines throughout the area are characterized by moderately steep slopes with exposed rock outcrops (primarily clinker, but some sandstone) accompanied by some large areas of flat terrain on top of ridgelines.

Drainages are generally azonal alluvial soils, often loamy in texture. Several named and unnamed drainages, including Lee Coulee, Richard Coulee, and Rape Coulee flow from the northwest throughout the area towards Rosebud Creek. The East Fork of Armells Creek also flows west to east along the northern margin of the area. Water availability is limited to ephemeral runoff associated with the more prominent drainages.

The area is dominated by woodlands interspersed with large open grasslands at the higher elevations and level to rolling grasslands interspersed with sagebrush and woody draw habitats along the numerous drainages at the lower elevations. High-elevation woodlands primarily consist of sparse to dense stands of ponderosa pine (*Pinus ponderosa*).

In late summer 2012, the Chalky wildfire spread throughout the southwestern and southern portions of the area; thus, a significant portion of the pine stands present are composed of dead standing trees with a relatively open canopy and short to sparse undergrowth. However, some scattered patches of unburned pine stands also exist in areas where the wildfire did not extend (particularly in the northeast). Some stands of ponderosa pine also occur at the lower elevations and along most creek drainages but are generally sparser and mixed with individuals or small stands of green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*), or cottonwoods (*Populus* spp.). Many of the larger stands of cottonwoods present along Richard Coulee and Rape Coulee were also burned in the Chalky wildfire but are still standing.

Large expanses of grassland habitat extended throughout the lower elevations, especially along the northwestern and southeastern ends of Richard Coulee and the northwestern portion of Lee Coulee. Herbaceous cover throughout the survey area varied from dense among the rolling hills and draws to sparse or bare along many of the steeper ridgelines or in the burned areas. The majority of grasses throughout the survey area ranged from approximately 6 to 32 inches in height.

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[1] Environmental Protection Agency. 1993. Ecoregions of the United States. Derived from J. W. Omernik, Ecoregions of the Coterminous United States; Scale 1:7,500,000. *Annals of the Association of American Geographers* 77:118–125.

Common grasses within the project area included wheatgrasses (*Agropyron* and *Pascopyron* spp.), needle-and-thread (*Hesperostipa comata*), junegrass (*Koeleria macrantha*), Japanese brome (*Bromus japonicus*), bluegrass (*Poa* spp.), green needlegrass (*Stipa viridula*), crested wheatgrass (*Agropyron cristatum*), and cheatgrass (*Bromus tectorum*).

The survey area also overlaps with previously mined areas at the former Big Sky Mine. As a result, approximately 3.2 mi^2 of reclaimed grassland exist within the central-eastern margin of the proposed AM5 tract and extended wildlife survey area. Grass cover in that area is dense and ranges in height from 12 to 38 inches.

Dominant shrubs in the area include big sagebrush (*Artemisia tridentata*) and silver sagebrush (*Artemisia cana*). Sagebrush communities typically occurred along the slopes at the lower elevations in a patchy mosaic of sparse to moderately dense stands. Sagebrush height generally varied from 12 to 30 inches (averaging 24 inches).

The majority of the sagebrush habitats occurred along the northwestern extent of Lee Coulee, the central stretch of Richard Coulee, and the southeastern portion of Rape Coulee on the drier east- and south-facing slopes. Dense, but less common shrubs were also observed in woody draw habitats. Those species included chokecherry (*Prunus virginiana*), snowberry (*Symphoricarpus alba*), gooseberry and currant (*Ribes* spp.), and serviceberry (*Amelanchier alnifolia*). Skunkbush sumac (*Rhus trilobata*) was also present at some of the higher elevations, and typically associated with rocky outcrops.

Seven major vegetation types including: conifer, grassland, improved pasture, mixed shrub, revegetation, sagebrush, and woody draw were classified within the proposed AM5 tract and extended wildlife study area.

Table 1. Vegetation Types[1] and Wildlife Habitat Acres within the Proposed AM5 Tract and Surrounding Area

Original Permit Designation	**Corresponding Vegetation Types**	**Total Acres**
Lowland		
Grassland	• Grassland	0
Deciduous Tree/Shrub	• Woody Draw	0
Upland		
Grassland	• Grassland	7,244.1
Big Sagebrush	• Sagebrush	281.8
Silver Sagebrush	• Sagebrush	827.0
Skunkbush Sumac	• Conifer/Sumac	1,056.8
Deciduous Tree/Shrub	• Woody Draw	92.3
Mixed Shrub	• Mixed Shrub	332.6
Conifer	• Conifer/Sumac	5,927.4
Wetlands - Wet Meadow	• Wetland	14.7
Disturbed Grassland	• Improved Pasture	28.7
Revegetation	• Revegetation	1,331.5
Wildlife Habitat Features:		
Sandstone Rock		5.2
Pond		22.6

[1] See Appendix E, *Area B Extension South Amendment (BESA) Baseline Vegetation Evaluation 2013 & 2016.*

P-0041742

Greater Sage-Grouse

The Montana Sage Grouse Habitat Conservation Program has reviewed the proposed project. The greater sage-grouse is of high management concern, and the conservation of the species and associated habitats is outlined in Executive Order 12-2015. Because of concerns regarding this species, Rosebud Mine biologists watch for and record all observations and sign of this species in all mine areas and associated wildlife survey areas during annual field surveys.

Historic occurrence of greater sage-grouse within the vicinity of the Rosebud Mine is rare, with the most recent documented sighting in 1999. This species has only been documented on leks in the historic mine-wide survey area in two previous years since annual monitoring began in 1973. Two male sage grouse were repeatedly observed at a sharp-tailed grouse lek (lek #20) in 1984, and one male was seen at the lek throughout spring 1985. However, lek #20 is outside the current Rosebud Mine wildlife survey area and has been for many years.

No sage grouse have been recorded within AM5, the current Rosebud Mine wildlife survey boundary, or the Big Sky Mine wildlife survey areas during the previous monitoring at these sites.

Program Analysis and Deviations from EO 12-2015

The proposed AM5 project area is located entirely within General Habitat for sage grouse. Stipulations recommended in EO 12-2015 are designed to maintain existing sage grouse populations and levels of suitable sage grouse habitat by regulating uses and activities in General Habitat in a manner that sustains sage grouse abundance and distribution in Montana.

Delineated General Habitat areas are important for maintaining the abundance and distribution of sage grouse across Montana, but not identified as Core or Connectivity Areas.[2] Development scenarios in General Habitat are more flexible than in Core Areas but must still be designed and managed to maintain sage grouse populations and habitats.

Potential EO stipulation deviations for this project include surface occupancy (NSO), seasonal use timing stipulations, and vegetation removal timing stipulations. No active sage grouse leks are located within 4 miles of the proposed AM5 (Figure 1). The nearest active leks are TR-004 (approximately 15 miles northwest corner of AM5) and RO-004 (approximately 14 miles northeast corner of AM5).

This project is fully consistent with EO 12-2015; therefore, no site-specific multipliers were applied to the HQT Score.

[2] MCA 76-22-103(7).

Figure 1. 2750 - Rosebud Mine Area B AM5 Disturbance Limit, Active Leks and 4-Mile Buffer, and HQT Basemap.

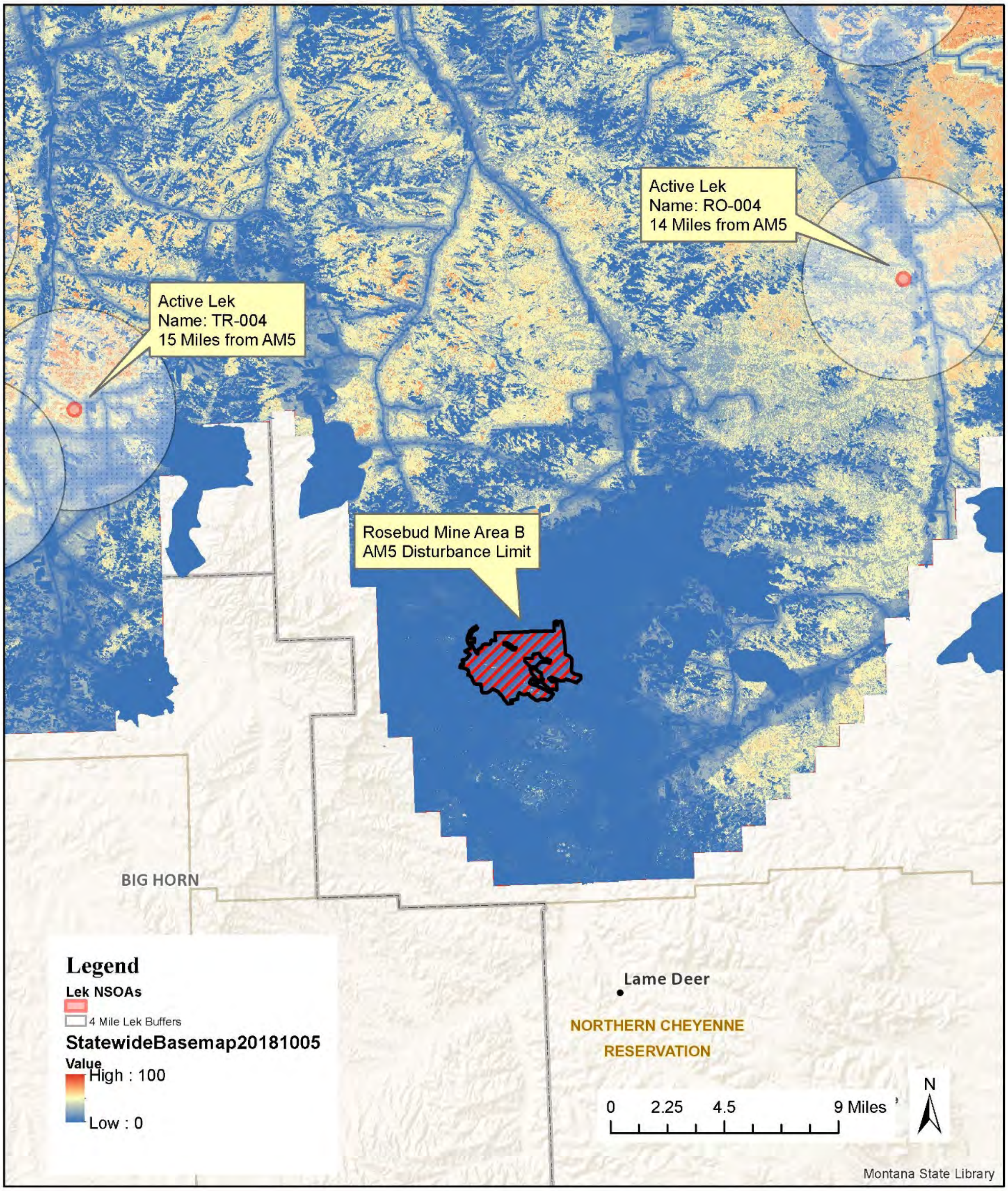

Figure 1. Rosebud Mine AM5 project location, nearest active leks with 4-mile buffers, and the Montana HQT Basemap showing relative functional acre values.

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Mitigation

The Program worked with Western Energy to review the proposed AM5 project. Although there were no active sage grouse leks within four miles at the time of this review, direct and indirect impacts to sage grouse habitat will occur with the proposed AM5 project. For this Mitigation Plan, all references to the *Montana Mitigation System Habitat Quantification Tool Technical Manual for Greater Sage-Grouse* (HQT) and the *Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse* refer to the October 2018, Version 1.0 documents.

Avoidance

Avoidance is defined as avoiding an impact from a proposed debit project altogether by not taking a certain action or parts of an action.[3] The entirety of this project is located within General Habitat, therefore direct and indirect impacts from this project to sage grouse habitat will not be avoided under the AM5 expansion.

Minimization

Minimization is defined as minimizing impacts by limiting the degree or magnitude of the action and its implementation.[4] Indirect project impacts to sage grouse habitat would be minimized under the AM5 expansion by locating roads within the Disturbance Limit of the project and continuing to use ground power cables rather than build overhead power lines during the life of the project. Removing the minimum amount of vegetation required for work under the AM5 expansion would also minimize impacts to sage grouse habitat.

Reclamation

Included in the AM5 amendment application to the Area B SMP C1984003B is a reclamation plan[5] with associated vegetation map[6] and reclamation map[7] which depict the post-mine, reclaimed state.

Reclamation is defined as rectifying the impact by repairing, rehabilitating, or restoring the affected environment.[8]

Reclamation for coal mines in Montana is required in the Montana Code, Title 82, Chapter 4, Part 2:[9]

"*The operator shall commence the reclamation of the area of land affected by the operator's operation as soon as possible after the beginning of strip mining or underground mining of that area in accordance with plans previously approved by the department*"

[3] Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse October 2018, Version 1.0.
[4] Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse October 2018, Version 1.0.
[5] AM5 Amendment to Area B SMP 1984003B Section 17.24.313 Reclamation Plan.
[6] AM5 Amendment to Area B SMP 1984003B Exhibit C – Post-mine Vegetation Plan.
[7] AM5 Amendment to Area B SMP 1984003B Exhibit J – Approximate Reclamation Plan.
[8] Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse October 2018, Version 1.0.
[9] MCA 82-4-234.

Per MCA 82-4-234, reclamation of AM5 will proceed as soon as possible. The following is a general overview of the plan for reclamation.

Soil

Soil materials will be salvaged with mobile equipment in advance of overburden blasting and pit excavation. The extent and depth of salvaged soils will be based on pre-mine soil surveys and the past intensive Western Energy pre-salvage soil sampling program. To the maximum extent possible, salvaged soil materials will be immediately redistributed.

The vegetation map shows the approximate locations for each post-mining reclamation type. These locations were selected after examining pre-mining topographic associations for each reclamation type and selecting comparable areas on the post-mine topography. Final locations may be adjusted during the regrading process as opportunities to develop appropriate topography (e.g. slope, aspect, position on slope, extent of feature, etc.) for selected reclamation types are identified. This is particularly applicable to reclamation types requiring more specific topographic features, aspect, substrates, etc. (e.g. mixed-shrub, conifer, etc.). Cropland and pastureland land uses, in addition to specific topographic limitations, require addition of wildlife enhancement features.[10] This requirement will be met by the inclusion of a combination of grassed waterways with various shrub plantings, incised drainages with concentrated woody species plantings, irregular field shapes, and/or placement near native vegetative and topographic escape cover as appropriate.

Soil laydown depths will be of a thickness consistent with the soil resource availability and appropriate for the reclamation type. Actual soil laydown will vary across a reclamation unit in an attempt to resemble a pattern consistent with natural soil depth (e.g. shallower on ridge tops and deeper in swales and depressions). The average depth will be within a given variance, defined for each reclamation type, from the average laydown depth. Variability of the soil laydown depths within a reclamation type will be dependent on the desired vegetative results. For instance, in a cropland area where uniform production is desired soil laydown depths will be restricted to a narrow variance from the target laydown depth. In the grasslands where more vegetative diversity is desired, a larger variance from the target depth will be allowed, and the number of sample soil laydown depths that must be within the variance interval will be reduced. For reclamation types where the establishment of woody species is desired, a greater variance from the target soil laydown depth is allowable and the number of sample laydown depths that must be within the variance interval is further reduced.

To promote vegetative diversity by increasing establishment of woody species and forbs, suitable spoil (as defined in MDEQ Soil, Overburden and Regraded Spoil Guideline), sandy or sandy loam subsoil, or scoria may be used as a soil substitute[11]). Sites identified to have similar slope complexity and aspect as native sites supporting the desired woody species will be selected for soil substitution. When available, tree substrate, including pockets of deeper tree subsoil and sandy or otherwise suitable overburden may be salvaged and direct hauled or stockpiled as needed to provide additional suitable conifer root zone material. This same practice may be used to provide additional rooting material to promote establishment of shrubs, particularly skunkbush.

[10] MCA 82-4-322(9).

[11] Montana Department of Environmental Quality (MDEQ). 1998. Soil Overburden and Regraded Spoil Guidelines – December 1994. Updated August 1998.

Vegetation

Recognizing that wildlife considerations are still important on the grazing lands, Western Energy has included shrub species in all seed mixes except pastureland. Soil substitution and variable soil laydown depths will also encourage shrub establishment and survival within the various reclamation types further compensating for the reduced shrubland and conifer acres. Post-mine tree and shrub stand size and shape will vary to generally resemble pre-mine shrub/tree stands. Shrub and tree planting rates assume a 50 percent mortality rate. The average plant spacing is 12 feet on center at a density of 300 plants per acre; however, the spacing of actual plantings will vary, in order to simulate natural conditions.

It is anticipated that the relatively small size of the stands and the often linear or irregular shape of the stands will expedite natural invasion of herbaceous species.

The diversity of reclamation types present in this plan use the best technology currently available to reclaim environmental resources in the permit area. The methods described in this plan are based on the results of previous investigations, observations, and trials.

Vegetation types are described below:

LOWLAND: This area is associated with reconstructed drainages and lowland surface water run-in sites. These are ephemeral drainage areas that collect surface runoff from surrounding sites and accumulate moisture, effectively increasing soil moisture content. Lowland areas are typically located within larger ephemeral drainages. In general, lowlands are found within drainages between the transition points (the point at which the gentle slope of the drainage bottom transitions from the steeper slopes of the adjacent hillsides) on the valley slopes. Lowland areas contain stabilizing grass, as well as woody species providing food and cover for both wildlife and livestock. Grassland, silver sagebrush, grassland shrub complex, and deciduous tree/shrub reclamation types occur in this topographic position.

Prior to mining, natural topographic position, parent material, and biota of the type resulted in soils of greater depth than generally found in uplands, conifer, and mixed shrub types. Topsoil and subsoil lifts will be redistributed to replicate pre-mine conditions. Topographic position will be replicated by targeting this reclamation type for the area from the main drainage upslope to the lower transition point of the side slope, approximately 10-30 feet above the drainage bottom.

Erosion features found within the native lowland type have little or no topsoil; therefore, soil substitution sites may be incorporated into post-mine reclamation to mimic these sites. Areas of soil substitution will be used for re-establishment of the silver sagebrush-grassland and deciduous trees and shrubs.

UPLAND: These are areas that occur on level, nearly level and moderate slopes. They are more xeric than the lowlands, but do have sites of elevated moisture levels, including snow catchment areas the lee sides of hillocks and ridges, incised drainages, dry washes, and small basins. Uplands are interspersed with various shrub associations that provide utility for both wildlife and livestock. Grassland, shrub-grassland (skunkbush sumac, shrub complex, silver sagebrush and big sagebrush types), mixed shrub and deciduous tree/shrub reclamation types occur in the uplands.

Soils on the pre-mine upland sites were not as deep as those found on lowland sites. With the exception of skunkbush sumac areas, soils will be salvaged in two approximately 12-inch lifts. Pockets of deeper soils will be created during reclamation to promote thick vegetative diversity. These pockets will be located on the lee sides of hillocks and ridges and other areas where soil material naturally accumulates due to their landscape position (i.e. deposition from wind and water erosion). Soil depths in these pockets will vary; however, they will not exceed 36 inches ± 6 inches. Since erosion features found within the upland type have little or no topsoil, soil substitution sites will be incorporated into post-mine reclamation to mimic these sites. Areas of soil substitution will be used for re-establishment of the shrub-grassland, mixed shrub and deciduous tree/shrub reclamation types.

AGRICULTURE AND PASTURELAND RECLAMATION TYPES:

Cropland: Agricultural development in the Colstrip vicinity includes various small grains and hay. While this reclamation type is primarily intended for livestock usage or as cash crops, agricultural fields will be utilized by various wildlife species on a seasonal basis. Specific locations and post-mine acreages of Agricultural areas are described in the Alternative Reclamation Plan for Cropland and Special Use Pastures.

Pastureland: This type was formerly referred to as Special Use Pasture and includes areas seeded or inter-seeded to native or introduced species (or in combination). These lands provide seasonal or special use for livestock on a more intensively managed basis than would occur if the land was grazing land. Pasturelands are typically limited in species diversity and are often nearly a monoculture. Occasional cutting of the forage species for livestock feed may be done for management of the stand or for emergency/supplemental livestock feed.

OTHER RECLAMATION TYPES:

Sandstone outcrops and cliffs are a common feature of the pre-mine landscape and are used by many wildlife species. Raptor and cliff dwelling bird species use them for nesting and/or hunting perches. Several other species (i.e. sagebrush lizards and scorpions) are also associated with these structures, which are usually impacted during the mining process. Two post-mine types (rock piles and cliffs) are designed to mitigate these impacts. Other wildlife habitat features included in post-mine reclamation planning include water features such as ponds and wet meadows. Such water features were present in the pre-mine landscape either as naturally formed features or ranching infrastructure, such as stock ponds and irrigation excavations. These features will provide both vegetation diversity and surface water for use by livestock and/or wildlife.

Compensatory Mitigation and the Habitat Quantification Tool Process

Compensatory mitigation is defined as actions that provide compensation for unavoidable adverse residual impacts to species or their habitat and when taken in advance of the impact through activities that preserve, enhance, restore, and/or establish habitat through the Montana Mitigation System.[12]

The HQT (Montana Mitigation System Habitat Quantification Tool Technical Manual for Greater Sage-Grouse October 2018, Version 1.0) was used to calculate the total debit obligation for this project. The analysis was conducted on November 13, 2018. The HQT assessment area associated with the development project's impacts was the Disturbance Limit. This is the area within the Permit Boundary where the actual activity and surface disturbance for the project will occur under the terms of the permit(s). See Figures 2 and 3 below.

[12] Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse October 2018, Version 1.0.

The Program discussed options for meeting this obligation with Western Energy, including permittee-responsible actions, purchasing credits from third-party private entities, making a financial contribution to the Stewardship Account, or some combination thereof. Western Energy informed the Program that they have selected the Stewardship Account contribution option.

Multipliers are applied to the Raw HQT Score (Montana Mitigation System Policy Guidance Document for Greater Sage-Grouse October 2018 Version 1.0) to account for: (1) risk and uncertainty through a Reserve Account; (2) net conservation gain where federal authorization is required (not applicable here); (3) advance payment if a cash payment is made to the Stewardship Account; and (4) site specific impacts when EO stipulations are violated.

Multipliers considered for this project:

- Risk and The Reserve Account Contribution of 20% will be applied to the Raw HQT Score for the Reserve Account multiplier. It is mandatory. This accounts for the fact that impacts are estimated. Actual impacts could be greater or smaller. The Reserve Account also functions as a shared insurance pool so that credits may be replaced if credit sites do not produce as many credits as predicted or credits are lost due to an Act of God, such as a wildfire.

- Advance Payment of 10% will be applied to the Raw HQT Score for direct and indirect impacts for the life of the project. This is included because Western Energy has selected the in-lieu fee approach by contributing to the Stewardship Account (as provided by the Stewardship Act) rather than undertaking a permittee-responsible approach of securing sufficient mitigation offsets of its own accord. Advance payments are included when a proponent elects to make a contribution because impacts would occur prior to mitigation offsets and there would be a temporary, short term loss of habitat.

- Site-Specific Impacts are addressed through a multiplier of 5% for General Habitat for each aspect of a proposed project that is not consistent with the Executive Order 12-2015 stipulations during either construction or operations phase of a project. Potential stipulations could include No Surface Occupancy (NSO), seasonal use timing for activities, and vegetation removal timing. This project is fully consistent with EO 12-2015; therefore, no site-specific multipliers were applied to the HQT Score.

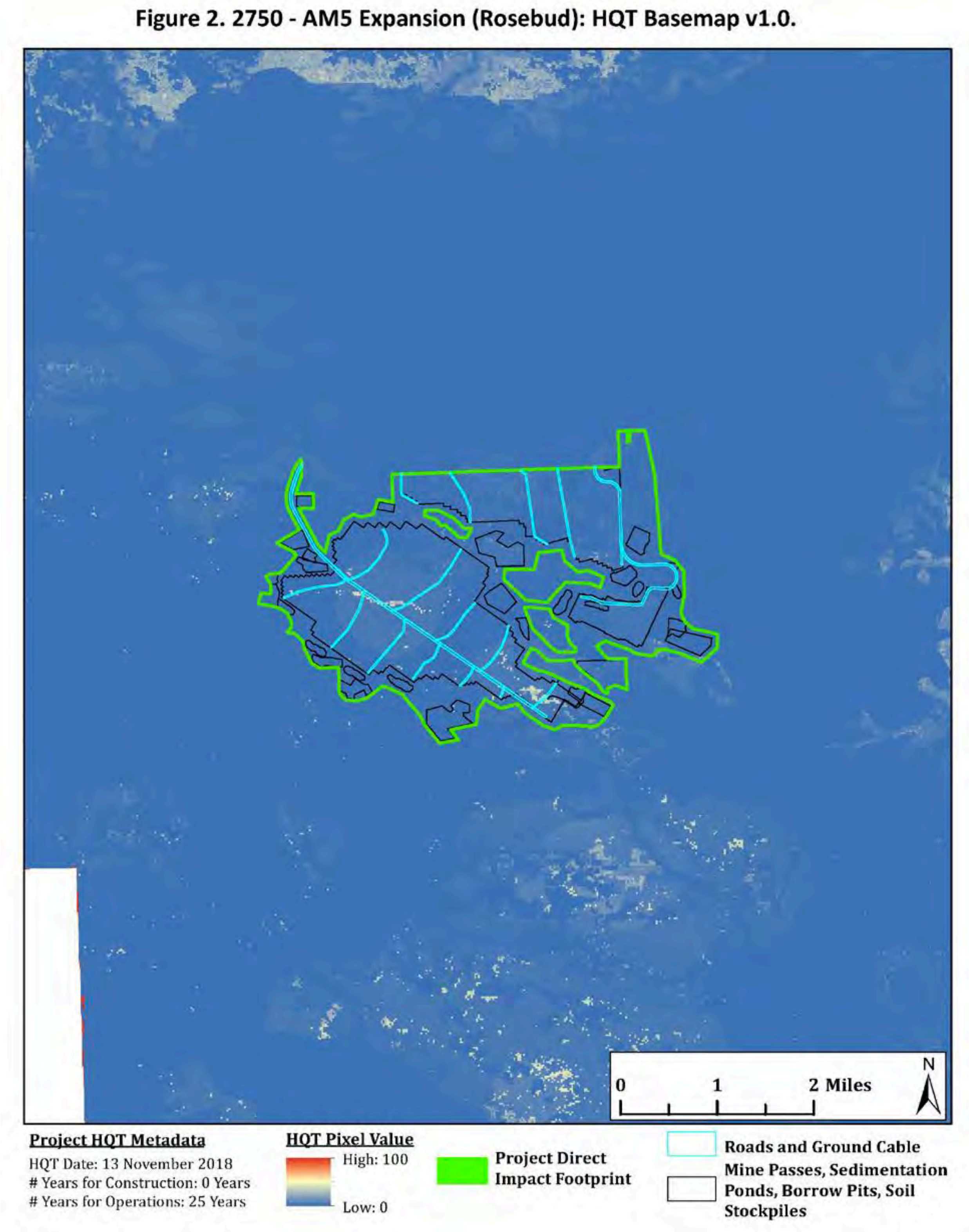

Figure 2. The Montana HQT Basemap, Rosebud AM5 Disturbance Limit, and project disturbance features.

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Figure 3. 2750 - AM5 Expansion (Rosebud): HQT Results - 1 Year of Operations.

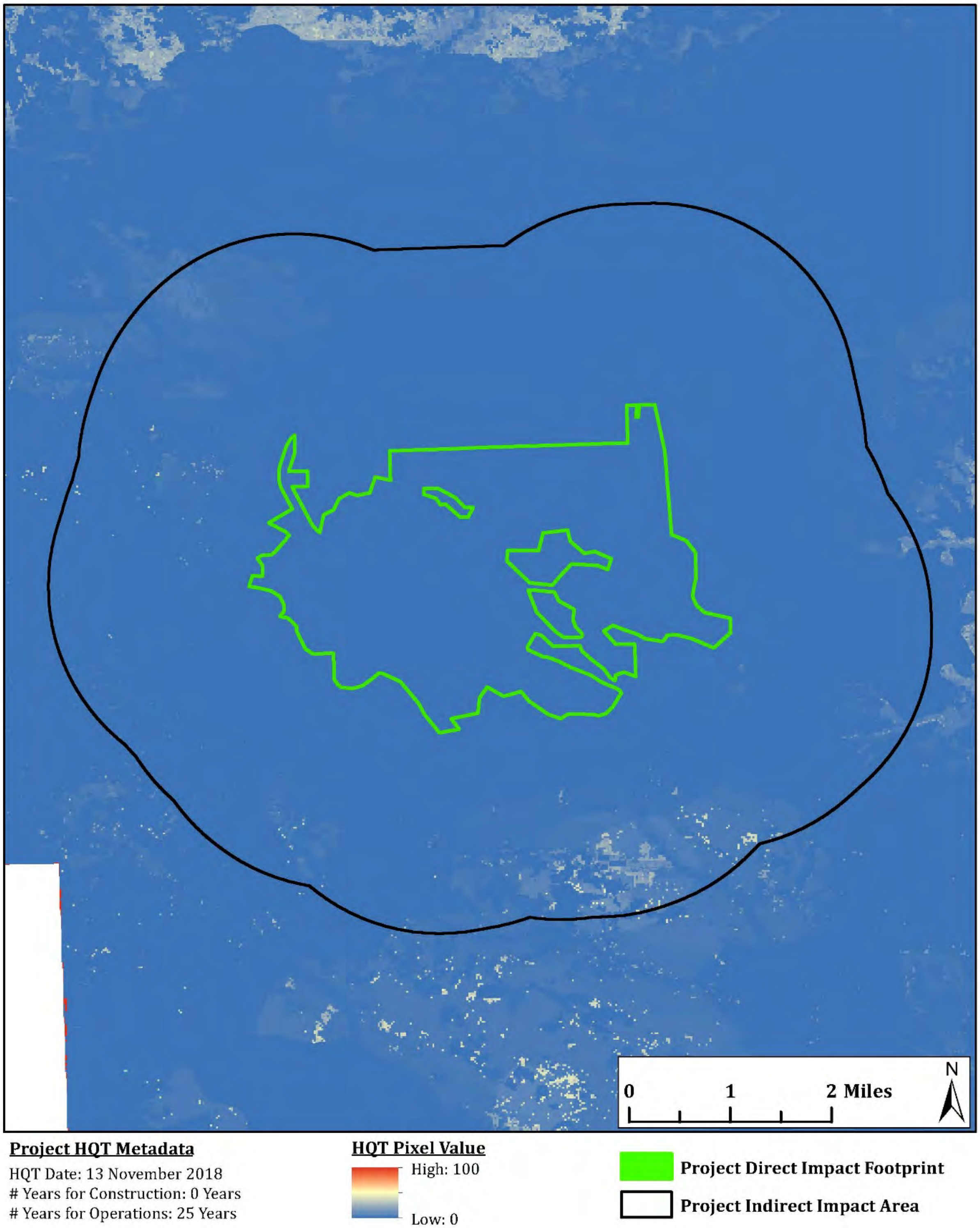

Figure 3. The Rosebud Mine AM5 expansion Disturbance Limits and the HQT Indirect impact buffer area overlaid on the HQT Basemap. The functional acres lost calculation is based on the difference in values between the Basemap and project impact buffer shown here.

HQT and Calculation of Project Impacts

The Program calculated the compensatory mitigation obligation based on Western Energy's decision to make a contribution to the Stewardship Fund. The HQT model run for the AM5 project resulted in a raw score of 3,137.72 functional acres lost due to the direct and indirect impacts for the life of the project. Added to this are the reserve account (20%) of 627.54 debits, and the advance payment (10%) of 313.77 debits for a total debit obligation of 4,079.03. No site-specific Executive Order stipulations apply to this project. Table 2 summarizes the debit obligations for this project.

Table 2: Compensatory Mitigation Debit Obligation Summary

Debit Component	Compensatory Mitigation Obligation
Raw HQT Score	3,137.72
Reserve Account	627.54
Advance Payment[13]	313.77
Site-Specific EO Stipulation	0
Total Debit Obligation	4,079.03
Total Stewardship Fund Contribution after applying Credit Discount Method	**$36,522.91**

Commitments

After working with the Program to fully consider all options for meeting their project debit obligations, Western Energy opted to make a contribution in the full amount of $36,522.91 to the Stewardship Fund for the Rosebud Area B AM5 project. A key condition of this option is that the contribution must be deposited after all permits are issued, but prior to commencing construction.

[13] Advance Payment to the Stewardship Account of 10%.

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Appendix D – Comments on the Draft EIS and Responses

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1.1 Introduction

This appendix contains the comments received on the Draft Environmental Impact Statement (DEIS) documents and Montana Department of Environmental Quality's (DEQ) responses to those comments.

DEQ issued the DEIS on September 23, 2020, for a 30-day public comment period and provided notice in the *Billings Gazette*, the *Forsythe Independent Press*, on DEQ's website, on Eventbrite, and on postcards and emails sent to persons on the project mailing list. DEQ extended the comment period by 30 days to November 23, 2020, at the request of some public commenters.

A remote public meeting was held via Zoom on November 10, 2020. DEQ personnel and representatives from DEQ's third-party EIS contractor, ERO Resources Corporation, provided an overview of the proposed project and anticipated impacts. Members of the public were given the opportunity to provide oral comments at the end of the meeting.

During the 60-day public comment period, 37 comment documents were submitted on behalf of 41 commenters. The format of these documents included letters, emails, and oral comments. Comment documents came from private individuals (21 emails, 2 letters, and 4 oral comments); tribes (2 emails); state government (1 oral comment); the project proponent (1 letter); and organizations (4 letters and 2 oral comments). Most commenters (71%) were from Montana. The *Comment Summary Report* (ERO Resources 2021) provides a comprehensive overview of public comments received during the comment period.

1.2 Qualitative Content Analysis

Each comment document was given a unique document identification number (e.g., 044). Using a process known as qualitative content analysis, all submitted documents were systematically reviewed for content. Substantive comments were coded hierarchically according to issue codes based on sections and subsections in the DEIS. Substantive comments are those that:

- Questioned the accuracy of the information in the DEIS;
- Questioned the adequacy of the environmental analysis;
- Proposed other alternatives;
- Suggested the need for changes in the DEIS or revisions to one of the alternatives considered in detail; or
- Provided new or additional information relevant to the analysis.

A complete list of issue codes used in the quantitative content analysis is provided at the end of this document in Attachment A. The code structure is summarized as follows:

- Comment codes 1000 to 1400 were assigned to comments on Chapter 1, Purpose and Need. Examples of codes from this series include comments about the right to a clean and healthful environment under Montana's Constitution (1102), declining demand or need for coal (1103), and bonding and financial assurance (codes 1200 to 1203).
- Comment codes 2000 to 2300 were assigned to comments on Chapter 2, Proposed Action and Alternatives. Examples of codes from this series include suggested alternatives, alternative component, or permit stipulation (2001); comments in support of or in opposition to the No Action Alternative or the Proposed Action (2100, 2101, 2200, and 2201); suggested changes to the Proposed Action, including the Operations Plan (2203), Reclamation Plan (2204), and monitoring or mitigation measures (2205).

- Comment codes 3000 to 4802 were assigned to comments on Chapter 3, Affected Environment and Environmental Consequences. Examples of codes from this series include comments about other resources that should be analyzed (3000), resource-specific comments (codes 3100 to 4705), and comments about actions to include in the cumulative impacts analysis (codes 4800 to 4802).
- Comment codes 5000 to 5002 were assigned to consultation, including tribal consultation.
- Comment codes 6200 to 6302 were assigned to comments outside the scope of the DEIS, including comments regarding transitioning Colstrip economy to renewable energy production (6302) and requests for documents or information.

1.3 Comments Received

1.3.1 Comments from Tribes and State Agencies

Emails and oral comments received from tribes and state agencies on the DEIS were reproduced and are included in **Section 1.4.1**. DEQ's responses are presented alongside each comment.

Table 1. List of Tribal Commenters

Doc#	Commenter
53	Jonathan Windy Boy, Chippewa Cree Tribe
73	Teanna Limpy, Northern Cheyenne Tribe
67	Laura Evilsizer, Montana SHPO

1.3.2 Comments from the Applicant

The comment letter received from the applicant, Westmoreland Rosebud Mining LLC, on the DEIS was reproduced and is included in **Section 1.4.2**. DEQ's responses are presented alongside each comment.

Table 2. List of Applicant Commenter.

Doc#	Commenter
78	Russell Batie, Westmoreland Rosebud Mining, LLC

1.3.3 Comments from Organizations

Comment letters received from organization on the DEIS were reproduced and are included in **Section 1.4.3**. DEQ's responses are presented alongside each comment.

Table 3. List of Organization Commenters.

Doc#	Commenter
76	Greg Kernohan, Ducks Unlimited
77	Jeanie Alderson, Northern Plains Resource Council
79	Shiloh Hernandez, Western Environmental Law Center on behalf of the Montana Environmental Information Center and the Sierra Club
80	Max Sarinsky, Jason Schwartz, and Iliana Paul, New York University School of Law Institute for Policy Integrity

1.3.4 Comments from Individuals

An alphabetical list of individuals that provided substantive comments (emails, letters, or oral comments) on the DEIS along with associated issue codes is provided in **Table 4**. A complete list of

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commenters is included in the Project record and available for public inspection at the addresses listed in **Section S.8, Where to Obtain More Information**, of the Final EIS or by submitting an electronic records request: https://montanadeq.govqa.us/WEBAPP/_rs/(S(h23n42um4ef5wixvyckr1u03))/supporthome.aspx.

Substantive comments received from individuals were organized for response according to issue statements, which correlate to issue codes. To reduce repetition, similar comments were grouped together under representative issue statements and responded to collectively. No responses are provided for nonsubstantive comments, requests, or comments merely in support of or against an alternative (2100, 2101, 2200, and 2201).

To find responses to comments by a particular individual or organization, please use the alphabetical list in **Table 4**. There, one can find each commenter's document number(s) and associated issue code(s). Use the index below to find the beginning page number for the responses to a particular issue statement. As noted above, similar comments are grouped together and responded to collectively.

Table 4. Alphabetical List of Commenters.

Commenter Name and Organization	Doc ID #	Issue Codes Assigned
Blank, D L	44	1103, 2201
Burton, Brent	45	2200
Byron, Lori	56	1103, 1200, 2201, 3604, 4801, 6302
Campbell, Francis	64	2201, 3204, 3604, 4404, 4604
Fallaw, Jenna	55	1103, 2201
Hedges, Anne/ Montana Environmental Information Center/	70	1102, 1103, 3000
Hunner, Bruce	58	1103, 2100, 2300
Hyndman, Donald	46	1001, 2100, 3000, 3504, 4103, 4503, 6301
Igoe, Kate	61	6201
Johnson, Derf/Montana Environmental Information Center/	66	1103, 1200, 1202, 2100, 3000, 3404, 3504, 3904, 6302
McCanse, Roberta	47	1100
McRae, Clint/Rocker Six Ranch	74	2203
McRae, Douglas S./Greenleaf Land & Livestock/	69	2203, 3604
Merrick, Lynn	60	2201
Miller, Slim	72	1103, 1200, 3000
Myran, Darrel	48	2200
Owen, Heidi	54	2201
Patton-Griffin, Sharon	59	1103, 2201, 3000, 4103, 6302
Pippin, Tana	49	6203
Publee, Jean	50	2201
Publee, Jean	51	2201
Salusso, Steve	65	2200
Semones, Linda	68	2201
Semones, Linda	57	1103, 1202, 2201, 6301
Simmons, Pat	63	2201
Stroock, Betty	71	1103, 2100, 3000, 3504
Struthers, Bill	52	3204, 3604, 4404, 4604
Watson, Vicki	62	1103, 1202, 2100, 3404, 6302
Weber, Sas	75	1200, 2201, 3000, 4801, 6302

1.4 Comment Response

Comment letters received from tribes, the applicant, and organizations on the DEIS are reproduced below. DEQ's responses are presented alongside each comment.

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Substantive comments received by individuals on the DEIS were summarized under issue statements and responded to collectively. An alphabetical list of individuals who provided comments along with associated issue codes can be found in **Table 4** (see **Section 1.3.4**). Responses to substantive comments from individuals begin on page 94 in **Section 1.4.4**.

For all comment responses, if the text of the Final EIS was revised as part of the response, the section where the change was made is noted in the response to comments. DEQ is not required to respond to every comment made by every person. Under Montana Environmental Policy Act regulations ARM 17.4.619(3), the agency is required to provide "responses to substantive comments, including an evaluation of the comments received and disposition of the issues involved." All of the original comments on the DEIS that DEQ received are available for public inspection a at the addresses listed in **Section S.8, Where to Obtain More Information**, of the Final EIS or by submitting an electronic records request:
https://montanadeq.govqa.us/WEBAPP/_rs/(S(h23n42um4ef5wixvyckr1u03))/supporthome.aspx.

DEQ appreciates the public's interest in the proposed Project and their participation in the EIS.

1.4.1 Response to Comments from Tribes and State Agencies

Document #53 Chippewa Cree Tribe

Document #73 Northern Cheyenne Tribe

Document #67 Montana SHPO

Com-ment	Document #53 Chippewa Cree Tribe	Response
53-1	053 **From:** Jonathan Windy Boy **To:** rosebud-mine-area-b-eis@eroresources.com; Harlan Baker; alvin@iresponse106.com; Melody Bernard; jmoschelle@yahoo.com; Jonathan Windy Boy **Subject:** Draft Environmental Impact Statement Available – Rosebud Mine Area B AM5 **Date:** Friday, September 25, 2020 9:24:00 PM Thank you for the notice. The Chiopewa Cree Ttibe is interested. We'll be in contact with you on the details. Keep us posted. Jonathan Windy Boy THPO CCCRPD **From:** rosebud-mine-area-b-eis@eroresources.com <rosebud-mine-area-b-eis@eroresources.com> **Sent:** Friday, September 25, 2020, 9:18 PM **To:** rosebud-mine-area-b-eis@eroresources.com **Subject:** Draft Environmental Impact Statement Available – Rosebud Mine Area B AM5 To Interested Stakeholders: The Montana Department of Environmental Quality (DEQ) has issued a Draft Environmental Impact Statement (EIS) to analyze and disclose the potential environmental impacts of the proposed fifth amendment (AM5) to the operating permit (C1984003B) for Area B (Project) at the Rosebud Mine, an existing surface coal mine near Colstrip, Montana. The Rosebud Mine is operated by Westmoreland Rosebud Mining, LLC. Two alternatives were analyzed: the No Action Alternative and the Proposed Action. If the Proposed Action is approved, 9,108 acres would be added to the existing Area B 6,045-acre permit area. Of the 9,108 acres proposed, 5,547 acres would be disturbed for mining and associated activities. In addition, the Area B operations plan and reclamation plan would be updated to include additional mine passes and reclamation in the existing permit area. The EIS also analyzes an application for a new Montana Pollutant Discharge Elimination System (MPDES) permit in the Project area. The proposed Project would extend the life of the Rosebud Mine by 7 years. DEQ is hosting a remote public meeting on October 7, 2020. The anticipated hour-long meeting will be held via Zoom at 6 p.m., accessible both online and by telephone. DEQ will give a presentation on the EIS, permitting process, and description of the Proposed Action beginning at 6 p.m., followed by the opportunity for the public to provide comments. To request a link visit: https://www.eventbrite.com/e/rosebud-mine-area-b-am5-draft-eis-virtual-public-meeting-and-hearing-registration-121609149239 or call Moira Davin, Public Relations Specialist, at: 406-461-2503. To learn more about the remote public meeting or to view the Draft EIS, please visit http://deq.mt.gov/Public/publiccomment. You are invited to provide written comments on the Draft EIS to: Jen Lane, MEPA Coordinator, Montana Department of Environmental Quality, PO Box 200901, Helena, MT 59620-0901, or emailed to rosebud-mine-area-b-eis@eroresources.com; ensure the subject line reads; ATTN: Rosebud Mine Area B AM5 EIS. All comments must be received or postmarked by October 24, 2020, to be considered. For additional information, contact Jen Lane: JLane2@mt.gov or 406-444-4956. *You are receiving this email because you previously submitted comments on the Rosebud Mine or*	**Comment Response 53-1:** Thank you for your comment. DEQ welcomes tribal participation in the MEPA process.

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Com-ment	Document #73-Northern Cheyenne Tribe	Response
73-1	073 **From:** Teanna Limpy **To:** rosebud-mine-area-b-eis@eroresources.com **Subject:** Attn: Rosebud mine Area B AM5 EIS. **Date:** Monday, November 23, 2020 5:49:43 PM Ms. Lane, I have reviewed the draft Environmental Impact Statement for the proposed Rosebud Mine Area B AM5. The Northern Cheyenne THPO office issues the following comment: " The Northern Cheyenne THPO has reviewed the EIS for the Rosebud Mine Area B AM5 and requests participation in remaining pedestrian survey fieldwork in sections 13 & 17, including site visits to the 37 sites mentioned as likely to be adversely impacted. We also request a site visit to the currently remaining unevaluated sites, as well as to sites areas where our tribe may attach religious and or significance. Additionally, these stipulations will require a mitigation, avoidance, and/or treatment plan for the sites that will be adversely affected. Our participation in this process, as well as the ethnographic study, is critical due to our major historical footprint in the area.	**Comment Response 73-1:** Thank you for your comment. DEQ will continue to consult with tribes over appropriate mitigation and avoidance measures. As you noted, DEQ is requiring Westmoreland Rosebud to complete an ethnographic study that will involve consultation with the Tribe to identify and discuss mitigation, avoidance, and/or a treatment plan for all potential sites with cultural or religious significance. At the time of publication of these responses to comments, DEQ issued a deficiency letter to Westmoreland Rosebud on July 24, 2020, on April 26, 2021, and again on August 13, 2021, that states the company must complete the ethnographic study—including additional outreach to the Tribe— as a condition of permit approval. All sites should therefore be identified and/or further outreach to the Tribe completed before the permit is issued. You may request site visits as part of this process. Further, in completing required archeological mitigation at some of the identified sites, DEQ has received seven mitigation plans from Westmoreland Rosebud, that we have forwarded to SHPO (March 29, 2021) and your THPO office (March 24, 2021) for review and comment. DEQ welcomes your participation and can help arrange a site visit if necessary. This can be coordinated through James Strait, DEQ's Tribal and Cultural Resource Officer.
73-2	The final EIS in adequacy will need to include such site information from our tribe and other consulting tribes in the final evaluation process so that the forthcoming treatment plans and/or avoidance measures will be properly coordinated and implemented. These measures can be discussed in greater detail in the final draft EIS for greater analysis as to the extent this project may have on cultural resources of significance to our nation." Respectfully, TEANNA LIMPY |THPO Northern Cheyenne Tribe P.O. Box 128 |Lame Deer, MT. 59043 W:: (406) 477-4839/4838| C::(406) 740-0420	**Comment Response 73-2:** Thank you for your comment. See Comment Response 73-1.

Com-ment	Document #67-Montana SHPO	Response
67-1	Laura Evilsizer: Yeah, certainly. I work for the Montana State Historic Preservation Office. I just want to say that I look forward to working with the federal agency involved in this, which I believe is the Office of Surface Mines, to resolve the cultural resource consultation under the National Historic Preservation Act. There are many sites in this area and we just want to make sure that the appropriate mitigation occurs. Just looking forward to hearing more about this from the future, from the federal agency side. Nicole: Thank you, Laura. audio_only (Completed 11/18/20) Page 9 of 13 Transcript by Rev.com	**Comment Response 67-1:** Thank you for your comment. As this is entirely a state project with no federal component, there will not be a National Environmental Policy Act (NEPA) EIS but only this Montana Environmental Policy Act (MEPA) EIS. DEQ will only be applying state law to the project and will not be consulting with the Office of Surface Mining and Reclamation Enforcement (OSMRE) on the NHPA. DEQ welcomes participation of the Montana SHPO, however, and looks forward to consulting with you on the project.

1.4.2 Response to Comments from the Applicant

Applicant (Westmoreland Rosebud) Documents

Document #78 Westmoreland Rosebud Mining LLC

Document #78-Westmoreland Rosebud Mining LLC

WESTMORELAND ROSEBUD MINING LLC 078
A Subsidiary of WESTMORELAND MINING LLC

P.O. Box 99 • 138 ROSEBUD LANE • Colstrip, MT 59323 • Phone: (406) 748-5100

November 23, 2020

Jen Lane
MEPA Coordinator
Montana Department of Environmental Quality
PO Box 200901
Helena, MT 59620-0901

Permit ID: C1984003B
Revision Type:
Permitting Action:
Subject: AM5: Draft EIS Comments

Dear Ms. Lane:

Please accept these comments on behalf of Westmoreland Rosebud Mining, LLC pertaining to the environmental analysis or Draft EIS for AM5.

Comment		Page No., Draft EIS Narrative	WRM Comment	Response
78-1	1	Page S-16 under "Transportation" for both Alternatives it states that Westmoreland would continue to plow county roads.	Westmoreland does not plow public roads.	**Comment Response 78-1:** The Final EIS has been updated as suggested.
78-2	2	Page 29 discusses the state of MPDES permit MT0023965.	This needs to be updated with the recent decision from the Montana Supreme Court.	**Comment Response 78-2:** The Final EIS has been updated as suggested.
78-3	3	Page 44 states "the haul roads would be constructed to facilitate two-way traffic, typically to a width of 80 feet" while Page 62 states "haul roads would be developed with a 120-foot width". Which is correct?	According to ARM 17.24.321 haul roads are constructed at a width of 80 feet. Needs more description for both locations in the EIS text for consistency. It may be necessary to note, in certain areas haul roads will be 120 feet wide to accommodate dragline walks.	**Comment Response 78-3:** The text in the Final EIS has been revised for clarity.
78-4	4	Page 52 states "the initial stages of reclamation would not occur until 2047" is not true.	This gives impression that company will not do any reclamation until mining ceases. Reclamation will occur concurrently with mining. Needs correction.	**Comment Response 78-4:** The text in the Final EIS has been revised for clarity. Reclamation would be concurrent, with initial stages of reclamation occurring within 2 years of mining, pursuant to MSUMRA. Initial stages of reclamation would not occur *on the last mine passes and on haul roads* until 2047.
78-5	5	Page 63 states "Westmoreland Rosebud would implement mitigation before ground disturbance as described in the Application Appendix N-1."	Text should be changed to reflect all aspects of mitigation. Efforts can and will be undertaken before, during, and after mining.	**Comment Response 78-5:** The text in the Final EIS has been revised for clarity.
78-6	6	Page 81 contains confusing language about the initiation of reclamation timing.	May consider revising.	**Comment Response 78-6:** The text in the Final EIS has been revised for clarity.

Please contact Wade Steere at (406) 748-5199 or Dicki Peterson at (406) 748-5124 if you have any questions or requests regarding these comments.

Sincerely,

Russell Batie, PE
Engineering Manager
Westmoreland Rosebud Mining LLC
Rosebud Mine
Phone: (406) 748-5179
Fax: (406) 748-5202
Email: rbatie@westmoreland.com

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1.4.3 Response to Comments from Organizations

Document #76 Greg Kernohan, Ducks Unlimited

Document #77 Jeanie Alderson, Northern Plains Resource Council

Document #79 Shiloh Hernandez, Western Environmental Law Center on behalf of the Montana Environmental Information Center and the Sierra Club

Document #80 Max Sarinsky, Jason Schwartz, and Iliana Paul, New York University School of Law Institute for Policy Integrity

Com-ment	Document #76-Ducks Unlimited	Response
	076 2812 Calendar Court, Fort Collins, CO / 970-481-7793 / gkernohan@ducks.org Montana DEQ Attn: Jen Lane, MEPA Coordinator P.O. Box 200901 Helena, MT 59620-0901 November 23, 2020 **Attn: Rosebud Mine Area B AM5 EIS** Dear Ms. Lane,	
76-1	Ducks Unlimited is submitting the following comments regarding the mitigation of impacted wetlands at the Westmoreland Rosebud Mine - Area B as requested. We recommend the DEQ require off-site mitigation to assure impacted wetlands are restored to the highest function and value possible within a reasonable timeframe. The Environmental Impact Statement (EIS) recognizes that mine expansion will impact approximately 14.47 acres of wetlands that are proposed to be restored on-site during reclamation. We are concerned that the wetlands identified as having good potential for mitigating impacted wetlands (32A, F049, and 27A) have already been identified as mitigating wetlands in another EIS for the mine (Area F) and that the hydrologic balance required to support conceptual wetland restorations may not rebound for fifty to one-hundred years causing exceptional temporal delays in recovering Montana's wetlands.	**Comment Response 76-1:** The wetland mitigation plan includes several options for mitigation, including creation through reclamation, enhancement and preservation, state initiative support, and restoration, as discussed in **Section 2.4.9.5, Wetland Mitigation Plan.** The Wetland Mitigation Plan (Section 4.0 of Appendix N-1; Fish and Wildlife Plan) outlines three mitigation alternatives including establishment in reclamation, enhancement of existing features, and restoration of wetlands within associated drainage areas. A fourth mitigation alternative was presented in the Wetland Mitigation Plan; however, the referenced initiative pertains to strategic directives which reflect any regulatory requirements that would exist in each alternative described above. Mitigation proposed in the Wetland Mitigation Plan was evaluated using the Montana Department of Transportation *Montana Wetland Assessment Method.* By addressing functional values, rather than strictly acre-for-acre metrics, mitigatory alternatives address the functions and values in a spatially appropriate context supporting the wildlife, vegetation, and hydrology regulation in the process.
76-2	The EIS appropriately cites Montana's "overarching goal to have no net loss of the state's remaining wetland resource base...and to overall increase the quality and quantity of wetlands in Montana". And, under the Montana Strip and Underground Mine Reclamation Act (MSUMRA) requirement to enhance wetlands and riparian areas..." (Montana Code §82-4-232(10)). While researching the potential for wetlands to be restored onsite, we discovered the wetlands identified in the EIS as having moderate to significant enhancement potential (wetlands 32A, F049, and 27A[1]) were the same wetlands identified in the Fish and Wildlife Resources Plan (FWRP) developed to support the Final EIS for the mine's Area F[2]; a mine plan that impacts an additional 8.38 wetland acres. These three wetlands currently exhibit 1, 0.9, and 1.5 acres of wetland characteristics, respectively. The linear nature of these wetlands bounded by relatively steep topography as determined from photos provided in the FWRP make it difficult to understand how these basins could be enhanced or restored to mitigate 14.47 acres, let alone the additional 8.38 acres identified in the EIS for Area F.	The comment concerning potential mitigation wetlands identified in the Area F EIS and the Area B AM5 EIS is correct, they are indeed the same wetlands. However, enhancement of existing wetlands is only one of several alternatives identified in the Wetland Mitigation Plan (see Application Appendix N-1 or summary in **Section 2.4.9.5, Wetland Mitigation Plan**). The choice between these options will depend not only on design, but the realities that are encountered as the reclamation progresses. Reserving several options that fit the need allows reclamation to successfully and adaptively progress in order to effectively support wetland creation, restoration, or enhancement. Not all wetlands are fed through groundwater connections, not all wetlands are perennial, and not all wetlands directly benefit specific species. Wetland mitigation would not be proposed in locations where groundwater or surface water is not expected to be restored in the short-term. Monitoring would be required and would evaluate if restoration of wetland hydrology is successful. Any functional units of a site used as mitigation for Area F would not also be counted towards mitigation necessary for Area B AM5 (i.e. no double dipping). DEQ recognizes that headwaters and seasonal wetlands have values to wildlife, vegetation communities, and the hydrologic balance and accordingly the MSUMRA permit must require that these habitats are restored and, where practical, enhanced as required by ARM 17.24.751.
76-3	It is also concerning that groundwater conditions may not recover for "hundreds of years". Wetlands act as areas of groundwater recharge or discharge. According to Westmoreland Rosebud's groundwater model, it would take more than fifty years for the water table to reestablish after the site is reclaimed. Although the mining company proposes to develop post-mining reclamation features that capture water, the plan causes significant temporal impacts to wetlands, whereby Montana may never recover these lost wetlands due to degraded hydrology[3].	
76-4	Although the EIS recognizes the potential to "restore other wetlands within the same watershed" including the aforementioned wetland projects, we would like to see a greater commitment to mitigating the loss of wetland [1] Montana Department of Environmental Quality. 2020. *Rosebud Mine Area B AM5 EIS.* Pg. 63. [2] Environmental Resources Management. 2017. *Fish and Wildlife Resources Plan for Rosebud Coal Mine – Area F.* Presented to Westmoreland Coal Company. [3] Ibid. Pg. 206.	**Comment Responses to 76-1, 76-2, and 76-3 continue on the following page.**

P-0041767

Com-ment	Document #76-Ducks Unlimited	Response
76-4 cont.	076 function and values prior to impacting wetlands. We recommend DEQ require Westmoreland Rosebud to restore wetlands within the impacted watershed and adjacent watersheds with 10-digit Hydrologic Unit Codes (HUCs) ranging between 1010000109 and 1010000112 south of the Yellowstone River. Restoring wetlands in these HUCs would provide significant geography to locate suitable mitigation projects while also assuring the functions and values of these wetlands remain relatively close to impacts. Restorations must be completed prior to commencing mining. This will assure that wetlands are restored and the prospect of attaining full function and value is attained within a few years of the restoration rather than several decades. Thank you for providing this opportunity to comment. Warm regards, Greg Kernohan Greg Kernohan, Director	**Comment Response 76-1 (Continued):** Final mitigation plans will be determined in coordination with DEQ, as detailed in the wetland mitigation plan, and mitigation strategies will be implemented two years prior to disturbance (Application Appendix N-1, Section 4.0, page 3-6). Final reclamation must support and comport with MSUMRA prior to final bond release, ARM 17.24.1116(c) and (d). **Comment Response 76-2:** See Response 76-1. The restoration of the referenced wetlands is only one of several options that are being evaluated by Westmoreland Rosebud in coordination with DEQ. Also, please note that while 14.47 acres have been identified in the analysis area (defined in Section **3.9.1.2**), only 13.46 acres of wetlands would be impacted (12.27 acres directly impacted and 1.19 acres indirectly impacted) by Alternative 2 – Proposed Action activities. Under Alternative 3 – Lee Coulee Only, this impact would only be 3.12 acres (1.93 acres directly impacted and 1.19 acres indirectly impacted). Please see analysis in **Appendix E**. **Comment Response 76-3:** See Response 76-1 and 76-2. **Comment Response 76-4:** DEQ will take your recommendation under consideration when developing the mitigation plan with Westmoreland Rosebud. Westmoreland Rosebud would follow all requirements under MSUMRA for wetland mitigation, which can and would occur prior, during, and after mining activities occur.

Comment	Document #77-Northern Plains Resource Council	Response
77-1 77-2	077 NORTHERN PLAINS RESOURCE COUNCIL Jen Lane, MEPA Coordinator Montana Department of Environmental Quality P.O. Box 200901 Helena, Montana 59620-0901 *Submitted via Email to rosebud-mine-area-b-eis@eroresources.com* November 23, 2020 Dear Ms. Jen Lane: On behalf of Northern Plains Resource Council (Northern Plains) and its members, I am submitting the following comments to the Montana Department of Environmental Quality (DEQ) in response to its Draft Environmental Impact Statement (DEIS) on the proposed amendment for mining permit C1984003B, which would expand Area B at the Rosebud Mine. This amendment would add 9,108 acres to the existing 6,053 acres permitted for mining in Area B. The mine is operated by Western Energy Company (Western Energy). Northern Plains is a grassroots conservation and family agriculture non-profit organization based in Billings, Montana. Northern Plains organizes Montana citizens to protect our water quality, family farms and ranches, and unique quality of life. Northern Plains is dedicated to providing the information and tools necessary to give citizens an effective voice in decisions that affect their lives. Northern Plains formed in 1972 over the issue of coal strip mining and its impacts on private surface owners who own the land over federal and state mineral reserves as well as the environmental and social impacts of mining and transporting coal. Our members care deeply about Montana, its future, and the issues surrounding coal. Many of our members' livelihoods as ranchers and farmers depend entirely on clean air and water, native soils and vegetation, and lands that remain intact. The strip mining of coal affects them directly. Our comments are submitted in an effort to aid DEQ in identifying issues and concerns with the DEIS. We believe there are serious issues not considered in the current draft, including the need for the expansion, and the effect this expansion will have on local water quality. Water Resources (77-1) Water is a precious resource in this semi-arid region of the state. Ranchers and other residents who live in this area rely on surface waters for irrigation and agricultural production. The quality of water greatly affects the operation of a ranch. Coal seams are filled with water and function as vital aquifers in this region. Coal strip mines sever and destroy these aquifers. The impacts of this severance can be seen many miles from the mine. (77-2) The proposed expansion of Area B would move stripmining into Richard and Lee coulees, both of which drain into Rosebud Creek, a productive basin for agriculture. 220 S. 27th Street, Suite A, Billings, MT 59101 Tel: 406.248.1154 Fax: 406.248.2110 Email: info@northernplains.org www.northernplains.org	**Comment Response 77-1:** Water resources, water rights in the analysis area, potential impacts to water resources and water rights in the analysis area, and cumulative impact assessments of the water resources and water rights in the analysis are described for Alternative 2 – Proposed Action in **Section 3.5, Water Resources – Surface Water; Section 3.6, Water Resources – Ground Water**; and **Section 3.7, Water Resources – Water Rights** and for Alternative 3 – Lee Coulee Only in **Appendix E**. Protection of water rights and sourcing replacement water are described in **Section 2.4.6.3** and **Section 3.7.3.2**. These analyses of potential impacts are conducted pursuant to MEPA, while the permitting decision under MSUMRA will assess (at a much more granular level in the cumulative hydrologic impact assessment [CHIA]) the probable hydrologic consequences and cumulative hydrologic impacts to water resources. § 82-4-227(a)(3); ARM 17.24.405(6). Pursuant to MCA, § 75-1-201(4) DEQ "may not withhold, deny, or impose conditions on any permit or other authority to act based on" a Final EIS. **Comment Response 77-2:** As described in **EIS Section 3.5.1.2**, Westmoreland Rosebud used the USDA Water Erosion Prediction Project (WEPP) and Sediment, Erosion, Discharge by Computer Aided Design (SEDCAD) models to evaluate the impact of mining disturbance on sediment yields in drainages in the analysis area. The WEPP model was used to estimate average annual sediment yield based on existing vegetation and land use in the analysis area. The SEDCAD model was used to estimate sediment yield from the postmine reclaimed land in the analysis area. Based on model results, average postmine sediment yields would be less than pre-mine sediment yields. During mining, disturbed area runoff would be controlled by a network of roadside ditches, sediment-control ponds, and sediment traps. Surface runoff from disturbed areas would be impounded in the mine pits or sediment-control structures in accordance with the Hydrologic Control Plan. Sediment control measures would be designed in accordance with ARM 17.24.639 and are continually monitored and maintained by Westmoreland Rosebud. **Section 2.4.6** describes proposed protection measures for Alternative 2, including surface water management, operation of sediment-control measures, pond maintenance and inspection, reclamation of sediment-control measures, and protection of existing water rights. **Section 2.4.6.2** describes Surface Water Management and Sediment-Control Measures that would be used to control sediment movement and erosion. **Section 3.5.1.1** describes requirements for a Sediment Control Plan in reclamation areas, and is designed to prevent excess runoff of sediment into the surrounding landscape. **(Comment Response 77-2 continues on next page)**

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Comment	Document #77-Northern Plains Resource Council	Response
	077	
77-2 cont.	Sedimentation in the drainages and creeks of the watershed are a concern. The construction activity necessary to expand and operate the coal strip mine has the potential to harm the surface waters of the area. Please fully analyze how this impact would be addressed in the final EIS.	**Comment Response 77-2 (continued):** Alternative 3 – Lee Coulee Only would use similar sediment control measures as Alternative 2; any differences are highlighted in **Appendix E**. All surface water point source discharges from the proposed mining areas would be required to comply with applicable MPDES permit effluent limits (see **Section 2.4.4**). Existing surface water discharges for Area B (as currently permitted) would continue in accordance with existing MPDES Permit MT-0023965, and new surface water discharges from the Project area would occur in accordance with a new MPDES Permit MT-0032042 (see **Appendix E** for updated outfalls for Alternative 3 – Lee Coulee Only).
77-3	This proposed expansion would also impact the lower drainage where the coal ash ponds for Colstrip Units 3 & 4 are currently leaking 400,000 gallons of toxic waste water into the aquifer each day. The sulfate concentrations in the water from monitoring wells adjacent to these coal ash ponds are 5 times the approved standard for cattle; the boron concentrations are 33 times the approved standard. Please ensure that these issues are thoroughly analyzed in the final EIS and that all efforts to lessen – or eliminate – these adverse impacts to the area's water resources	**Comment Response 77-3: EIS Section 1.5.2.2** lists and provides rationale for the scoping issues eliminated from detailed analysis. Pursuant to ARM 17.4.617(4)(b), DEQ must analyze "primary, secondary, and cumulative impacts" of the Proposed Action and reasonable alternatives. The cumulative impacts associated with the Proposed Action and the Colstrip Power Plant are disclosed in **EIS Chapter 3** and for Alternative 3 – Lee Coulee Only in **Appendix E**. MEPA does not require agencies to evaluate connected actions.
77-4	are made to the proposed plan. As one example, could permitting less coal by containing mining to specific areas (and away from new drainages) be used to protect water resources?	**Comment Response 77-4:** DEQ has analyzed an alternative that limits mining to Lee Coulee only, primarily in an area where mining has previously occurred (see **Appendix E**). This alternative was considered but not carried forward for detailed analysis in the Draft EIS (see dismissal rationale in **Section 2.5.3** of the Draft EIS). As the MSUMRA permitting process progressed concurrently with the MEPA process, however, DEQ permitting analysis led the agency to determine that analyzing the Lee Coulee Only alternative (Alternative 3) in detail in the Final EIS was warranted; see Appendix E for a description of the alternative and the impacts analyses. DEQ's rationale for carrying the alternative forward in the Final EIS is in the revised **Section 2.5.3**. Under MEPA, "alternative" means an alternative approach or course of action that would appreciably accomplish the same objectives or results as the proposed action; design parameters, mitigation, or controls other than those incorporated into a proposed action by an applicant or by an agency before preparation of the EIS; or no action or denial (Administrative Rules of Montana [ARM] 17.4.603(2)). In accordance with ARM 17.4.603(2)(b), for a state-sponsored project (which this is not), DEQ is "required to consider only alternatives that are realistic, technologically available, and that represent a course of action that bears a logical relationship to the proposal being evaluated."**(Responses 77-5 through 77-8 continue on the following pages)**
77-5	We also request that the final EIS fully disclose and evaluate Western Energy's plans to restore or replace water resources in and adjacent to the mine permit area that are affected by mining. More details are outlined in the "Reclamation" section below, but given the failure of existing Western Energy mining operations to restore coal-seam aquifers disturbed by mining, and the failure of most Montana mines to restore water supplies sufficient to gain Phase IV bond release, we believe the analysis presented in the final EIS must disclose and critically examine Western Energy's plans for restoring surface and underground water resources. Wildlife and Air Quality Issues	
77-6	Please ensure that the final EIS updates all wildlife information for the mine area and details the measures the mine takes/will take to minimize disturbance to wildlife (including avian species) in the area.	
77-7	Please ensure that the final EIS updates and addresses the ambient air quality of the area. Not only is there additional potential air pollution from nitrogen oxide clouds that are the result of blasting operations, but there could be an increase in particulate matter from coal dust and diesel fumes from coal-mining equipment. In this dry and windy environment, construction activities that denude the soil will eventually lead to blowing dust, dirt, and debris. Please detail in the final EIS the potential changes to air quality from construction activities. How will this situation be controlled? Reclamation	
77-8	Based on the geology and soils information, how confident is DEQ that full reclamation of the land disturbed by the coal strip mine is possible? Do the baseline vegetative survey maps as well as habitat maps lead DEQ to suggest that the plant communities can be fully restored to pre-mining condition in Area B?	
77-9	Are there any threatened and endangered species, species of special concern (regionally, nationally, or globally), or endemic species in the project area? How will native vegetation be protected or, if disturbed, restored/reclaimed? Phase III bond release requires plant communities to endure for years, thus, reclaiming with native species that are endemic is critical to success. We request that the EIS analysis address these issues.	

Comment	Document #77-Northern Plains Resource Council	Response
		Comment Response 77-5: Replacement of water supplies is required in both the statute and in rule without condition. Section 82-4-222(1)(m), MCA, requires the applicant to submit a determination of the Probable Hydrologic Consequences (PHC), which includes findings on whether the proposed mining may proximately result in the diminution or interruption of a water supply that is used for domestic, agricultural, industrial or other beneficial use. Section 82-4-222(1)(n) further requires an applicant to provide a plan for monitoring the availability and suitability of both ground and surface waters for current and approved postmining land uses. ARM 17.24.304 requires that an application for a strip coal mining permit include (among other things): a description of alternative water supplies, not to be disturbed by mining, that could be developed to replace water supplies diminished or otherwise adversely impacted in quality or quantity by mining activities so as not to be suitable for the approved postmining land uses. ARM 17.24.304(1)(f)(iii). ARM 17.24.648 (part of MSUMRA) requires that Westmoreland Rosebud replace the water supply of any owner of interest in real property who obtains all or part of their water supply for domestic, agricultural, or other uses from surface or ground water if such supply has been affected by contamination, diminution, or interruption proximately resulting from mine operations. Specific steps for responding to a complaint regarding water supply and replacement thereof are laid out in 82-4-253(3)(d), MCA, which requires in pertinent part that an operator shall be ordered (in compliance with MCA Ch. 2, Tit. 85) to replace lost water supplies on both an interim (to supply needed water) and a permanent basis with a supply of water in like quantity, quality and duration. ARM 17.24.301(107) defines replacement to include "provision for an equivalent water delivery system and payment of operation and maintenance costs in excess of customary and reasonable delivery costs for pre-mining water supplies." Coal mine permittees also have a separate and independent regulatory obligation to "replace the water supply of any owner of interest in real property who obtains all or part of his supply of water for domestic, agricultural, industrial, or other legitimate use from surface or underground source if such supply has been affected by contamination, diminution, or interruption proximately resulting from strip or underground mine operation by the permittee." ARM 17.24.648(1). **(Comment Response 77-5 continues on next page)**

P-0041771

Com ment	Document #77-Northern Plains Resource Council	Response
		Comment Response 77-5 (continued): The EIS describes the protection of water rights and sourcing replacement water in **Sections 2.4.6.3** and **3.7.3.2**. If a water supply is impacted, Westmoreland must, as noted, "replace the water immediately on a temporary basis to provide the needed water and within a reasonable time, replace the water in like quality, quantity, and duration." § 82-4-253(3)(d), MCA. Possible sources of replacement water would likely be ground water pumped from the unmined areas of the coal aquifers, or the Sub-McKay aquifer, which generally yields more water than the coal aquifers and is not anticipated to be impacted by mining. The water quality of these aquifers is comparable to the existing quality of the streams, springs, and wells in and near the project area. In addition, water could also be delivered by truck or pipeline from other areas, and stock ponds would be constructed in the project area during reclamation. MSUMRA requires that Westmoreland affirmatively demonstrate that alternative water supplies (not to be disturbed by mining) exist which could be developed to replace water supplies diminished or otherwise adversely impacted in quality or quantity by mining activities so as not to be suitable for the approved postmining land uses. ARM 17.24.304(1)(f)(iii). Westmoreland Rosebud has consistently provided reliable water supplies in reclaimed areas of other Rosebud Mine permit areas. DEQ is unaware of any complaints from water rights holders regarding unresolved impacts from the Rosebud Mine on water rights. DEQ is required by § 82-4-254(3)(a) and (b), MCA to investigate complaints of adversely affected water rights using all available information including monitoring data gathered at the mine site, together with any additional monitoring wells or other practices that may be needed to determine the cause of water loss. **Comment Response 77-6:** The EIS contains information on wildlife species gathered from a variety of sources from the most recent baseline studies conducted by Westmoreland, the U.S. Fish and Wildlife Service, and Montana Natural Heritage Program. The most up-to-date information is included in the EIS. As stated in **Section 3.10.3.2, Proposed Action, Direct Impacts Fish and Wildlife Species**, minimization measures including phased mining and concurrent reclamation of mined areas would reduce overall impacts. Similar measures would be used in Alternative 3 – Lee Coulee Only (see **Appendix E**). Restoration of all areas will allow establishment of habitat and support incremental increases in wildlife diversity as reclaimed areas mature.

Comment	Document #77-Northern Plains Resource Council	Response
		Comment Response 77-7: The EIS addresses impacts of the Project on ambient air quality due to a variety of mining activities including the ones mentioned in the comment (i.e., blasting, coal mining equipment, dust blown due to wind erosion) and other sources of emissions as discussed below. The analysis of potential direct and secondary impacts of the Proposed Project (Alternative 2) on ambient air quality is described in **Section 3.3.3.2**, and the analysis of cumulative impacts is described in **Section 3.3.3.3**. These impacts are described for Alternative 3 – Lee Coulee Only in **Appendix E**. See also **Section 3.3.2.3**, which states, Westmoreland Rosebud is required to develop and employ a Fugitive Dust Control Plan to minimize fugitive dust emissions from the mine. The control measures, which apply to either action alternative, include but are not limited to the application of water and chemical dust suppressant on haul and access roads, use of a foam dust-suppression system in coal processing and conveying facilities, prompt revegetation of disturbed areas, and use of an enclosure when drilling coal and overburden before blasting, when considering air quality mitigation measures. An air emissions inventory of criteria air pollutants and precursors from the Project are provided in EIS **Table 19**. The inventory includes emissions of nitrogen oxides and other gaseous pollutants (i.e., carbon monoxide, sulfur dioxide, and volatile organic compounds) from both blasting operations and mining equipment exhaust. Estimated emissions of particulate matter (PM) from mining operations and wind erosion of disturbed areas (blowing dust) are also provided. A qualitative discussion of how Alternative 3 emissions would be similar to or differ from Alternative 2 is provided in **Appendix E**. Neither action alternative includes construction of any new facilities in the Project area other than haul and ramp roads to serve the additional acreage to be added by AM5 (see **Section 2.4.1** and **Appendix E**). The construction of these roads would result in fugitive PM dust emissions from earth moving and construction equipment usage, as well as PM and NOx and other gaseous emissions from equipment exhaust during the period of construction. The Final EIS was revised (in **Section 3.3.3.2**) to add a discussion of road construction emissions; these emissions would be similar for Alternative 3 (see **Appendix E**). Estimated PM emissions from the wind erosion of all disturbed areas including unpaved roads were included in the emissions inventory as discussed above. **(Comment Response 77-7 continues on the following page)**

Comment	Document #77-Northern Plains Resource Council	Response
		Comment Response 77-7 (continued): Air quality modeling was performed to determine whether emissions from the Proposed Project (Alternative 2) would contribute to exceedances of the NAAQS and/or MAAQS. The potential increases in coal dust and diesel fumes from coal-mining equipment mentioned in the comment were assessed. Impacts from blasting and fugitive dust from mining equipment and wind erosion (blowing dust) were also assessed in addition to the other mining sources discussed above. The EIS concludes that Alternative 2 would result in minor, unavoidable, adverse impacts on air quality, but direct, secondary, and cumulative impacts would be lower than the health based federal and state ambient air quality standards where applicable. Impacts for Alternative 3 would be similar and are disclosed in **Appendix E.** The air emissions from the mining, construction, and reclamation operations of the Project, regardless of alternative, would be subject to a number of DEQ air quality regulations that control fugitive particulate matter emissions as described in **Section 3.3.1.1**. This includes ARM 17-8-304(2) which requires that fugitive dust emissions from the Project meet an operational visible opacity standard of 20 percent or less averaged over 6 consecutive minutes, including during construction of haul roads. The operator would also be required to employ fugitive dust control measures in accordance with 82-4-231(10)(m), MCA; the operators air quality permit (MAQP #1483-09), and applicable federal and state air quality standards (ARM 17.24.761(1) and 17.24.311(1)). A discussion of relevant fugitive dust control measures has been added to the Final EIS in **Section 3.3.3.2, Direct Impacts on Criteria Air Pollutants.**

P-0041774

Comment	Document #77-Northern Plains Resource Council	Response
		Comment Response 77-8: There are multiple State requirements in place to ensure that full mined land reclamation would be completed and would be successful. Based on analysis of 88 core-hole samples, the overburden in the analysis area was deemed suitable by DEQ for backfilling of mined areas **(Section 3.4.2.2, Analysis Area Geology and Geochemistry**). Based on the baseline soil study of the analysis area, with a few exceptions, the upper 24 inches of soil are suitable for reclamation and revegetation, and there is sufficient suitable soil to reclaim the proposed disturbances **(Section 3.18.2.2, Suitability for Reclamation)**. The permittee must follow requirements for soil removal, storage, and replacement, and for revegetation and rehabilitation of land and water to be affected by the operation outlined in 82-4-222, 231 and 232, MCA and in ARM 17.24.701 and 702 (**Section 3.18.1.1, Regulatory Framework**). In addition, DEQ cannot issue a permit until the applicant files the required performance bond payable to DEQ as financial assurance (**Section 1.6, Financial Assurance**). The bond amount is based upon the cost to the State if it were to reclaim and restore the permit area in the event that the mine operator defaults on its permit obligations. The bond may not be less than the total estimated cost to the State of completing the work described in the reclamation plan (**Section 1.6.1, Bond Amount**). All currently permitted areas of the Rosebud Mine are fully bonded for reclamation (**Section 2.2.2, Existing Operating Permits, Disturbances and Reclamation**). Pursuant to ARM 17.24.1116, DEQ cannot release any portion of the performance bond until it finds that the permittee has met the requirements of the applicable reclamation phase. Final bond release occurs only when the permittee has successfully met all Phase IV reclamation requirements (**Section 1.6.4, Bond Release**). **Comment Response 77-9:** The baseline vegetation surveys did provide detailed mapping of the vegetation communities. Westmoreland Rosebud Mining reclamation plans and past vegetation reclamation success demonstrate the vegetation communities can be reestablished. Westmoreland Rosebud Mining cannot receive Phase III bond release until at least 10 growing seasons after the last reclamation treatment (as defined in ARM 17.24.725). Phase III bond requires a stable and established vegetative community that is consistent with the approved postmining land use. As stated under **Section 3.8.2, Vegetation Affected Environment,** no federally threatened or candidate vegetation species are listed as potentially occurring in Rosebud County and no federally listed plant species were documented in the AM5 expansion portion of the analysis area during the field surveys in 2013 or 2016. In addition, no species of concern were documented in the analysis area during the field assessments in 2013 or 2016.

P-0041775

Com ment	Document #77-Northern Plains Resource Council	Response
77-10	077 Construction of any kind is notorious for spreading weeds. As part of the baseline vegetative surveys, was a survey and detailed map of all weed infestations now found in the area completed? How will Western Energy prevent the introduction of noxious weeds, and, if those weeds appear, control them? Will sterilization of construction materials and steam-washing and inspection of equipment be required? During the operation of the coal strip mine, how will weeds be controlled?	**Comment Response 77-10**: Noxious weeds and their density were recorded during the baseline vegetation surveys and mapping of noxious weeds is required under the noxious weed management plan. As stated under **Section 3.8.3.2, Alternative 2 – Proposed Action**, the noxious weed management plan would prevent any large populations of noxious weeds from establishing within the Project area. A noxious weed management plan would also be required for Alternative 3 – Lee Coulee Only (see **Appendix E**). Westmoreland Rosebud Mining manages weed outbreaks per ARM 17.24.308(f) and ARM 17.24.718 via their county approved weed management plan and through disking and reseeding where applicable until native perennial grasses, shrubs, or woody species become established. For all action alternatives, control would be completed using a combination of chemical, biological, and physical methods. Maps would be used to track infestation sites and treatment results. In addition, the reclamation plan and performance bond require noxious weed control and control of noxious weeds would continue until final bond release is obtained (**Section 1.6.4, Bond Release**).
77-11	Under the Montana Strip and Underground Mine Reclamation Act (MSUMRA), DEQ is to "enforce a reclamation program that complies with [the federal] Surface Mining Control and Reclamation Act" (SMCRA). Under SMCRA, contemporaneous reclamation is required at coal strip mines.[1] The purpose of SMCRA is to ensure restoration of the land and hydrology to pre-mine conditions. Under REG-8, OSMRE [Office of Surface Mining Reclamation and Enforcement] oversight guidance document, analysis of "reclamation success as measured by bond release" is required. In Montana there are four phases of bond release, with each phase building upon the preceding, successfully completed phase. Final bond release occurs when the permittee has not only successfully established plant communities suitable to the region's climate and post-mining land use on the mine-disturbed lands (Phase III bond release requirements) but has also reclaimed the hydrologic balance within any designated drainage basin. Final bond release is the *only* lawful and objective measure to evaluate reclamation success. Without bond release, especially final bond release, there is no proof of successful mine reclamation. There is a woeful lack of evidence of contemporaneous reclamation and/or reclamation success as measured by bond release throughout the West, and this is a significant issue in Montana. Coal strip mines have been operating in Montana for more than 40 years. However, as mines continue to expand, it remains to be seen if the severed aquifers destroyed by mining will ever recover to the pre-mining conditions, thus achieving Phase IV bond release. Although some acres have achieved Phase IV bond release in Montana, the overwhelming majority of mined land – and the aquifers impacted by mining - have not.	**Comment Response 77-11**: This comment questions the occurrence and enforcement of contemporaneous reclamation at the Rosebud Mine. **Table 6** in **EIS Section 2.2.2, Existing Operating Permits, Disturbance, and Reclamation**, provide the reclamation status of the Rosebud Mine permit areas. Pursuant to ARM 17.24.1116 (6)(d)(i), Phase IV bond release can only occur after all disturbed lands within a designated drainage basin have been reclaimed in accordance with phases I, II, and III requirements, thus Phase IV bond release is occurring "as contemporaneously as possible with the surface coal mining operations." 30 U.S.C. § 1202(e). Westmoreland Rosebud is in compliance with MSUMRA reclamation requirements and schedules for the phases of bond release outlined in ARM 17.24.1116. MSUMRA evaluates if contemporaneous reclamation is occurring primarily by the timeliness of the operator's actions according to permit terms and commitments, including the approved reclamation plan. The four stages of bond release and associated requirements are discussed in **EIS Section 1.6.4, Bond Release**. The AM5 application includes a schedule of reclamation activities as required in ARM 17.24.313(1)(b). The analysis regarding the re-establishment of vegetation is included in ARM 17.24.313(1)(h), and the hydrology analyses are included in the PHC and ARM 17.24.314. The criteria and schedule for bond release are outlined in ARM 17.24.1116. Rosebud Mine has two permitted mine areas which are actively being reclaimed in compliance with state requirements. **(Comment Response 77-11 continues on the following page)**
77-12	Northern Plains raises the following questions that we request DEQ address and analyze in the final EIS: What happens if the impacts to local water resources are permanent and the hydrologic balance is never restored to pre-mining condition in the watersheds surrounding the Rosebud Mine? What are the lasting impacts to agricultural producers downstream from Area B? Does the potential for lasting impacts justify the project's stated need? Does DEQ assume all mined land will someday achieve Phase IV bond release? If so, what is the evidence supporting that assumption? What are the consequences for local agriculture if the hydrologic balance in large sections of Area B is never restored? We encourage DEQ to analyze the potential for permanent damage to aquifers in Lee and Richard Coulees in the EIS, and what those lasting impacts will mean for local agriculture and wildlife. [1] 30 U.S.C. 1202(e) (in the Statement and Purpose section of SMCRA, "assure that adequate procedures are undertaken to reclaim surface areas as contemporaneously as possible with the surface coal mining operations")	

P-0041776

Comment	Document #77-Northern Plains Resource Council	Response
		Comment Response 77-11 (continued): A June 6, 2018 letter from OSMRE responded to an April 2, 2018 WildEarth Guardians (WEG) complaint alleging that Rosebud Mine and other Montana coal mines were failing to meet their reclamation obligations based upon what WEG alleged to be a failure to conduct contemporaneous reclamation and achieve final bond release. DEQ, in a letter to OSMRE dated April 30, 2018 rejected the allegations in WEG's complaint, and OSMRE's June 6, 2018 response to WEG concurred with DEQ and likewise rejected WEG's allegations. As OSMRE's June 6 letter in pertinent part explained: (i) The applicable statutory and regulatory framework does not contemplate instant reclamation or reclamation on an acre-by-acre basis as surface mining proceeds, but instead contemplates that reclamation is supposed to occur "as contemporaneous as practicable." OSMRE Response at 6-7, citing WildEarth Guardians v. Salazar, 880 F. Supp. 2d 77, 91, n. 10 (D.D.C. 2012); see also Sections 82-4-231, 82-4-234 and 82-4-336(2), MCA; ARM 17.24.115; (ii) An operator's success at contemporaneous reclamation is primarily measured by the operator's compliance with its permit and reclamation plan, which is developed under the applicable approved regulatory program and not by the status of bond release. OSMRE Response at 7; (iii) Under MSUMRA, whether contemporaneous reclamation is occurring is primarily measured by the timeliness of the operator's actions in accordance with permit terms and commitments, including those made in the operator's approved reclamation plan. OSMRE Response at 11, and; (iv) Based on available information, there is no reason to believe that, as a factual matter, a violation of contemporaneous reclamation requirements for coal mining operations in Montana, including the Rosebud Mine, is occurring. OSMRE Response at 12. **Comment Response 77-12**: As noted in **EIS Section 3.7.3.2**, the hydrologic balance is protected in accordance with MSUMRA requirements for Phase IV bond release (ARM 17.24.1116(6)(d)). Response to **Comment 77-5** describes the protection of water rights and sourcing replacement water if a water supply is impacted. Restoration of mined lands is never "assumed" under MSUMRA. Instead, an applicant must affirmatively demonstrate that reclamation can be achieved. § 82-4-227(1), MCA. An applicant must further demonstrate that the proposed mining operation is designed to prevent material damage outside the permit area. See also response to **Comment 77-8**.

P-0041777

Comment	Document #77-Northern Plains Resource Council	Response
77-13	077 <u>Connected and Cumulative Impacts of the Project that Must be Examined in the EIS</u> The DEQ must analyze this proposed mine expansion in consideration of other actions that are connected and are cumulative. Connected actions are those that are closely related, those that cannot or will not proceed unless other actions are taken previously or simultaneously, or those that are interdependent parts of a larger action and depend on the larger action for their justification. Cumulative impacts are those impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.	**Comment Response 77-13:** See Comment Response 77-3.
77-14	*Reclamation* Northern Plains believes that reclamation at the Rosebud Mine, to date, is a connected and cumulative part of this mine expansion project proposal and must be fully considered and analyzed before any further mine expansion is approved. It is paramount that the progress of Rosebud Mine's reclamation plan, including the mine's ability to cover its current and future reclamation obligations, be considered as part of the analysis of this mine expansion proposal. Specifically, and, at a minimum, the following must be fully analyzed and evaluated:	**Comment Response 77-14:** See response to Comment 77-8 above. Additional detail is also provided in **Section 1.4.4.5, Reclamation at the Rosebud Mine (Code 1202)** of this appendix.
77-15	• The status of reclamation at the Rosebud Mine including, but not limited to, an assessment of bond release at the mine operations (all phases), an assessment of any barriers to bond release, and identification of mine areas eligible for bond release. • A detailed schedule and time frame for achievement of reclamation success for lands and waters at the Rosebud Mine must be analyzed and evaluated.	**Comment Response 77-15:** See response to Comment 77-11 above.
77-16	• The direct, indirect, and cumulative impacts of authorizing more land and water (both surface and underground aquifers) for disturbance by coal mining at the Rosebud Mine must be analyzed as well as other mines within the Montana portion of the Powder River Basin (PRB) as connected and cumulative actions.	**Comment Response 77-16:** The analyses areas for direct, secondary, and cumulative impacts are resource-specific: analysis areas vary by resource in order to use the most appropriate boundaries for anticipated impacts. (**Section 3.1, Introduction**). For surface water, the analysis area for direct, secondary, and cumulative impacts encompasses surface watersheds extending through and downstream from the 9,108-acre proposed permit area that receive surface water drainage from the 5,547-acre disturbance area as modified by AM5 under Alternative 2—Proposed Action (**Section 3.5.1.2, Analysis Area**). This analysis area includes the East Fork Armells Creek (EFAC), Richard Coulee, and Lee Coulee watersheds (see **EIS Figure 33**). The analysis area for Alternative 3 is considerably larger and is shown on **Figure E-9** in **Appendix E**. For ground water, the direct and secondary analysis area is the proposed 15,153-acre Project area and the surrounding area where direct impacts on ground water quantity are predicted to be greater than 5 feet as determined by ground water modeling conducted for the Proposed Action (**Section 3.6.1.2, Analysis Area**). For cumulative impacts to ground water, DEQ determined that the appropriate analysis area is the entire Rosebud Mine and Big Sky Mine, including areas previously and presently mined (**Section 3.6.3.3, Cumulative Impacts**) because as water quantity and quality impacts from mining in different mine areas can overlap and are sometimes additive, impacts do not typically extend any significant distance from each specific permit area. The same groundwater analysis areas were used for Alternative 3.
77-17	• An alternative should be evaluated whereby DEQ disapproves the proposed mine expansion proposal until such time as the majority of mined lands at the Rosebud Mine have achieved Phase III bond release.	**Comment Response 77-17:** see response to Comment 77-4.
77-18	• Significant conditions and/or stipulations to the proposed mine expansion proposal that requires addressing the problems identified with the lack of reclamation and final bond release success must be evaluated.	**Comment Response 77-18:** Under MSUMRA, DEQ has the authority to include conditions on a permit to ensure compliance with MSUMRA or its implementing rules (ARM 17.24.413), but they must be related to the specific actions being permitted (in this case, mining in the proposed Project area). See discussion of reclamation status and bonding in response to Comment 77-8. Additional detail is provided in **Section 1.4.4.5, Reclamation at the Rosebud Mine (Code 1202)** in this appendix.
77-19	Given the lack of reclamation occurring at other areas of the Rosebud Mine, how does expanding the mine permit area encourage more reclamation and prevent the mine from falling even further behind in its responsibilities under SMCRA (and MSUMRA)? It is our opinion that DEQ must assess the timing of reclamation activities within the proposed mine expansion area and thoroughly consider the impacts of prolonged or untimely reclamation, including re-establishment of vegetation and restoration of water resources. We believe that the final EIS should examine an alternative whereby Western Energy dedicates a set portion of its budget for Area B aside for ***active*** reclamation (instead of simply posting bonds with the promise of future reclamation).	**Comment Response 77-19:** See responses to Comment 77-4 (alternatives) and Comment 77-11 (reclamation responsibilities).

P-0041778

Comment	Document #77-Northern Plains Resource Council	Response
77-20	077 *The Burning of the Coal and the Issue of Coal Ash* The coal mined at the Rosebud Mine is largely burned at the two coal-fired power plants in Colstrip. Coal ash is a byproduct of burning coal. Coal ash contains health-damaging heavy metals including arsenic, lead, cobalt, selenium, and mercury as well as many other toxic materials. The Colstrip power plants use a wet ash method to handle the coal ash. Water is pumped from the Yellowstone River to Colstrip where it is used in the power plant in the cooling towers and various other plant operations, including mixing the water with the produced coal ash. This slurry is then piped to a series of ponds where the coal ash is settled out and the "clear" water is piped back to the plants for re-use. Coal ash slurry from Colstrip 3 and 4 are piped into the Cow Creek watershed a few miles south of the power plants; Cow Creek is a tributary to Rosebud Creek. From the early 1970s, Northern Plains and its local affiliate, the Rosebud Protective Association, raised concerns about the potential for the coal ash slurry to leak into the shallow aquifers that our members rely on for watering livestock. This contamination of the groundwater would be devastating to agricultural operations and the residents of the town and area. Despite promises from the Montana Power Company (MPC), the original owner of the Colstrip power plants, and the State of Montana that the coal ash ponds would be completely sealed, it was discovered in the late 1990s that the coal ash ponds for Colstrip Units 1 and 2 had leaked and contaminated the wells of homeowners north of town. A lawsuit filed by homeowners and townspeople resulted in monetary damages being paid and requiring PP&L (the corporation that bought out MPC) to pipe water from the Yellowstone River to the Colstrip surge pond and then back to all impacted homeowners. PP&L reserves the right of first refusal to buy any property that comes up for sale. In the early 2000s, it was discovered that the Colstrip Units 3 and 4 ponds were also leaking. This was discovered by a landowner checking water for his cattle. He noticed water that had filled a reservoir that should not have had water in it during that time of year. He tested the water in the reservoir and also tested the water in the well that was used to fill that reservoir. Both were contaminated by the leaking coal ash ponds. Another lawsuit was filed and eventually 1,280 surface acres were forcedly bought that had contaminated water beneath them. Since then, the DEQ and PP&L (and the subsequent owners of the Colstrip Generation Facility, Puget Sound Energy and Talen Energy Corporation) prepared an Administrative Order of Consent for cleaning up this toxic waste. But, this does not negate the fact that the coal ash pond leakage continues. DEQ's estimate of leakage from the ash ponds is 275 gallons per minute (gpm). Using DEQ's estimate, this means that 400,000 gallons of contaminated water are leaking into the area's shallow aquifers each day. The plant owners have drilled more than 1500 monitoring and pump-back wells in an effort to contain the problem. However, the underground plume of toxic water from the coal ash continues to move and expand. This issue of the leaking coal ash ponds is integrally tied to all the coal mining at the Rosebud Mine, particularly the proposal to expand mining in Area B. Without serious consideration of the coal ash issue, an expansion of the current mine is only going to exacerbate the issue.	**Comment Response 77-20:** See response to Comment 77-3. Additional detail is provided in **Section 1.4.4.1, Colstrip Power Plant (Code 1001)** in this appendix.

P-0041779

Comment	Document #77-Northern Plains Resource Council	Response
77-21	077 *The Financial Status of Westmoreland Coal Company* In late 2019, Westmoreland emerged from bankruptcy and Rosebud Mine is now operating under a new owner, Westmoreland Rosebud Mining, LLC. This company was created by Westmoreland's first lien creditors and are not traditional coal company financers, but instead, as we understand, are managers of hedge funds. DEQ should analyze the financial health of Westmoreland's re-organization and consider if the company is financially stable enough to meet the long-term reclamation duties required with an Area B expansion. Will this new company be around for the many decades it takes to complete full reclamation in Richard and Lee Coulees? Without the Area B expansion, can the Rosebud Mine continue producing coal to be financially viable? If so, why move forward with the long-term impacts to land and water outlined in Table S-1 of the DEIS?	**Comment Response 77-21:** The financial viability of Westmoreland Mining LLC and its subsidiary, Westmoreland Rosebud, is outside the scope of the EIS. Pursuant to § 82-4-223, MCA, DEQ may not issue a permit under MSUMRA until the operator has filed a performance bond with DEQ made payable to the state of Montana in an amount to be determined by DEQ. The performance bond amount is based upon the cost to the state if it were to reclaim the permitted area as described in its associated reclamation plan. ARM 17.24.1102. DEQ will not issue an approval of the AM5 Project until a satisfactory performance bond is secured. The bond will cover the reclamation cost should the operator not perform for financial (or any) reason(s).
77-22	**Conclusion** The proposed amendment of the Rosebud Mine's permit for Area B needs a thorough, honest, and critical analysis. The final EIS prepared must examine the future of coal as well as the major reclamation obligations and responsibilities as yet not completed at the Rosebud Mine.	**Comment Response 77-22:** See response to Comment 77-11 regarding reclamation obligations and responsibilities.
77-23	A 2018 Montana Legislative Services Division study completed for the Montana Environmental Quality Council (at the request of the 2017 Montana Legislature) confirms what has been apparent to many for years, "Coal-fired power generation is in decline as inexpensive natural gas and cheaper renewables fuel more electricity production." The Colstrip Generating Station, which burns over 85% of the coal mined at the Rosebud Mine, is majority owned by entities in the states of Washington and Oregon. The above report states that "Colstrip's future also will be dependent on policies enacted in Washington and Oregon concerning the use of coal-fired generation." The state of Oregon has already decided to require their investor-owned utilities to phase out all electricity generated from coal by 2030. Washington State is on track to eliminate coal from its electrical portfolio by requiring all their large utilities to no longer have coal-fired power by 2025. The DEIS states on the first page of the document (S-1) that, "…mine production is expected to drop to approximately 6 million tons annually for years 2020 through 2029." DEQ must take these facts into account when evaluating this proposed expansion project.	**Comment Response 77-23:** When evaluating the impacts of the proposed action, DEQ considered the following: • Area B (as Modified by Area B): Westmoreland Rosebud's projected annual production rate as stated in the permit application; see **Table 8** in **EIS Section 2.4.1**). • Other permit areas of the Rosebud Mine (A, B, C, and F): 1) Approved mining and 2) production estimates as a proportion of total production (e.g., Area F will account for as much as 50 percent of the total output of the Rosebud Mine); see **Section 2.2.4, Life of Operations**. • Rosebud Mine (as a whole): recent rather than projected production rates. All of these factors are assumptions based on the best available information at this time; similar factors were considered in the Alternative 3 analysis (see Appendix E). As the EIS discloses, changes to production rates, additions of other mine permit areas, or changed market conditions may influence the operational life of the Rosebud Mine as a whole or of individual permit areas. **Comment Responses 77-24 and 77-25 are on the following page.**
77-24	Northern Plains believes that the environmental consequences of this mine permit amendment are significant. Potentially, this permit amendment might not be needed if the current owners of the Generating Station decide to phase out electricity generated from coal. In such a case, where would the Rosebud Mine sell its coal? The BTU content of Rosebud Mine coal is lower than the BTU content of coal mined at other Montana coal mines (Spring Creek, Decker, Signal Peak), so it is unlikely this coal would be sellable elsewhere if it is not used at Colstrip.	
77-25	As less and less coal is used for electrical generation and as more and more electricity entities and customers are switching to natural gas and renewable energy sources, there is less reason to permit new coal mines. A thorough analysis of market demand is essential to this analysis. A thorough analysis of Western Energy's financial health is also essential to the final EIS.	

P-0041780

Comment	Document #77-Northern Plains Resource Council	Response
	077 Thank you for the opportunity to provide formal comments on this proposed project. These comments are submitted with the hope that the final EIS prepared by the DEQ will bring substantive and meaningful information together so that a fully informed decision on this project can be made. Indeed, that is our expectation. Sincerely, Jeanie Alderson Chair, Northern Plains Resource Council	**Comment Response 77-24:** Currently, coal from the Rosebud Mine is sold to owners of the Colstrip Power Plant and the Rosebud Power Plant. Westmoreland Rosebud has not foreclosed consideration of sale of project area coal to other parties in the future. If, and when, Westmoreland Rosebud seeks to sell project area coal to other buyers, whether domestic or international, Westmoreland Rosebud would engage with the appropriate agencies to obtain the necessary permits. The scope of the necessary environmental review would be determined at that time. Currently, there is no proposal from Westmoreland Rosebud to ship project area coal. See response 77-25 regarding marketability of project area coal. **Comment Response 77-25:** The state action before DEQ is to review and to make a decision on Westmoreland Rosebud's surface-mine operating permit application under MSUMRA, Section 82-4-221 et seq., MCA **(EIS Section 1.3.1, Purpose and Need**). There is no requirement under existing regulations that would necessitate DEQ to make a determination regarding the marketability of the coal to be mined under the operating permit.

P-0041781

Com-ment	Document #79-Western Environmental Law Center	Response
79-1	079 **Northwest** 1216 Lincoln Street Eugene, Oregon 97401 (541) 485-2471 **Rocky Mountains** 103 Reeder's Alley Helena, Montana 59601 (406) 443-3501 **Southwest** 208 Paseo del Pueblo Sur #602 Taos, New Mexico 87571 (575) 751-0351 **Defending the West** www.westernlaw.org **Western Environmental Law Center** November 23, 2020 Montana DEQ Attn: Jen Lane, MEPA Coordinator PO Box 200901 Helena, MT 59620-0901 rosebud-mine-area-b-eis@eroresources.com jlane2@mt.gov Dear Sir/Madame: Please accept the following comments regarding the DEIS for Western Energy Company's (WECo) AM5 application. These comments are being submitted by the Western Environmental Information Center (WELC) on behalf of the Montana Environmental Information Center (MEIC) and the Sierra Club (collectively, Conservation Groups). **I. The Draft Environmental Impact Statement Violates the Montana Constitution** The Constitution of the State of Montana guarantees the inalienable right to a "clean and healthful environment" and "human dignity." Mont. Const. Art. II, §§ 3, 4. These rights entail the correlative duty of the State to "maintain and improve a clean and healthful environment in Montana for present and future generations." *Id.* Art. IX, § 1(1). Accordingly, the State must "protect[] … the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources." *Id.* § 1(3). DEQ's proposal to allow a massive expansion of the Rosebud Mine in the face of the worsening crisis of climate change violates the Montana Constitution and contradicts DEQ's purported mission to protect the environment. The Conservation Groups have previously explained to DEQ the degree to which its coal mining permitting system egregiously violates the constitutional and 1	**Comment Response 79-1:** Comment noted.

Com-ment	Document #79-Western Environmental Law Center	Response
79-2	079 human rights of all Montanans—especially those of children. Those comments are summarized below and incorporated by reference hereto.[1] Based on an overwhelming amount of climate evidence published in recent years, DEQ must acknowledge the findings of recent climate reports, including the Fourth National Climate Assessment of 2018 and those prepared by the Intergovernmental Panel on Climate Change (IPCC) and U.S. Geological Survey. Additionally, information published in January 2019 by Oil Change International specifically highlights the urgent need for federally-managed fossil fuels to remain in the ground in order to effectively combat climate change. The findings of these recent and important climate reports are summarized below. **Fourth National Climate Assessment** Prepared by the U.S. Global Change Research Program and published in 2018, the Fourth National Climate Assessment, Volume II ("NCA4") identifies and evaluates the risks of climate change that threaten the U.S., and how a lack of mitigation and adaptation measures will result in dire climate consequences for the U.S. and its territories. This report builds upon the foundational physical science set out in the first volume of NCA4, the 2017-released *Climate Science Special Report*, which analyzed how climate change is affecting geological processes across the U.S.[2] Volume II focuses on national and regional impacts of human-induced climate change since the Third National Climate Assessment in 2014, as well as highlighting the future of global warming that will jeopardize human health, economy, and the environment. The report affirms that it is no longer reliably true that current and future climate conditions will resemble the recent past. Due to human activities that produce greenhouse gas emissions, the atmospheric concentration of carbon dioxide has increased approximately 40 percent since the beginning of the industrial era in the 19th century.[3] In fact, USGCRP concludes that evidence of anthropogenic climate change is staggering, and that the impacts of climate change are intensifying across [1] Comment Letter from WELC to DEQ (Sept. 26, 2019) (Ex. 1). [2] USGCRP, Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II: Report-in-Brief (2018) 1. [3] *Id.* at 30 2	**Comment Response 79-2:** Thank you for your comment. DEQ acts consistently with Montana's Constitution by "faithfully execut[ing] the laws of Montana." See *Merlin Meyers Revocable Trust v. Yellowstone County*, 2002 MT 201, ¶ 21, 311 Mont. 194, 200. Here, the statute is clear, as are DEQ's duties thereunder. Under MEPA, DEQ's analysis may not include a review of actual or potential impacts beyond Montana's borders. It may not include actual or potential impacts that are regional, national, or global in nature such as impacts that may result from climate change. Section 75-1-201(2)(a), MCA. Section 75-1-201(2)(a) provides two limitations on the impacts that may be contained in an EIS. First, an environmental review may not include a review of actual or potential impacts that are beyond Montana's borders. This limitation is subject to the limited exceptions set forth in (2)(b). Second an environmental review may not include a review of impacts that are regional, national, or global in nature. These limitations are clear and unequivocal. An EIS may not analyze impacts that are beyond Montana's borders (subject to the exceptions stated above). Nor may an EIS analyze impacts that are regional, national, or global in nature. Subsection (1)(b)(iv)(B) provides a general requirement that an EIS analyze any adverse effects on Montana's environment. That general requirement is subject to the particular provision precluding an EIS from reviewing impacts that are regional, national or global in nature. Under Section 1-2-102, a particular provision controls a general provision that is inconsistent with it. DEQ is, as always, confined to what the statute provides. Further, DEQ cannot deny a coal mining permit under Sections 75-1-102(3) and 201(4)(a), MCA. A substantive decision on whether to issue or deny a coal mining permit would be made pursuant to MSUMRA, 82-4-201, MCA, et seq. In addition, no federal coal is proposed to be mined in the Proposed Action.

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	079	**Comment Response 79-3:** See response to Comment 79-2.
	the U.S. and its territories. These impacts are multiplying climate risks to Americans' physical, social, and economic well-being.[4] Climate risks threatening the U.S. and its territories include: impacts to the economy, such as property losses up to $1 trillion in coastal property destruction; loss of reliable and affordable energy supplies and damaged energy infrastructure; declines in agricultural productivity; loss of two billion labor hours annually by 2090 due to temperature extremes; recreational and cultural losses of wildlife and ecosystems such as coral reefs; decreased water quality and security; diminished snowpack, sea level rise, and frequent flooding; increase in droughts, wildfires, and invasive species; and rise in deaths across vulnerable populations due to extreme weather events and heat waves.[5] To avoid these grave scenarios, the public and private sectors must invest in and implement mitigation actions to reduce greenhouse gas emissions, as well as adopt adaptation plans to prepare for future impacts.	**Comment Response 79-4:** Opposition to the Proposed Action is noted. See response to Comment 79-2.
79-3 79-4	These findings are significant in regards to DEQ moving forward with the AM5 expansion, since no matter the amount carbon dioxide produced from fossil fuel extraction and end-source combustion, NCA4 unequivocally states that we must immediately reduce U.S. greenhouse gas emissions. DEQ must take into account this updated climate report, and explicitly acknowledge its findings. We urge DEQ to consider the report's conclusions and not move forward with the proposed strip-mine expansion.	
	IPCC SR 1.5	
	In October 2018, the Intergovernmental Panel on Climate Change ("IPCC") released a special report on the impacts of global warming, commissioned by the Paris Agreement of 2016. *Global Warming of 1.5°C*, finds greenhouse gas emissions produced by human activity have significantly contributed to global warming since the industrial revolution of the 19th century, increasing the rise in global temperature by 0.2°C per decade at present.[6] The report forecasts the state	
	[4] *Id.* at 26. [5] *Id.* at 36-48. [6] IPCC, *Global Warming of 1.5°C*, An IPCC Special Report on the Impacts of Global Warming of 1.5°C Above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts 3	

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	079 of the climate at 1.5°C and 2°C, describing the devastating consequences continued warming has for our earth—destroying ecosystems, disrupting global economy, and jeopardizing public health. The report is a stark warning that delayed actions to cut greenhouse gas emissions, as well as the implementation of other mitigation and adaptation measures to climate change, will be extremely costly. The IPCC report assessed scientific, technical, and socio-economic literature to compare the impacts of global warming at 1.5°C to 2.0°C above pre-industrial levels of greenhouse gas emissions, and the results are severe. At 2.0°C warming, as compared to 1.5°C, the following will be even more certain to occur: heavy precipitation and flooding; loss of ice sheets in Antarctica and Greenland triggering multi-meter sea level rise; heat waves, heat-related morbidity and mortality, and spread of vector-borne diseases; species loss and extinction, including doubling the number of insects, plants, and invertebrates losing over half of their geographic range; increased risks of forest fires and the spread of invasive species; increase in ocean temperature, acidity, and deoxygenation; risks to marine biodiversity, fisheries, and the near extinction of coral reef ecosystems; climate-related risks to health, livelihoods, food security, and freshwater supply; and risks to economic growth and the increase of poverty by several hundred million by 2050.[7] *Global Warming of 1.5°C* concludes that anthropogenic CO_2 emissions must decline approximately 45 percent from 2010 levels by 2030 in order to stay within the range of 1.5°C, reaching net zero emissions around 2050.[8] In addition to cutting carbon emissions, the IPCC reports other non-CO_2 emissions, including methane, must be deeply reduced to achieve limiting global warming to 1.5°C with no or limited overshoot.[9] To progress in reducing global greenhouse gas emissions, rapid and transformative changes must be made to our global economy, particularly energy infrastructure. For instance, the IPCC suggests the complete phase-out of coal, explaining "the use of coal, with no or limited overshoot of to Eradicate Poverty, Summary for Policymakers at SMP-4 (2018) (hereafter "IPCC"). [7] *Id.* IPCC at 8-14. [8] *Id.* at 15. [9] *Id.* at 16. 4	

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	079 1.5°C, shows a steep reduction in all pathways and would be reduced to close to 0% (0-2%) of electricity (*high confidence*)."[10] In summary, the lower the greenhouse gas emissions in 2030, the less challenging it will be to limit global warming to 1.5°C. Far-reaching climate mitigation and adaptation efforts are needed to both slow the rise in global temperature as well as prepare the planet for climate change impacts that are already in place, due to past and ongoing greenhouse gas emissions. The report specifically notes that "the challenges from delayed actions to reduce greenhouse gas emissions include the risk of cost escalation, lock-in carbon-emitting infrastructure, stranded assets, and reduced flexibility in future options in the medium- and long-term (*high-confidence*)."[11] Therefore, collective, international cooperation on all levels is needed to limit global warming to 1.5°C. Further, there is strong evidence that even limiting global warming to 1.5°C is "not considered 'safe' for most nations, communities, ecosystems, and sectors."[12] Instead, the unrefuted evidence shows that the maximum safe level of carbon dioxide concentrations in the atmosphere is 350 parts per million.[13] Currently, global carbon dioxide concentrations are terrifyingly high: 415 ppm.[14] [10] *Id.* at 21. [11] *Id.* at 24. [12] *Id.* at 5-4. [13] *E.g.*, Hansen et al., *Young People's Burden* at 1. [14] Miller & Rice, *Carbon Dioxide Levels Hit Landmark at 415 ppm, Highest in Human History*, US Today (May 13, 2019), *available at* https://www.usatoday.com/story/news/world/2019/05/13/climate-change-co-2-levels-hit-415-parts-per-million-human-first/1186417001/. 5	

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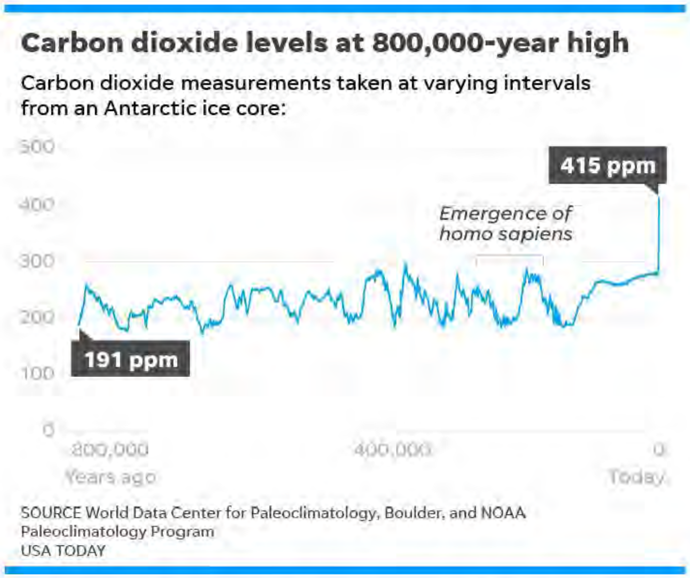
79-5	079  Given this report from the IPCC and its strong evidence of the rise in global temperature and severity of future climate change impacts, DEQ should deny the proposed coal mine expansion and instead take steps to ensure that its decisions do not further exacerbate the climate crisis. **U.S. Geological Survey** The U.S. Geological Survey (USGS), a bureau within the U.S. Department of the Interior, released a study in November 2018 that calculates the amount of greenhouse gases emitted from fossil fuel extraction and combustion on federal lands, as well as the sequestration, or absorption of carbon that naturally occurs on undisturbed public lands. Specifically, from 2004 to 2015, USGS quantified the amounts of carbon (CO_2), methane (CH_4), and nitrous oxide (N_2O) produced from coal, gas, and oil activities, as a result of public lands management. 6	**Comment Response 79-5:** See response to Comment 79-2. Additionally, this is a state-only project, implementing only state law, and it does not involve any federal lands.

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79-6	079 Using data collected from 28 states (not including tribal lands) and offshore Gulf and Pacific continental shelves, USGS concludes that 1,279.0 million metric tons (MMT) CO_2, 47.6 MMT CO_2 equivalent CH_4, and 5.5. MMT CO_2 equivalent N_2O were released between 2004 and 2015.[15] During the same time period, federal lands sequestered an average of 343 MMT CO_2, of which nine states accounted for 60 percent of carbon storage.[16] Therefore, only approximately 15 percent of CO_2 emissions resulting from fossil fuel extraction and end-use combustion were offset by sequestration. Depending on public lands management, federal lands can either be a net sink or source of greenhouse gas emissions. Significantly, over the 10-year period of this study, the report finds emissions from fossil fuels produced on federal lands represent, on average, 23.7 percent of national emissions for carbon dioxide, 7.3 percent for methane, and 1.5 percent for nitrous oxide.[17] In 2014, Wyoming, offshore Gulf areas, New Mexico, Louisiana, and Colorado had the highest CO_2 emissions from fossil fuels produced on federal lands. CO_2 emissions attributed to federal lands in Wyoming are 57 percent of the total from federal lands in all states and offshore areas combined.[18] In addition, in 2014, methane emissions were highest from federal lands in Wyoming (28 percent), New Mexico (23 percent), offshore Gulf areas (20 percent), Colorado (13 percent), and Utah (7 percent).[19] In short, DEQ must not only acknowledge this new scientific information, but it must address the policy implications that necessarily follow. Releasing additional carbon dioxide into the atmosphere intensifies global warming, and thus the impacts of climate change.[20] DEQ must disclose the scientific conclusions about [15] Matthew D. Merrill et al., Federal lands greenhouse gas emissions and sequestration in the United States—Estimates for 2005–14, (2018). [16] *Id.* at 13. [17] *Id.* at 6. [18] *Id.* [19] *Id.* [20] USGCRP, 30. 7	**Comment Response 79-6:** See response to Comment 79-2.

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79-6 cont.	079 rising global temperatures and the need to keep carbon in the ground if we are to avoid the worst effects of climate disruption. **Oil Change International: Drilling Towards Disaster** In January 2019, Oil Change International in collaboration with another 17 not-for-profit organizations published a report called *Drilling Towards Disaster: Why U.S. Oil and Gas Expansion is Incompatible with Climate Limits* ("Report").[21] In addition to discussing why further oil and gas expansion must be halted to avoid climate crisis, the Report discusses the **dire need of saying "no" to additional coal reserve development**. Already with all developed reserves of coal, gas, oil, and cement combined, we have surpassed the threshold of a 50 percent chance of only a 1.5°C global temperature increase.[22] In fact, we have surpassed this threshold by so much that we are now on the doorstep of a 66 percent chance of a 2°C increase with developed reserves alone.[23] Approving this proposed coal expansion at the Rosebud Mine for strip-mining over 100 million tons of coal would only further lock us into an unsustainable and catastrophic climate trajectory. To date, the U.S. is still the world's third-largest coal producer, behind China and India.[24] Federally leased coal is a huge player as "[a]round 40% of all U.S. coal production comes from federally leased land."[25] Existing U.S. mines already contain far more coal than the U.S. can extract under a coal phase-out timeline that is consistent with the Paris Agreement goals.[26] Based on both economic efficiency and equity, the U.S. should phase out coal much faster than the global average to [21] Kelly Trout and Lorne Stockman, *Drilling Towards Disaster: Why U.S. Oil and Gas Expansion is Incompatible with Climate Limits*, Oil Change International (January 2019). [22] *Id.* at 5 [23] *Id.* [24] *Id.* at 21. [25] *Id.* at 22. [26] *Id.* 8	

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79-7	079 meet responsibilities under the Paris goals.[27] To be consistent with Powering Past Coal Alliance's (an alliance that include 28 national governments) coal mining phase out of 2030, more than 70 percent of coal reserves in existing mines need to remain in the ground.[28] Although U.S. coal mining is currently in decline, it is not being managed in a way that is fast enough for climate or fair for workers. Again, "[i]f U.S. coal production is phased out over a timeframe consistent with equitably meeting the Paris goals, at least 70 percent of coal reserves in already-producing mines would [need] to stay in the ground."[29] Federal agencies as well as policymakers need to focus on accelerating the phase out of coal by 2030 or sooner, while ensuring a just transition for communities and workers. Based on the overwhelming scientific consensus that we must drastically reduce GHG emissions as quickly as possible in order to avoid a climate catastrophe, DEQ should reject further mining of coal reserves at the Rosebud Mine. The scientific evidence further plainly demonstrates that the devastating impacts of the climate crisis will not spare Montana, but that Montanans will see dire impacts to their health, livelihoods, and recreation interests and that Montana's environmental life support system will suffer cascading harms. The worsening impacts of climate change in Montana will include new and unprecedented extreme weather, such as intense flooding followed by extreme drought, harm to agriculture from water stress and extreme weather, and cascading harms to ecosystems.[30] The state will also suffer ever-worsening wildfires and water scarcity.[31] Indeed, Montanans have already seen the prelude of smoke-filled summers—climate change has already doubled the number of acres burned across the United States due to wildfire:[32] [27] *Id.* [28] *Id.* [29] *Id.* at 7 (emphasis in original). [30] USGCRP, NCA4 at 136-38. [31] *Id.* at 146. [32] *Id.* at 151. 9	**Comment Response 79-7:** Opposition to the Proposed Action is noted. See response to Comment 79-2.

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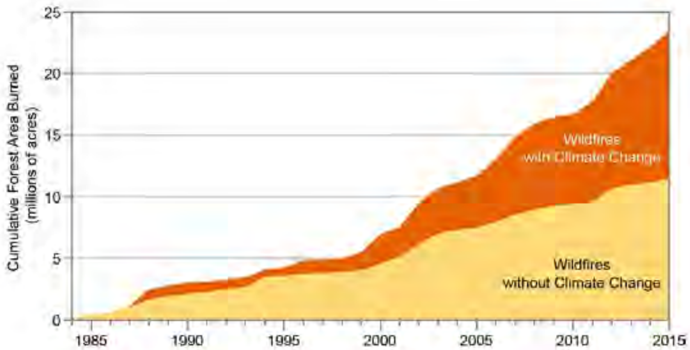

Increased wildfire activity is expected to cause "profound changes" to ecosystems.[33] Climate change is and will continue to affect Montana's hydrology and it will exacerbate persistent drought in the states.[34] Reduced snowpack and increased summer temperatures will cause reduced summer flows in streams and rivers throughout the state and worsen warm season drought throughout the state.[35] This could have "severe consequences for human and natural systems," including "catastrophic impacts on some aquatic species."[36] The trout-streams eulogized by Normal McClean will be dramatically reduced.[37] Climate change will also dramatically change Montana's forests as we know them. Higher temperatures are likely to cause more of Montana's forests to simply die and give way to grasslands.[38] More trees will be killed by forest pests, such as bark beetles and

[33] USGCRP, NCA4 Vol. 1, at 231.

[34] Mont. Instit. on Ecosystems, Montana Climate Assessment at 140.

[35] *Id.* at 130-33.

[36] *Id.* at 133.

[37] *Id.* at 134-35.

[38] *Id.* at 150.

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79-8	079 more forest will burn, due to lengthened fire seasons (due to higher temperatures).[39] Climate change is going to tax Montanans' pocketbooks as well. Agricultural impacts could total over $700 million in lost income and nearly 25,000 lost jobs.[40] These impacts will be felt most acutely in Montana's small towns and rural areas.[41] Climate change is further expected to cost Montana hundreds of millions of dollars and over 10,000 jobs by impacting the recreation industry in the form of reduced fishing, hunting, sight-seeing, winter recreation, and visits to national parks.[42] Conservatively estimated, the impacts of increased fire, in the form of destroyed homes and ever-increasing fire management costs will be billions of dollars.[43] Despite the devastating impacts of climate change, DEQ refuses to broach the topic at all, in reliance on Montana Code Annotated § 75-1-201(2)(a). This provision—which mandates official ignorance of what may be the gravest threat to our state, nation, and planet—is blatantly unconstitutional. The Montana Constitution enshrines all Montanans' fundamental constitutional right to a "clean and healthful environment." Mont. Const. art. II, § 3. Further, the constitution provides: "The State and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations." *Id.* art. IX, § 1(1). "The legislature shall provide for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources." *Id.* art. IX, § 1(3). The arbitrary exclusion of harmful pollution from regulation implicates these rights and obligations. *MEIC v. DEQ*, 1999 MT 248, ¶ 80, 296 Mont. 207, 988 P.2d 1236. This mandates a showing that the statute is narrowly tailored to a compelling state interest. *Id.* ¶ 63. The state cannot meet this standard, as there is no compelling interest in willful ignorance. [39] *Id.* [40] Power & Power, The Impact of Climate Change on Montana's Agricultural Economy at iv (2016). [41] *Id.* at 18. [42] Power & Power, The Impact of Climate Change on Montana's Outdoor Economy at 57 (Ex. 33). [43] *Id.* 11	**Comment Response 79-8**: Thank you for your comment. See response to Comment 79-2.

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79-9	079 The DEIS's complete failure to assess the climate impacts of mining and burning over 100 million tons of coal violates the fundamental right to a clean and healthful and environment, as well as the state's duty to maintain and improve a clean and healthful environment. The legislature's mandated ignorance in Montana Code Annotated § 75-1-201(2)(a) plainly violates these rights, as well as the legislatures duty to provide adequate remedies to prevent degradation of the environmental life support system. On September 9, 2019, the UN High Commissioner on Human Rights, Michelle Bachelet, stated: Climate change is a reality that now affects every region of the world. The human implications of currently projected levels of global heating are catastrophic. Storms are rising and tides could submerge entire island nations and coastal cities. Fires rage through our forests, and the ice is melting. We are burning up our future – literally. The climate emergency is already driving a sharp increase in global hunger, which according to FAO has increased this year for the first time in a decade. WHO expects climate change to cause approximately 250,000 additional deaths per year between 2030 and 2050 – from malnutrition, malaria, diarrhoea and heat stress alone. In many nations, chaotic weather patterns and other manifestations of our environmental emergency are already reversing major development gains; exacerbating conflict, displacement and social tension; hampering economic growth; and shaping increasingly harsh inequalities. The world has never seen a threat to human rights of this scope. This is not a situation where any country, any institution, any policy-maker can stand on the sidelines. The economies of all nations; the institutional, political, social and cultural fabric of every State; and the rights of all your people – and future generations – will be impacted. Excellencies, The window of opportunity for action may be closing – but there is still time to act. We live in an era of tremendous innovation. More thoughtful approaches to our use of natural and renewable resources; policies which protect and empower marginalised communities, including various social protection initiatives; and better strategies by 12	**Comment Response 79-9:** See response to Comment 79-2.

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	079 businesses across their supply chains can be good for the environment and promote greater human dignity and rights. This Council has recognised that "human rights obligations, standards and principles have the potential to inform and strengthen international, regional and national policymaking in the area of climate change, promoting policy coherence, legitimacy and sustainable outcomes". We need to act on that powerful statement. We need strong national commitments for action, with an emphasis on participation by environmental human rights defenders, indigenous peoples, and civil society groups representing the communities that are most at risk – as well as support from business actors, cities and other active stakeholders. The Secretary-General will convene a Climate Action Summit in two weeks' time in New York to step up the pace of climate action by States and the international community. As members of the world's primary intergovernmental body for human rights, I ask each of your States to contribute the strongest possible action to prevent climate change, and to promote the resilience and rights of your people in dealing with environmental harm. Effective action on climate requires bringing the uncommitted and unconvinced into a shared, just and truly international effort. Human rights can help galvanize that movement. Today, a very uneven mosaic of environmental and human rights standards stands between human beings and environmental harm – and many have no effective recourse for the harm they suffer. I am encouraged by the increasing recognition of the right to a healthy and sustainable environment, in over 100 national and regional laws, which defines the relationship between the environment and human rights. To each of us, a healthy environment is no less important than the food we eat, the water we drink, or the freedom of thought we cherish; all people, everywhere, should be able to live in a healthy environment and hold accountable those who stand in the way of achieving it. Mr. President, 13	

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79-10	079 This Council has a critical role to play, with both existing and innovative means to contribute to climate action. There are five key points that I believe should guide our action on climate. Point one: Climate change undermines rights, development and peace. The Secretary-General has noted that over the past six decades, 40% of civil wars have been linked to environmental degradation. While there are many current examples of this, I want to look to the countries of the Sahel region. As the UN Special Adviser on the Sahel has noted, this is among the regions most vulnerable to climate change, with temperature increases projected to be 1.5 times higher than the global average.[44] Continued development of coal, the dirtiest of all fossil fuels, constitutes a gross and continuing violation of the human rights of everyone in Montana, and indeed of everyone in the world. It is a flagrant violation of Montanans' right to a clean and healthful environment. As noted above, the impacts of climate change are most cruel to the least powerful, particularly children. All children, even those without pre-existing illness, are considered a "sensitive population" to the effects of the climate crisis because their bodies are still developing.[45] Air pollution poses severe health risks for Montana's youth and is shown to impede their physical development. Montana's persistent drought conditions and record wildfire seasons have doubled respiratory-related emergency room visits.[46] As illustrated in Figure 17, panel (a) below, Montana, in [44] UN Human Rights, Office of the High Commissioner, Global Update at the 42nd session of the Human Rights Council (Sept. 9, 2019), *available at* https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=24956&LangID=E. [45] U.S. Environmental Protection Agency et al., *Wildfire Smoke A Guide for Public Health Officials*, Montana Department of Environmental Quality (revised May 2016), http://deq.mt.gov/Portals/112/Air/FireUpdates/Documents/wildfire_may2016.pdf. [46] Phil Drake, *Gov. Bullock Creates Climate Change Council*, Great Falls Tribune (Jul. 1, 2019, 1:05 PM), https://www.greatfallstribune.com/story/news/2019/07/01/montana-governor-creates-climate-solutions-council/1619878001/?cid=twitter_GFTribune. 14	**Comment Response 79-10:** See responses to Comment 79-2.

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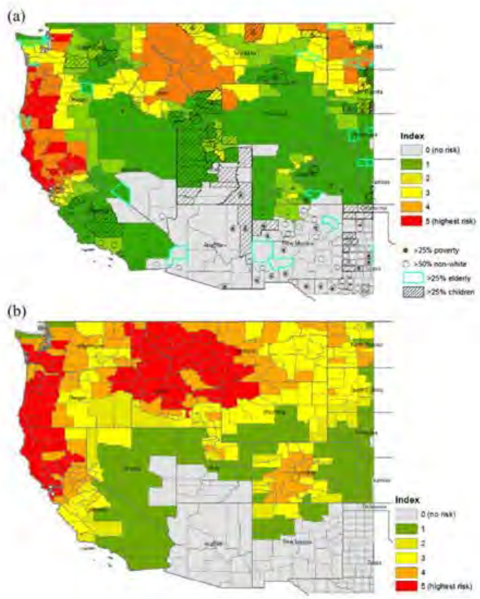
	079 particular western Montana, already experiences some of the worst wildfire smoke conditions in the United States.[47] Unless the climate crisis is addressed, the smoke conditions in Montana will get significantly worse, with much of western Montana facing the highest risk factor (Figure 17, panel (b)).[48]  [47] Jia Coco Liu., et al., *Particulate air pollution from wildfires in the Western US under climate change*, 138 Climate Change, 655, 662 (2016). [48] Panel (a) represents the Fire Smoke Risk Index ("FSRI") for the Western United States from 2004-2009 while panel (b) represents the future (2046-2051) FSRI. The FSRI summarizes overall wildfire risk based on duration, intensity, and frequency of smoke waves. 15	

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	079 The psychological harms from the climate crisis are acute and chronic and they accrue from impacts such as heat waves, drought conditions, wildfires, air pollution, violent storms, the loss of wildlife, watching glaciers melt, and the loss of familial and cultural foundations and traditions. Many children experience psychological impacts and are distressed from day to day conditions, anxious about the climate crisis, and are unable to alleviate their concerns.[49] Children are acutely aware that the window to avoid locking in irreversible climate change impacts is closing. As climate disruption transforms communities, children are likely to experience a feeling that they are losing a place that is important to them, which is a phenomenon called *solastalgia*.[50] Solastalgia describes the gripping sense of existential loss when treasured places are irreparably damaged or destroyed as a result of human carelessness or willful disregard for them, and can cause profound distress.[51] The psychological health effects include elevated levels of anxiety, depression, post-traumatic stress disorder, increased incidences of suicide, substance abuse, social disruptions like increased violence, and a distressing sense of loss. The psychological harms caused by the climate crisis can result in a lifetime of hardships for children. The physiological features of children make them disproportionately vulnerable to the impacts of the climate crisis and air pollution. Perhaps most important, their organs, such as lungs and brain, are still developing, which makes youth more vulnerable to environmental stresses, pollution, and injuries. Children breathe in more air per unit time than adults and consume more food and water proportional to their body weight, making them more susceptible to polluted or contaminated air, water, or food.[52] The behavior of children, which includes spending more time recreating outside and having a harder time self-regulating, also makes them more vulnerable to excess heat, poor air quality, and other climate impacts. Childhood [49] Expert Report of Lise Van Susteren, *Juliana v. United States*, No. 6:15-cv-01517-TC, 2-3 (D. Or. June 8, 2016). [50] *Id.* at 8. [51] *Id.* at 8 (citing Glenn Albrecht, *'Solastalgia': A New Concept in Health and Identity*, 3 PAN: Philosophy Activism Nature 41). [52] *Wildfire Smoke A Guide for Public Health Officials*, *supra* note 140. 16	

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79-11	079 exposure to climate disruptions and air pollution can result in impaired physical and cognitive development with life-long consequences. Children are particularly vulnerable to climate change-related diseases. The vast majority (approximately 88%) of current sufferers of diseases due to climate disruption are children.[53] Allergies are highly prevalent among children and climate disruption exacerbates allergy symptoms, including asthma. An increase in these symptoms can affect children's physical and psychological health by interfering with sleep, play, school attendance, and performance. Certain categories of children are especially vulnerable to climate change impacts and air pollution, for example, children that have pre-existing medical conditions, as well as children that are economically disadvantaged or from minority populations, including indigenous peoples. The adverse impacts of the climate crisis and air pollution on the physical and mental health of children can result in life-long challenges and consequences (see Figure below).[54] The climate crisis is limiting children's potential for development and inhibiting their opportunity to engage in Montana's most important institutions and heritage.[55] [53] World Health Organization (WHO), Quantitative Risk Assessment of the Effects of Climate Change on Selected Causes of Death, 2030s and 2050s, 48 (Simon Hales, et al., eds., 2014). [54] Susan E. Pacheco, *Catastrophic effects of climate change on children's health start before birth*, The Journal of Clinical Investigation (Jan. 13, 2020), https://www.jci.org/articles/view/135005. [55] The adverse impacts of climate disruption on children start before they are born and have lifelong impacts. 17	**Comment Response 79-11:** The laws and rules that DEQ enacts and enforces are designed to protect human health and the environment. USEPA has delegated authority to DEQ to administer and enforce the regulations set forth under the Clean Air Act. Air quality standards under the Clean Air Act are set to protect the most sensitive subpopulations, including children. Regarding air quality in Area B AM5, air quality modeling was used to determine whether emissions from the Proposed Project (Alternative 2) would contribute to exceedances of the NAAQS and/or MAAQS. The potential increases in coal dust and diesel fumes from coal-mining equipment mentioned in the comment were assessed. Impacts from blasting and fugitive dust from mining equipment and wind erosion (blowing dust) were also assessed in addition to the other mining sources discussed above. The EIS concludes that the Project (for either Alternative 2—Proposed Action or Alternative 3—Lee Coulee Only) would result in minor, unavoidable, adverse impacts on air quality, but direct, secondary, and cumulative impacts would be lower than the health based federal and state ambient air quality standards where applicable. Comparison of the modeling results to the NAAQS and MAAQS is a routine approach for determining whether an air quality permit will be issued. See also responses to Comment 79-2.

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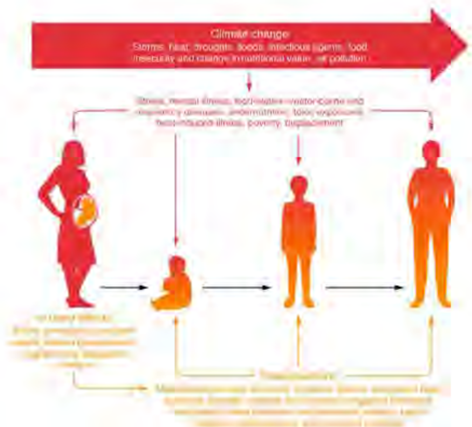
079



Indeed, the Red Cross and Red Crescent recently issued a report concluding that extreme weather from climate change has killed more than 410,000 people in the past ten years.[56] Climate disasters have further affected 1.7 billion people.[57] The State of Montana clearly knows about this danger and its impact specifically to Montana, as detailed in the Montana Climate Solutions Plan (2020), which recognized that "urgent action … is needed to address the increasing threats and impacts of climate change."[58] Indeed, the Governor has explained:

> Montanans across the state believe climate change is a significant problem posing risks to the future of Montana and to future generations. For too long our response to this issue has been curtailed out of a false

[56] International Federation of Red Cross and Red Crescent Societies, Come Heat or High Water at 19 (2020), *available at* https://media.ifrc.org/ifrc/world-disaster-report-2020.

[57] *Id.*

[58] Montana Climate Solutions Council, Montana Climate Solutions Plan (2020).

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 pretense that dealing with climate will divide our state along east-west, rural-urban, and partisan divides. As the Council's work demonstrates, there is an impressive array of opportunities and recommendations that represent a broad-based consensus and can serve as a foundation for bipartisan climate action moving forward that responds to the many values Montanans share. There is an immediate and urgent need for the state to plan for the future and confront the needs to prepare our communities and economy. Already Montana is three degrees warmer on average than we were just a few decades ago. Earlier spring runoffs are causing flooding, impacting our water availability, and contributing to the increasing size and severity of our wildfire seasons. 2017 saw our largest fire season on record since the Big Burn of 1910, spurring periodic waves of evacuations, curtailing visitation, and prompting twice the incidence of respiratory-related ER visits in affected counties. But the risks facing Montana due to climate change are not just physical risks to our health and safety. The state's businesses and economy face a series of economic and financial risks as well. Shifting energy demands and policy changes are prompting a transition across our region and around the world, impacting the markets Montana traditionally serves. Institutional and private investors are increasingly signaling their concern over stranded assets of energy companies and financial performance tied to these changes. In small towns across the state, workers and communities are caught in the crosshairs, lacking the economic capacity to shift labor and capital to emerging opportunities. These transitions are also impacting our state's fiscal health, where declines in traditional revenue streams from energy production and increasing costs tied to unforeseen events, like the 2017 fire season, can impact our state's core services and programs. Planning for climate change helps us manage these risks and costs tied to transitions, but it also offers insights into how we can develop competitive advantages and local economic development strategies that put Montana at the forefront of new energy an technology solutions.	**Comment Response 79-12:** See responses to Comment 79-2.
79-12	In sum, it is plainly unlawful for DEQ here to refuse to address an issue that the State recognizes as extremely dangerous and harmful to Montana. 19	

P-0041800

Com-ment	Document #79-Western Environmental Law Center	Response
	079 **II. The DEIS Must Consider Reasonable Alternatives, Including a Just Transition.** MEPA's provision on environmental impact statement provides: (1) The legislature authorizes and directs that, to the fullest extent possible: (a) the policies, regulations, and laws of the state must be interpreted and administered in accordance with the policies set forth in parts 1 through 3; (b) under this part, all agencies of the state, except the legislature and except as provided in subsections (2) and (3), shall: (i) use a systematic, interdisciplinary approach that will ensure: (A) the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking for a state-sponsored project that may have an impact on the Montana human environment by projects in Montana; and (B) that in any environmental review that is not subject to subsection (1)(b)(iv), when an agency considers alternatives, the alternative analysis will be in compliance with the provisions of subsections (1)(b)(iv)(C)(I) and (1)(b)(iv)(C)(II) and, if requested by the project sponsor or if determined by the agency to be necessary, subsection (1)(b)(iv)(C)(III); (ii) identify and develop methods and procedures that will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking for state-sponsored projects, along with economic and technical considerations; (iii) identify and develop methods and procedures that will ensure that state government actions that may impact the human environment in Montana are evaluated for regulatory restrictions on private property, as provided in subsection (1)(b)(iv)(D); (iv) include in each recommendation or report on proposals for projects, programs, and other major actions of state government significantly 20	

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 affecting the quality of the human environment in Montana a detailed statement on: (A) the environmental impact of the proposed action; (B) any adverse effects on Montana's environment that cannot be avoided if the proposal is implemented; (C) alternatives to the proposed action. An analysis of any alternative included in the environmental review must comply with the following criteria: (I) any alternative proposed must be reasonable, in that the alternative must be achievable under current technology and the alternative must be economically feasible as determined solely by the economic viability for similar projects having similar conditions and physical locations and determined without regard to the economic strength of the specific project sponsor; (II) the agency proposing the alternative shall consult with the project sponsor regarding any proposed alternative, and the agency shall give due weight and consideration to the project sponsor's comments regarding the proposed alternative; (III) the agency shall complete a meaningful no-action alternative analysis. The no-action alternative analysis must include the projected beneficial and adverse environmental, social, and economic impact of the project's noncompletion. (D) any regulatory impacts on private property rights, including whether alternatives that reduce, minimize, or eliminate the regulation of private property rights have been analyzed. The analysis in this subsection (1)(b)(iv)(D) need not be prepared if the proposed action does not involve the regulation of private property. (E) the relationship between local short-term uses of the Montana human environment and the maintenance and enhancement of long-term productivity; (F) any irreversible and irretrievable commitments of resources that would be involved in the proposed action if it is implemented; 21	

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 (G) the customer fiscal impact analysis, if required by 69-2-216; and (H) the details of the beneficial aspects of the proposed project, both short-term and long-term, and the economic advantages and disadvantages of the proposal; (v) in accordance with the criteria set forth in subsection (1)(b)(iv)(C), study, develop, and describe appropriate alternatives to recommend courses of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources. If the alternatives analysis is conducted for a project that is not a state-sponsored project and alternatives are recommended, the project sponsor may volunteer to implement the alternative. Neither the alternatives analysis nor the resulting recommendations bind the project sponsor to take a recommended course of action, but the project sponsor may agree pursuant to subsection (4)(b) to a specific course of action. (vi) recognize the potential long-range character of environmental impacts in Montana and, when consistent with the policies of the state, lend appropriate support to initiatives, resolutions, and programs designed to maximize cooperation in anticipating and preventing a decline in the quality of Montana's environment; (vii) make available to counties, municipalities, institutions, and individuals advice and information useful in restoring, maintaining, and enhancing the quality of Montana's environment; (viii) initiate and use ecological information in the planning and development of resource-oriented projects; and (ix) assist the legislature and the environmental quality council established by 5-16-101; (c) prior to making any detailed statement as provided in subsection (1)(b)(iv), the responsible state official shall consult with and obtain the comments of any state agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in Montana and with any Montana local government, as defined in 7-12-1103, that may be directly impacted by the project. The responsible state official shall also consult with and obtain comments from any state agency in Montana with respect to any regulation of private property 22	

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 involved. Copies of the statement and the comments and views of the appropriate state, federal, and local agencies that are authorized to develop and enforce environmental standards must be made available to the governor, the environmental quality council, and the public and must accompany the proposal through the existing agency review processes. (d) a transfer of an ownership interest in a lease, permit, license, certificate, or other entitlement for use or permission to act by an agency, either singly or in combination with other state agencies, does not trigger review under subsection (1)(b)(iv) if there is not a material change in terms or conditions of the entitlement or unless otherwise provided by law. (2)(a) Except as provided in subsection (2)(b), an environmental review conducted pursuant to subsection (1) may not include a review of actual or potential impacts beyond Montana's borders. It may not include actual or potential impacts that are regional, national, or global in nature. (b) An environmental review conducted pursuant to subsection (1) may include a review of actual or potential impacts beyond Montana's borders if it is conducted by: (i) the department of fish, wildlife, and parks for the management of wildlife and fish; (ii) an agency reviewing an application for a project that is not a state-sponsored project to the extent that the review is required by law, rule, or regulation; or (iii) a state agency and a federal agency to the extent the review is required by the federal agency. (3) The department of public service regulation, in the exercise of its regulatory authority over rates and charges of railroads, motor carriers, and public utilities, is exempt from the provisions of parts 1 through 3. (4)(a) The agency may not withhold, deny, or impose conditions on any permit or other authority to act based on parts 1 through 3 of this chapter. 23	

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 (b) Nothing in this subsection (4) prevents a project sponsor and an agency from mutually developing measures that may, at the request of a project sponsor, be incorporated into a permit or other authority to act. (c) Parts 1 through 3 of this chapter do not confer authority to an agency that is a project sponsor to modify a proposed project or action. (5)(a)(i) A challenge to an agency action under this part may only be brought against a final agency action and may only be brought in district court or in federal court, whichever is appropriate. (ii) Any action or proceeding challenging a final agency action alleging failure to comply with or inadequate compliance with a requirement under this part must be brought within 60 days of the action that is the subject of the challenge. (iii) For an action taken by the board of land commissioners or the department of natural resources and conservation under Title 77, "final agency action" means the date that the board of land commissioners or the department of natural resources and conservation issues a final environmental review document under this part or the date that the board approves the action that is subject to this part, whichever is later. (b) Any action or proceeding under subsection (5)(a)(ii) must take precedence over other cases or matters in the district court unless otherwise provided by law. (c) Any judicial action or proceeding brought in district court under subsection (5)(a) involving an equine slaughter or processing facility must comply with 81-9-240 and 81-9-241. (6)(a)(i) In an action alleging noncompliance or inadequate compliance with a requirement of parts 1 through 3, including a challenge to an agency's decision that an environmental review is not required or a claim that the environmental review is inadequate, the agency shall compile and submit to the court the certified record of its decision at issue, and except as provided in subsection (6)(b), the person challenging the decision has the burden of proving the claim by clear and convincing evidence contained in the record. 24	

Com-ment	Document #79-Western Environmental Law Center	Response
	079 (ii) Except as provided in subsection (6)(b), in a challenge to the agency's decision or the adequacy of an environmental review, a court may not consider any information, including but not limited to an issue, comment, argument, proposed alternative, analysis, or evidence, that was not first presented to the agency for the agency's consideration prior to the agency's decision or within the time allowed for comments to be submitted. (iii) Except as provided in subsection (6)(b), the court shall confine its review to the record certified by the agency. The court shall affirm the agency's decision or the environmental review unless the court specifically finds that the agency's decision was arbitrary and capricious or was otherwise not in accordance with law. (iv) A customer fiscal impact analysis pursuant to 69-2-216 or an allegation that the customer fiscal impact analysis is inadequate may not be used as the basis of an action challenging or seeking review of the agency's decision. (b)(i) When a party challenging the decision or the adequacy of the environmental review or decision presents information not in the record certified by the agency, the challenging party shall certify under oath in an affidavit that the information is new, material, and significant evidence that was not publicly available before the agency's decision and that is relevant to the decision or the adequacy of the agency's environmental review. (ii) If upon reviewing the affidavit the court finds that the proffered information is new, material, and significant evidence that was not publicly available before the agency's decision and that is relevant to the decision or to the adequacy of the agency's environmental review, the court shall remand the new evidence to the agency for the agency's consideration and an opportunity to modify its decision or environmental review before the court considers the evidence as a part of the administrative record under review. (iii) If the court finds that the information in the affidavit does not meet the requirements of subsection (6)(b)(i), the court may not remand the matter to the agency or consider the proffered information in making its decision. 25	

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 (c) The remedy in any action brought for failure to comply with or for inadequate compliance with a requirement of parts 1 through 3 of this chapter is limited to remand to the agency to correct deficiencies in the environmental review conducted pursuant to subsection (1). (d) A permit, license, lease, or other authorization issued by an agency is valid and may not be enjoined, voided, nullified, revoked, modified, or suspended pending the completion of an environmental review that may be remanded by a court. (e) An individual or entity seeking a lease, permit, license, certificate, or other entitlement or authority to act may intervene in a lawsuit in court challenging a decision or statement by a department or agency of the state as a matter of right if the individual or entity has not been named as a defendant. (f) Attorney fees or costs may not be awarded to the prevailing party in an action alleging noncompliance or inadequate compliance with a requirement of parts 1 through 3. (7) For purposes of judicial review, to the extent that the requirements of this section are inconsistent with the provisions of the National Environmental Policy Act,[1] the requirements of this section apply to an environmental review or any severable portion of an environmental review within the state's jurisdiction that is being prepared by a state agency pursuant to this part in conjunction with a federal agency proceeding pursuant to the National Environmental Policy Act. (8) The director of the agency responsible for the determination or recommendation shall endorse in writing any determination of significance made under subsection (1)(b)(iv) or any recommendation that a determination of significance be made. (9) A project sponsor may request a review of the significance determination or recommendation made under subsection (8) by the appropriate board, if any. The appropriate board may, at its discretion, submit an advisory recommendation to the agency regarding the issue. The period of time between the request for a review and completion of a review under this subsection may not be included for the purposes of determining compliance with the time limits established for environmental review in 75-1-208. 26	

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Com-ment	Document #79-Western Environmental Law Center	Response
79-13	079 Mont. Code Ann. § 75-1-201. "The existence of reasonable but unexamined alternatives renders a [NEPA] analysis inadequate." *Friends of Southeast's Future v. Morrison*, 153 F.3d 1059, 1065 (9th Cir. 1998). Here, DEQ needs to show some more effort and creativity, as two alternatives are plainly inadequate. In particular, DEQ must consider a reasonable middle ground alternative with less coal development. This is clearly reasonable, as with the acknowledged closure of Units 1 and 2, coal need has declined by one-third. Accordingly, existing mining and proposed mining under AM5 are simply not required. It is clear that there is no market for Rosebud coal beyond Colstrip. Thus, the 70 million tons in Area F, the 30 million in existing reserves, and the 100 million tons in AM5 are well in excess of what Units 3 and 4 could possibly use if they operated into the 2040s (6 million tons per year X 25 years is only 150 million tons). Thus, AM5 contains 50 million tons of unnecessary coal. The result of this irrationally limited analysis is that WRM will surely mine only the cheapest shallowest coal, in violation of coal conservation requirements.	**Comment Response 79-13:** DEQ has analyzed an alternative that limits mining to Lee Coulee only (Alternative 3; see **Appendix E**). This alternative was considered but not carried forward for detailed analysis in the Draft EIS (see dismissal rationale in **Section 2.5.3** of the **Draft EIS**). As the MSUMRA permitting process progressed concurrently with the MEPA process, however, DEQ permitting analysis led the agency to determine that analyzing the Lee Coulee Only alternative (Alternative 3) in detail in the Final EIS was warranted; see **Appendix E** for a description of Alternative 3 and the impacts analyses. DEQ's rationale for carrying the alternative forward in the Final EIS is in the revised **Section 2.5.3.** MEPA does not specify the number of alternatives that need to be considered in an EIS; however, any alternative proposed must be reasonable, in that the alternative must be achievable under current technology and the alternative must be economically feasible as determined solely by the economic viability for similar projects having similar conditions and physical locations and determined without regard to the economic strength of the specific project sponsor (75-1-201(1)(b)(iv)(C), MCA). See response to Comment 77-4 (DEQ cannot propose an alternative that has different objectives or results than the Proposed Action alternative) and response to Comment 77-5 above (marketability of coal). Additional detail is also provided in **Section 1.4.4.3, Demand for Coal (Code 1103)** of this appendix.
79-14	Moreover, it is abundantly clear to everyone that Units 3 and 4 will not last beyond 2030 at the latest. DEQ's refusal to acknowledge this and corresponding refusal to sketch out a viable transition for the community constitutes an ongoing harm to the public. As noted, Units 1 and 2 closed earlier than expected because they were simply uneconomical to operate: In July, Talen Montana President Dale Lebsack told Montana legislators that his company continues to lose money on Colstrip Units 1 and 2 and the units would have to close. The decision was made before Colstrip owners agreed to a new contract for coal with Westmoreland Mining LLC, the parent company of Rosebud Mine. Westmoreland went bankrupt in 2019 as the coal industry continued a yearslong loss of energy market share to natural gas. In regulatory filings, Colstrip Power Plant owners state that the rising cost of coal will further increase customers' power prices. In Montana, Colstrip power owned by NorthWestern Energy is already the most expensive power in the company's portfolio, according to the Montana Consumer Counsel. MCC put the 2017 customer price of power from Colstrip Unit 4 at $73.85 per megawatt hour, with spot market power and Judith Gap Wind farm anchoring the low end at $31 or less. 27	**Comment Response 79-14:** The EIS acknowledges retirement of Units 1 and 2 and current changes to operations of Units 3 and 4 (see **Section 3.1.4.1, Related Past and Present Actions**). Analyses in the EIS are based on recent rather than projected production rates. To be considered in the analysis, related future actions must be under concurrent consideration by a state agency through preimpact statement studies, separate impact statement evaluation, or permit-processing procedures" as set forth in the Administrative Rules of Montana (ARM) 17.4.603(7). No related future actions for Units 3 and 4 as defined under ARM 17.4.603(7) are known to currently be under consideration by a state agency. See also response to Comment 77-23. Additional detail is also provided in **Section 1.4.4.3, Demand for Coal (Code 1103)** of this appendix.

Com-ment	Document #79-Western Environmental Law Center	Response
	079 Additionally, the Colstrip complex remains challenged by climate change laws passed in Washington and Oregon. Units 3 and 4 face a 2025 coal power ban in Washington, where power plant owners Puget Sound Energy and Avista Corp. are based and PacifCorp, another Colstrip owner, does business. Oregon coal power bans begin in 2030 and will affect PacifiCorp and Portland General Electric, another Colstrip owner. Between the two Pacific Northwest states there are 3.1 million Colstrip customers going offline. Those utilities are making plans for new, non-coal generation, including a large investment in renewable energy by PacifiCorp. NorthWestern Energy, with its 374,000 electric customers in Montana, is the only utility showing interest in keeping Colstrip operational for more than a decade.[59] As this article makes clear, Units 3 and 4 are also too expensive to compete in the market and, because they are so expensive, they are not prudent for any utility commission to approve as a rate base. Oregon and Washington Law prohibits import of expensive and dirty coal power. Or. Rev. Stat. Ann. § 757.518; Wash. Rev. Code Ann. § 19.405.030. Regulators in Washington and Idaho have both indicated that a short-term exit from dirty and polluting Colstrip is in the best interest of ratepayers. Utility owners also indicate that they want to leave the aging plant. Thus Portland General Electric recently explained that it would be economical for that utility to advance depreciation of its interest in Units 3 and 4 to 2025 to align with all other utility owners (save NorthWestern Energy): "[Analysis] suggests the removal of Colstrip from PGE's portfolio in 2025 provides customers the greatest reduction in the IRP portfolio metrics of cost and risk. This date also aligns with Washington's CETA legislation and the current coal contract, better aligning PGE with several co-owners."[60] Similarly, Avista recently represented to the Idaho Public Service Commission that closure of Unit 3 and Unit 4 by 2025 is the most economical option: "The 2020 Electric IRP indicates that the most economic decision for Colstrip Unit 3 and 4 is to close the [59] Tom Lutey, Shutdown of Colstrip Units 1 and 2 is underway, Billings Gazette (Jan. 2, 2020), available at https://billingsgazette.com/news/shutdown-of-colstrip-units-1-and-2-is-underway/article_9cf84136-f56e-51b4-8bf9-e4e90d28bdab.html. [60] Portland General Electric, Colstrip Enabling Study (2020) (Ex. 2). 28	

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 plant by the end of 2025."[61] The replacement is Montana wind and other wind and pumped hydro, among other resources. Likewise PacifiCorp has agreed to accelerate deceleration of Unit 4 to 2023, after which date the company will not make further investments in the ageing facility.[62] While NorthWestern Energy would like to continue to operate the plant owing to its nearly usurious profits from the plant (due to its rate-basing its interest in the plant for more than double its purchase price, much to the disadvantage of Montana ratepayers (for this reason electricity from Colstrip costs Montana ratepayers $73.85 per megawatt hour[63]), it is clear that other owners will not be given leave to sell their interests to NorthWestern.[64] In the various proceedings related to NorthWestern's attempt to purchase more of Colstrip, evidence repeatedly showed that mining and burning coal at the power plant is an economic loser.[65] This is due in part to WRM's new coal contract, which significantly increases the cost of coal.[66] It is also due to the fact that other energy sources, such as renewables paired with storage are half the [61] *In re Avista IRP*, No. AVU-E-19-01, Order No. 34814 (Oct. 15, 2020) (Ex. 3). [62] *Wash. Utilities & Transp. Comm'n v. PacifiCorp.*, Docket UE-191024 (Wash. Utilities & Transp. Comm'n July 16, 2020) (Ex. [63] Tom Lutey, *Colstrip sale falls apart amid strong opposition*, Billings Gazette (Oct. 9, 2020), *available at* https://billingsgazette.com/news/state-and-regional/colstrip-sale-falls-apart-amid-strong-opposition/article_bf78c828-d568-59f2-b037-7286a69e0298.html ("NorthWestern owns a 30% share of Colstrip Unit 4, but none in Unit 3. The utility with 379,000 Montana customers is a relative Colstrip newcomer, having bought its share for $187 million in 2007. Its customers are just 11 years into a 32-year payment plan for that 30% share, for which they're paying $407 million at 8.25% interest. An early shutdown could threaten those terms. NorthWestern also says it's in need of more "dispatchable power," that is to say generation that can be increased or decreased on demand."). [64] *Id.* [65] *E.g.*, Testimony of Ron Binz (Ex. 4) (noting increased risks and expenses at plant post 2025 and likelihood of non-compliance with pollution standards at plant). [66] *Id.*; Coal Supply Contract (2019) (partially redacted) (setting *base* price of $27/ton) (Ex. 7). 29	

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079

cost of Colsrip, as shown by the following bids from Colorado in response to a solicitation from Xcel Energy:[67]

RFP Responses by Technology

Generation Technology	# of Bids	Bid MW	# of Projects	Project MW	Median Bid Price or Equivalent	Pricing Units
Combustion Turbine/IC Engines	30	7,141	13	2,466	$ 4.80	$/kW-mo
Combustion Turbine with Battery Storage	7	804	3	476	6.20	$/kW-mo
Gas-Fired Combined Cycles	2	451	2	451	[redacted]	$/kW-mo
Stand-alone Battery Storage	28	2,143	21	1,614	11.30	$/kW-mo
Compressed Air Energy Storage	1	317	1	317	[redacted]	$/kW-mo
Wind	96	42,278	42	17,380	$ 18.10	$/MWh
Wind and Solar	5	2,612	4	2,162	19.90	$/MWh
Wind with Battery Storage	11	5,700	8	5,097	21.00	$/MWh
Solar (PV)	152	29,710	75	13,435	29.50	$/MWh
Wind and Solar and Battery Storage	7	4,048	7	4,048	30.60	$/MWh
Solar (PV) with Battery Storage	87	16,725	59	10,813	36.00	$/MWh
IC Engine with Solar	1	5	1	5	[redacted]	$/MWh
Waste Heat	2	21	1	11		$/MWh
Biomass	1	9	1	9		$/MWh
Total	430	111,963	238	58,283		

And the public has no appetite for continuing to subsidize this aging and uneconomic super-polluter.

79-15 In sum, the presumption that Colstrip and the mine will operate beyond 2030 (and, likely 2025) is pie in the sky thinking, utterly disconnected from economic reality and environmental necessity. DEQ must consider alternatives that align with reality. In light of the failing economics of Colstrip and the multiple owners' desire to leave and retire the uneconomic plant, DEQ must consider a transition alternative. Its failure to do so, not only harms the environment, but also harms all the people who live in Colstrip and Lame Deer. Not coincidentally, both the City of Colstrip and the Northern Cheyenne Tribe have requested a public discussion of
79-16 a transition plan. Unfortunately, Montana regulators have entirely ignored these cries. It would be a shame for DEQ to continue to ignore this reality to the detriment of everyone (except the utilities, the coal corporation and its hedge fund owners).[68] *See, e.g., Libby Rod & Gun Club v. Poteat*, 457 F. Supp. 1177, 1187 (D. Mont. 1978) ("It is this court's conclusion that the Corps violated Section 102 of

[67] Binz Testimony at 30-31.

[68] Brief of Northern Cheyenne, *In re NWE Acquisition*, Dkt. No. 2019.12.101 (Mont. Pub. Serv. Comm'n) (Ex. 5); Brief of City of Colstrip, *In re NWE Acquisition*, Dkt. No. 2019.12.101 (Mont. Pub. Serv. Comm'n) (Ex. 6).

30

Comment Response 79-15: See responses to Comments 77-4, 79-13, and 79-14. Pursuant to § 75-1-220(1), MCA, alternatives do not include alternative facilities or an alternative to the proposed project itself when the project is not a state-sponsored project. The Proposed Action is not a state-sponsored project.

Comment Response 79-16: See response to Comment 79-15.

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79-17 79-18	079 NEPA by failing to adequately consider the alternative of meeting the Northwest's energy needs through other sources, the alternative of conservation, and the no-action alternative."). It is clear that other energy sources are more economical and socially acceptable, and it is clear that the public wants the government to lay out a just transition. DEQ's cramped alternatives analysis does neither, in violation of MEPA. **III. The DEIS Must Evaluate the Indirect Effects of Coal Combustion.** The DEIS recognizes the need to consider indirect and cumulative effects, yet it fails almost entirely to consider either. There is no question that combustion of the AM5 coal at the Colstrip Power Plant is an indirect or secondary effect. *Dine Citizens Against Ruining Our Env't v. United States Office of Surface Mining Reclamation & Enf't*, 82 F. Supp. 3d 1201, 1213 (D. Colo. 2015), *order vacated in part as moot*, 643 F. App'x 799 (10th Cir. 2016) ("Accordingly, I find that the coal combustion-related impacts of NTEC's proposed expansion are an "indirect effect" requiring NEPA analysis."). As in the *Diné CARE* case it is clear and there is no doubt that the coal from AM5 is destined to be burned at the Colstrip plant. Indeed, the DEQ recognizes this and even goes so far as to note that the plant's permit prohibits it from burning any coal except coal from the Rosebud seam. As such, DEQ must analyze the impacts of coal combustion, including air pollution, water withdrawals from the Yellowstone, and coal ash disposal. Each of these poses significant problems. Water withdrawals from the Yellowstone may adversely affect aquatic life in that river, as explained in prior comments by the groups, which are incorporated by reference here[69]: > An EIS must consider the direct, indirect, and cumulative impacts of the action, along with connected, similar, and cumulative actions. 40 C.F.R. § 1508.25. Here, the DEIS failed to take a hard look at important impacts to water resources. The DEIS fails to consider any impacts to the Yellowstone River or aquatic life in the Yellowstone River from the power plants' water intake on the Yellowstone River. The DEIS recognizes that continued mining in Area F will lead to continued operations of the Colstrip Generating Station, which will in turn, require continued water withdrawals from the Yellowstone River. It is certainly foreseeable that if the coal is mined and burned at the power plant, the power plant will make additional water withdrawals over the [69] Comment Letter from WELC to OSM (Mar. 5, 2018) (Ex. 8). 31	**Comment Response 79-17:** See responses to Comments 79-13 and 79-15. **Comment Response 79-18:** Past, present, and related future operations of the Colstrip Power Plant were considered in the cumulative impacts analyses (see **Section 3.1.4, Actions Considered in Cumulative Impacts Analyses**). DEQ is required to analyze "secondary" impacts under MEPA (rather than indirect effects, as required under NEPA), ARM 17.4.603(18). Secondary impact means "a further impact on the environmental that may be stimulated or induced or otherwise result from a direct impact of the action." The production of coal is not among the "impacts" of coal mining assessed herein because it is the production of coal which gives rise to the environmental impacts assessed herein, but the resulting product itself is not an "impact." The impacts associated with combustion of coal mined at Rosebud Mine are not "stimulated or induced" and do not "otherwise result" from the impacts of the action of mining coal, but instead result from the utilization of the resulting product in connection with an entirely separate action regulated under MFSA and the CAA, that is, the combustion of coal to create electricity. The Colstrip Power Plant and the operations of its associated facilities (paste plant, ponds, etc.) are governed by a certificate issued by DEQ under the Major Facility Siting Act (MFSA), 75-20-101, MCA *et seq*. Colstrip Units 3 and 4 were originally limited to burning coal from Areas C, D, and E, but in 2015, DEQ approved an amendment to the Certificate also allowing the use of coal from other permit areas. For a discussion of "connected actions" see Comment Response 77-3.

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79-19	079 next 19 years. The power plant cannot operate without water. The power plant is consumes an enormous amount of water annually, approximately 27,000 acre feet. This consumes a significant amount of the water flow from the Yellowstone River at Forsythe. Indeed, in recent years, the power plant has seen reduced flows affect its ability to obtain water for the plant, to the point that Colstrip's mayor asked residents to minimize their use of water.[70] Subsequently, the plant operators moved their water intake farther into the river to gain access to more water during summer low flows. The cooling water intakes are potentially a significant impact on water quantity in the Yellowstone, especially during low flows, and also water ecology, and water users, especially given anticipated reductions in flows from the worsening impacts of climate change.	**Comment Response 79-19:** Consumption of cooling water by the Colstrip Power Plant is regulated by CWA § 316(b) (cooling water withdrawals) and Talen Energy's Certificate of Compliance issued pursuant to the Major Facility Siting Act, §§ 75-20-101 et seq., MCA. which regulate industrial/municipal water diversions that have a priority date of 1970. Analysis of Yellowstone River flow reductions is outside the scope of this EIS.
79-20	In its initial EIS for the Colstrip plan, the Montana Department of Health and Environmental Sciences determined that the significant water withdrawals from the Yellowstone for the power plant would lead to more erratic water temperatures, including higher maximum temperatures and longer periods of freezing.[71] This, the Department concluded, would affect fish in the river by altering growth and reproduction, growth rates of aquatic plants and algae, and would affect diversity of fish in the river.[72] The water withdrawals will also lead to increased concentration of pollutants in the river due to the reduced amount of dilution.[73] This may affect concentrations of coliforms, dissolved oxygen, pH, turbidity, temperature, residues, sediment and settleable solids, toxics, and nutrients.[74] This is a problem because the Montana Department of Environmental Quality already considers this [70] Associate Press, Colstrip Seeks to Limit Water Use to Help Coal Plant (Aug. 23, 2016). [71] Mont. Dep't of Health and Envtl. Sciences, Environmental Impact Statement on the Proposed Montana Power Company Electrical Generating Plant at Colstrip, Montana (1973). [72] *Id.* [73] *Id.* [74] *Id.* 32	**Comment Response 79-20:** The Yellowstone River above the Rosebud Creek confluence is around 40,208 square miles. The 5,711 acres of disturbance proposed by Westmoreland Rosebud under Alternative 2 (assuming a scenario of simultaneous buildout) would represent approximately 0.021% of the Yellowstone drainage at Rosebud Creek, or about 1% of the Rosebud Creek drainage at the Lee Coulee confluence some 92 miles upstream of the Yellowstone. Given the scale of disturbance associated with AM5 on Rosebud Creek and the Yellowstone River, it is unlikely that spring-fed tributaries of Yellowstone tributaries, which are dominated by ephemeral flow characteristics with minor flow contributions from springs (see page EIS page 147), would have a measurable impact on water quality. These springs (EIS page 147) are lost to evaporation or infiltration, and some support wetlands or (livestock) ponds. Additional review on springs, ponds, wetlands and streams (including ephemeral tributaries) will be presented in the CHIA, which is part of the written findings for the Area B AM5 amendment.

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	079 portion of the creek to be impaired and not fully supporting its designated use for supporting aquatic life.[75] In particular, the river is impaired for a host of different pollutants including copper, lead, total dissolved solids, zinc, pH, nitrite + nitrate, and sediment.[76] Continued water withdrawals will only worsen these water pollution problems. This particularly the case given that additional factors will worsen these pollution problems. First, the impacts of climate change are predicted to reduce summer low flows in the Yellowstone.[77] Climate change is already causing decreased mountain snowpack in Montana, which in turn affects summer stream flows.[78] Continued warming due to continued GHG emissions will only continue to reduce snow pack and summer stream flows.[79] Climate change, caused by continued GHG pollution from fossil fuel operations, like the Colstrip plant, is worsening summer droughts in Montana, like the brutal "flash drought" from last summer.[80] The Yellowstone River is expected to have significant reduced stream flows from July to October from by 2040.[81] These predictions may be conservative, as low summer flows are already affecting operations of the power plant: Talen, the plant operator, has recently applied to install a weir in the Yellowstone River to increase the water level because it is having trouble operating its [75] Mont. Dep't of Envtl. Quality, Water Quality Standards Attainment Record, Yellowstone River, Cartersville Dam to Powder River (2018); Mont. Dep't of Envtl. Quality, Water Quality Standards Attainment Record, Yellowstone River, Big Horn to Cartersville Diversion Dam (2018). [76] *Id.* [77] Montana Instit. for Ecosystems, 2017 Montana Climate Assessment (attached as Exhibit) [78] *Id.* [79] *Id.* [80] *Id.* [81] *Id.* 33	

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79-21	079 water pumps during low flows.[82] As summer season water becomes more scarce because of climate change, more water users will put additional demand on water rights in the Yellowstone River, causing still further water reductions.[83] Second, pollution from the mine and power plant to East Fork Armells Creek is just going to add to the already harmful pollution problem in the Yellowstone. The Montana Department of Environmental Quality has determined that East Fork Armells Creek is impaired for a host of pollutants, which the power plant and mine are contributing to, as noted in the DEIS and in the assessment records.[84] Indeed, the Office of Surface Mining and the Montana Department of State Lands predicted that coal mining at the adjacent Big Sky Mine would cause a measurable increase in salinity downstream at the mouth of Rosebud Creek (5%) with the Yellowstone River, which would also affect the already impaired waters of the Yellowstone.[85] This anticipated increase in salinity will only increase with the massive strip-mining expansion in the Area B Extension (AM5) of the Rosebud Mine. The EIS for Area F must consider the cumulative impacts to the Yellowstone from each of the proposed mining expansions. The Office of Surface Mining and the Department of Environmental Quality cannot simply dismiss these potentially significant cumulative impacts without actually studying them.[86] Moreover, and in addition to the foregoing, it is clear that the power plant itself adds pollution to the Yellowstone River that worsens its [82] *See* Talen, Application for Fill Permit (Aug. 2016). [83] Montana Instit. for Ecosystems, 2017 Montana Climate Assessment. [84] Mont. Dep't of Envtl. Quality, Water Quality Standards Attainment Report East Fork Armells Creek (2018). [85] US Office of Surface Mining, Montana Department of State Lands, Final Environmental Impact Statement Peabody Big Sky Mine—Area B, Rosebud County, Montana (1988); Montana Dep't of State Lands, Written Findings Big Sky Mine, Lee Coulee, Area B (1988). [86] *See, e.g.*, Expert Disclosure of Payton Gardner, Ph.D. (2017) (Ex. 9); Supplemental Rebuttal Expert Disclosure of Payton Gardner, Ph.D., (2018) (Ex. 10). 34	**Comment Response 79-21:** East Fork Armells Creek (EFAC), as disclosed in the EIS, would not be impacted by the Proposed Project (Alternative 2) or Alternative 3 (see **Appendix E**). The project area analyzed in the EIS would drain through Lee and Richard Coulees toward Rosebud Creek, around river mile 92 and 97 respectively, and eventually meets the Yellowstone River. The assessment unit for the receiving assessment unit of Rosebud Creek, AUID #MT42A001_012, is listed as not fully supporting aquatic life, with a cause name listed as "Cause Unknown", and a source name identified as "Dam Construction (Other than Upstream Flood Control Projects)". As of the 2020 Integrated Report & 303(d) List, salinity has not been identified as an impairment in Rosebud Creek. The detailed assessment report for AUID #MT42A001_012 pertains to effects on aquatic life, specifically warmwater fisheries due to an irrigation dam approximately 3.8 miles from the Yellowstone confluence. Salinity is not the identified as a cause or source of any impairment in the 111.77 mile long receiving assessment unit, nor the 4.28 mile long AUID #MT42A001_012 lower Rosebud Creek assessment unit extending to the Yellowstone confluence. The assessment unit for the Yellowstone River between the Cartersville diversion dam (near Forsyth) to the Powder River (AUID #MT42K001_010, approximately 89 miles in length) is similarly not listed for an impairment caused by salinity, although a cause for aquatic life impairment (not fully supporting) is listed for TDS, with a source indicated as rangeland grazing. Regarding the "measurable increase in salinity" in Rosebud Creek the commenter mischaracterizes the 1988 Big Sky Mine EIS. As described in the AM5 EIS **Section 3.6.3.3**, the 1988 Big Sky EIS predicted: "…mining activities (both historic mining and foreseeable future mining) would raise the TDS levels in Rosebud Creek near the mouth by 1.7 percent in an average water year." (p. IV-17 to IV-18). As the 1988 Big Sky EIS makes clear this prediction is based on the cumulative impacts of all mining, not just Big Sky. There is no prediction of a 5% increase in salinity at the mouth of Rosebud Creek. Neither the 1988 Big Sky EIS or the cited written findings made any statement that such increases as were predicted would be "measurable." As described in **EIS Section 3.6.3.3**, **Alternative 2 – Proposed Action** would raise TDS in Rosebud Creek by 0.1 percent. DEQ independently verified this analysis and calculated the cumulative increase in TDS in Rosebud Creek from all existing, previous, and anticipated mining contributing to the Rosebud Creek drainage. Alternative 3 would not impact TDS levels in Rosebud Creek; see **Appendix E**.

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79-22	079 impairment. The DEIS notes at page 522 that nitrogen deposition from the power plant is 6% of total atmospheric nitrogen deposition east of the power plant.[87] The Yellowstone River east of the power plant is impaired and not meeting water quality standards because of nitrate/nitrite (as well as lead, copper, and zinc).[88] Given the already impaired status of the river, the DEIS's statement that additional pollution deposition from the Costrip power plants "would not adversely affect water quality" is unsupported.	**Comment Response 79-22:** The Yellowstone River is not included in the direct, secondary, or cumulative impacts analysis areas (see **EIS Figure 33** for Alternative 2 and **Appendix E, Figure E-9** for Alternative 3), and water quantity impacts to the Yellowstone River as a result of power plant cooling operations were not analyzed in the EIS. See comment response 5-27 and 5-33 of the Area F Final EIS. During preparation of the Area F EIS, OSMRE and DEQ determined that water quality effects due to coal combustion at the Colstrip and Rosebud Power Plants would not be expected to be measurable and disclosed the rationale for why they would not be measurable in Section 4.7.3.3 of the Area F EIS.
79-23	The potential water quantity and water quality (and cumulative) impacts of the operation to the Yellowstone River also raises concerns about impacts to threatened and endangered species. The area is also habitat for Pallid Sturgeon, as the lower Yellowstone River provides probably the best sturgeon spawning habitat in the state, which is the primary focus of the U.S. Fish and Wildlife Service. *See Defenders of Wildlife v. COE*, 2017 WL 2869415 (D. Mont. July 5, 2017). This habitat will be critical for the survival of sturgeon in Montana over the next two decades, which is the planned operation time of the proposed expansion.[89] Worse, as noted, continued water withdrawals from the power plant will be exacerbated by decreased summer flows due to the worsening impacts of climate change (due to continued burning of coal and other fossil fuels) and because of additional pollution loading from East Fork Armells Creek. The recovery plan notes that climate change may threaten sturgeon due to "reduced late-season flows," especially in the upper Missouri River basin.[90] [87] Mont. Dep't of Health and Envtl. Sciences, Environmental Impact Statement on the Proposed Montana Power Company Electrical Generating Plant at Colstrip, Montana (1973), *supra* (noting that "the Yellowstone River" "will be altered in a number of ways" by operations of the mine power plant complex). [88] Mont. Dep't of Envtl. Quality, Water Quality Standards Attainment Record, Yellowstone River, Cartersville Dam to Powder River (2018), *supra*. [89] FWS, Revised Recovery Plan for the Pallid Sturgeon (2014). [90] *Id.* 35	**Comment Response 79-23:** The point of diversion for water rights is approximately 4 to 4.5 miles upstream of the Cartersville Diversion Dam, meaning there are two significant passage barriers on the Yellowstone: Intake Diversion Dam (construction of a bypass channel is underway, ETC 2022-2023), and the Cartersville Diversion Dam. Current research indicates that between 9 and 26% of the wild Pallid Sturgeon population migrate to the Intake structure annually; additional research is being conducted by the Bureau of Reclamation (in cooperation with U.S. Fish & Wildlife Service, Montana Fish Wildlife and Parks, and the U.S. Geological Survey) related to translocated (now-resident) fish approaching reproductive maturity. The furthest documented Pallid Sturgeon, as a result of translocation around the Intake Diversion Dam, remained below the Cartersville Dam for approximately 42 days. A hatchery female made it within 5 miles of the Cartersville Diversion Dam. A 2020 Technical Memorandum issued by the Bureau of Reclamation on recent translocation efforts is available here: https://www.usbr.gov/gp/mtao/loweryellowstone/docs/2019_lower_yellowstone_pallid_sturgeon_translocation_report.pdf A revised USFS Biological Opinion was issued in October 2020 for the Lower Yellowstone Project and is available here: https://www.usbr.gov/gp/mtao/loweryellowstone/docs/2020_lower_yellowstone_fish_passage_project_bo.pdf The Bureau of Reclamation maintains a public facing information site regarding the Lower Yellowstone Project and the Record of Decision for that project, available here: https://www.usbr.gov/gp/mtao/loweryellowstone/index.html

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79-24 79-25	079 Further evidence shows that water withdrawals for the polluting power plant poses a significant cumulative threat to endangered pallid sturgeon.[91] Regarding air pollution impacts, DEQ must inform the public and decisionmakers that public health, including incidence of lung cancer and other lung disease, is more prevalent in Rosebud County than elsewhere in the state and that this may well be due to the giant polluting power plant that is the center of the community. As DEQ and OSM stated with regard to this in the Area F FEIS: In MT, chronic diseases account for over 60 percent of the leading causes of death (MDHHS 2013). Cardiovascular disease and cancer combined account for nearly half the deaths on an annual basis, while respiratory disease accounts for 7 percent of deaths. Within Regions 1 and 3 (which includes Rosebud, Treasure, and Big Horn Counties, among other counties, as well as the Crow and Northern Cheyenne Reservations), cancer rates exceed state rates. The incidence of asthma in the larger analysis area (8.6 percent in both regions) is comparable to that of Montanans as a whole (8.7 percent statewide). The incidence of asthma in Rosebud County, however, is 10.1 percent. Lung cancer rates in the analysis area are slightly higher than the state, at 68.2 per 100,000 in Region 1 and 67.2 per 100,000 in Region 2, compared to 64.7 per 100,000 in the state (MDHHS 2011). The prevalence of diabetes is slightly higher in the regions (7.7 percent in Region 1, 6.9 percent in Region 3, and 8.7 percent in Rosebud County), compared to MT (6.2 percent). The causal factors for the relatively high rates of chronic disease in the project area are unknown but may be linked in part to nutrition and wellbeing factors as well as exposure to environmental pollution from coal plant emissions (see the **Nutrition** and **Wellbeing** discussions below) (Clean Air Task Force 2010; Institute for Health Metrics and Evaluation 2016).[92] [91] Report of Marcus Griswold, Ph.D. (2019) (Ex. 11); Decl. of Marcus Griswold, Ph.D. (Ex. 12). [92] Area F FEIS at 184. 36	**Comment Response 79-24**: Pallid Sturgeon move from larger waterbodies to smaller waterbodies in late spring to spawn in suitable habitat types. These spawning areas require specific substrate types and flows to successfully distribute the emerging larval stage individuals. No observations of Pallid Sturgeon in Rosebud Creek or EFAC are listed on MT FWP's FishMT database, nor the Montana Natural Heritage Program's website. Credible sources such as the USGS attribute large scale impacts to the Pallid Sturgeon to impoundments, flow modification, and channel modifications. In the case of the Proposed Project (Alternative 2), the modifications to the flow regime to Lee and Richard coulees occur within headwaters areas of these ephemeral drainages. Because these tributaries are ephemeral in nature, they would have flowed only in response to precipitation including snowmelt. Even then, flow from the headwaters areas may only have reached the mouth of Lee or Richard Coulee during particularly intense, long duration, or successive precipitation events. Sedimentation ponds typically are designed and maintained for a 10-year, 24-hour event and have been observed to discharge during larger events in Montana coal mines. Even in these more dramatic events there is data to suggest that flows do not persist long. Ponds in Area B AM5 are proposed to be designed/constructed to the 100-year, 24-hour event to minimize potential to discharge into Rosebud Creek or its tributaries (Richard and Lee coulees), thereby minimizing the chance to exceed the numeric standards established by ARM 17.30.670. Although this means that the frequency of discharges from the disturbed area are potentially reduced, this would result in a temporary impact until a sedimentation ponds are reclaimed and the contributing drainages have been released from Phase II bond requirements. At this point, effluent limitation in MPDES permits shift to Western Alkaline standards Best Practicable Control Technology effluent limitations, found at 40 CFR 434, Subpart H. At this point, water flows through reclamation in a purposefully similar capacity with similar water quality as found in pre-mine conditions. In ephemeral drainages, stream flow is expected to resume ephemeral stream flow. The focus of the EIS is for the impacts of the Area B AM5 expansion. The analysis of impacts to a species which have not been observed locally, or within the applicable assessment unit is out of scope, and introduces far too many variables to reach a reliable conclusion. See also Comment Response 77-3 and 79-18. **Comment Response 79-25 is on the following page.**

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		Comment Response 79-25: See responses to comments 79-11, 79-2 and 79-8. The laws and rules that DEQ enacts and enforces are designed to protect human health and the environment. USEPA has delegated authority to DEQ to administer and enforce the regulations set forth under the Clean Air Act. Air quality standards under the Clean Air Act are set to protect the most sensitive subpopulations, including children. Regarding air quality in Area B AM5, air quality modeling was performed to determine whether emissions from the Project would contribute to exceedances of the NAAQS and/or MAAQS. The potential increases in coal dust and diesel fumes from coal-mining equipment mentioned in the comment were assessed. Impacts from blasting and fugitive dust from mining equipment and wind erosion (blowing dust) were also assessed in addition to the other mining sources discussed above. The EIS concludes that the Project would result in minor, unavoidable, adverse impacts on air quality, but direct, secondary, and cumulative impacts would be lower than the health-based federal and state ambient air quality standards where applicable. Comparison of the modeling results to the NAAQS and MAAQS is the nationally accepted approach when determining whether an air quality permit will be issued. See also responses to Comments 79-2 and 79-8 above.

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79-26 79-27	079 This finding corresponds with the findings of the Clean Air Task Force, which show that air pollution from coal kills and sickens thousands of people annually.[93] Indeed, using EPA data and peer reviewed research, the Clean Air Task Force determines that the Colstrip Plant pollution is responsible for 36 premature deaths, 10 hospital admissions, 14 asthma ER visits, 22 heart attacks, 9 cases of chronic bronchitis, 240 asthma attacks, 1,781 lost work days each year.[94] This is consistent with numerous studies that find that the great volumes of pollution from coal plants cost the public hundreds of millions of dollars each year.[95] Indeed, there is abundant evidence that the harm to the public from coal significantly outstrips the total value of the coal.[96] If DEQ is going to trumpet the supposed economic benefits, it must also disclose the economic costs of this pollution (DEQ should also clarify in its assessment of economic benefits that the mine expansion has been partially or entirely exempted from gross proceeds tax). Furthermore, DEQ's sole reliance on supposed compliance with National Ambient Air Quality Standards (NAAQS) as an indicator of the supposed harmlessness of the power plant pollution is misplaced, because NAAQS are a political, not a scientific standard, as numerous courts have explained. *North Carolina v. TVA*, 593 F.Supp.2d 812, 822 (W.D.N.C. 2009) *rev'd on other grounds*, 615 F.3d 291 (4th Cir. 2010) (In tort case against coal-fired power plants "Court finds that, at a minimum, there is an increased risk of incidences of premature mortality in the general public associated with $PM_{2.5}$ exposure, even for levels at or below the NAAQS standard of 15 [u]g/m ^{3}."); *Ohio Power Company v. EPA*, 729 F.2d 1096, 1098 (6th Cir. 1984)(in challenge to Clean Air Act regulation of power plants 25 years ago, court holds "there is now no longer any doubt that high levels of pollution sustained for periods of days can kill. Those aged 45 and over with chronic diseases, particularly of the lungs or heart, seem to be predominantly affected. In addition to these acute episodes, pollutants can attain daily levels which have been shown to have serious consequences to city dwellers."); *Sierra* [93] Clean Air Task Force, The Toll from Coal (2010), *available at* https://www.catf.us/resource/the-toll-from-coal/. [94] Clean Air Task Force, Toll from Coal. https://www.tollfromcoal.org/#/map/(title:6076//detail:6076//map:6076/MT). [95] Report of Tom Power, Ph.D. (2018) (Ex. 13). [96] *Id.*; Gillingham et al., Reforming the U.S. Coal Leasing Program, Science (2016) (Ex. 14). 37	**Comment Response 79-26:** The information provided in the EIS was gathered from public records on what the coal mines in Montana have paid recently in taxes and royalties and does not provide unreasonable or speculative taxes or royalties that might be paid under another scenario. The information also reflects the current rates per § 15-23-703, MCA, and § 15-23-715, MCA. MEPA and its implementing rules require that an EIS contain a description of the proposed action including its purpose and benefits [Section 75-1-201(1), MCA; ARM 17.4.617(1)]. See also Comment Response 79-20. "State and local governments do not levy or assess any mills against the reported gross proceeds of coal. Instead, a flat tax of 5 percent is levied against the value of the reported gross proceeds for most coal mines. Underground mines currently in operation pay a lower tax rate of 2.5 percent of value on production through 2030. Any new underground mine receives this lower rate for the lifetime of the mine. In addition, counties have the option to abate up to 50 percent of the local share liability for new or expanding coal mines, but the state tax liability would still remain at 5 percent. No counties currently offer this abatement." (2020 Biennial Report – Natural Resources on mtrevenure.gov) **Comment Response 79-27:** Meeting the National Ambient Air Quality Standards (NAAQS) is routinely applied as a method in regulatory permitting and assessment situations to demonstrate that adverse health effects are not anticipated. The Clean Air Act of 1970 as amended in 1990 requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment with an "adequate margin of safety." Primary NAAQS set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, and are based on the best available science. Section 109(b)(1) of the Clean Air Act defines a primary NAAQS as "the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health." Note that the primary standard is to be set at "… the maximum permissible ambient air level…which will protect the health of any [sensitive] group of the population," and that for this purpose "reference should be made to a representative sample of persons comprising the sensitive group rather than to a single person in such a group" (S. Rep. No. 91:1196, 91st Cong., 2d Sess. 10, 1970). **Comment Response 79-27 continues on the next page.**

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	079 *Club v. TVA*, 592 F.Supp.2d 1357, 1371 (N.D. Al. 2009) (In Clean Air Act enforcement action against coal-fired power plant, court holds "there is no level of primary particulate matter concentration at which it can be determined that no adverse health effects occur."); *Catawba County v. EPA*, 571 F.3d 20, 26 (D.C. Cir. 2009)("A 'significant association' links elevated levels of PM2.5 with adverse human health consequences such as premature death, lung and cardiovascular disease, and asthma. *Id.* And significantly for the primary issue before us — EPA's method for identifying the geographic origins of elevated ambient PM2.5 concentrations — PM2.5 can travel hundreds or thousands of miles."); 70 Fed. Reg. 65,983, 65,988 (Nov. 1, 2005) ("emissions reductions resulting in reduced concentrations below the level of the standards may continue to provide additional health benefits to the local population."); 71 Fed. Reg. 2620, 2635 (Jan. 17, 2006) (US EPA unable to find evidence supporting the selection of a threshold level of $PM_{2.5}$ under which the death and disease associated with $PM_{2.5}$ would not occur at the population level).	**Comment Response 79-27 (continued):** Risks from exposure to an ambient air pollutant such as PM may be influenced due to intrinsic factors such as pre-existing disease, genetic factors, or life stage, or extrinsic factors such as sociodemographic status. These influences may also be present in co-concurrent combinations, for example subsets of the population may be at increased risk due to socioeconomic status (SES) and also have a pre-existing condition. The NAAQS should be protective for even these sub-populations. The following text was added to **Section 3.3.1.1, Regulatory Framework, Ambient Air Quality Standards** in the Final EIS. Section 109(b)(1) of the Clean Air Act defines a primary NAAQS as "the attainment and maintenance of which in the judgment of the Administrator, based on such criteria and allowing an adequate margin of safety, are requisite to protect the public health" and that primary standard is to be set at "… the maximum permissible ambient air level…which will protect the health of any [sensitive] group of the population."
79-28	Finally, DEQ must fully disclose the cumulative harm from coal ash: where has all the coal ash from the plant gone, what are the effects, and where will the coal from the AM5 coal go. It is worth noting that DEQ has identified the power plant's leaking coal ash ponds as the source of excessive pollution in East Fork Armells Creek, for example in its CHIA for the AM4 expansion, DEQ noted:	**Comment Response 79-28:** See response to Comment 77-3 and 79-18 and response below in **Section 1.4.4.1, Colstrip Power Plant (Code 1001)**. Coal ash is synonymous with bottom ash and the latter is used in the EIS with its use described in **Section 2.4.4.5, Bottom Ash**. The Proposed Action for this EIS does not consider the use of bottom ash since Westmoreland Rosebud would not use bottom ash for any purpose within the Project area (**EIS Section 3.16.3.2**).
79-29	The area of EFAC between Stocker Creek and Corral Creek (north of the surface water and groundwater CIA boundaries) is the only AVF identified in the Colstrip area. This section is downstream of the town of Colstrip and is subject to impacts from numerous sources other than mining. Changes in water level and water quality can be expected from leaks from ash ponds associated with the Colstrip Power Plant, discharge from municipal utilities in the town of Colstrip, and infiltration from the water storage facility known as Castle Rock Lake. There are no surface water sites within the AVF reach that have been monitored since 1985. A USGS stream gauge and sampling site has the longest record spanning 1975 to 1985.[97] [97] DEQ AM4 CHIA at 9-3 (2015). 38	**Comment Response 79-29:** See response to Comment 79-26.

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79-30 79-31 79-32 79-33 79-34	079 DEQ has also identified ash ponds located in Cow Creek, which is a tributary of Rosebud Creek.[98] High boron concentrations have been measured in Spring, Pony, and Cow Creeks, which may be a result of the ash impoundment.[99] In sum, DEQ must now tell the public the true extent of the pollution from the mine and power plant complex on receiving waters around the mine, differentiating the sources of the pollution, and identifying the extent of the pollution. The agency may not discount the pollution as outside its jurisdiction (as it often does in SMCRA and CWA permitting decisions). Further, it is clear that DEQ has significant information about the extent of the pollution from the leaking ash ponds, including synoptic analyses of pollution in East Fork Armells Creek, among other analyses. The DEIS mentions historic use of bottom ash throughout the mine, but provides no detailed information about how much was used, where it has been placed, and any monitoring data related to its use. Please provide this information. Further, please formalize WRM's apparent commitment not to use bottom ash at the mine by including a permit provision prohibiting such use. **IV. The DEIS Needs to Significantly Improve Its Analysis of Water Impacts** DEQ must also provide a much more comprehensive analysis of water impacts. The analysis at present is incomplete and misleading. First, the cumulative impacts [98] *Id.* at 8-9. [99] *Id.* at 9-22 (DEQ noted that boron is likely from the power plant's leaking ash ponds: "Elevated concentrations of boron in EFAC are likely from water leaking from the power plant ash ponds and ponds at the power plant facilities mixing with EFAC surface water. Boron is part of a group of elements known as oxyanions (along with As, Mo, Sb, Se, and V) which are most mobile in the neutral to moderately alkaline pH range (Jones, 1995). Since groundwater in the Colstrip area is moderately alkaline, boron is expected to be very mobile. Boron oxides from ash become dissolved in water and are easily leached from the ash particles where it can then rapidly travel downstream or down gradient. Boron detected in tributaries in Cow Creek down gradient from the ash ponds and slurry pipelines is from the leaking ash ponds and former leaks in the pipelines. Boron in samples from the power plant's facilities ponds have ranged from 0.2 mg/L to 854 mg/L (PPL, 2014). The wide range of concentration is a result of various amounts of dilution in the ponds; some of the power plant ponds receive water from multiple sources."). 39	**Comment Response 79-30:** Alternative 2 impacts to water resources and water rights in the analysis area are described in **EIS Section 3.5.3, Surface Water**; **Section 3.6.3, Ground Water**; and **Section 3.7.3, Water Rights**. Alternative 3 impacts are described in **Appendix E, Section 1.4.5, Surface Water**,; **Section 1.4.6, Ground Water**; and **Section 1.4.7, Water Rights**. **Comment Response 79-31:** Impacts to water resources and water rights in the analysis area are described in **EIS Section 3.5.3, Surface Water**; **Section 3.6.3, Ground Water**; and **Section 3.7.3, Water Rights**. Cited water bodies and ash ponds are not within the scope of this EIS. **Comment Response 79-32:** See response to Comment 79-28. **Comment Response 79-33:** As stated in **EIS Section 3.16.3.2**, "Under all alternatives, Westmoreland Rosebud would not use bottom ash for any purpose within the Project area." In DEQ's *Record of Decision and Written Findings for Rosebud Coal Mine Area F*, DEQ did include a permit condition that prohibited the use of bottom and fly ash within the project area. In its Round 8 deficiency letter to Westmorland Rosebud (August 13, 2021), DEQ stated, "Please revise '17-24-510 Disposal of Off-Site Generated Waste.pdf' to state bottom ash will not be used in Area B." Westmoreland Rosebud responded to this deficiency by adding such a commitment to the permit. **Comment Response 79-34:** Impacts to water resources and water rights in the analysis area are described in **EIS Section 3.5.3, Surface Water**,; **Section 3.6.3, Ground Water**; and **Section 3.7.3, Water Rights**.

Com-ment	Document #79-Western Environmental Law Center	Response
	079	
79-34 cont.	analysis for surface water appears to be a cut and paste job from the Area F FEIS.[100] Thus, the AM5 DEIS states: The Proposed Action would contribute long-term adverse cumulative impacts on surface water hydrology due to changes in stream and spring flows, loss of springs, and loss of ponds or reduction in water supply to ponds. The Proposed Action would contribute short-term and long-term adverse cumulative impacts on surface water quality due to backfilling with spoil and surface disturbances.[101] The Area F FEIS states: The Proposed Action would contribute long-term adverse cumulative impacts on surface water hydrology that would range from minor to major. This would occur due to changes in stream and spring flows, loss of springs, loss of ponds or reduction in water supply to ponds, and changes in the hydrologic balance. The Proposed Action would contribute short-term and long-term adverse cumulative impacts on surface water quality due to backfilling with spoil, surface disturbances, and changes in the hydrologic balance that would range from minor to major.[102]	
79-35	The distinction is that the DEIS inexplicably omits the conclusion from the Area F FEIS, namely that impacts to water will be major. Please explain this distinction. It is certainly troubling that without OSM's involvement in the process, DEQ appears to be withdrawing from its prior conclusions with respect to impacts to water resources.	**Comment Response 79-35:** The definitions used for the Area B AM5 EIS' impact analyses are provided in **Section 3.1.1** and are defined in ARM 17.4.603. The Area F EIS was prepared jointly with OSMRE and had to meet requirements of that agency's rules and guidelines in addition to those of MEPA. Intensity labels, such as "major" and "minor," were used in the Area F EIS to meet OSMRE NEPA guidelines. MEPA has no provision for intensity labels to describe impacts. As this is a state-only project, a MEPA (and not NEPA) analysis is required.
79-36	Further, and more importantly, the cumulative impacts analysis contains no detailed quantitative information, in violation of MEPA. As the Ninth Circuit recently explained:	**Comment Response 79-36:** See response to Comment 79-32.
	[100] *Compare* AM5 DEIS at 205, *with* Area F FEIS at 685. [101] DEIS at 205. [102] Area F FEIS at 685. 40	

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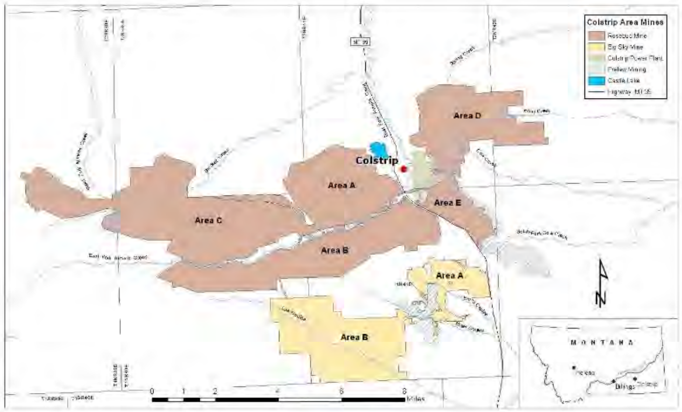
Com-ment	Document #79-Western Environmental Law Center	Response
79-37	079 "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency ... undertakes such other actions." 40 C.F.R. § 1508.7. "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." *Id.* "[I]n considering cumulative impact, an agency must provide 'some quantified or detailed information; ... [g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided.'" *Ocean Advocates*, 402 F.3d at 868 (alterations in original) (quoting *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1379–80 (9th Cir. 1998)). "This cumulative analysis 'must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects.'" *Id.* (quoting *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1075 (9th Cir. 2002)) (internal quotation marks omitted). We have held that cumulative impact analyses were insufficient when they "discusse[d] only the direct effects of the project at issue on [a small area]" and merely "contemplated" other projects but had "no quantified assessment" of their combined impacts. *Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 994 (9th Cir. 2004). *Bark v. United States Forest Serv.*, 958 F.3d 865, 872 (9th Cir. 2020). Here, the cumulative effects analysis is devoid of any specific detailed and quantitative analysis of impacts. Historic mining in Areas A and B of the Big Sky Mine and Areas D, E and B of the Rosebud Mine have occurred in the headwaters of tributaries of Rosebud Creek,[103] yet DEQ has failed to identify what the cumulative effect of all this mining will have on water quality and water quantity in Rosebud Creek. [103] DEQ, AM4 CHIA at fig. 1-1. 41	**Comment Response 79-37:** Alternative 2 cumulative impacts on surface water resources are described in **Section 3.5.3.3,** and Alternative 3 impacts are described in **Appendix E Section 1.4.5**. Westmoreland Rosebud's application and the EIS analysis contained in **Section 3.5.3.3** contain detailed and quantitative analyses of impacts. The impacts associated with mining in Areas A through E at the Rosebud Mine and the Big Sky Mine are described in Appendix I of the Written Findings for Area B AM4 (DEQ 2015b), and the Area B AM5 Cumulative Hydrologic Impact Assessment will be included with the Written Findings for this EIS.

Com-ment	Document #79-Western Environmental Law Center	Response
79-38	079  The DEIS states that the proposed mining will cause an 8% increase in salinity in the alluvial groundwater in Rosebud Creek.[104] This, on its own, is troubling, given that Rosebud Creek's median salinity levels are on the verge of exceeding applicable water quality standards (ARM 17.30.670).[105] In light of this, it is troubling that DEQ discounts these impacts as "trivial."[106] I doubt anyone who relies on Rosebud Creek water for irrigation would agree that these impacts are trivial. Please try to think beyond the interests of regulated industry.	**Comment Response 79-38:** As analyzed in **EIS Section 3.6.3.2**, the 8 percent increase in alluvial ground water salinity under Alternative 2 translates to an increase of 0.1 percent or 0.9 mg/L in Rosebud Creek surface water. The modifier "trivial" was deleted in the Final EIS. There would be no changes in TDS/SC in Rosebud Creek as a result of Alternative 3 (see **Appendix E, Section 1.4.6**). DEQ will evaluate the significance of this level of impact in the CHIA with the Written Findings.
79-39	Further, it is inexplicable why DEQ's analysis of cumulative effects to groundwater only refers to the information about water quality at the mouth of Rosebud Creek from the 1988 EIS for the Big Sky Mine.[107] The written findings [104] DEIS at 239. Conservation Groups request DEQ to provide the calculations that it used to reach this calculation, as well as DEQ's calculation that surface water would only see salinity increases of 0.1%. [105] DEIS, tbls. 39, 40. [106] DEIS at 239. [107] DEIS at 240. 42	**Comment Response 79-39:** See responses to Comments 77-3 and 79-33. The commentor mistakenly describes the 11% increase in TDS in the alluvium predicted by the Big Sky EIS to be a prediction of an increase in Rosebud Creek itself. Similarly, the commentor in this paragraph disingenuously conflates the predicted changes in groundwater quality with surface water by omitting the word "alluvium" when discussing the 8% increase in TDS in Rosebud Creek alluvium, which the commentor correctly described in the previous paragraph. DEQ evaluated probable impacts on EC/TDS concentrations in Rosebud Creek resulting from the Project and the cumulative impacts from all previous, existing, and anticipated mining which contributes to the Rosebud Creek watershed (DEQ 2021). DEQ's analysis determined that mining in Lee Coulee would results in no changes in TDS/SC in Rosebud Creek compared to existing/previous mining (DEQ 2021).The commentor misrepresents the information presented in the AM4 CHIA regarding Rosebud Creek water quality. As the AM4 CHIA showed in Figure 9-5, exceedances of the water quality standard for specific conductance in Rosebud Creek were observed in monitoring stations both upstream and downstream from potential mining influence. As the section quoted by the commentor states "most samples collected **since 1980**" (emphasis added) have exceeded the standard. Mining in the Lee Coulee drainage began in 1989, thus any samples collected before that time at the downstream site also represent conditions not influenced by mining. The AM4 CHIA also explained that specific conductance was typically higher downstream of Lee Coulee throughout the monitoring record, but that "[t]he concentration of TDS measured at the downstream station has not increased over time." These facts indicate that the exceedances in Rosebud Creek near Lee Coulee are not caused by mining.

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Com-ment	Document #79-Western Environmental Law Center	Response
79-39 cont. 79-40	079 for the Area B expansion of the Big Sky Mine found that mining in Lee Coulee would increase salinity levels in Rosebud Creek by 11%.[108] Thus, the AM5 will increase alluvial salt levels in Rosebud Creek by 8% and Area B of Big Sky will increase salinity by 11%. This is significant because neither analysis includes significant historical mining in Big Sky Area A on Miller and Emile Coulee, and historic mining in Rosebud Areas D and E in the headwaters of Cow Creek, Pony Creek, and Spring Creek. Further, DEQ's analysis omits any identified impacts to Rosebud Creek from the coal ash impoundment on Pony Creek, which DEQ recognizes as likely leaking pollution.[109] It is clear that significant mining has occurred in the 32 years since 1988. It is illogical why DEQ used the analysis of the EIS from 1988 for this analysis. It is also odd that DEQ has ignored DSL's written findings (which found an 11% increase just from mining). Further, even in the 1988 EIS, OSM noted that salinity in Rosebud Creek is already causing irrigators to "forego use of water in the lower portion" of the creek.[110] Further monitoring has confirmed that water quality in Rosebud Creek is currently in decline and it appears to be a result of mining. Thus, in the AM4 CHIA, DEQ stated that "most water quality samples collected since 1980 on Rosebud Creek near Lee Coulee have exceeded the water quality standard for specific conductance defined in ARM 17.30.670."[111] DEQ noted in the AM4 CHIA that conductivity values have increased below Lee Coulee, which is the first stream that has been subject to historical mining operations.[112] While DEQ was chary about attempting to provide any attribution of this to mining, there certainly was no affirmative demonstration that mining was not the cause of the increased salinity levels. Other analyses have also identified significant increases in salinity in Rosebud Creek downstream of tributaries that have been mined, especially during years of low [108] Mont. Dep't of State Lands, Written Findings for Big Sky Mine Lee Coulee Area B at 9 (1988) (Ex. 15). [109] DEQ, AM4 CHIA at 9-22. [110] OSM & DSL, FEIS Big Sky Area B at IV-17 (1988). [111] DEQ, AM4 CHIA at 9-15. [112] *Id.* fig. 9-5. 43	**Comment Response 79-40:** Long term increases in the salinity of alluvial groundwater and stream water adjacent to mining is discussed in the Draft EIS for Alternative 2 in **Section 3.6.3.2** and **Section 3.5.3.2**, respectively. Cumulative impacts to surface water and ground water resources are described in **Section 3.5.3.3** and **Section 3.6.3.3**, respectively, and in **Appendix E** for Alternative 3. As noted in **Section 3.6.3.3**, the TDS contribution to Rosebud Creek alluvium from the AM5 expansion area is calculated to increase the Rosebud Creek surface water TDS concentration under Alternative 2, assuming complete mixing, 0.1 percent (Application Appendix O Attachment R). See also response to Comment 79-32. DEQ's analysis determined that mining in Lee Coulee (Alternative 3) would result in no changes in TDS/SC in Rosebud Creek compared to existing/previous mining (see **Appendix E, Section 1.4.6**). Commenter cites Lambing & Ferreira (1986), which did report higher TDS downstream from Cow Creek in 1983, and mining had occurred in the Cow Creek drainage prior to that date, but the report does not attribute the high concentrations of TDS observed to mining, rather concluding "it is probable that the large concentrations measured in 1983 are the result of very small streamflow in Rosebud Creek." This is typical expected conditions during drought such as occurred in the early 1980s as water sourced from runoff of recent precipitation is lower in TDS than water sourced from groundwater in the Tongue River Member. As the cited source explains: "The source of this increase in dissolved-solids concentration presumably is inflow derived from the Tongue River Member." Lambing & Ferreira reported conditions of "no flow" in monitoring sites both upstream and downstream from the sites where high TDS was measured and minimal flow at those sites (0.01-0.04 ft^3/s). Evaporation of slow moving to stagnant surface water such as occurs in low gradient streams in dry years also serves to concentrate TDS, likely contributing to the high TDS concentrations observed in these locations in 1983. The commenter cites to a 1998 letter from DEQ to OSMRE, however this analysis is no longer valid. The Rosebud Mine and DEQ evaluated trends in salinity in EFAC in detail for the AM4 amendment in 2014. The results of this analysis using a larger dataset and including more recent data indicated that the conclusions presented in the 1998 letter were inaccurate. Additionally, AM5 is not predicted to have any impacts on the EFAC drainage. **Comment Response 79-40 continues on next page.**

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Com-ment	Document #79-Western Environmental Law Center	Response
79-40 cont.	079 flow in Rosebud Creek.[113] Similar increases in salinity have been observed both in East Fork Armells Creek and the Tongue River downstream of significant coal mining operations.[114] Similarly, the Powder River, which may be the most impacted by improvident fossil fuel development, has been found to deliver a significant load of toxic pollution to the Yellowstone River.[115] The picture is starting to become clear that energy permitting decisions that have allowed a little increase in pollution here and a little increase of pollution there (while ignoring the larger impact) are in fact slowing changing the chemistry and biology of Montana's waters. *See Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 994 (9th Cir. 2004) ("Cumulative impacts of multiple projects can be significant in different ways. The most obvious way is that the greater total magnitude of the environmental effects—such as the total number of acres affected or the total amount of sediment to be added to streams within a watershed—may demonstrate by itself that the environmental impact will be significant. Sometimes the total impact from a set of actions may be greater than the sum of the parts. For example, the addition of a small amount of sediment to a creek may have only a limited impact on salmon survival, or perhaps no impact at all. But the addition of a small amount here, a small amount there, and still more at another point could add up to something with a much greater impact, until there comes a point where even a marginal increase will mean that no salmon survive.").	**Comment Response 79-40 (continued):** The commenter cites to the attainment record for the Tongue River, Twelve Mile Dam to Mouth, but fails to mention this reach is over 100 miles downstream from the nearest coal mines at Decker, and that none of the reaches between the coal mines and the cited reach are listed as impaired for salinity. The assessment reports the probable sources of the salinity impairment as Streambank Modifications-destabilization, Impacts from Hydrostructure Flow Regulation-modification, Natural Sources, and Crop Production (Irrigated), therefore commentors' footnote editorial "DEQ does not know the cause of the salinity – though broad scale strip mining upstream cannot be ruled out" is incorrect. Strip mining is not listed as a probable cause of this impairment. Additionally, AM5 is not predicted to have any impacts on the Tongue River. Commenter's reference to impacts to the Powder River from "fossil fuel development" has no relevance to this EIS which evaluates impacts from a specific coal permitting action, primarily in the Rosebud Creek drainage. The Powder River is a separate watershed, which is distant from the Rosebud Creek watershed, and while both are tributary to the Yellowstone River, no direct, secondary, or cumulative impacts from AM5 are anticipated on the Yellowstone River.
79-41	The DEIS's statement that DEQ is unable to identify any impacts to surface water quality from the mine is disappointing. After nearly 50 years or oversight at the Rosebud Mine, DEQ claims to lack baseline data for comparisons: [113] Lambing & Ferreira, USGS, Variability in Base Streamflow and Water Quality of Streams and Springs in Otter and Rosebud Creek Basins, Southeastern Montana (1986) (Ex. 16). [114] Letter from Dan Erbes, DEQ, to OSM (1998) (Ex. 17); DEQ, Water Quality Standards Attainment Report, Tongue River, Twelve Mile Dam to Mouth (2020) (Ex. 19) (finding river impaired for salinity and in need of a TMDL, but since no TMDL has been prepared DEQ does not know the cause of the salinity—though the broad scale strip mining upstream cannot be ruled out). [115] Webb, M., et al., Pallid Sturgeon Basin-Wide Contaminants Assessment (2019), *available at* https://pubs.er.usgs.gov/publication/70211832 (Ex. 18). 44	**Comment Response 79-41:** Baseline data has been collected as required by MSUMRA for all Rosebud Mine permitting actions since the enactment of MSUMRA including AM5. Some mining in Areas A, B, D, and E occurred prior to enactment of MSUMRA monitoring and baseline data requirements. See also response to Comment 79-42.

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Com-ment	Document #79-Western Environmental Law Center	Response
	079 Surface water quality data for Areas A, B, C, D, and E were evaluated for changes in water quality that may have occurred before mining and during or after mining. For the most part, there were limited premine data to make such a comparison. In addition, changes in laboratory detection limits since the 1970s and early 1980s (pre-mining), as well as natural water quality variability, made it difficult to analyze changes in stream, spring, and pond water quality due to mining. Another variable for stream water quality was the suspended solids concentration, which is variable during runoff events and can affect metal concentrations in streams. The only documented difference in water quality occurred in Pond 917 in Area D, where nitrate+nitrite and selenium concentrations were sometimes higher during and after mining than when measured before mining began in Area D.[116]	**Comment Response 79-42:** Baseline data has been collected as required by MSUMRA for all Rosebud Mine permitting actions since the enactment of MSUMRA including AM5. Some mining in Areas A, B, D, and E occurred prior to enactment of MSUMRA monitoring and baseline data requirements. As the quoted portion of the DEIS states, the available data was evaluated to determine any possible mine impacts. As discussed, limited data, natural variability, changes in sampling methodology, and updated detection limits since the 1970s complicated this analysis. This is discussed in **EIS Section 3.5.3.2**. Commenter assumes that the lack of apparent changes in water quality is due to a failure in monitoring or analysis, when in fact the lack of apparent changes in water quality is most likely due to a lack of changes in water quality due to mining.
79-42	This statement is either a copout of epic proportions or a regulatory failure of epic proportions. The fundamental requirement of MSUMRA is that the regulatory authority not approve mining unless there is sufficient baseline information to detect impacts of mining. *See* Mont. Code Ann. § 82-4-222(1)(m) (prohibiting issuance of a permit "until hydrologic information on the general area prior to mining is made available from an appropriate federal or state agency. The permit may not be approved until the information is available and is incorporated into the application."). During the past fifty years DEQ has approved at least a dozen expansions of the Rosebud Mine and Big Sky Mine. And for each one, the agency is required by law to collect baseline information. Yet now after 50 years the agency purports to not have sufficient high quality baseline information to make any determination about whether strip-mining over 30,000 acres has affected water quality. But the agency purports to be able to identify one change in nitrate at a pond in Area D.[117] DEQ has failed the public on this point.	**Comment Response 79-43:** This quote is contained in a letter to OSMRE and refers to an increase in the TDS of the East Fork Alluvial Aquifer. The mechanism identified for the increase upstream of Colstrip was determined to be the capture and containment of fresh water (as precipitation and snowmelt) in mine ponds rather than discharge from mine spoil water seeping into the alluvial aquifer. As mining progresses and reclamation occurs, the containment of surface waters will be phased out and TDS impacts associated with containment will be eliminated. It should also be noted that the 2018 Water Quality Standards Attainment Record for EFAC headwaters to the mine shop area indicates that no data analysis could be located to support the information that is quoted in this letter to OSMRE. Additionally, the Rosebud Mine and DEQ reevaluated trends in salinity in EFAC in detail for the AM4 amendment in 2014. The results of this analysis using a larger dataset and including more recent data indicated that the conclusions presented in the 1998 letter were inaccurate. Therefore, DEQ has rejected this prior analysis based on more recent and more complete analysis.
79-43	In any event, it is hard not to think that DEQ has not been able to find any change in water quality because the agency is not looking. Numerous prior analyses by DEQ itself have identified impacts to surface water quality. Is the agency now rejecting its own prior analyses? For example, DEQ previous wrote that "A 40% [116] DEIS at 200. [117] DEQ previously identified this pond has having high boron concentrations, yet asserted that they were natural or potentially the result of power plant deposition. DEQ, AM4 CHIA at 9-23. 45	

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Com-ment	Document #79-Western Environmental Law Center	Response
79-44	079 increase in TDS in the alluvial aquifer observed upstream of Colstrip appears to be directly associated with mining activity."[118] And DEQ previously identified coal mining as the source of excessive conductivity and TDS in East Fork Armells.[119] In the CHIA for the AM4 expansion in Area B, DEQ identified dramatic spikes in chloride in East Fork Armells Creek, which were without question attributable to mine operations (namely use of dust suppressants):[120] [118] DEQ, Water Quality Standards Attainment Report, East Fork Armells Creek, Headwaters to Colstrip (2014) (Ex. 21). [119] DEQ, Water Quality Standards Attainment Report, East Fork Armells Creek, Colstrip to Mouth (2014) (Ex. 22). [120] DEQ, AM4 CHIA fil. 9-15. 46	**Comment Response 79-44:** See Coment Response 79-49 regarding AM5's impacts on EFAC. DEQ also continues to disagree with the assertions contained in this comment regarding EFAC, as expressed in the ongoing appeal of the AM4 permit action. S*ee In re Western Energy AM4 Amendment*, BER 2016-03 SM, Board Order (June 6, 2019) Findings of Fact ¶¶ 51; 56; 58; 71-72; 94; 96-103; 106; Conclusion of Law ¶ 35; *see also id.* at pp. 62-63; Appealed to District Court (DV 2019-34). MPDES permits include effluent limits, monitoring requirements and special conditions designed to protect the beneficial uses of the receiving water bodies. The MPDES permit conditions regulate pollutants of concern, including any associated with waterbody impairments and include effluent limits, monitoring requirements, and other special conditions. The AM4 CHIA did identify elevated concentrations of chloride in EFAC surface water and alluvium in the vicinity of the Area A facilities and surface water site SW-55, which was attributed to the use of magnesium chloride as a dust suppressant/de-icer. Other potential sources for elevated chloride include inputs from leakage of the power plant's ponds which contribute water to the alluvium near SW-55. Westmoreland no longer uses magnesium chloride on roads to prevent runoff of excess salts and chloride concentrations have decreased from previous highs. AM5 is not expected to impact the water quality in EFAC as nearly all proposed operations except for a portion of the haul road are located in the Rosebud Creek drainage.

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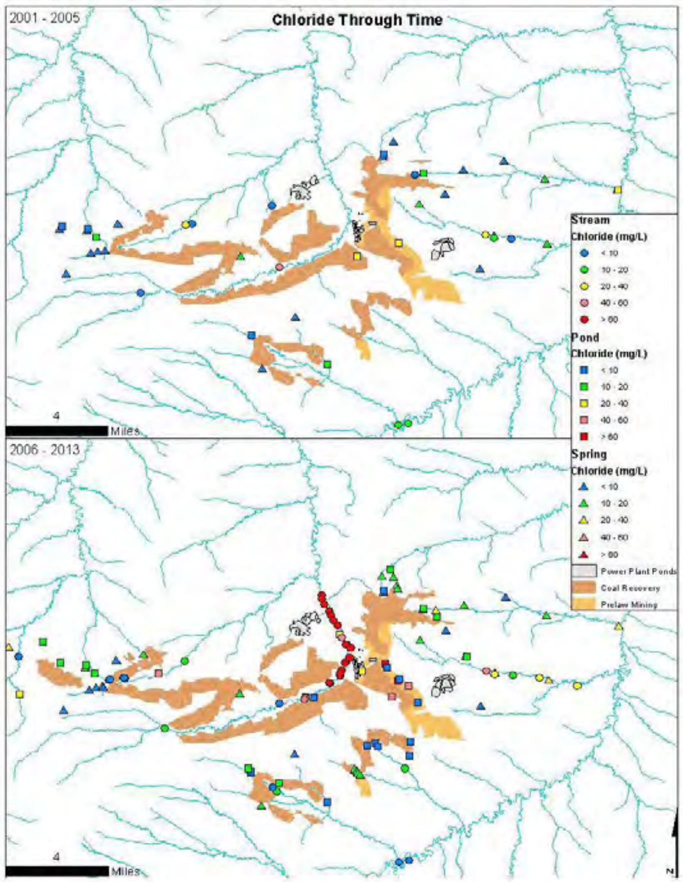
079



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Com-ment	Document #79-Western Environmental Law Center	Response
	079	
79-45	DEQ has similarly identified high nitrate concentrations in surface water downstream of mining potentially due to blasting agents.[121] While the elevated nitrate has not persisted in measurements in streams, that may simply be because drawdown from mining has caused ground water to flow away from the creek and to the mine pits (rather than the opposite). DEQ has also identified numerous exceedances for copper, aluminum, iron, sodium, magnesium, and manganese.[122]	**Comment Response 79-45:** See Comment Responses 79-44 and 79-49.
79-46	DEQ has also identified East Fork Armells Creek as impaired for a host of pollutants, including: iron, aluminum, specific conductivity, TDS, nitrate/nitrite, total nitrogen, total phosphorous, and habitat alterations.[123] While the agency purports to not know the source of all this pollution, this information should be included in the EIS and DEQ should endeavor to identify the sources of these exceedances. Further, as noted before, salinity has been increasing in Rosebud Creek downstream of mining. This is certainly relevant to this analysis.	**Comment Response 79-46:** See response to Comment 79-40 for discussion on salinity and Rosebud Creek. A discussion of the impacts to Rosebud Creek salinity from mining has been included in the **Water Resources – Surface Water** and – **Ground Water** sections.
79-47	Further, some DEQ scientists have noted that water chemistry in East Fork Armells is unlike any other, strongly indicating that coal mining and coal burning operations have significantly changed the chemistry of the stream: From this analysis, the department concludes that there are no reference sites (per Suplee *et al.*, 2005) that would make a reasonable geochemical comparison to EF Armells. This could be the result of chance alone, or it may be that EF Armells' base chemistry has been altered to such a degree by human activities that it no longer resembles any of the reference sites. Either way, we do not recommend proceeding with comparing these references sites' SC and TDS to EF Armells. Further, when retrospectively considering WF Armell's base water chemistry, the department also concludes that the WF Armells sites were not a particularly good comparison to EF Armells.[124] [121] DEQ, AM4 CHIA at 9-26. [122] *Id.* at 9-27. [123] DEQ, Water Quality Standards Attainment Record (2020), *available at* https://deq.mt.gov/Portals/112/Water/WQPB/CWAIC/Reports/2020/MT42K002_1 10.pdf. [124] DEQ Memo (July 27, 2018) (Ex. 23). 48	**Comment Response 79-47**: The Alternative 2 analysis area used in the EIS (see **Figure 44** in **EIS Section 3.5.1.2**) includes only the upper most portion of EFAC in a reach defined by ephemeral flow conditions. See also response to Comment 79-44 and 79-49.

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Com-ment	Document #79-Western Environmental Law Center	Response
79-48	079 It is hard to believe that the base chemistry of East Fork Armells Creek just happens to be utterly unique in Montana. It seems more likely that "EF Armells' base chemistry has been altered to such a degree by human activities." Further, it is also clear that mining may be the source of this unique or highly altered chemistry—as other potential sources proposed by the Coal Program were discounted:[125] Not sure an additional meeting is needed, but if the following does not clarify sufficiently, a meeting is fine. Regarding Martin's email, I believe I sufficiently addressed the key concerns we discussed Here is the concluding sentence Martin mentions below: **"From this analysis, the department concludes that there are no reference sites (per Suplee et al., 2005) that would make a reasonable geochemical comparison to EF Armells. This could be the result of chance alone, or it may be that EF Armells' base chemistry has been altered to such a degree by coal mining activity that it no longer resembles any of the reference sites."** Any plain read of this indicates that chance alone may be the reason the reference sites are not like EF Armells, or perhaps coal mining may have had an effect. Both reasonable conclusions, and neither has a bearing on the final outcome, which is, we have no reference sites we feel comfortable comparing to EF Armells. Also, per Martin's point about Castle Lake (aka Yellowstone River water), I pointed out that the cluster of points on EF Armells that are so similar to one another include sites both influenced and not influenced by Castle Lake water (paragraph 3). I checked the EF Armells site locations with the Monitoring staff on this point. In terms of this analysis, there is no pronounced effect of Castle Lake on the base chemistry signature of the water (otherwise, Castle Lake-influenced sites would probably have clustered someplace else in the diagram). I was told that EF Armells sites in the vicinity of Castle Lake have lower EC, but EC is not addressed here. Regarding the area on WF Armells above (upstream of) the Lebo Shale, I also pointed out that that issue pertains to the original study design of the Monitoring Section , not this analysis in response to a comment, and is irrelevant in this context. [125] DEQ Emails (June 2018) (Ex. 24). 49	**Comment Response 79-48:** This quotation provides the context for comment 79-49. See response to Comment 79-49.

Com-ment	Document #79-Western Environmental Law Center	Response
79-49	079 The completely unique chemistry of East Fork Armells Creek corresponds to the similarly unique and unhealthy assemblage of aquatic life in the creek. The FEIS should note to the public that the chemistry and aquatic life assemblages in the creek are unique.[126] The FEIS should also explain why this is either the result of pure chance or if it is the result of the pervasive industrial activity that has surrounded and polluted the creek for decades.	**Comment Response 79-49:** The Alternative 2 analysis area used in the EIS (see **Figure 44** in **EIS Section 3.5.1.2**) includes only the upper most portion of EFAC, in a reach defined by ephemeral flow conditions. Because AM5 disturbance within the EFAC watershed under Alternative 2 is limited to 125 acres of haul road with sediment ponds and traps that would only temporarily detain flow, it is expected that impacts on these surface water resources would not be measurable. No additional water quality impacts to EFAC are expected. Under Alternative 3, there would be even less disturbance within the EFAC watershed (see **Appendix E**). See also responses to Comments 79-43, 79-44, and 79-45.
79-50	The DEIS also inexplicably waters down language from the Area F FEIS regarding monitoring information about violations. The Area F FEIS states: In addition, an evaluation of several decades of spoil water quality data from Permit Areas A and B of the Rosebud Mine shows that in a number of wells concentrations of the following parameters have increased over time: TDS, sulfate, carbonate alkalinity, total alkalinity, chloride, dissolved iron, and dissolved manganese. After nearly 40 years of monitoring, there is no clear indication that TDS concentrations in the spoil have reached equilibrium or have shown decreases. Possible adverse effects of discharges from spoil on the water quality of down slope streams may increase over time. It is not known how long it would take for the quality of water in spoil to eventually improve as soluble salts and metals are flushed from the system. Based on spoil water quality presented in **Section 4.8, Water Resources – Ground Water,** TDS, sulfate, alkalinity, calcium, sodium, nitrate+nitrite, magnesium, and manganese concentrations in streams below the spoil may increase and exceed nitrate+nitrite and total nitrogen standards, and recommended limits for the other parameters for livestock, other ruminants, and aquatic life when and where ground water discharge is the major or only source of water to streams.[127] The DEIS for AM5 paste and alters this language as follows: [126] Sullivan & Bollman, Rhithron Associates, A Re-evaluation of 2014 biological data from East Fork Armells Creek (2014) (Ex. 25); Expert Report of Sean Sullivan, M.S. (Ex. 26); Supplemental Expert Report of Sean Sullivan (Ex. 27). [127] OSM & DEQ, Area F FEIS at 521. 50	**Comment Response 79-50:** This comment pertaining to the Area F Final EIS analysis provides the context for comment 79-51. See response to Comment 79-51.

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	079	
	In addition, an evaluation of several decades of spoil water quality data from Areas A, B, and C of the Rosebud Mine indicate the potential for spoil exceedances of water quality standards would be low, although some spatial and temporal variability would be expected. After nearly 40 years of monitoring, there is no clear indication that TDS concentrations in the spoil have reached equilibrium or have shown decreases. It is not known how long it would take for the quality of water in spoil to improve as soluble salts and metals are flushed from the system. Based on spoil water quality presented in **Section 3.6, Water Resources – Ground Water**, TDS, sulfate, calcium, sodium, magnesium, and manganese concentrations in spoil may exceed recommended limits for livestock, other ruminants, and aquatic life; however, these parameters also exceeded these recommended limits in pre-mining ground water. If ground water discharge from spoil was the major or only source of water to a stream, surface water may also exceed these recommended limits; this scenario was not identified as a probable hydrologic consequence (Application Appendix O).[128]	
79-51	Thus, DEQ now revises its analysis from the Area F FEIS to state that "potential for spoil exceedances of water quality standards would be low." This statement is unsupported. Similarly, DEQ now adds to its analysis that exceedances of standards "was not identified as a probable hydrologic consequence" by the mining company. Again, as with the numerous prior instances, DEQ seems to be amending its analysis to support the desires of WRM. This is troubling and suggests a degree of regulatory capture. This conclusion is reinforced by the fact that members of the EIS consultant team are also paid experts for WRM in ongoing litigation.[129] DEQ needs to be an independent regulator.	**Comment Response 79-51:** The quoted AM5 reference is from Surface Water **Section 3.5.3.2** of the EIS. Ground Water **Section 3.6.3.2** of the EIS provides the analysis for ground water impacts and the resulting quantitative impact to Rosebud Creek surface water from the Proposed Action (see response to Comment 79-33). The pertinent change in the analysis is that the AM5 analysis notes that potential analytes that may exceed recommended limits were also exceeded in pre-mining ground water, which provides the context as to why it was not identified as a probable hydrologic consequence.
79-52	DEQ also refusal to recognize intermittent to perennial stream reaches is similarly disappointing. The DEIS identifies 36 springs, but only has baseline monitoring for less than one-third (this demonstrates the agency's ongoing failure to obtain necessary baseline information). DEIS at 144. Even though multiple spring occur [128] DEIS at 202. [129] Krish Vijayaraghavan is a member of the consulting team. DEIS at 431. He is also submitting declarations on behalf of WRM in litigation. Vijayaraghavan Declaration (Ex. 28). 51	**Comment Response 79-52:** Final EIS text was revised to state: "Water quality results from the past 10 years are available for one surface water monitoring site located in a wetland along Richard Coulee (SW-302) and two surface water monitoring sites located on Rosebud Creek (SW-304 and SW-305)." See response to Comment 79-54 regarding baseline data for monitored springs. Springs and seeps do not necessarily represent stream flow. The definitions of intermittent stream and perennial stream are contained in 82-4-203(29) and (40), MCA, and ARM 17.24.301(61) and (84). Whether or not a stream is sourced by groundwater is immaterial to whether a stream is perennial or intermittent, but rather by its adherence to those definitions. DEQ will evaluate the regulatory status of streams with regard to MSUMRA requirements, and pursuant to ARM 17.24.651 preclude mining within 100 feet of any stream determined to be intermittent or perennial, or any stream reach containing a biological community as defined in ARM 17.24.651(3). As described in the Final EIS, DEQ's predecessor, the Department of State Lands, determined the wet reach of Lee Coulee to be intermittent during permitting of the Big Sky Mine Area B in the 1980s. Additional data, analysis, and conclusions regarding the regulatory status of these streams will be included in DEQ's written findings and CHIA.

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Com-ment	Document #79-Western Environmental Law Center	Response
79-52 cont.	079 in stream channels and the springs are described as being sourced from the alluvium, DEQ refuses to recognize these intermittent reaches of Richard Coulee and Lee Coulee. DEIS at 145-47. DEQ's description of these reaches as "nonephemeral" is puzzling. DEIS at 162. It appears that the agency is attempting to create new category of stream that is not entitled to legal protections. This is unlawful. If a stream or a stream reach has water sourced groundwater (like the alluvial springs and seeps described in the DEIS), those reaches are intermittent or perennial. ARM 17.24.301(61), (84). That is how OSM and DEQ described these reaches in the Area F FEIS.[130] While DEQ previously clashed with OSM about whether to describe ground water fed reaches of headwater streams as intermittent to perennial, the agency did ultimately agree not to classify them as ephemeral.[131] What basis does DEQ have for departing from its prior practice? It is certain that WRM advocates for classification of these stream reaches as ephemeral in order to avoid regulation under both the CWA (ARM 17.30.637(4)), and MSUMRA (ARM 17.24.651), but DEQ cannot share that motivation. In any event, it appears from the DEIS that both Richard Coulee, tributaries of Richard Coulee, and Lee Coulee have intermittent and/or perennial stream reaches, which must be protected and buffered from mining. ARM 17.24.651.	
79-53	Please provide all photos, videos, and other assessments of flow in Richard Coulee, Lee Coulee, and tributaries with identified "alluvial springs" in the stream channel.	**Comment Response 79-53:** Relevant baseline data are part of the permit application and fulfill the requirements of ARM 17.24.304. Application documents are available to the public here: http://svc.mt.gov/deq/myCOALPublic/. Any other supporting documentation can be requested by the public from the DEQ Coal Program. Instructions for records request are provided here: http://deq.mt.gov/Public/ea/coal.
79-54	Furthermore, noting the need for baseline information, please include in the FEIS information about each of the 36 springs identified in the project area. Please include also information about the sources of these springs.	**Comment Response 79-54:** Springs in the analysis area are discussed in **Section 3.5.2.4** and **Section 3.5.2.5**, which include baseline data for 11 monitored springs. The monitored springs were selected in coordination with DEQ to include the most productive springs nearest to the proposed mining. Monitoring data collected for these springs are expected to be representative of the quality and flow of all springs in the project area because they include all of the possible sources of water to springs in the area. The uses of these springs are described in the EIS. See also response to Comment 79-53.
79-55	The Conservation Groups further incorporate by reference their comments on DEQ's completeness determination, as all concerns identified in those comments remain relevant.[132] In particular the following discussion of hydrologic impacts deserves particular attention: [130] OSM & DEQ, Area F FEIS at 211 to 213 (describing similar ground water fed stream reaches as intermittent to perennial); *id.* at 511 (describing streams at intermittent). [131] Emails between DEQ and OSM (Oct. 2018) (Ex. 29). [132] Comment Letter from WELC to DEQ (July 19, 2017) (Ex. 30). 52	**Comment Response 79-55:** See responses to Comments 79-37, 79-43 and 79-45. regarding comments associated with 'cumulative hydrologic impacts.' See responses to Comments 79-43, 79-44, 79-45, and 79-49 regarding comments associated with EFAC water quality. AM5 would not contribute additional TDS to the EFAC drainage through groundwater. Runoff from the small additional area of surface disturbance would be controlled by existing sediment control ponds. **Comment Response 79-55 continues on next page.**

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79-55 cont.	079 Montana Code Annotated § 82-4-227(3)(a) and ARM 17.24.405(6)(c) prohibit DEQ from approving a coal mining permit until DEQ determines and the applicant affirmatively demonstrates that the "cumulative hydrologic impacts" of mining will not cause material damage to the hydrologic balance. Material damage, by definition, includes violation of water quality standards. § 82-4-203(31), MCA. Here, DEQ cannot make the required affirmative demonstration. First, as noted, DEQ's own Water Quality Bureau has determined that East Fork Armells Creek is not meeting water quality standards and that "coal mining" is one potential cause. The available information supports this conclusion: recent evaluations of aquatic life in the stream indicate an impaired stream and no available evidence shows that mining is not at least partially responsible for these impacts.[133] DEQ's hydrologists have documented "an increase in EC, sulfates, and chlorides" in East Fork Armells Creek coincident with mining operations.[134] And WECo's own expert has determined that mining operations are going to cause a 13 percent increase in salinity in East Fork Armells Creek[135]—and independent, unbiased assessments have concluded that the figure is closer to 20 percent.[136] To summarize, the Water Protection Bureau has determined that the stream is impaired for "salinity/TDS/chlorides," and DEQ's and WECo's hydrologists have concluded that mining has caused and will cause increases in salinity, TDS, and chlorides (and sulfates). Thus, there has been no "affirmative demonstration" that the mine will not cause material damage, but rather that it is already causing such damage and that additional such damage will occur if mining continues. Indeed, it is clear that DEQ itself has [133] Expert Reports of Sean Sullivan and Payton Gardner, Ph.D. [134] Decl. of Emily Hinz, DEQ, ¶ 53. [135] Nicklin Earth & Water, Addendum to the Comprehensive Evaluation of Probable Hydrologic Consequences Areas A, B, and C Western Energy Rosebud Mine at 4 (2015) ("The best projection that can be made at this time is that, in the long term, the average TDS concentrations in the alluvium and stream would have a net increase of about 13 percent over baseline concentrations."). [136] *See* Gardner Report. 53	**Comment Response 79-55 (continued):** See responses to Comments 79-43, 79-44, 79-45, and 79-49 regarding comments associated with EFAC water quality. Additionally, under Alternative 2, AM5 is not expected to impact the water quality in EFAC as nearly all proposed operations except for a portion of the haul road are located in the Rosebud Creek drainage. Under Alternative 3, almost no disturbance would occur in the EFAC drainage and there are no expected additional water quality impacts on that watershed. The 2020 attainment record for Lower EFAC (MT42K002_110) does not list an impairment for salinity or chlorides.

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79-55 cont.	079 determined, albeit in behind-closed-doors meetings with Western Energy Company (WECo), that the mine is causing material damage outside the permit area.[137] In addition to the evidence indicating that pollution from the mine is causing violations of water quality standards, there is also abundant evidence that WECo's dewatering of the Rosebud aquifer (as well as overlying strata) has completely dewatered portions of East Fork Armells Creek and has reduced flows throughout the entire basin. DEQ's prior cumulative hydrologic impact assessments for the Rosebud Mine indicated that East Fork Armells Creek was intermittent for long stretches upstream of Colstrip, between Area B and Area C of the mine.[138] In its recent CHIA for Area B AM4, DEQ noted that these previously intermittent areas are now ephemeral and no longer receive groundwater discharge from the Rosebud Coal aquifer, which WECo has removed: "Two sections of upper EFAC (a reach in T1N R40E Section 8 and a reach in T1N R40E Section 15) were identified in the middle 1980s as possessing intermittent to perennial flow, and both of these reaches are currently observed as being ephemeral."[139] Continued removal of the Rosebud Coal aquifer will only cumulatively worsen the dewatering of East Fork Armells Creek, further preventing the creek [137] From Dicki Peterson, WECo, to Daniel Munoz, WECo, Meeting Notes (June 13, 2014) (summarizing call between DEQ and WECo's counsel that DEQ is "concerned there is material damage off the mine site and what mitigation would be used if necessary"). [138] Mont. Dep't of State Lands, Cumulative Hydrologic Impact Assessment, Rosebud Area B Amendment (1995) ("Two adjacent intermittent flow reaches have been described in EFAC, beginning near the west end of the amendment area (NW1/4 section 15, T1N, R40E) and continuing two miles downstream to SE1/4 section 10 (T1N, R40E)"); Mont. Dep't of State Lands, US Office of Surface Mining, Final EIS, Western Energy Company's Rosebud Mine Area C, Block 1, at II-28 to II-35 (1982) (describing intermittent to perennial stream flow in East Fork Armells Creek upstream of Colstrip). [139] DEQ, CHIA AM4 at 9-9. 54	**Comment Response 79-55 (continued):** Alternative 2 impacts to water resources and water rights in the analysis area are described in **EIS Sections 3.5.3, Surface Water; 3.6.3, Ground Water;** and **3.7.3, Water Rights**. Because AM5 disturbance within the EFAC watershed is limited in Alternative 2 to 125 acres of haul road with sediment ponds and traps that would only temporarily detain flow, it is expected that impacts on these surface water resources would not be measurable. See also responses to Comments 79-43, 79-44, 79-45, and 79-49. Alternative 3 impacts to water resources and water rights are described in **Appendix E, Sections 1.4.5, Surface Water; 1.4.6, Ground Water;** and **1.4.7, Water Rights.** Surface water hydrology is discussed in **EIS Section 3.5.2.4,** which describes the flow characteristics of the streams in the analysis area. **EIS Section 3.5.3.2** discusses Alternative 2 impacts to surface water hydrology and **EIS Section 3.6.3.2** discusses Alternative 2 impacts to ground water quantity; see **Appendix E** for a discussion of these impacts under Alternative 3. As noted in **EIS Section 3.5.2.4**, surface water quantity is combination of surface water runoff and discharges from ground water. As noted in **EIS Section 3.6.3.2**, ground water contributions to surface water would be impacted under Alternative 2 during mining and until ground water levels recover following mining; similar impacts are described for Alternative 3 in **Appendix E, Section 1.4.6.1**. The replacement of the Rosebud Coal aquifer with spoil would temporarily reduce ground water quantity and its contribution to surface water flow during mining but once ground water levels recover following mining, discharges to surface water would recover. Similarly, as noted in **EIS Section 3.5.3.2** for Alternative 2, during mining surface runoff to streams would be captured and until watershed topography and hydrology are reclaimed to conditions similar to pre-mine conditions, reductions in surface water quantity would occur during mining. Changes to site hydrology in the analysis area would continue throughout the Project area during mining and reclamation until sedimentation ponds are removed during the reclamation process and the watershed topography and hydrology are reclaimed to conditions similar to pre-mine conditions; see **Appendix E, Section 1.4.5.3** for discussion of Alternative 3.

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79-55 cont.	079 from attaining water quality standards.[140] *See PUD No. 1 of Jefferson Cty. v. Washington Dep't of Ecology*, 511 U.S. 700, 719 (1994) ("Petitioners also assert more generally that the Clean Water Act is only concerned with water 'quality,' and does not allow the regulation of water 'quantity.' This is an artificial distinction. In many cases, water quantity is closely related to water quality; a sufficient lowering of the water quantity in a body of water could destroy all of its designated uses, be it for drinking water, recreation, navigation or, as here, as a fishery. In any event, there is recognition in the Clean Water Act itself that reduced stream flow, i.e., diminishment of water quantity, can constitute water pollution."). DEQ must determine whether there is evidence that affirmatively demonstrates that continued strip-mining of the Rosebud Coal aquifer will not lead to further violation of water quality standards in East Fork Armells Creek. The State's prior analyses also cast significant doubt on WECo's ability to strip-mine thousands of acres of tributary streams of Rosebud Creek without causing violations of water quality standards in that creek. Rosebud Creek is protected by stringent water quality standards limiting increased salinity in the creek. ARM 17.30.670(4). WECo's probable hydrologic consequences report indicates that existing conditions in the impacted Rosebud Creek tributaries do not meet numeric EC standards.[141] WECo also admits that mining operations will cause increases in salinity (which is measured by EC) in the spoils and impacted stream systems.[142] This is consistent with the State's prior predictions. In its cumulative hydrologic impact assessment for the adjacent Big Sky Mine Area B, the State concluded that mining operations would increase salinity in both the Lee Coulee alluvium and the alluvium of Rosebud Creek: The probable hydrologic impacts to the surface water system within the permit area are summarized above. Minor impacts are predicted for the [140] *See* Gardner Report; Sullivan Report. [141] *See* PHC at 68. [142] *Id.* at 62 (13 percent increase in salinity). 55	**Comment Response 79-55 (continued):** See response to Comment 79-38, 79-39, and 79-40 regarding comments associated with Rosebud Creek water quality. Regarding predictions of increases in TDS in spoil from the 1988 Big Sky Area B Written Findings and EIS, 30 years of monitoring of spoil groundwater which has occurred since that time has resulted in better estimates of the expected increases in TDS in spoil after mining. See Application Appendix O, Section 4.4.6. As noted, DEQ will evaluate the cumulative impacts of mining in the CHIA as required by MSUMRA and record its permitting decision in the Written Findings.

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79-55 cont.	079 surface water system outside the permit area. This includes an approximate 2 percent increase in TDS at the mouth of Rosebud Creek (based on average annual flow) which could be somewhat higher during low flow months or years. [A]verage TDS increase in the spoil aquifer is predicted to be 2.3 times the pre-mine values, at a maximum, for the disturbed aquifers. The impact to the Rosebud Creek alluvial aquifer outside the permit area is predicted to be an 11 percent rise in TDS. This increase in TDS may affect land management practices, or cause impacts outside the permit area where the local water table is very near to the surface . . . .[143] Given these prior analyses, it seems highly likely that the proposed large expansion of strip mining in Richard Coulee and Lee Coulee will lead to increased EC levels in the alluvium of both tributaries, as well as the alluvium of Rosebud Creek. This is particularly the case given that prior studies of the migration of pollution from mining at the Big Sky Mine found that salinity pollution did not attenuate as it moved through unmined portions of coal away from the mine site.[144] Unless WECo can affirmatively demonstrate that it will not cause an increase in salinity in the alluvium of these creeks, then DEQ may not issue a permit for the AM5 Amendment without violating § 82-4-227(3) and ARM 17.24.405(6)(c). DEQ must also acknowledge that mining will harm the communities of aquatic life in the intermittent sections of Richard and Lee Coulees. In its cumulative hydrologic impact assessment for the AM4 Amendment, the DEQ acknowledged that aquatic life was reduced concomitant to mining operations: "Taxa richness declined coincident with increased [143] Mont. Dep't of State Lands, Written Findings for Big Sky Mine Lee Coulee, Area B (1988); *accord* Mont. Dep't of State Lands, Final Environmental Impact Statement Peabody Big Sky Mine—Area B, Rosebud County, Montana (1988). [144] David W. Clark, USGS, Geochemical Processes in Ground Water Resulting from Surface Mining at the Big Sky and West Decker Mine Areas, Southeastern Montana 41 (1995). 56	**Comment Response 79-55 (continued):** Alternative 2 impacts to aquatic life are discussed in **EIS Section 3.10.3.2**; Alternative 3 impacts are described in **Appendix E, Section 1.4.10**. See also response to Comment 79-49.

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Com-ment	Document #79-Western Environmental Law Center	Response
79-55 cont.	079 mining activities in the drainage."[145] DEQ must assess whether the impacts to aquatic life identified in Lee Coulee are likely to be repeated with additional mining in Lee Coulee and Richard Coulee. .... By law DEQ may not approve a mine expansion unless it possesses adequate baseline information from which to measure impacts. § 82-4-222(1)(m). Yet it has been a refrain of both DEQ and the coal industry that it is impossible to discern the impacts of mining operations due to inadequate baseline information. For example, in its cumulative hydrologic impact assessment for the AM4 Amendment to the Area B permit, DEQ asserted that it was unable to assess whether mining had in fact dewatered portions of East Fork Armells Creek due to lack of baseline monitoring and that it was unable to assess impacts to aquatic life due to inadequate baseline monitoring.[146] WECo admits in its probable hydrological consequences report that it possesses insufficient baseline information about flows in Richard Coulee and that further monitoring is required: "This site has experienced ice accumulation in the flume, flume damage from flow events, and flume equipment issues. As such, the reliability of the data should be generally qualified as uncertain until a longer period of sustained operation is established."[147] Flow information is critical, for without such information it is impossible for DEQ or the public to show with certainty that impacts have occurred, as DEQ asserted with respect to dewatering of East Fork Armells Creek. Accordingly, DEQ must not approve this permit until such "longer period" of "sustained" monitoring provides reliable flow data. ... ARM 17.24.651 provides: [145] DEQ, CHIA AM4 at 9-12. [146] DEQ, CHIA AM4 at 9-8, 9-10 (2015). [147] PHC at 65. 57	**Comment Response 79-55 (continued):** See response to Comment 79-53. Regarding data from Richard Coulee monitoring locations, DEQ also noted the data quality issues commentor referenced in their 2017 comment letter and required additional data be collected. Baseline data at these sites continues to be collected to this day and the data is sufficient to identify, in detail, the seasonal variations in water quantity and quality.

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Com-ment	Document #79-Western Environmental Law Center	Response
79-55 cont.	079 (1) No land within 100 feet of a perennial stream or intermittent stream or a stream reach with a biological community determined according to (3) may be disturbed by strip or underground mining operations, nor may the stream itself be disturbed, except as approved in accordance with ARM 17.24.634 through 17.24.637 and 17.24.751, upon finding by the department that: (a) the original stream function will be restored in accordance with ARM 17.24.634 and 17.24.751; and (b) during and after the mining, the water quantity and quality and other environmental resources of the stream and the lands within 100 feet of the stream will not be adversely affected. (2) Any area not to be disturbed must be designated a buffer zone and marked as specified in ARM 17.24.524. (3) A stream with a biological community is determined by the existence in the stream of an assemblage of two or more species of fish, amphibians, arthropods or mollusk that are: (a) adapted to flowing water for all or part of their life cycle; (b) dependent upon a flowing water habitat; (c) reproducing or can reasonably be expected to reproduce in the water body where they are found; and (d) these species must be longer than two millimeters at some stage of their life cycle spent in the flowing water habitat. Further, an intermittent stream is defined as a stream that is below the local water table for a portion of the year and receives "its flow from both surface runoff and ground water discharge." ARM 17.24.301(61). It is clear from the PHC that portions of Richard Coulee and Lee Coulee meet this definition of intermittent. While it is not entirely clear from available maps, DEQ must assure that no mining operations, as defined by the Surface Mining Control and Reclamation Act, may occur in or affect these segments of these streams. 58	**Comment Response 79-55 (continued):** See response to Comment 79-47 intermittent streams. The majority of Lee Coulee and Richard Coulee are not intermittent or perennial streams but rather are ephemeral streams with localized palustrine emergent wetland areas, as described in Westmoreland's Application Appendix E and summarized in Table 1. These wetland areas include a combination of flat bottoms, small depressions in the landscape, and areas influenced by springs or stock ponds; they do not contain the biological community described in ARM 17.24.651(3). Additionally, ARM 17.24.651 allows for exceptions pursuant to findings by the department as stated in the ARM. As described above and in the Final EIS, DEQ's predecessor, the Department of State Lands, determined the wet reach of Lee Coulee to be intermittent during permitting of the Big Sky Mine Area B in the 1980s.

Com-ment	Document #79-Western Environmental Law Center	Response
79-56	079 **V. The DEQ Must Address Black Lung Disease and Other Health Problems** The DEIS does not discuss the harmful impacts of coal mining on workers. The Area F FEIS notes that "Studies indicate that individuals and communities located near coal mines do not have increased incidence of asthma (Pless-Mulloli et al. 2000; Pless-Mulloli et al. 2001) but may be at a greater risk for cancer and other chronic illnesses (Jenkins et al. 2013; Hendryx and Ahern 2008)."[148] That document also indicated that lung cancer rates are elevated in Colstrip.[149] Please provide a detailed baseline of human health conditions in Colstrip and Lame Deer and the surrounding areas. Please detail and disclose how twenty more years of air pollution, water pollution, hazardous waste, and coal dust will affect these community health conditions. In particular, has there been any analysis of black lung for miners and for people in the community? In general, the FEIS has virtually no information about community health. Please correct this.	**Comment Response 79-56:** DEQ does not as an entity regulate private businesses relative to workplace health exposures. Most private businesses are covered by the Occupational Safety and Health Administration, and mine operations of course are covered by the Mine Safety and Health Administration (MSHA). MSHA works to prevent death, illness, and injury from mining and promote safe and healthful workplaces for U.S. miners. This would include making sure the appropriate safeguards are in place including personal protective equipment relative to coal mine dust and the resulting chronic Black Lung Disease. DEQ as part of the EIS analysis would not deny a permit based on facility conditions within the fence line but would be evaluating ambient air where the public would be exposed to such pollutants as particulate matter. See Comment Responses 77-7, 79-11, and 79-27. If the particulates emitted from Western Energy exceed the NAAQS/MAAQS beyond the fence line, DEQ would not issue an air quality permit without additional restrictions to provide concentrations below the primary and secondary standards for the NAAQS/MAAQS.
79-57	**VI. The DEIS Must Detail a Closure Plan** Please include a plan for ultimate close of the mine and power plant. This should best be included in a detailed discussion of a transition alternative. What is imperative is that Montana taxpayers not get saddled with another superfund site.	**Comment Response 79-57:** As required by MSUMRA, Westmoreland Rosebud has an approved reclamation plan for each of its permit areas. Westmoreland Rosebud will reclaim all mining-related land disturbances to a use equal to or better than what existed before mining as required in 82-4-231 and 82-4-232, MCA. A comprehensive closure plan for the Rosebud Mine is not required by statute or rule and is beyond the scope of this EIS. Similarly, the Colstrip Power Plant is not owned by Westmoreland Rosebud, continued operations of the power plant are not a connected action (see response to Comment 77-3 and 79-18), and any analysis of potential closure of the power plant would be beyond the scope of this EIS.
79-58	**VII. The DEIS Must Address Coal Waste McKay Coal** The DEIS asserts that the mine cannot mine McKay Coal. However, the Big Sky Mine mined coal from that seam (though it did eventually stop).[150] The DEIS asserts that the interburden is only a "few feet" in some locations.[151] While this coal may not be suitable for Units 3 and 4, there must be an appropriate evaluation before DEQ can allow this coal to be unmined (as that may reduce the size of the mine). Please provide an analysis that the McKay seam cannot be economically mined. ARM 17.24.322. [148] OSM & DEQ, Area F FEIS at 179. [149] *Id.* at 184. [150] OSM & DSL, Big Sky Mine Area B FEIS at II-20. [151] DEIS at 119. 59	**Comment Response 79-58:** Mining of the McKay Coal is not part of the Proposed Action evaluated (**EIS Section 2.4.3**). Reasons for not mining the McKay Coal are discussed in **EIS Section 3.4.3, Coal Recovery**.

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Com-ment	Document #79-Western Environmental Law Center	Response
79-59 79-60	079 **VIII. The DEIS Must Fully Evaluate Impacts to Threatened, Endangered, and Sensitive Species** The DEIS discounts the area as potential occupied habitat for Sage Grouse.[152] DEQ's predecessor, however, identified Sage Grouse in the Colstrip Area.[153] A comment letter from the U.S. Fish and Wildlife Service stated that Sage Grouse are "common" in the area.[154] If Sage Grouse were once common in the area, but have not been observed in decades, why has this happened? Is it a result of disturbance from mining activites? Further, if Sage Grouse were once present in the Colstrip area, it is unlikely that they will return post-mining given that it does not appear that any sagebrush habitat has been reclaimed at the mine in 50 years. It appears that such reclamation is extremely difficult, if not effectively impossible.[155] If any sagebrush habitat has been reclaimed at any portion of the Rosebud Mine, please provide that information. The concern about the potential for reclamation is further supported by statements in the Area F FEIS, which noted that Peabody has never succeeded in reclaiming the flowing reach of Lee Coulee, which does not flow but drains into the spoils.[156] [152] DEIS at 313-14. [153] DSL, EIS on the Proposed Montana Power Company Electrical Generating Plant at Colstrip, Montana at A-16 (1973). [154] *Id.* (comment letter from U.S. FWS at 2). [155] Report of Clait Braun, Ph.D. (Ex. 31); Emails from OSM (2016) ("What I am attempting to point out is that from the photos that I see of this mine, overtime not much of the defined reclamation process actually appears to have taken place in any of the initial areas of A, B, or C. These pits all remain open with little evidence in the backfilled spoil that significant amounts of grading has taken place, nor can I see evidence that any seeding has been done to the extent it is successful and visible from photographs. There are vast areas in all of the open pits where the dragline arcs remain very prominent. My concern is that what is proposed in Area F will again undergo the extremely slow reclamation process I see exists now at this mining operation. Granted there is blending from the various pits, but miles of open pits w/ little evidence of focused reclamation disturbs me. I'd like to see this new area begin with a serious attempt at more contemporaneous reclamation.") (Ex. 32). [156] OSM & DEQ, Area F FEIS at 517. 60	**Comment Response 79-59: EIS Section 3.10.3.2** outlines general habitat, lek abundance and core habitat in the analysis area. No core habitat, or active leks have been documented in the analysis area. However, general habitat does occur in the Analysis area. In accordance with the Montana System Habitat Quantification Tool for Greater Sage Grouse (HQT) Western Energy calculated approximate 3,137.72 functional acres of general greater sage-grouse would be lost due to impacts of the Project (Alternative 2). Western Energy elected to make a financial contribution to the greater-sage grouse Stewardship account, which is consistent with mitigation under Executive Order 12-2015. **EIS Section 2.4.9.3, Greater Sage-Grouse Compensatory Mitigation** in **Appendix C** contains details on Greater Sage Grouse Mitigation. Answers to questions regarding sage grouse regional declines and the reasoning as to why such declines have occurred would be speculative. It is unknown as to whether mining, or other environmental factors are the reason for such declines. Commenter's statement that sagebrush habitat has not been reclaimed at the Rosebud Mine is false. Reclamation at the mine is progressing toward meeting the targets set forth in the reclamation plan and established in Table 313-2b. These dictate that sagebrush communities will make up 17% of reclamation. Evidence of this progress can be found in annual revegetation monitoring reports submitted as part of the Annual Mine Reports. **Comment Response 79-60:** The Area F Final EIS stated that where topography was flat, surface flow may infiltrate into the spoil. As noted, this was observed once, at the Big Sky Mine Area B, and should not be construed to represent the predominant or even likely outcome. Surface water runoff from and flow through reclaimed areas has been observed and/or documented in many other reclaimed drainages, including other drainages at the Big Sky Mine Area B. Alternative 2 impacts to surface water flow are described in **EIS Section 3.5.3.2**, including the possibility that flows may be reduced in areas with low slopes due to infiltration; Alternative 3 impacts are described in **Appendix E, Section 1.4.5.3**.

Com-ment	Document #79-Western Environmental Law Center	Response
	079	
79-61	As noted above, DEQ must assess the impacts of water withdrawals on pallid sturgeon. DEQ must also assess the cumulative impacts of mining pollution on pallid sturgeon in the Yellowstone River, as it appears that this is a significant threat to this critically endangered heritage species.[157]	**Comment Response 79-61**: See comment response 79-23 and 79-24. The focus of the EIS is for the impacts of the Area B AM5 expansion. The analysis of impacts to a species which have not been observed locally, or within the applicable assessment unit is out of scope.
	IX. Please Highlight All Changes to Facilitate Public Review of the FEIS.	
79-62	In addition to the foregoing comments, the Conservation Groups request that DEQ highlight any changes in the DEIS so the public can see how the agency has responded to our concerns and so the public can easily identify changes in the final document.	**Comment Response 79-62: Section 1.2.2, Revisions to the EIS**, has been added to the Final EIS. Key changes between the Draft and Final EIS are summarized and highlighted in the section. Also, in this appendix, Appendix D – Responses to Comments, DEQ has indicated if any of the EIS text was revised to address a public comment.
	X. Conclusion	
79-63	In sum, the Conservation Groups urge DEQ to either select the no action alternative or, better, a just transition alternative that will be detailed in the final EIS.	**Comment Response 79-63:** Opposition to the Proposed Action is noted. See responses to comment 77-4 and 79-13.
79-64	All the evidence demonstrates that continued operations of the strip-mine and power plant are not economically viable (absent significant public subsidies) and not environmentally or socially acceptable. The state owes it to the communities of Lame Deer and Colstrip to lay out a just transition from coal.	**Comment Response 79-64:** See responses to comment 77-4 and 79-13.
	Respectfully, <u>/s/ Shiloh Hernandez</u> Shiloh Hernandez Western Environmental Law Center 103 Reeder's Alley Helena, MT 59601 hernandez@westernlaw.org *On behalf of MEIC and Sierra Club*	
	[157] Webb, M., et al., Pallid Sturgeon Basin-Wide Contaminants Assessment (2019), *available at* https://pubs.er.usgs.gov/publication/70211832.	
	61	

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Com-ment	Document #80-New York University School of Law Institute for Policy Integrity	Response
80-1	080 Institute *for* Policy Integrity NEW YORK UNIVERSITY SCHOOL OF LAW November 23, 2020 **To**: Montana Department of Environmental Quality **Subject**: Comments on Greenhouse Gas Emissions and Social Cost of Carbon in Draft Environmental Impact Statement for Area B at the Rosebud Mine The Institute for Policy Integrity at New York University School of Law ("Policy Integrity")[1] respectfully submits the following comments on the Montana Department of Environmental Quality's (the "Department") Draft Environmental Impact Statement for the proposed fifth amendment to the operating permit for Area B at the Rosebud Mine (the "Proposed Amendment").[2] Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decision-making through advocacy and scholarship in the fields of administrative law, economics, and public policy. We regularly submit comments to and testify before federal and state agencies on the assessment of climate impacts in administrative determinations, including through use of the Social Cost of Carbon.[3] The Proposed Amendment would add over 9,000 acres to the permit area and extend the life of the Rosebud Mine by seven years.[4] Because the release of carbon dioxide into the atmosphere is a natural consequence of coal extraction and combustion, the Proposed Amendment would lead to considerable emissions of this greenhouse gas. As carbon dioxide traps heat and thereby warms the Earth's atmosphere, the Proposed Amendment would incrementally contribute to climate change and exacerbate its many consequences including harms to energy infrastructure and increases in energy demand, an increase in wildfire and extreme weather events, impacts to agriculture and water resources, and human health impacts including mortality from heat-related illness and changing disease vectors like malaria and [1] This document does not purport to represent the views, if any, of New York University School of Law. [2] MT. DEP'T OF ENV'T QUALITY, DRAFT ENVIRONMENTAL IMPACT STATEMENT, ROSEBUD MINE AREA B AM5 COLSTRIP, MONTANA (Sept. 2020) [hereinafter "DEIS"]. [3] A selection of Policy Integrity's state-level comments and testimony on the Social Cost of Carbon is available at https://costofcarbon.org/resources. States that Policy Integrity has engaged in include Colorado, Nevada, California, New Jersey, and others. [4] DEIS at S-1.	**Comment Response 80-1:** Thank you for your comment. See response to Comment 79-2.

Com-ment	Document #80-New York University School of Law Institute for Policy Integrity	Response
80-2	060 dengue fever.[5] Despite these foreseeable and inevitable consequences of the Proposed Amendment, the Department does not discuss climate change in the Draft Environmental Impact Statement or project the carbon dioxide emissions that would result from the proposal. The Department should estimate the carbon dioxide emissions resulting from the Proposed Amendment, both directly from mining operations and indirectly from coal combustion. Projecting carbon dioxide emissions from coal combustion is relatively straightforward. Here, the Department projects that the Proposed Amendment would yield 104.3 million short tons of additional subbituminous coal (beyond what the mine is already expected to produce).[6] According to emission factors published by the U.S. Environmental Protection Agency, each short ton of subbituminous coal yields 1,676 kilograms of carbon dioxide when combusted.[7] Thus, **total coal combustion resulting from the Proposed Amendment would produce about 175 billion kilograms—or 175 million metric tons—of carbon dioxide.**[8]	**Comment Response 80-2:** DEQ received similar comments during public scoping for the project, but eliminated the issue from detailed consideration pursuant to 75-1-201(2)(a), MCA. See **EIS Section 1.5.2.2, Scoping Issues Eliminated from Detailed Analysis**, as well as the responses to Comments 79-18 and 80-1.
80-3	Simply projecting the volume of greenhouse gas emissions by itself does not meaningfully inform the climate-related harms that those emissions will cause. To project those impacts, federal and state policymakers typically turn to the Social Cost of Carbon. The Social Cost of Carbon is a metric designed to quantify and monetize climate damages, representing the net economic cost of carbon dioxide emissions. The tool provides a monetary estimate of the damage done by each ton of carbon dioxide that is released into the atmosphere. The methodology calculates how the emission of an additional unit of carbon dioxide affects atmospheric greenhouse concentrations, how that change in atmospheric concentrations changes temperature, and how that change in temperature incrementally contributes to the various social and economic damages described above.[9] The Social Cost of Carbon therefore captures the factors that actually affect public welfare and assesses the degree of impact to each factor. [5] For a more complete discussion of actual climate effects, including air quality mortality, extreme temperature mortality, lost labor productivity, harmful algal blooms, spread of West Nile virus, damage to roads and other infrastructure, effects on urban drainage, damage to coastal property, electricity demand and supply effects, water supply and quality effects, inland flooding, lost winter recreation, effects on agriculture and fish, lost ecosystem services from coral reefs, and wildfires, *see* EPA, *Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment* (2017); U.S. Global Change Research Program, *Climate Science Special Report: Fourth National Climate Assessment* (2017); EPA, *Climate Change in the United States: Benefits of Global Action* (2015); Union of Concerned Scientists, *Underwater: Rising Seas, Chronic Floods, and the Implications for U.S. Coastal Real Estate* (2018). [6] DEIS at 43, S-1 (explaining that the mine produces subbituminous coal. [7] EPA, *Emissions Factors for Greenhouse Gas Inventories*, https://www.epa.gov/sites/production/files/2020-04/documents/ghg-emission-factors-hub.pdf (last modified Mar. 26, 2020). As this chart details, combustion of subbituminous coal also produces about 19,800 metric tons of methane and 292 metric tons nitrous oxide—both of which are more potent greenhouse gases than carbon dioxide. [8] Another method to estimate greenhouse gas emissions is to apply the emissions factors from the U.S. Environmental Protection Agency's Greenhouse Gases Equivalencies Calculator explains that each railcar of coal (i.e. 90.89 metric tons) produces 181.85 metric tons of carbon dioxide upon combustion. *See* EPA Greenhouse Gases Equivalencies Calculator, https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator. Applying these emissions factors finds that total coal combustion resulting from the Proposed Amendment will produce about 189.3 million metric tons of carbon dioxide. [9] Interagency Working Group on the Social Cost of Carbon, *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis* 5 (2010). 2	**Comment Response 80-3:** A full cost-benefit analysis is not required under MEPA and is beyond the scope of this EIS. ARM 17.4.617(f). As a state agency, DEQ "must faithfully execute the laws of Montana," which includes MEPA and its implementing rules. See Merlin Meyers Revocable Trust v. Yellowstone County, 2002 MT 201, ¶ 21, 311 Mont. 194. "It is the exclusive power of the courts to determine if an act of the legislature is unconstitutional." Id. (citing In re License Revocation of Gildersleeve, 283 Mont. 479, 484, 942 P.2d 705, 708 (1997)). See also the response to comment 79-2.

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Com-ment	Document #80-New York University School of Law Institute for Policy Integrity	Response
80-4	080 Because it provides a comprehensive and easily discernible estimate of climate damages, the Social Cost of Carbon is incredibly useful for evaluating policies that affect greenhouse gas emissions. Monetization provides much-needed context for otherwise abstract consequences of climate change. It allows decision-makers and the public to weigh all costs and benefits of an action—and to compare alternatives—using the common metric of money. By monetizing and contextualizing the risks of climate change, the Social Cost of Carbon makes it far more difficult for decisionmakers and the public to ignore these risks, as it translates long-term costs into present values and thereby concretizes the harms of climate change and gives due weight to the potential of lower-probability but catastrophic outcomes. For these reasons, the tool has been used by numerous federal agencies for regulatory impact analysis and environmental impact assessment,[10] and over a dozen states also apply the Social Cost of Carbon in their decisionmaking including California, Colorado, Oregon, Nevada, and Washington.[11] The best estimates of the Social Cost of Carbon were developed by the federal Interagency Working Group on the Social Cost of Carbon ("Working Group"), a coordinated effort among twelve federal agencies and White House offices. The Working Group released estimates in 2010 and updated them in 2016 to "provide a consistent approach for agencies to quantify [climate change] damage in dollars."[12] Many authorities endorse the Working Group's estimates of the Social Cost of Carbon, such as the National Academies of Sciences[13] as well as distinguished independent economists.[14] Federal courts have upheld agency reliance on these figures[15] and held up the Working Group's estimates as well-considered and reliable.[16] The central value identified by the Working Group for the damages from one ton of carbon dioxide emitted in the year 2025 is $46 in 2007$,[17] which equates to $57 in today's value after adjusting for inflation. Simply multiplying this value by the projected emissions calculated above reveals that **the Proposed Amendment would produce roughly $10 billion in climate damages from carbon-dioxide emissions alone.**[18] This is a substantial number that should bear heavily on the Department's evaluation of the proposal. [10] *See* Peter Howard & Jason Schwartz, *Think Global: International Reciprocity as Justification for a Global Social Cost of Carbon*, 42 COLUM. J. ENVTL. L. 203, 270–84 (2017) (listing all uses by federal agencies through mid-2016, including numerous assessments under the National Environmental Policy Act). [11] States Using the SCC, https://costofcarbon.org/states. [12] *Fla. Se. Connection, LLC*, 162 FERC ¶ 61,233, at P 45 (Mar. 14, 2018). [13] Nat'l Acads. Sci., Eng'g & Med., *Valuing Climate Damages: Updating Estimates of the Social Cost of Carbon Dioxide* 3 (2017); Nat'l Acads. Sci., Eng'g & Med., *Assessment of Approaches to Updating the Social Cost of Carbon: Phase 1 Report on a Near-Term Update* 1 (2016). [14] *See* Richard L. Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 SCIENCE 655 (2017) (co-authored with Michael Greenstone, Michael Hanemann, Peter Howard, and Thomas Sterner). [15] *Zero Zone, Inc. v. U.S. Dep't of Energy*, 832 F.3d 654, 678 (7th Cir. 2016). [16] *California v. Bernhardt*, 2020 WL 4001480, at *25–28 (N.D. Cal. July 15, 2020) (endorsing Working Group's estimates of the social cost of methane and vacating a rulemaking that relied on alternate estimates); *High Country Conservation Advocates v. U.S. Forest Serv.*, 52 F. Supp. 3d 1174, 1190–93 (D. Colo. 2014) (describing Working Group's methodology and concluding that its estimates are applicable to project-level reviews). [17] Interagency Working Group on the Social Cost of Carbon, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis* 4 (2016). [18] 175 million multiplied by $57 equals $9.975 billion. In a proper cost-benefit analysis, the emissions projected for each year would be valued at the Social Cost of Carbon value for that year, with future emission damages 3	**Comment Response 80-4:** See response to Comments 79-2 and 80-3.

Com-ment	Document #80-New York University School of Law Institute for Policy Integrity	Response
80-5	080 The Social Cost of Carbon provides an estimate of incremental *global* climate damages. There is no Social Cost of Carbon estimate that reflects climate damages only to individual states. For one, models cannot accurately calculate a domestic-only, let alone a state-only Social Cost of Carbon. Moreover, it is in each state's interest to use an estimate of the global damages of a ton of carbon dioxide. This is because greenhouse gas pollution does not stay within geographic boundaries but rather mixes in the atmosphere and affects the climate worldwide. Each ton emitted by the United States or a particular U.S. state thus not only creates domestic harms, but also imposes large externalities on the rest of the world. Conversely, each ton of greenhouse gases abated in another country benefits the United States and each individual U.S. state. A Policy Integrity report found that, as of 2015, climate policies worldwide—including efforts by Europe, Canada, and many other countries—could generate upwards of $2 trillion in direct benefits to the United States by 2030.[19] To avoid a global "tragedy of the commons" that could irreparably damage all countries and political jurisdictions, including Montana, every government worldwide should ideally set policy according to the global Social Cost of Carbon.[20] All states, including Montana, benefit tremendously from actions of other states and other countries to mitigate climate change, and the use of a global social cost estimate helps encourage reciprocal policy choices. Montana's citizens and businesses also have financial and other interests that extend far beyond the state's physical borders. If all states or countries used jurisdiction-specific numbers, the result would be drastic under-regulation, harming the citizens of Montana in countless ways. Thus, every state that has applied the Social Cost of Carbon to its energy-planning decisions—California, Colorado, Connecticut, Illinois, Maine, Maryland, Minnesota, Nevada, New Jersey, New York, Oregon, Virginia, and Washington—has adopted a global framework for valuing climate damage. Appended to these comments is a 2017 report from Policy Integrity titled "The Social Cost of Greenhouse Gases and State Policy," which offers further detail on the development and use of the Social Cost of Carbon and provides answers to frequently asked questions from states that have considered using it in their own policymaking. We also append comments that Policy Integrity jointly filed with seven other non-profit groups in March 2018 in response to the federal Office of Surface Mining's own proposal to expand the Rosebud Mine, which details why the Social Cost of Carbon was appropriate for assessing the impacts of that proposal. For the reasons discussed above and detailed further in the appended documents, the Department should apply the Social Cost of Carbon to evaluate the climate damages that will result from the Proposed Amendment. discounted back to present value. Note that this social cost valuation does not include methane and nitrous oxide emissions from the Proposed Amendment, which can also be calculated using the Social Cost of Greenhouse Gases. *See* Iliana Paul et al., Inst. for Pol'y Integrity, *The Social Cost of Greenhouse Gases and State Policy* 21–22 (2017) (attached) (providing Working Group's valuations for the Social Cost of Methane and Social Cost of Nitrous Oxide). [19] Peter Howard & Jason Schwartz, Inst. for Pol'y Integrity, *Foreign Action, Domestic Windfall: The U.S. Economy Stands to Gain Trillions from Foreign Climate Action* 2 (2015), http://policyintegrity.org/files/publications/ForeignActionDomesticWindfall.pdf. [20] *See* Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968) ("[E]ach pursuing [only his or her] own best interest . . . in a commons brings ruin to all."). 4	**Comment Response 80-5:** See comment responses 79-2 and 80-3.

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Com-ment	Document #80-New York University School of Law Institute for Policy Integrity	Response
	080 Sincerely, Iliana Paul, Senior Policy Analyst Max Sarinsky, Attorney Jason A. Schwartz, Legal Director Appended: 1) Iliana Paul et al., Inst. for Pol'y Integrity, *The Social Cost of Greenhouse Gases and State Policy* (2017) 2) Inst. for Pol'y Integrity et al., Comments on the Failure to Use the Social Cost of Greenhouse Gases in the Draft Environmental Impact Statement for Western Energy Rosebud Mine Area F (Mar. 5, 2018) 5	

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1.4.4 Response to Comments from Individuals

Issue statements were drafted by DEQ to summarize substantive comments from individuals. Representative quotes from public comments are provided verbatim (including any original errors or misspellings) for each issue statement followed by DEQ's responses. All public comments are available in the project record.

1.4.4.1 Colstrip Power Plant (Issue Code 1001)

Issue Statement: Power generation at the Colstrip Power Plant is directly linked to mining at the Rosebud Mine and should be analyzed as such in the EIS.

Representative Quotes:

> This is a coal mining proposal that is directly linked to the future of Colstrip power, even the ending date of 2047. Without continued operation of Colstrip, the mine can't operate (Document 46, page 1).

Response: The Proposed Action and Colstrip Power Plant are not considered connected actions (see **Section 1.5.2.2, Scoping Issues Eliminated from Detailed Analysis**). Regardless, there is no required federal approval for this project requiring NEPA compliance, and MEPA does not require agencies to evaluate connected actions.

The Colstrip Power Plant and the operations of its associated facilities (paste plant, ponds, etc.) are governed by a certificate issued by DEQ under the Major Facility Siting Act (MFSA), 75-20-101, MCA *et seq*. Colstrip Power Plant Units 3 and 4 were originally limited to burning coal from Areas C, D, and E, but in 2015, DEQ approved an amendment to the MFSA Certificate also allowing the use of coal from other permit areas. In March 2019, DEQ approved an amendment to the certificate to allow the Colstrip Power Plant the flexibility to also use non-Rosebud seam coal obtained from mines other than the Rosebud mine. Talen Energy subsequently rescinded the 2019 amendment request, and the power plant is once again limited to using Rosebud seam coal from the Rosebud Mine. There was a statutory amendment in 2021; however, that may allow Talen to use non-Rosebud coal without amending the power plant's MFSA Certificate. See HB 648, Sec. 5 (67th Leg., 2021), § 75-20-228, MCA.

Past, present, and related future operations of the Colstrip Power Plant were considered in the cumulative effects analyses (see **Section 3.1.4, Actions Considered in Cumulative Impacts Analyses**). Indirect effects of combusting coal in Colstrip Power Plant Units 3 and 4 and in the Rosebud Power Plant were analyzed in in the Area F EIS (OSMRE and DEQ 2018). The Area F EIS was a joint environmental review by DEQ and a federal agency, and indirect effects of combusting coal in Colstrip Units 3 and 4 were included to satisfy federal requirements. For the proposed Project, unlike the Area F project, there is no required federal approval or need for NEPA compliance.

1.4.4.2 Constitutional Right to a Clean and Healthful Environment (Code 1102)

Issue Statement: The Proposed Action is inconsistent with Montana's constitutional right to a clean and healthful environment.

Representative Quotes:

> I continue to be distressed as "economic concerns" take precedence over the health of our wild lands. "Good jobs" should not be an excuse for destruction of life sustaining environments. "Good jobs" can be made available in several areas of alternative power production. It is simply a matter of priorities. (Document 47, page 1)

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> Allowing this hedge fund to strip mine the land and continue to destroy the water resource for no good reason when there's sufficient coal at the mine, is simply not only unconscionable but it is contrary to any stated need for this expansion (Document 70, page 1).

Response: MSUMRA is in large part a remedial statute which provides multiple, separate and independent remedies for both DEQ and the citizens of Montana. To be sure, the legislature enacted MSUMRA "mindful of its constitutional obligations under Article II, section 3, and Article IX of the Montana constitution" in order to, among other things, "provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources." Section 82-4-202(1), MCA. MSUMRA thus serves to protect the inalienable rights of all Montanans including the right to a clean and healthful environment (Mont. Const. Ar. II, § 3) and to "provide adequate remedies" for the protection of that environment. Mont. Const. Art. IX, § 1(3).

1.4.4.3 Demand for Coal (Code 1103)

Issue Statement: The proposed project is not needed as there is already enough coal permitted, Units 1 and 2 of the Colstrip Power Plant have already shut down, and Units 3 and 4 may not be in operation much longer due to actions by western states and declining demand for coal-generated power. If the project is permitted, the life of mine estimate provided in the EIS may underestimate the actual timeframe the mine would be operating.

Representative Quotes:

> This expansion, combined with another large expansion DEQ approved just last year, would increase the size of the mine by 65% and provide the Colstrip plant with coal until beyond 2050! The plant only burns about 6 million tons of coal each year (Document 55, Page 1).

> The only reason that it continues to mine coal is because of the Colstrip coal-fired power plant directly adjacent to it. It's more than likely that that plant is going to shut down by 2025, not out through 2048 as considered in this. Especially, considering the release of Area F as released and approved by DEQ. There's not going to be a customer for this coal and it's almost frustrating to think that we're here potentially wasting our time on this consideration. Potentially, wasting state resources on something that is so far off in the future and so unlikely (Document 66, page 1).

> I think your numbers are way off, for how long will this amount of coal provide coal for the Colstrip plant. The Units 1 and 2 are offline. Northwestern and all the other owners are anticipating according to even Northwestern which is the most reluctant owner to close a plant. Proposing to really scale down their operations to the Colstrip plant. Northwestern is proposing or proposed in the CU4 acquisition docket before the public service commission that it would really be running Colstrip intermittently beyond 2025, more as a backup resource than anything else. All of the other owners in Washington state must stop using Colstrip power by the end of 2025. Portland General Electric, the other owner, has to stop using Colstrip power by 2030, and has told its utility regulators that it anticipates getting out earlier. The question is, if this plant continues to operate because, for some magical reason Northwestern owns it, it's going to run this coal at the ability to operate far beyond 2045. It'll be well into, probably, the 2060s. There simply is no viable way that this facility will continue to operate that long. There is already coal as permitted at Area F, which is just under construction and at other places in the other areas of the mine. This is not needed and if your environmental impact statement or environmental assessment, whatever this is, I think it's an EIS, proceeds with a needs analysis, it has got to consider the fact that this coal simply is not needed to provide energy for this plant (Document 70, page 1).

Response: The state action before DEQ is to review and to make a decision on Westmoreland Rosebud's surface-mine operating permit application under MSUMRA, Section 82-4-221 et seq., MCA (see **EIS**

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Section 1.3.1, Purpose and Need). There is no requirement under existing regulations that would necessitate DEQ to make a determination regarding the marketability of the coal to be mined under the operating permit.

The EIS acknowledges retirement of Units 1 and 2 and current changes to operations of Units 3 and 4 (see **Section 3.1.4.1, Related Past and Present Actions**). To be considered in analysis, related future actions must be under concurrent consideration by a state agency through preimpact statement studies, separate impact statement evaluation, or permit-processing procedures" as set forth in the Administrative Rules of Montana (ARM) 17.4.603(7). No related future actions for Units 3 and 4 as defined under ARM 17.4.603(7) are known to currently be under consideration by a state agency. See also comment response 77-23.

When evaluating the impacts of the proposed action (Alternative 2) and Alternative 3, DEQ considered the following:

- Area B (as Modified by Area B): Westmoreland Rosebud's projected annual production rate for the proposed action (Alternative 2) as stated in the permit application (see **Table 8** in **EIS Section 2.4.1**); Alternative 3 uses annual production rate provided in Westmoreland Rosebud's revised application (see **Appendix E, Table E-2**).
- Other permit areas of the Rosebud Mine (A, B, C, and F): 1) Approved mining and 2) production estimates as a proportion of total production (e.g., Area F will account for as much as 50 percent of the total output of the Rosebud Mine); see **EIS Section 2.2.4, Life of Operations**.
- Rosebud Mine (as a whole): recent rather than projected production rates.

All of these factors are assumptions based on the best available information at this time. As the EIS discloses, changes to production rates, additions of other mine permit areas, or changed market conditions may influence the operational life of the Rosebud Mine as a whole or of individual permit areas.

1.4.4.4 Westmoreland Rosebud's Financial Stability (Code 1200)

Issue Statement: Westmoreland Rosebud's financial health and ability to pay for reclamation should be analyzed in the EIS.

Representative Quotes:

> We should not anticipate that the recent buyers of the mine will stick around for restoration work; another bankruptcy is fairly likely. (Document 56,1)
>
> In terms of the owner, this is not Westmoreland. The best that we can tell for this company is a subsidiary of a bunch of hedge funds at this point that are attempting to recoup the last bit of money that they have invested in this, following the bankruptcy of Westmoreland. They were investors of Westmoreland. We're concerned that there's an incentive to cut corners and ignore environmental safeguards associated with strip mining (Document 66, page 1).
>
> The other major concern for me is ownership. It's one thing when a big major established coal company is operating a coal mine and applying for an expansion, but when it gets to the point where it's investment bankers that are applying for this, it should raise serious concerns on the state's part on the future of the mining efforts (Document 72, page 1).

Response: The financial viability of Westmoreland Mining LLC and its subsidiary, Westmoreland Rosebud, is outside the scope of the EIS.

Pursuant to § 82-4-223, MCA, DEQ may not issue a permit under MSUMRA until the operator has filed a performance bond for the selected alternative with DEQ made payable to the state of Montana in an amount to be determined by DEQ. The performance bond amount is based upon the cost to the state if it were to reclaim the permitted area as described in its associated reclamation plan. ARM 17.24.1102. DEQ will not issue an approval of the AM5 Project until a satisfactory performance bond is secured. The bond will cover the reclamation cost for the selected alternative should the operator not perform for financial reasons. See also responses to comments coded 1202 below in **Section 1.4.4.5, Reclamation at the Rosebud Mine (Code 1202)**.

1.4.4.5 Reclamation at the Rosebud Mine (Code 1202)

Issue Statement: Complete reclamation, meaning Phase IV bond release, has only occurred on a fraction of the existing Rosebud Mine acreage – what guarantees are there that reclamation will ever be achieved on the proposed project area?

Representative Quote:

> Less than 3% of the currently operating mine has been fully reclaimed despite the fact that it has been in operation for over 40 years. Mines have an obligation to do “contemporaneous reclamation” but the Rosebud mine has entirely failed to comply. The government should not let the mine expand even further and create an even bigger environmental mess when it hasn’t bothered to clean up the mess it already made. The fact that NO cleanup has been made means that the owners of the mine are probably planning on dumping the cleanup costs on the people of Montana. This has been the unfortunate case in so many instances that you can almost predict what will happen. If the mine is allowed to expand without cleaning up its current mess, we, the people of Montana, will be on the hook for another cleanup (Document 57, page 1)

Response: Reclamation has occurred concurrently with mine operations in all currently permit areas of the Rosebud Mine as required by MSUMRA, and all permitted areas are fully bonded for reclamation (**EIS 2.2.2, Existing Operating Permits, Disturbances and Reclamation**). The criteria and schedule for performance bond release are outlined in ARM 17.24.1116. The Rosebud Mine has four permitted mine areas which are actively being reclaimed in compliance with state requirements, and one of those, Area D, is entirely in reclamation. A description of the Rosebud Mine’s past and existing mine and reclamation operations is provided in **EIS Section 2.2, Rosebud Mine – Description of Past and Existing Mine Operations and Reclamation**.

Disturbed lands in the permitted areas at the Rosebud Mine as of 2019 were 17,829 acres. Of that 1,137 acres had been released from Phase I, 7,447 acres had been released from Phase II, 2,001 acres had been released from Phase III, and 263 acres from Phase IV. This does not include the former 1,026-acre Area E permit area, which after completion of Phase IV reclamation was released as a mine permit area (**Section 2.2.2, Existing Operating Permits, Disturbances and Reclamation**).

Phase I reclamation includes pit backfilling and grading to meet the postmine topography and drainage basin design. Phase II consists of surface stabilization to prevent accelerated erosion, soil application, revegetation, and sediment-control measures. Phase III ensures that the postmining land uses have been met and includes extensive monitoring of the reclaimed landscape, including monitoring of vegetation, soil, and surface water and ground water resources. Phase IV ensures the restoration of the hydrologic balance, among other final reclamation measures, as described in ARM 17.24.1116(6)(d) (**Section 1.6.4, Bond Release**). As of 2019, roughly 54 percent of disturbed lands within the permitted areas had soil respread and has been successfully revegetated to protect the surface from accelerated erosion.

In 2018, Office of Surface Mining Reclamation and Enforcement (OSMRE) responded to a complaint filed by WildEarth Guardians (WEG) alleging that Rosebud Mine and other Montana coal mines were failing to meet their reclamation obligations based upon what WEG alleged to be a failure to conduct contemporaneous reclamation and achieve final bond release. In a letter dated June 6, 2018, OSMRE stated that the applicable statutory and regulatory framework does not contemplate instant reclamation or reclamation on an acre-by-acre basis as surface mining proceeds, but instead contemplates that reclamation is supposed to occur "as contemporaneous as practicable". Furthermore, OSMRE stated that an operator's success at contemporaneous reclamation is primarily measured by the operator's compliance with its permit and reclamation plan, which is developed under the applicable approved regulatory program and not by the status of bond release, and whether contemporaneous reclamation is occurring is primarily measured by the timeliness of the operator's actions in accordance with permit terms and commitments, including those made in the operator's approved reclamation plan. In conclusion, OSMRE stated that on available information, there is no reason to believe that, as a factual matter, a violation of contemporaneous reclamation requirements for coal mining operations in Montana, including the Rosebud Mine, is occurring.

To protect the State and people of Montana from incurring reclamation costs, DEQ cannot issue a permit until the applicant files the required performance bond payable to DEQ as financial assurance (**EIS Section 1.6, Financial Assurance**). The bond amount is based upon the cost to the State if it were to reclaim and restore the permit area in the event that the mine operator defaults on its reclamation obligations. The bond may not be less than the total estimated cost to the State of completing the work described in the reclamation plan (**EIS Section 1.6.1, Bond Amount**). All currently permitted areas of the Rosebud Mine are fully bonded for reclamation.

Pursuant to ARM 17.24.1116, DEQ cannot release any portion of the performance bond until it finds that the permittee has met the requirements of the applicable reclamation phase. Final bond release occurs only when the permittee has successfully met all Phase IV reclamation requirements (**Section 1.6.4, Bond Release**).

1.4.4.6 Proposed Operations Plan (Code 2203)

Issue Statement: Changes should be made to the Proposed Operations Plan in the EIS.

Representative Quote:

> I recently acquired sections 24, I think, it's 25, I believe that's the correct numbers on the east edge of the mine. I've asked Western Energy to withdraw them from the permit area (Document 69, page 1).

Response: During the permitting process, Big Sky Area B received final bond release which triggered an ownership change from Big Sky Coal Mine to Greenleaf Land and Livestock Company modified on Montana Cadastral recorded on September 17, 2020. Westmoreland completed a landowner agreement on December 3, 2021, with Greenleaf Land and Livestock Company that includes surface mining activities.

1.4.4.7 Suggested Resources for Analysis (Code 3000)

Issue Statement: Climate change as it relates to the proposed project, including potential impacts, and the social cost of carbon should be analyzed in the EIS.

Representative Quotes:

> The impacts on climate are not being considered. I understand that such requirements are not required by a law passed in 2015, but this is 2020. The impacts of global warming grow more evident every day. No request of this magnitude should be processed until the impact on the climate can be included. This application should be put on hold until the legislature can draft such requirements if that is what is necessary to have them be included (Document 59, page 1).
>
> It's bizarre that we're considering this expansion today, one of the largest mine expansions, if not the largest mine expansion in modern Montana history. We're doing this at a time when we're in the middle of a climate catastrophe. This expansion, as mentioned, would allow for the Rosebud Mine to gain access to approximately 104 to 147 million tons of additional coal. That amounts to two or 300 million tons of carbon dioxide. DEQ completely failed to analyze the carbon

> emissions associated with this project, even though you have the tools available to do so. That's completely unconscionable at a time when our climate is so rapidly changing. How does that failure comport with the DEQ's mission and how does that comply with our constitutional fundamental right to a clean healthful environment? As a simple answer, it doesn't (Document 66, page 1).

Response: Under MEPA, DEQ's analysis may not include a review of actual or potential impacts beyond Montana's borders. It may not include actual or potential impacts that are regional, national, or global in nature such as impacts that may result from climate change. Section 75-1-201(2)(a), MCA. Further, DEQ cannot deny a coal mining permit under MEPA. Sections 75-1-102(3) and 201(4)(a), MCA. A substantive decision on whether to issue or deny a coal mining permit would be made pursuant to MSUMRA, 82-4-201, MCA, et seq.

See also, response to comments 77-7 and 79-2. **EIS Section 3.3, Air Quality** includes an analysis of air quality impacts from the Proposed Action.

Issue Statement: Public health as it relates to the proposed project, including potential impacts, should be analyzed in the EIS.

Representative Quotes:

> I know the prent non insubstantial health problems with coal-fired power generation (over 200,000 deaths per year in the US) as well as the damage to the unborn child - increased risk of preterm, stillbirth, neurodevelopmental defects, thyroid disruption, Attention Deficit, autism, and more. That is just from air pollution. Adding on the climate change that is already occurring adds a host of new risks to our children (Document 56, page 1).

Response: The laws and rules that DEQ enacts and enforces are designed to protect human health and the environment. USEPA has delegated authority to DEQ to administer and enforce the regulations set forth under the Clean Air Act. Air quality standards under the Clean Air Act are set to protect the most sensitive subpopulations, including children. Regarding air quality in Area B AM5, air quality modeling was performed to determine whether emissions from the Project would contribute to exceedances of the NAAQS and/or MAAQS. The potential increases in coal dust and diesel fumes from coal-mining equipment mentioned in the comment were assessed. Impacts from blasting and fugitive dust from mining equipment and wind erosion (blowing dust) were also assessed in addition to the other mining sources discussed above. The EIS concludes that the Project would result in minor, unavoidable, adverse impacts on air quality, but direct, secondary, and cumulative impacts would be lower than the health based federal and state ambient air quality standards where applicable.

See also response to comment 79-2 above.

1.4.4.8 Air Quality Analysis and Impacts (Codes 3203 and 3204)

Issue Statement: The EIS air quality analysis should disclose impacts of mine construction and operations on air quality, including blowing dust.

Representative Quotes:

> When the wind blows from the east- north east We have dust (Document 52, page 1)

> The dust is also a problem (Document 64, page 1).

Response: The air emissions from the mining, construction, and reclamation operations of the Project would be subject to a number DEQ air quality regulations that control fugitive dust emissions as described in **EIS Section 3.3.1.1**. This includes ARM 17-8-304(2) which requires that fugitive dust emissions from the Project meet an operational visible opacity standard of 20% or less averaged over 6 consecutive minutes, including during construction of haul roads. The operator would also be required to employ fugitive dust control measures in accordance with 82-4-231(10)(m), MCA; the operators air quality permit (MAQP #1483-09), and applicable federal and state air quality standards (ARM 17.24.761(1) and 17.24.311(1)). If there are consistent dust impacts reaching outside the Western Energy property and reaching area residents, complaints can be filed with DEQ to assure that Western is meeting its reasonable precaution requirements and other air quality permit conditions. A discussion of relevant fugitive dust control measures has been added to the Final EIS in **Section 3.3.3.2, Direct Impacts on Criteria Air Pollutants**.

1.4.4.9 Surface Water Analysis and Impacts (Codes 3401, 3403, and 3404)

Issue Statement: The EIS needs to better analyze cumulative effects on surface water quality and quantity.

Representative Quotes:

> The Rosebud mining operations have already dewatered streams in the region, and the remaining water is now heavily polluted from mining activities. A mine expansion would worsen existing water quality and quantity problems (Document 62, page 1).
>
> This mine expansion is supposed to prevent material damage outside the permit boundary. We are way past that threshold at this point for the Rosebud Mine and this expansion is only going to make it cumulatively worse. Without a doubt, this expansion is going to have impacts to the water of sensitive perennial streams and the surrounding area. Without a doubt, it's going to add salts and to the surrounding stream such as Rosebud Creek (Document 66, page 1).

Response: Water resources, water rights in the analysis area, potential impacts to water resources and water rights in the analysis area, and cumulative impact assessments of the water resources and water rights in the analysis are described for Alternative 2 in **Sections 3.5, Surface Water**; **3.6, Ground Water;** and **3.7, Water Rights** and for Alternative 3 in **Appendix E, Sections 1.4.5, Surface Water; 1.4.6, Ground Water;** and **1.4.7, Water Rights**. Protection of water rights and sourcing replacement water are described in **EIS Section 2.4.6.3** and **Section 3.7.3.2**. See also responses to Comments 77-5 regarding replacement of water supplies and 79-37 regarding cumulative impacts.

1.4.4.10 Ground Water Analysis and Impacts (Codes 3503 and 3504)

Issue Statement: The EIS needs to analyze direct, secondary, and cumulative impacts on ground water quality and quantity.

Representative Quote:

> Mining would almost certainly lower the regional water table adversely, negatively affecting wetlands and riparian areas. It would certainly further contaminate the groundwater in the area and down-flow (Document 46, page 1)
>
> The mine itself has already damaged water resources in the area. The expansion is only gonna make it worse. In addition to water quality of course, water quantity in fact, has already been de-watered by the mine and the remaining water that is there is already heavily polluted from mining activities (Document 66, page 1).
>
> Let's be clear when you strip mine the aquifer, it's practically impossible to restore the hydrologic balance (Document 66, page 1).

Response: Direct and secondary impacts from the Proposed Action on ground water quantity and quality are analyzed in **EIS Section 3.6.3.2**. Cumulative impacts are analyzed in **EIS Section 3.6.3.3**. MSUMRA does not require that the hydrologic balance be "restored", but rather that impacts to the hydrologic balance be minimized [82-4-231(10)(k), MCA and ARM 17.24.314(1)]. See also responses to Comments 77-5 regarding replacement of water supplies and 79-37 regarding cumulative impacts.

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1.4.4.11 Water Rights Impacts and Mitigations (Codes 3602 and 3604)

Issue Statement: Impacts on water rights and private property from proposed mining are concerning.

Representative Quotes:

> If they mine to the south of my place I will have the well go dry as it will drop the water ground water level (Document 52-1).
>
> I live with in 1 mile of the mine and it its not been fun. The blasting has . . . dirtied up my well water (Document 52-1).
>
> The people of the region already have undrinkable water from the coal that has been burned (Document 56-1).
>
> I live next to the mine on west side of Area B. The blasting from the mine has raised hell with my water well & house. It costs me more for water filters. The water table has dropped down (Document 64-1).
>
> I will submit some written comments because I have some serious concerns about the impacts to the water that's on those two sections too (Document 69-1).

Response: Water resources, water rights in the analysis area, potential impacts to water resources and water rights in the analysis area, and cumulative impact assessments of the water resources and water rights in the analysis are described for Alternative 2 in **Sections 3.5, Surface Water**; **3.6, Ground Water**; and **3.7, Water Rights** and for Alternative 3 in **Appendix E, Sections 1.4.5, Surface Water; 1.4.6, Ground Water;** and **1.4.7, Water Rights**. Protection of water rights and sourcing replacement water are described in **EIS Section 2.4.6.3** and **Section 3.7.3.2**. See also responses to Comments 77-5 regarding replacement of water supplies and 79-37 regarding cumulative impacts.

1.4.4.12 Fish and Wildlife Analysis and Impacts (Codes 3903 and 3904)

Issue Statement: In the EIS, DEQ must assess the impacts of water withdrawals from the power plants on pallid sturgeon.

Representative Quote:

> We disagree with the conclusion that this is not going to have an impact on endangered species. If Colstrip is able to run and continue to suck an enormous amount of water out of the Yellowstone River, that will have an impact on the pallid sturgeon (Document 66-2).

Response: The Proposed Action would have no effect on the pallid sturgeon because the small streams in the analysis area do not provide suitable habitat for pallid sturgeon.

Additionally, DEQ is not required to analyze the impacts of Colstrip Power Plant water withdrawals from the Yellowstone River. The analysis of impacts from the Colstrip Power Plant are beyond the scope of this EIS. See Comment Response 77-3, 79-18, and 79-24.

1.4.4.13 Socioeconomics Analysis and Impacts (Codes 4103 and 4104)

Issue Statement: The socioeconomic analysis in the EIS needs to include both benefits (positive impacts) and costs (negative impacts).

Representative Quotes:

> The company says there would be a benefit of $27 million annually to the state. I am not going to analyze how they come up with that figure but I expect much of it is open to dispute. What is open to dispute is that the relevant figure is the NET benefit to the state. They do not outline the

> negative costs to the state, including years more of contamination of air and groundwater, additional waste disposal and cleanup of ash ponds, and other aspects (Document 46, page 1).
>
> The positive impacts if the proposal were to be accepted are related to the positive economic that would result from the acceptance of this application. While that might benefit a small population for the next ten or so years, the negative health and environmental impacts will affect the whole world in general as well as the people living the specific area and near the rivers affected (Document 59, page 1)

Response: For the EIS analysis, an IMPLAN regional economic modeling system was used to estimate the direct, indirect, and induced (cumulative) regional economic effects from the Rosebud Mine and the Colstrip Generating Station. IMPLAN is an input-output model, originally developed by the U.S. Forest Service that is now widely used for impact analysis by public and private sector economists throughout the United States. In addition, the information provided in the EIS was gathered from public records on what the coal mines in Montana have paid recently in taxes and royalties and does not provide unreasonable or speculative taxes or royalties that might be paid under another scenario. The information also reflects the current rates per § 15-23-703, MCA, and § 15-23-715, MCA.

1.4.4.14 Transportation Analysis and Impacts (Codes 4403 and 4404)

Issue Statement: Westmoreland Rosebud is improperly using private roads and controlling access on county roads.

Representative Quotes:

> They locked up the county road that I use and will not give me a key so I have to drive an extra 12 miles on bad roads to go get fire wood or visit my friends (Document 52, page 1).
>
> We have an easement on our Lane which is not in their Permit Area. They came in & took it over & started using it for their mine access. Opened it up to the public for hunting. They will not maintain it. We can't afford to maintain and gravel it for them to use (Document 64, page 1).

Response: DEQ contacted the commenter on January 15, 2021, to notify them of other avenues to pursue with DEQ, such as filing a formal complaint. DEQ conducted an inspection on January 20, 2021, to investigate the complaint. After analysis and consulting permit documents, DEQ concluded that no violation had occurred and responded to the individual on January 29, 2021, with a formal decision.

1.4.4.15 Solid and Hazardous Waste Analysis (Codes 4503)

Issue Statement: Additional information about hazardous materials disposal at the Rosebud Mine (e.g., location, how much was used, and any monitoring data) should be provided in the EIS.

Representative Quotes:

> Hazardous wastes include solvents transported to a treatment storage disposal facility which is not identified or described. How can you safely dispose of solvents safely, except perhaps by incineration; even then what are the incineration byproducts? (Document 46, page 1).

Response: Treatment, storage, and disposal of hazardous wastes generated at the mine are regulated activities (**EIS Section 3.16.1.1**) and are handled at the mine in accordance with the Montana Hazardous Waste Act (75-10-401, MCA), MSUMRA (82-4-201 *et seq.*, MCA), and the federal Resource Conservation and Recovery Act (RCRA) of 1976.

1.4.4.16 Noise Impacts (Code 4604)

Issue Statement: The EIS should disclose that noise impacts from blasting include impacts on homes close to the mine.

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Representative Quotes:

> I live within 1 mile of the mine and it its not been fun. The blasting has cracked the ceiling of my home (Document 52-1).
>
> A person's house can only take the blasting so long & it shook apart. The things on the wall inside the house fall off on the floor. I talked with them & they say we're with in our limits (Document 64, page 1).

Response: DEQ contacted the commenter on January 15, 2021 to notify them of other avenues to pursue with DEQ, such as filing a formal complaint. DEQ conducted an inspection on January 20, 2021 to investigate the complaint. After analysis and consulting permit documents, DEQ concluded that no violation had occurred and responded to the individual on January 29, 2021 with a formal decision.

1.4.4.17 Soil Impacts (Code 4704)

Issue Statement: The EIS should discuss reclamation potential for disturbed land and soils.

Representative Quote:

> Based on the geology and soils information, how confident is DEQ that full reclamation of the land disturbed by the coal strip mine is possible? (Document 77, page 2).

Response: There are multiple state requirements in place to ensure that full reclamation will be completed. Based on analysis of 88 core-hole samples, the overburden in the analysis area was deemed suitable by DEQ for backfilling of mined areas (**EIS Section 3.4.2.2, Analysis Area Geology and Geochemistry**). Based on the baseline soil study of the analysis area, with a few exceptions, the upper 24 inches of soil are suitable for reclamation and revegetation, and there is sufficient suitable soil to reclaim the proposed disturbances (**EIS Section 3.18.2.2, Suitability for Reclamation**). The permittee must follow requirements for soil removal, storage, and replacement, and for revegetation and rehabilitation of land and water to be affected by the operation outlined in 82-4-222, 231 and 232, MCA and in ARM 17.24.701 and 702 (**EIS Section 3.18.1.1, Regulatory Framework**).

DEQ cannot issue a permit until the applicant files the required performance bond payable to DEQ as financial assurance (**EIS Section 1.6, Financial Assurance**). The bond amount is based upon the cost to the State if it were to reclaim and restore the permit area in the event that the mine operator defaults on its reclamation obligations. The bond may not be less than the total estimated cost to the State of completing the work described in the reclamation plan (**EIS Section 1.6.1, Bond Amount**). All currently permitted areas of the Rosebud Mine are fully bonded for reclamation (**EIS Section 2.2.2, Existing Operating Permits, Disturbances and Reclamation**).

Pursuant to ARM 17.24.1116, DEQ cannot release any portion of the performance bond until it finds that the permittee has met the requirements of the applicable reclamation phase. Final bond release occurs only when the permittee has successfully met all Phase IV reclamation requirements (**EIS Section 1.6.4, Bond Release**).

1.4.4.18 Cumulative Impacts (Code 4801)

Issue Statement: The geographic extent of the cumulative impacts analysis area should be southeastern Montana and must include the Montana portion of the Powder River Basin. All actions that are connected and/or cumulative must be analyzed, including power plant operations, agricultural operations, the entire Rosebud Mine, and other mining operations.

Representative Quotes:

> The expansion would also exacerbate damage to sensitive prairies streams and wildlife, and impact agricultural operations in SE MT (Document 75, page 1).

Response: MEPA requires an analysis of cumulative impacts, which are defined as “the collective impacts on the human environment of the Proposed Action when considered in conjunction with other past and present actions related to the Proposed Action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any state agency through preimpact statement studies, separate impact statement evaluation, or permit-processing procedures” as set forth in ARM 17.4.603(7). The analyses areas for cumulative impacts are resource-specific: analysis areas vary by resource in order to use the most appropriate boundaries for anticipated impacts. See resource sections in **Chapter 3**; cumulative impacts analyses areas are always identified in the 3.x.3.3 subsection). A large geographic analysis area, such as southeastern Montana or the Powder River Basin, is too broad for most resources and could be considered arbitrary if applied universally. Past, present, and related future actions under concurrent consideration that are in the vicinity of the Project are described in the **EIS** in **Section 3.1.4, Actions Considered in Cumulative Impacts Analyses** and were updated for the **Final EIS** in **Appendix E, Section 1.4.1.2**. MSUMRA also requires that DEQ provide an assessment of the cumulative hydrologic impacts of the proposed operation and all previous, existing, and anticipated mining which will be included in DEQ’s written findings.

Appendix E – Alternative 3 Analysis and Affected Environment Updates

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Appendix E: Alternative 3 Analysis and Affected Environment Updates

Tables

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Figures

1.1 INTRODUCTION

For the proposed fifth amendment (AM5) to the operating permit (C1984003B) for Area B at the Rosebud Mine (Project), Montana Department of Environmental Quality (DEQ) analyzed two action alternatives in detail: Alternative 2 – Proposed Action (Proposed Action or Alternative 2; described in the Environmental Impact Statement (EIS) (**EIS Section 2.4**) and Alternative 3 – Restrict Coal Mining to Lee Coulee Only Alternative (Alternative 3 or Lee Coulee Only; described in this appendix). The proposed Project area for both alternatives is the 15,153-acre Area B permit area as modified by proposed AM5 (**Figure E-1**). Appendix E discloses the potential direct, secondary, and cumulative environmental impacts that would result from Alternative 3, which was designed to avoid potential water quantity and quality impacts. This alternative was previously considered but not carried forward for detailed analysis in Draft EIS. **Draft EIS Section 2.5.3** was revised in the Final EIS to provide background and DEQ's rationale for why this alternative is now being carried forward and analyzed in detail.

Appendix E also updates the affected environment based on changes since the issuance of the Draft EIS, including the following: changes to the Colstrip Power Plant, designation of the monarch butterfly as a candidate species for listing under the Endangered Species Act (ESA), and a recent wildland fire in the Project area. These analyses and updates are included in an appendix rather than in the main body of the Final EIS so that the reader can easily identify new information. Many of these updates and analyses grew out of the comments DEQ received on the Draft EIS. Minor updates to the Final EIS, such as updated public participation information or slight corrections, are not called out in this appendix but instead are briefly described in the Final EIS in **Section 1.2.2, Revisions to the EIS**.

Appendix E is organized into five major sections:

- **Section 1.1, Introduction** (current section).
- **Section 1.2, Alternative 3 – Lee Coulee Only Alternative** (describes the alternative, including figures and tables, as needed).
- **Section 1.3, Updates to the Affected Environment** (describes updates to the affected environment based on changes to the Colstrip Power Plant and a recent wildland fire in the Project area since the issuance of the Draft EIS).
- **Section 1.4, Environmental Consequences** (describes environmental impacts of Alternative 3 and any updates to the impacts of Alternative 1 (No Action) and Alternative 2 (Proposed Action) as a result of the revised affected environment).
- **Section 1.5, Regulatory Restrictions of Private Property** (describes impacts on Westmoreland Rosebud's property rights, if any, as a result of Alternative 3).
- **Section 1.6, References** (lists the references specific to this appendix; all other references remain at the end of the EIS).

1.2 ALTERNATIVE 3 – LEE COULEE ONLY ALTERNATIVE

1.2.1 Key Differences Between Action Alternatives

The primary difference between Alternatives 2 and 3 is that under Alternative 3, no mining would occur in Richard Coulee. Under Alternative 2, mining and associated disturbance would occur in both the Lee

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Coulee and Richard Coulee drainages, but in Alternative 3, all mining and most disturbance would be limited to the Lee Coulee drainage. Under Alternative 3, some limited, minor disturbance to approximately 26 acres also would occur on the ridge between Richard and Lee Coulees for construction of eight (AM5-11 through AM5-18) Montana Pollutant Discharge Elimination System (MPDES) outfalls/(TA-Rich-1 through TA-Rich-8) sediment traps (see **Figure E-4)**. These eight MPDES outfalls would discharge to Richard Coulee. **Table E-1** presents the key differences between the two alternatives. **Table E-2** provides an estimated annual production and disturbance schedule for Alternative 3; **Table 8** in **EIS Section 2.4.1** provides the estimated annual production and disturbance schedule for Alternative 2.

Table E-1. Comparison of Action Alternative Components.

Alternative Component	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Operations Plan		
Operational life of Area B[1]	30 years from approval of AM5 (15 additional years beyond current Area B permit)	21 years from approval of AM5 (6 additional years beyond current Area B permit)
Operational life of the Rosebud Mine	7 additional years	4 additional years
Area B permit area	15,153 acres	15,153 acres
Area B total disturbance area[2]	11,202 acres	8,194 acres
Mining area	7,397 acres	5,478 acres
Highwall reduction	1,239 acres	871 acres
Soil storage area	901 acres	644 acres
Scoria pits	80 acres	69 acres
Haul roads	457 acres	335 acres
Other disturbances[3]	1,135 acres	1,022 acres
Acreage with two or more types of disturbance	-8 acres	-225 acres
AM5 disturbance only	5,711 acres of new Project-related disturbance within the Proposed Action's 11,202-acre disturbance area	2,658 acres of new Project-related disturbance within the Alternative 3 8,194-acre disturbance area
Coal recovery[4]	104.3 million tons (AM5) 147.2 million tons (entire Area B)	42.9 million tons (AM5) 62.3 million tons (entire Area B)
Drainages disturbed by mining operations or other related disturbance	Lee Coulee Richard Coulee East Fork Armells Creek (in part) Rape Coulee (in part)	Lee Coulee Richard Coulee (confined to approximately 26 acres for the construction of eight MPDES outfalls and sediment traps on the ridge between Richard and Lee Coulees)
Haul road extensions	Richard Haul Road Lee Haul Road (T1N, R40E, Sections 13, 14, 24, and 25, i.e., Fossil Fork of Lee Coulee)	Lee Haul Road (T1N, R40E, Sections 13, 14, 24, and 25, i.e., Fossil Fork of Lee Coulee)
Ramp road construction	Lee Coulee Richard Coulee	Lee Coulee
New scoria pits	Two (T1N, R40E, one in Sections 26 and 27 and one in Section 35)	Two (T1N, R40E, one in Section 27 and one in Section 35)
Use of bottom ash	None	None
Buffer zones	100 feet	100 feet
Permitted discharges	Existing Area B outfalls (MT-0023965) 27 new outfalls (MT-0032042)	Existing Area B outfalls (MT-0023965) 18 new outfalls (MT-0032042)
Surface ownership (permit area)	13,993 acres private (92 percent) 1,160 acres State of Montana (8 percent)	13,993 acres private (92 percent) 1,160 acres State of Montana (8 percent)
Subsurface ownership (permit area)	9,944 acres private 1,160 acres State of Montana	9,944 acres private 1,160 acres State of Montana

Alternative Component	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
	4,049 acres federal government	4,049 acres federal government
Ownership of coal leases to be mined[2]	7,397 acres (total for Area B) 3,170 acres (AM5 addition only): *Private (3,089 acres)* *State of Montana (22 acres)* *Federal (59 acres)*	5,478 acres (total for Area B) 1,250 acres (AM 5 addition only): *Private (1,198 acres)* *State of Montana (22 acres)* *Federal (30 acres)*
Acres to be disturbed in the former Big Sky Mine permit area (C1988004B)	500 acres	500 acres
Reclamation Plan		
Reclamation of haul roads	Within 2 years of cessation of mining (estimated to be 2047)	Within 2 years of cessation of mining (estimated to be 2044)
Delay of reclamation in existing Area B permit area	Up to 15 years later than currently permitted	Up to 6 years later than currently permitted
Delay in reclamation of mine support facilities in other permit areas	Up to 7 years later than currently permitted	Up to 4 years later than currently permitted

[1]Based on Table 303-2 from Westmoreland Rosebud's Application (Alternative 2) and October 6, 2021, deficiency response (Alternative 3).

[2]Based on Table 303-1 from Westmoreland Rosebud's Application (Alternative 2) and October 6, 2021, deficiency response (Alternative 3). Acreages are rounded to the nearest whole number.

[3]Other disturbances mostly include undisturbed ground near or adjacent to other disturbed areas including ponds, sediment traps, and ditching associated with surface-water sediment controls; ramps connecting haul roads to the mining area; and electrical substations.

[4]Based on Table 322-2 from Westmoreland Rosebud's Application (Alternative 2) and October 6, 2021, deficiency response (Alternative 3).

Table E-2. Alternative 3 – Estimated Annual Production in Area B (as Modified by AM5) by Year and Acres Disturbed.

Operation Year	Tons ($\times 10^6$)	Cumulative Total	Acres Disturbed	
			Annual	Total
Before AM5	144.1	144.1	4,854.0	4854.0
Year 1	3.1	147.2	87.6	4941.6
Year 2	3.2	150.4	92.9	5034.4
Year 3	6.9	157.3	284.4	5318.8
Year 4	2.3	159.6	66.6	5385.4
Year 5	3.0	162.6	85.4	5470.8
Year 6	2.3	164.9	64.8	5535.6
Year 7	2.2	167.1	63.8	5599.4
Year 8	2.7	169.8	78.5	5677.9
Year 9	5.1	174.9	197.8	5875.7
Year 10	4.6	179.5	167.8	6043.4
Year 11	4.5	183.9	155.9	6199.3
Year 12	3.2	187.1	90.7	6290.0
Year 13	4.4	191.5	151.6	6441.6
Year 14	2.2	193.7	63.6	6505.2
Year 15	3.5	197.2	101.5	6606.6
Year 16	4.2	201.5	121.6	6728.2
Year 17	3.5	204.9	99.7	6827.9
Year 18	6.6	211.5	243.9	7071.9
Year 19	3.9	215.4	111.9	7183.8
Year 20	2.7	218.1	77.1	7260.9
Year 21 (begin closure)	0.0	218.1	466.7	7727.6
Year 22 (Closure Year 2)	0.0	218.1	466.7	8194.3
Total			**8,194**	

Table is based on Table 303-2 from Westmoreland Rosebud's Application Deficiency Response submitted on October 6, 2021.
Tonnage estimates provided in the table represent the most current information provided in Westmoreland Rosebud's Application and include the assumption that mining will continue as currently permitted in other permit areas of the Rosebud Mine.
Tons produced prior to AM5 include previously mined-out tonnages in the existing Area B permit area and the proposed Project area, including approximately 14 million tons of previously mined-out tonnages from Big Sky Mine (C1988004B).

1.2.2 Elements Common to All Action Alternatives

For both Alternatives 2 and 3, if the AM5 Area B permit amendment is approved by DEQ, the size of the permit area would be the same: 15,153 acres (a 9,108-acre or 151 percent increase from the existing Area B permit area). The additional acreage would be located adjacent to the southern boundary of the existing Area B permit area, primarily in the Lee Coulee and Richard Coulee drainages. As defined in the EIS in **Section S.1.1, Project Background**, the Project area is the 15,153-acre Area B permit area as modified by AM5; see **Figure E-1**.

If either action alternative is implemented, mining operations in the Project area would continue to run 24 hours a day, 7 days a week, and the same surface-mining and reclamation methods currently used in Area B (described in **EIS Section 2.2.2.2, General Mining Method** and **EIS Section 2.4.5, Reclamation Plan**) would continue to be employed throughout the Project area. Westmoreland Rosebud would continue to use fugitive dust control measures in the Project area and other supporting permit areas consistent with Montana Air Quality Permit (MAQP) #1483-09 throughout operations and reclamation. Blasting would continue to be completed according to Westmoreland Rosebud's approved blasting plan, which would be modified to include the entire Project area. Existing discharges for Area B (as currently permitted) would continue in accordance with existing MPDES Permit MT-0023965. New discharges from the Project area would occur in accordance with Westmoreland Rosebud's new MPDES Permit MT-0032042, if approved by DEQ.

Other elements described for Alternative 2 in the EIS would also be the same for Alternative 3, including methods for protecting the hydrological balance (**EIS Section 2.4.6**), such as ground water and surface water management, sediment-control measures, and protection of existing water rights, and any contingencies for cessation of operations (**EIS Section 2.4.7**).

1.2.3 Monitoring and Mitigation

Most monitoring and mitigations under Alternative 3 would be as described for Alternative 2 or would be very similar; one key difference is the hydrology mitigation proposed under Alternative 3 for impacts on the wet reach of Lee Coulee. **Table E-3** summarizes the key components of monitoring and mitigation under the two action alternatives; please see **EIS Sections 2.4.8** and **2.4.9** for greater detail. The timeline for monitoring is expected to be 9 years shorter under Alternative 3 than under Alternative 2.

Table E-3. Summary of Monitoring and Mitigation for All Action Alternatives.

Alternative Component	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Monitoring		
Note: Sources of monitoring requirements and/or descriptions are shown in italics		
Soil and spoil monitoring	*DEQ's Soil and Spoil Guidelines:* Systematic sampling and analysis of graded spoil and soil would be conducted.	Same as Alternative 2.
Revegetation monitoring	*Reclamation Plan*: A three-phase revegetation monitoring plan would be implemented during the bond liability period.	Same type of monitoring described for Alternative 2. See **Figure E-6** and **Figure E-7** for Reclamation and Revegetation Plans.
Stream monitoring	*Monitoring and Quality Assurance Plan*: Surface water monitoring would be undertaken in drainages, including drainages that contain wetlands. At all surface water monitoring sites, flow, field parameter data, and water level readings would be collected monthly. At the flumes, water levels and flow would be monitored continuously using pressure transducers. Water quality samples would be taken on a quarterly, event-based basis. Sediment samples would be collected monthly and after major precipitation and snowmelt events.	Same type of monitoring described for Alternative 2.
Pond monitoring	*Monitoring and Quality Assurance Plan*: Water level measurements at ponds would be collected monthly throughout the year, and field parameters would be collected monthly. Water quality samples would be collected semiannually.	Same type of monitoring described for Alternative 2.

Table E-3. Summary of Monitoring and Mitigation for All Action Alternatives.

Alternative Component	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Spring monitoring	*Monitoring and Quality Assurance Plan*: Springs, including those that feed wetlands, would be monitored. Spring flow data and field parameter data would be collected monthly. Water quality samples would be collected semiannually. The frequency of spring sampling would be increased to quarterly once mining commences in the drainage in which the spring is located.	Same type of monitoring described for Alternative 2.
Ground water monitoring	*Monitoring and Quality Assurance Plan*: Ground water monitoring wells are located throughout the Project area, including upgradient and downgradient of the proposed disturbance area. Water level measurement frequency in wells is based on the observed variability in water levels and potential for impact and would be collected quarterly or semiannually in most wells. Water quality samples would be collected semiannually, annually, or every third year, depending on observed trends in water quality and potential for impacts.	Same type of monitoring described for Alternative 2.
MPDES outfall monitoring	*Monitoring and Quality Assurance Plan*: Monitoring is required under MT-0023965 and would be required under the new MPDES Permit for the Project area.	Same type of monitoring described for Alternative 2. See **Figure E-4** for MPDES outfall locations.
Climate monitoring	*Monitoring and Quality Assurance Plan*: Precipitation data would be collected from 10 on-site rain loggers. Snow depth would be measured using snow boards at nine locations throughout the Rosebud Mine.	Same type of monitoring described for Alternative 2.
Protection of AVF monitoring	*Required by DEQ's 6th Round Deficiency Letter*: Additional alluvial ground water monitoring locations near the confluence of Richard Coulee and Rosebud Creek to verify, during and after mining, that the likely AVF on Rosebud Creek would not be impacted by mining.	No AVF monitoring would be needed, as there would be no new potential impacts on the potential Rosebud Creek AVF.
Wildlife surveys	*Wildlife Monitoring Plan*: Annual wildlife monitoring for the Rosebud Mine, including the Project area, would be undertaken for big game, upland game birds, raptors, and songbirds. In accordance with ARM 17.24.312(1)(d)(i), Westmoreland Rosebud would monitor threatened or endangered species listed under the Endangered Species Act of 1973, as amended, should these species be documented in the permit area.	Same as Alternative 2.

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Table E-3. Summary of Monitoring and Mitigation for All Action Alternatives.

Alternative Component	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Aquatic macroinvertebrate surveys	*New plan to be developed, if required*: Aquatic macroinvertebrate surveys were completed during the permit renewal cycle for Area B in East Fork Armells Creek. Surveys followed the DEQ 2012 protocol, *Sample Collection, Sorting, Taxonomic Identification, and Analysis of Benthic Macroinvertebrate Communities Standard Operating Procedure*.	Same as Alternative 2.
Mitigations		
Air quality mitigations	Fugitive Dust Control Plan, as required by MAQP #1483-09; may need to be updated to include the Project area.	Same as Alternative 2.
Cultural resources	Mitigation Plan, to be developed by Westmoreland Rosebud, submitted to DEQ, and approved by DEQ in coordination with the SHPO prior to disturbance.	Same as Alternative 2.
Hydrology mitigations for impacts on the wet reach of Lee Coulee	None proposed.	Two mitigation plans: 1) Installation of exempt well(s) constructed to discharge directly into Lee Coulee Pond (PO-311); and/or 2) Installation of exempt well(s) that would discharge directly to the wet reach of Lee Coulee.
Greater sage-grouse compensatory mitigation	$36,522.91 contribution to the Stewardship Fund.	Same as Alternative 2.
Fish and wildlife enhancement measures	Implement avoidance measures, minimize impacts, reclaim habitats, implement a wildlife conservation plan for T&E species and SOCs, and monitor wildlife use.	Same as Alternative 2.
Wetland mitigation	*Mitigation for direct impacts:* 12.27 acres of palustrine persistent emergent saturated wetlands and 2 open water features (G700 and 4-4/8). *Mitigation for secondary impacts:* 1.19 acres of wetlands impacted from changes to surface and ground water flows within the analysis area and 6.3 acres of downstream wetlands.	Mitigation for direct impacts: 1.93 acres of palustrine persistent emergent saturated wetlands and 1 open water feature. Mitigation for secondary impacts: 1.19 acres of wetlands impacted from changes to surface and ground water flows within the analysis area, 3.13 acres of downstream freshwater ponds, and 0.40 acre of downstream wetlands.
Operations plan mitigation and avoidance measures	Sediment-control structures, strategically placed pits and ponds, 120-ft haul roads designed to minimize wetland and spring crossings, compliance with MPDES Permits, proper disposal of hazardous materials, and concurrent (within 2 years) reclamation.	Same as Alternative 2.
Mitigations for the loss of wetland function and values	Creation through reclamation, enhancement of wetland habitat, state initiative support, and restoration.	Same as Alternative 2.

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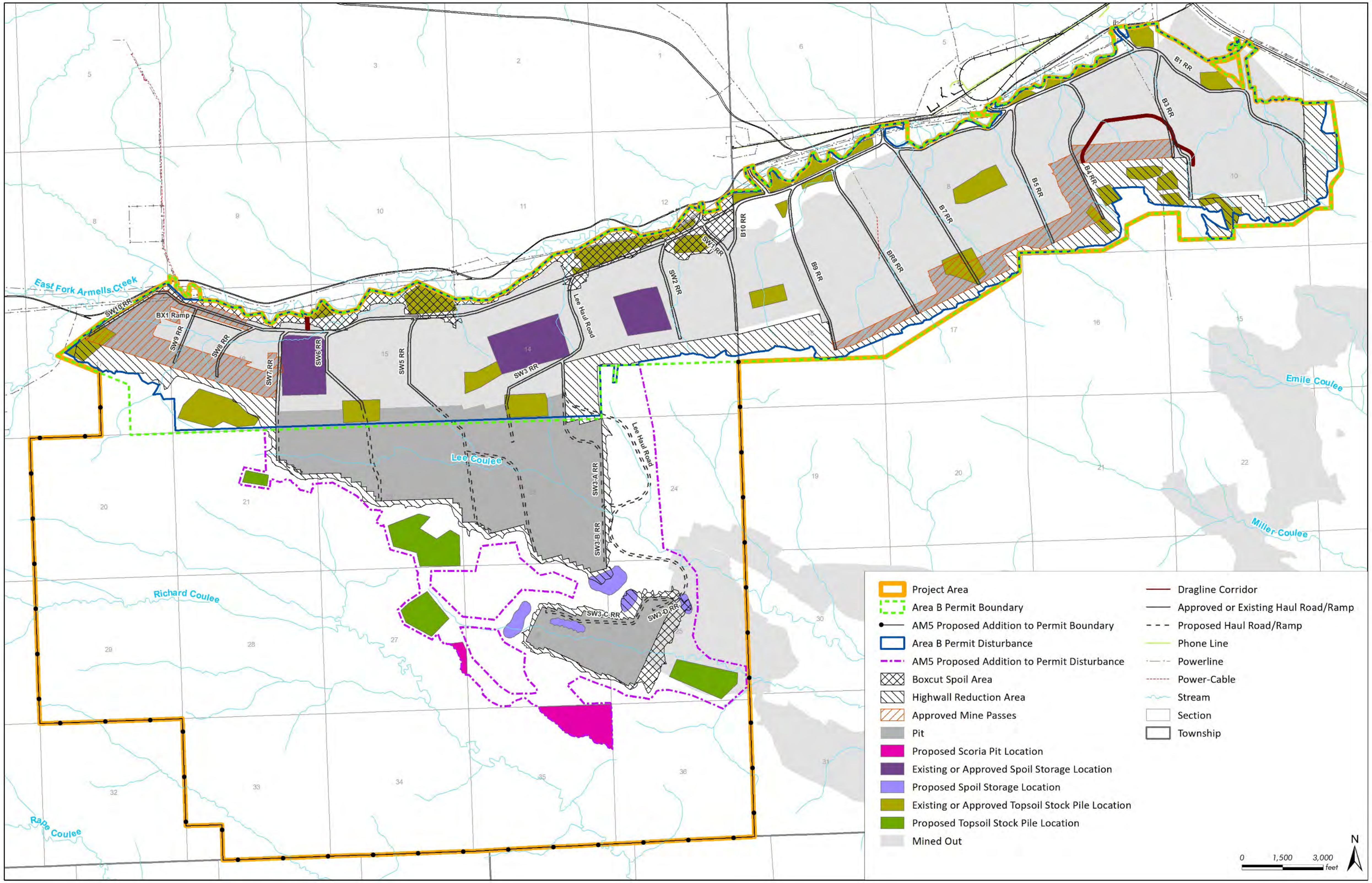

Figure E-1. Proposed Project Area (Alternative 3).

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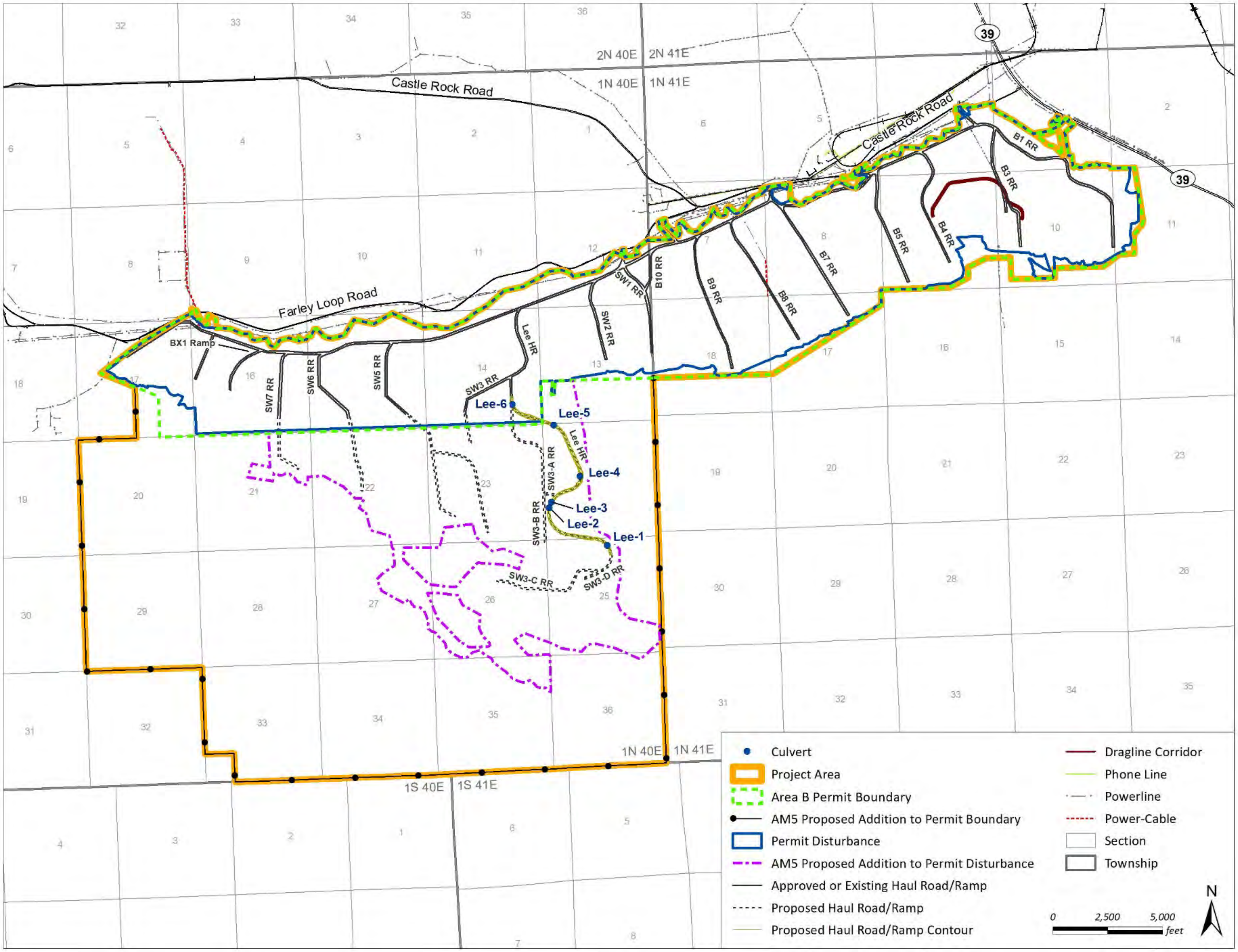

Figure E-2. Proposed Ramp Road and Haul Road Construction (Alternative 3).

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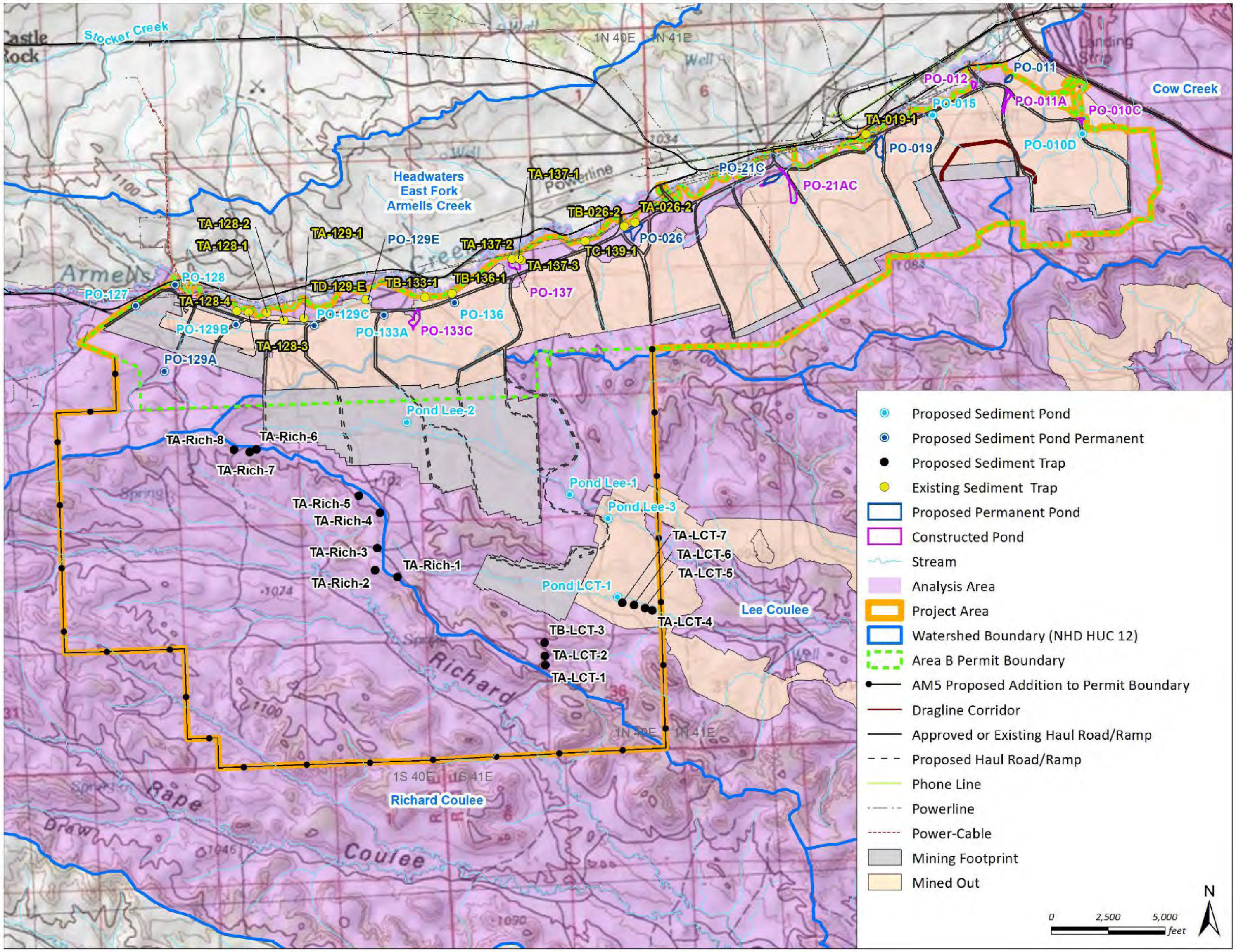

Figure E-3. Hydrologic Control Plan (Alternative 3).

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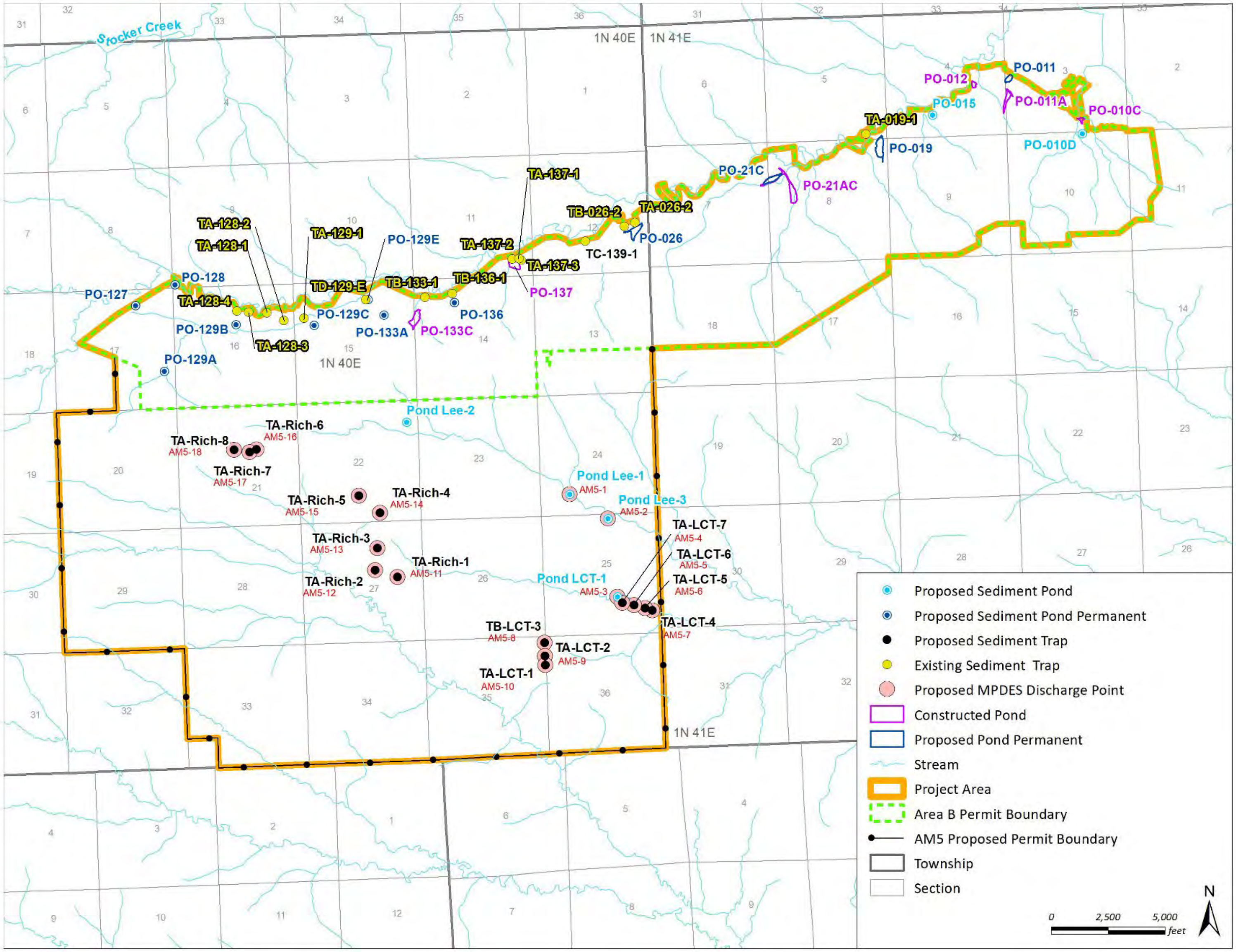

Figure E-4. Proposed MPDES Permit MT-0032042 Outfalls and Sediment Ponds and Traps (Alternative 3).

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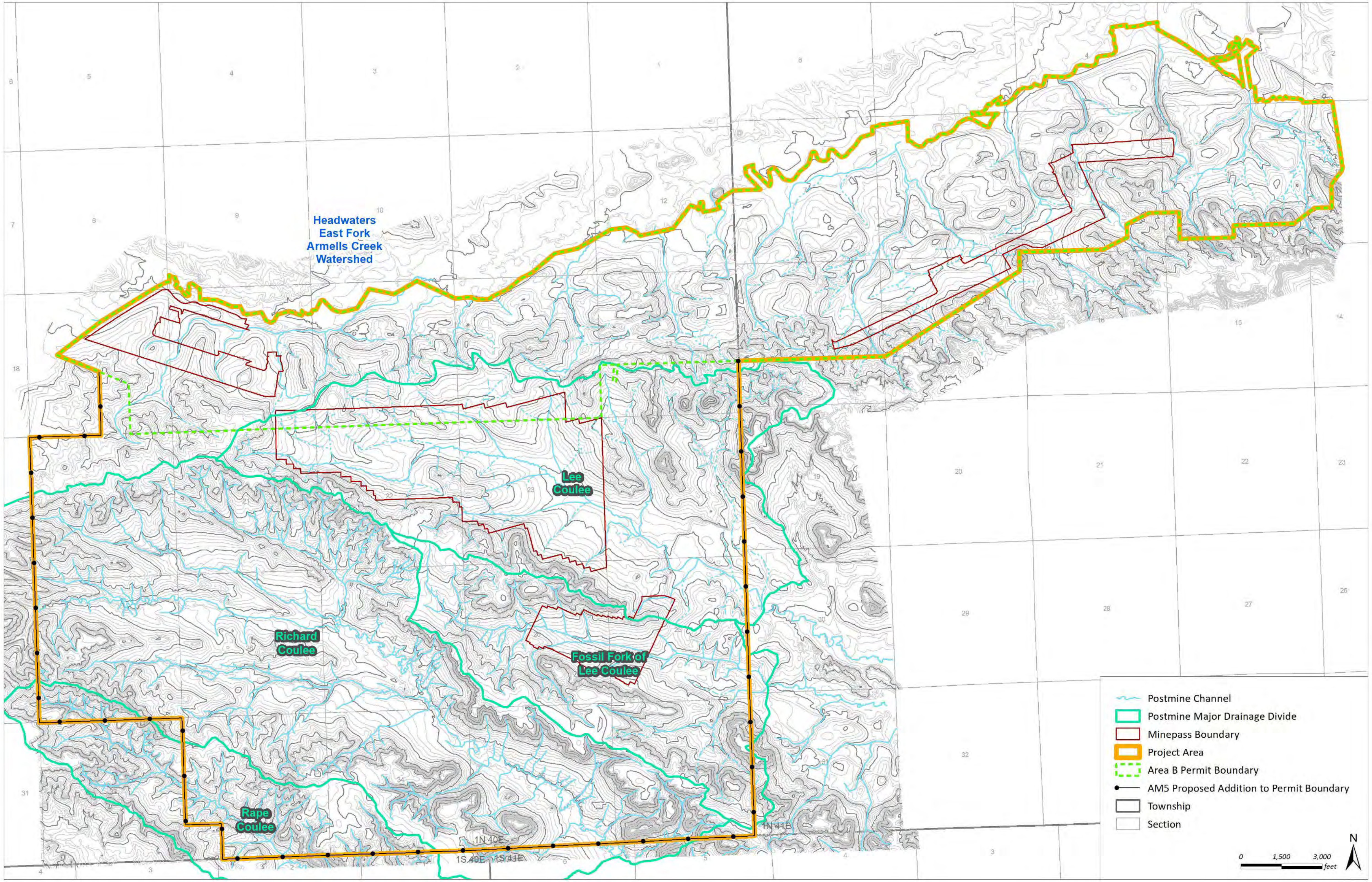

Figure E-5. Proposed Postmine Topography (Alternative 3).

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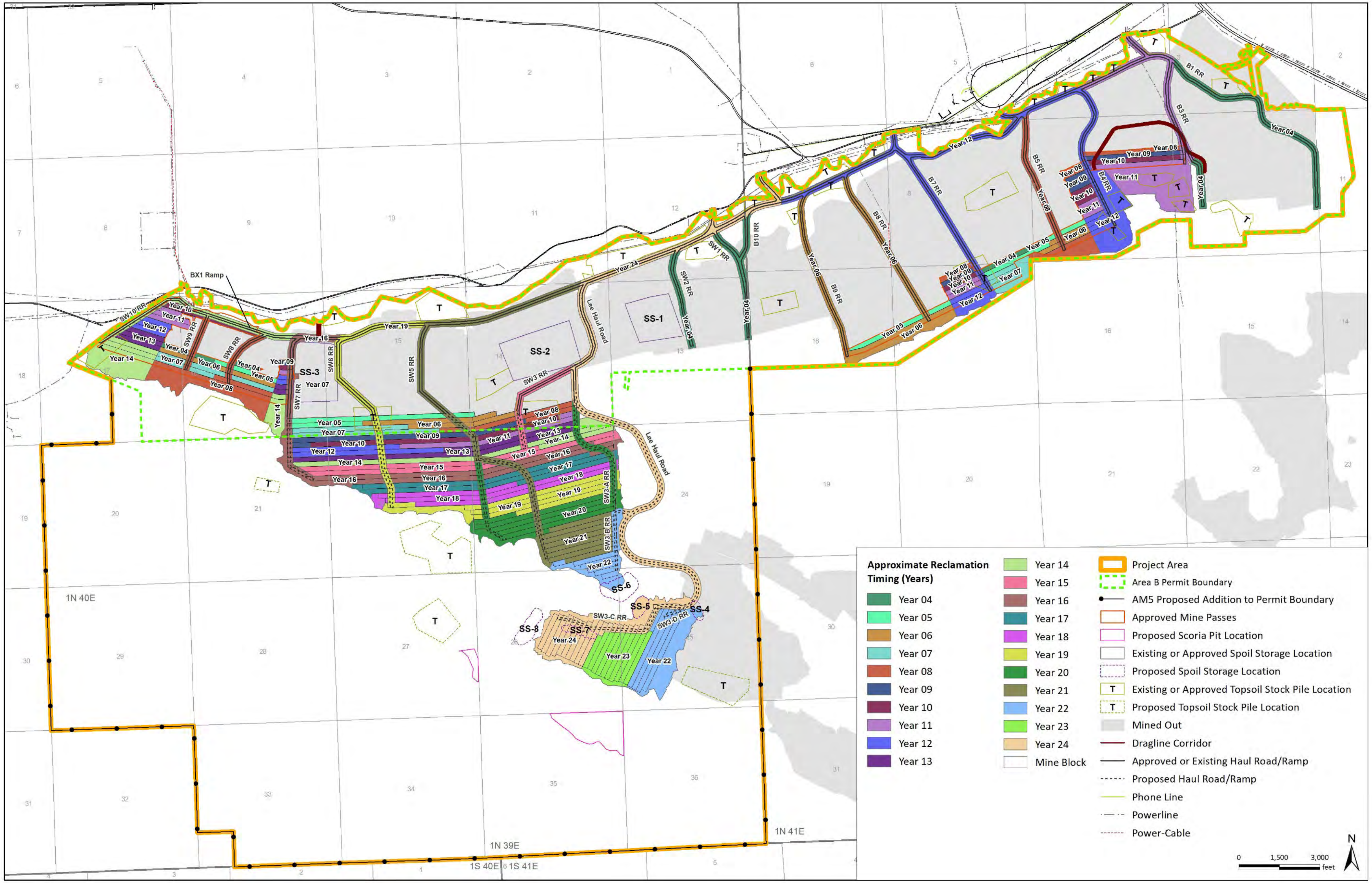

Figure E-6. Alternative 3 Reclamation Plan (Grading, Application of Soil, and Seeding).

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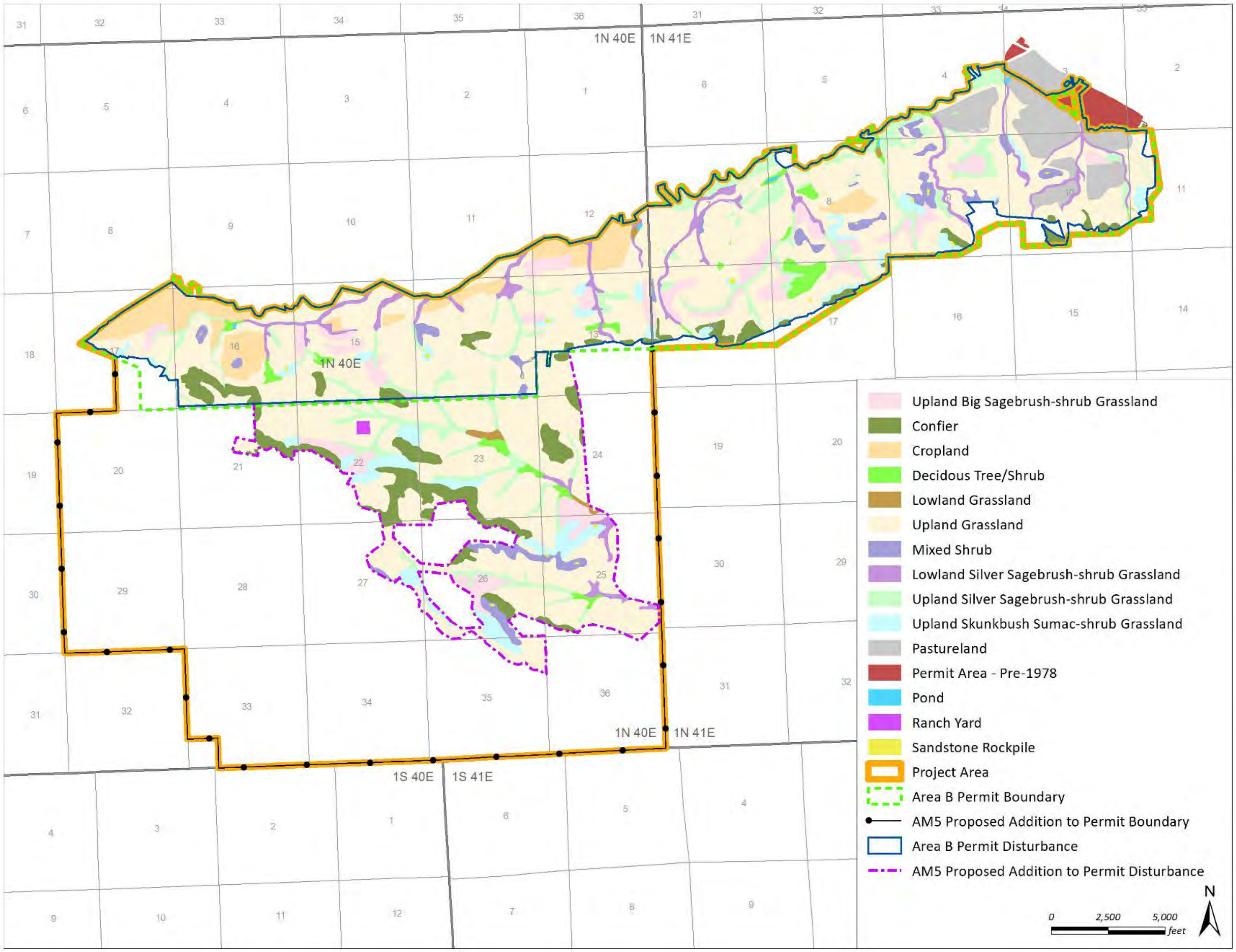

Figure E-7. Proposed Revegetation Plan (Alternative 3).

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1.3 UPDATES TO THE AFFECTED ENVIRONMENT

This section describes updates to the affected environment since the issuance of the Draft EIS.

1.3.1 Colstrip Power Plant

The Colstrip Power Plant is located in the city of Colstrip and currently is operated by Talen Energy. Colstrip Units 1 and 2, which each had 307 megawatts (MW) of generating capacity; were constructed in 1972; began operating in 1975 and 1976, respectively; and were retired from use on January 2, 2020, and January 3, 2020, respectively.

Colstrip Units 3 and 4, which each have about 740 MW of generating capacity, started operating in 1984 and 1986, respectively, and are currently generating power. The Colstrip Power Plant Units 3 and 4 were originally limited to burning coal from Areas C, D, and E, but in 2015, DEQ approved an amendment to the Major Facility Siting Act (MFSA) Certificate also allowing the use of coal from other permit areas. In March 2019, DEQ approved an amendment to the MFSA Certificate to allow the Colstrip Power Plant Units 3 and 4 the flexibility to also use non-Rosebud seam coal obtained from mines other than the Rosebud Mine (DEQ 2019). Talen Energy subsequently rescinded the 2019 amendment request, and the power plant is once again limited to using Rosebud seam coal from the Rosebud Mine. There was a statutory amendment in 2021, however, that may allow Talen to use non-Rosebud coal without amending the Power Plant's MFSA Certificate. See HB 648, Sec. 5 (67^{th} Leg., 2021), § 75-20-228, MCA.

1.3.2 Monarch Butterfly

In December 2020, the monarch butterfly (*Danaus plexippus plexippus*) was designated as a candidate species under consideration for listing as an endangered species (85 *Federal Register* 243). The monarch's range includes southern Canada and the entire continental United States to South America. This distinctive, large (5.2 to 5.8 centimeters long at the forewing), orange and black butterfly overwinters in California and Mexico. Larval food plants include several species of *Asclepias* (milkweed - the primary host plant genus), *Apocynum*, *Calotropis*, *Matelea*, and *Sarcostemma*; adults feed on nectar from a variety of flowers (MNHP 2022a).

The species is known to occur throughout Montana during summer and fall months at elevations between 2,000 and 3,000 feet in open places, native prairie, foothills, open valley bottoms, open weedy fields, roadsides, pastures, marshes, and suburban areas (MNHP 2022a). Potential habitat occurs in the analysis area, but no critical habitat has been designated. The nearest known occurrences of this species to the analysis area are documented along the Yellowstone River and Smith Creek north and west of Forsythe in Rosebud and Custer Counties (MNHP 2022b).

1.3.3 Wildland Fire and Prescribed Burns

Wildland fires have historically occurred in the vicinity of the Rosebud Mine. During the 2012 wildland fire season, the McClure Creek and Donley Creek fires burned 221 acres, impacting vegetation and wildlife on and around the southern boundary of Rosebud Mine Areas C and F. The 2012 Chalky Fire burned 131,000 acres south of Area B, including the majority of the AM5 area. In the summer of 2021, the Richard Spring Fire, which began in a coal seam approximately 10 miles southwest of Colstrip on August 8, burned 171,130 acres in the vicinity of the Rosebud Mine, including nearly the entire Project area (**Figure E-8**). Vegetation burned in the fire was primarily short grass beneath a ponderosa pine overstory but also included interspersed areas of sage brush and juniper (InciWeb 2021).

It is currently unclear what water quality and quantity impacts on the affected environment have resulted from the Richard Spring Fire. Wildfire impacts would first be detected in surface water as precipitation interacts with the charred remains of the impacted land surface. Impacts on surface water would include an increase in turbidity of surface water as ash is transported downgradient and erosion of the land surface increases from the loss of vegetation. Water quality effects due to wildfire can result in pH changes as well as the addition of nutrients, dissolved organic carbon, major ions, and metals. The loss of vegetation from the wildfire can also alter the quantity of water within a watershed due to the reduction of water uptake by vegetation and the increase in evaporation rate due to ground temperatures increasing from the loss of shade-producing vegetation. Water quality effects in ground water from changes to surface water would likely be more pronounced in shallow alluvial ground waters relative to deeper bedrock ground waters, where the effects of pH changes would be better buffered and nutrient increases could be mitigated by geochemical conditions due to the longer residence times of ground water in a deeper saturated zone relative to a shallower saturated zone.

Effects of wildland fires, such as the Richard Spring Fire, also include alteration of vegetation communities, increases or decreases in nonnative and noxious weed species, alteration of wetland habitats, and reduction in insect pests that may be adversely affecting native vegetation. All of these impacts would have associated impacts on wildlife and their habitats.

Wildland fire effects may also include breakdown in soil structure, reduced moisture retention and capacity, and development of water repellency, all of which increase susceptibility to erosion. One of the most important impacts on soils results from the combustion of organic matter. Consumption of organics can range from scorching (producing black ash) to complete ashing (producing white ash), depending on fire severity, moisture content, and thickness of the organic layer. The effects of fire on soils are a function of the amount of heat released from combusting biomass and the duration of combustion.

Effects of wildland fires on cultural resources include burning of any intact structural features and surface artifacts. Charcoal remnants and root burn can also contaminate sites for potential carbon dating techniques.

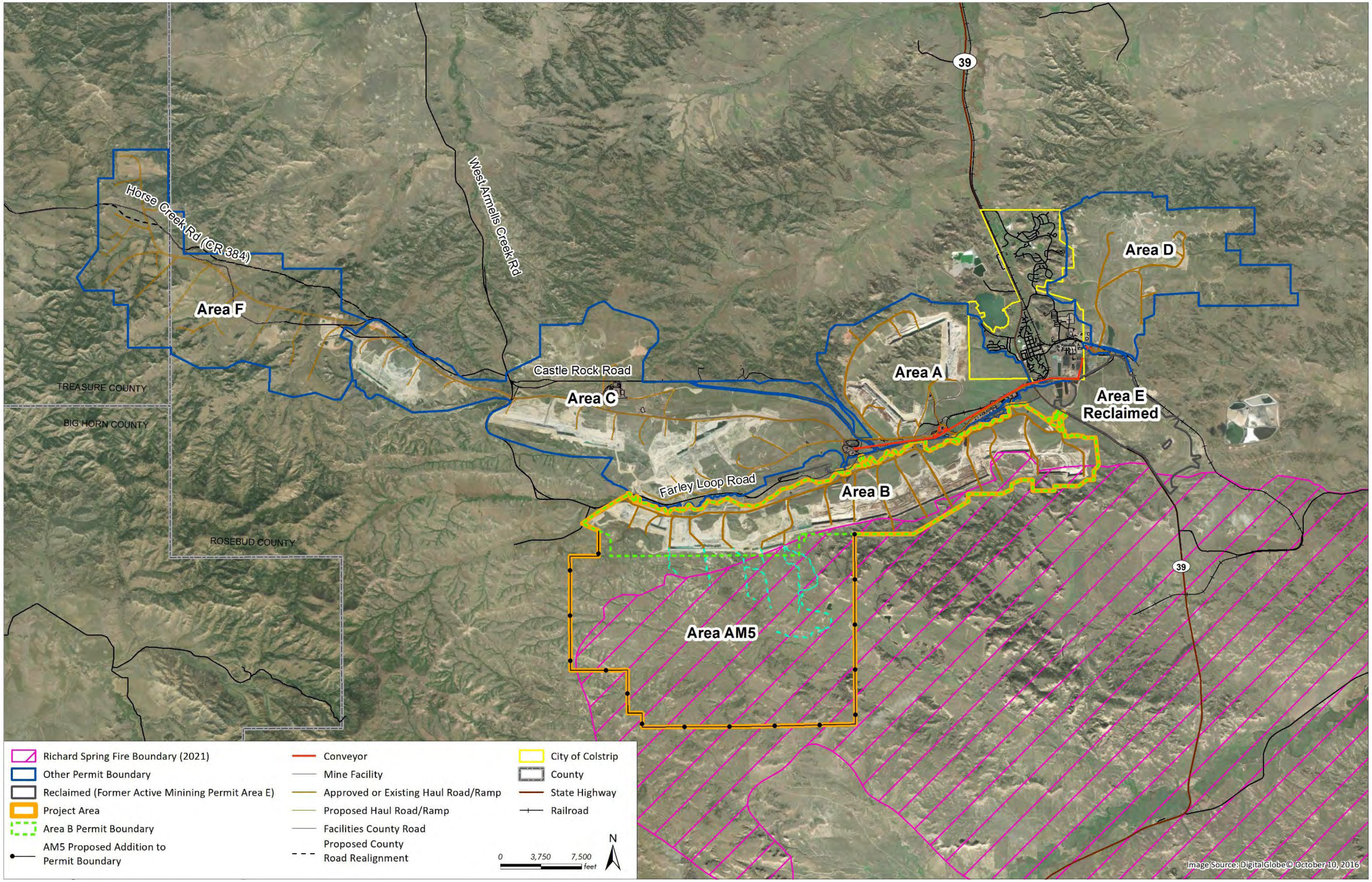

Figure E-8. 2021 Richard Spring Fire.

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1.4 ENVIRONMENTAL CONSEQUENCES

This section describes the environmental impacts (direct, secondary, and cumulative) that may result from selection and implementation of Alternative 3 – Lee Coulee Only. Impacts were analyzed by considering the impacts of an action (direct, secondary, and cumulative) on each of the 17 resources described in the EIS. DEQ based these impact analyses and conclusions on the review of existing literature and studies, information provided by resource specialists and other agencies, professional judgment, agency staff insights, and public input; resource-specific analysis methodologies are provided in the introductions to each resource section.

1.4.1 Introduction

1.4.1.1 Analysis Areas

Alternative 3 impacts (direct, secondary, and cumulative) were analyzed using the same or similar analysis areas that were used for Alternatives 1 and 2; these resource-specific analysis areas are described in **Chapter 3** of the EIS and summarized below under each resource heading. To use the most appropriate boundaries for each resource, the analysis areas varied by resource and were one of the following: (1) the 15,153-acre Project area (**Figure E-1**), (2) the 5,711-acre area of new Project-related disturbance (within the Proposed Action's 11,202-acre disturbance area) (**Figure E-1**), or (3) another resource-specific boundary. Figures for resource-specific analysis areas are in **Chapter 3** of the EIS and cross-referenced, as applicable, in this appendix; the Alternative 3 surface water analysis area is included in this appendix as **Figure E-9** in **Section 1.4.5**.

1.4.1.2 Actions Considered in Cumulative Impacts Analyses

The past, present, and future actions that would contribute to cumulative impacts on human and environmental resources are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**. Two exceptions are the Richard Spring wildfire in the Project area and an amendment to the MFSA certificate for the Colstrip Power Plant. These actions are described in **Section 1.3, Updates to the Affected Environment** and are discussed below in the resource-specific cumulative impacts sections.

1.4.1.3 Definitions

As a reminder, in this EIS, an environmental impact is any change from the present condition of any resource or issue that may result as a consequence of implementation of the No Action Alternative (Alternative 1), the Proposed Action (Alternative 2), or Lee Coulee Only (Alternative 3 – Lee Coulee Only). Definitions used to describe impacts are provided in **EIS Section 3.1.1, Definitions Used for Impacts Analyses.**

1.4.1.4 Summary of Impacts

Table S-1, which was included in the Summary of the Draft EIS in **Section S.7, Potential Environmental Impacts**, has been updated to include Alternative 3 and is presented below. The updated **Table S-1** (now **Table E-4**) summarizes and compares the potential direct and secondary impacts on natural, cultural, and human resources associated with the three alternatives. Direct, secondary, and cumulative impacts are described fully in the Draft EIS for Alternatives 1 and 2 and in the sections below for Alternative 3.

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Table E-4. Potential Environmental Impacts (Updated to Include Alternative 3).

Resource	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Topography (Section 3.2)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	5,711 acres would be disturbed (68 acres within this area have been disturbed previously). During operations, impacts would be noticeable. Reclamation of portions of the existing Area B permit area would be delayed by 15 years due to ongoing operations in the Project area. In accordance with the reclamation plan, the postmine landscape of the analysis area would be restored after mining operations to the approximate original contour to facilitate postmine land uses. Over time, differential erosion of the spoil could occur, including the preferential erosion of the softer stone fragments and sediment relative to the harder stone fragments in created areas of drainage and hillsides.	2,658 acres would be disturbed within Lee Coulee area; no topography impacts would occur in Richard Coulee. The types of impacts to topography that would occur in Lee Coulee under Alternative 3 would be the same as described for Alternative 2. The duration of mining would be nine years shorter under Alternative 3, allowing the reclamation plan to be implemented sooner and the area disturbed from mining would be reduced by 3,053 acres as compared to Alternative 2.
Air Quality (Section 3.3)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	Direct and secondary air quality impacts would occur as a result of the emission of air pollutants from mining and reclamation operations. Fugitive dust-generating activities such as topsoil and overburden removal and handling, coal removal and processing and transport, blasting of coal and overburden, travel on unpaved haul and access roads, and wind erosion of disturbed areas would be the primary source of PM emissions. Vehicle exhaust would also be a source of PM emissions as well as gaseous emissions of NO_x, SO_2, CO, and VOC. Explosives use in coal and overburden blasting would result in gaseous emissions of NO_x, SO_2, and CO.	The direct impacts on ambient concentrations of criteria air pollutants and hazardous air pollutants under Alternative 3 would be typically similar to or lower than the modeled impacts discussed under Alternative 2. Secondary air quality impacts under Alternative 3 would be generally comparable to or less than those estimated under Alternative 2. The modeled cumulative concentrations from all sources (including the Project Area, Area F, and all other regional emission sources outside the Rosebud Mine) under Alternative 3 would be well below the NAAQS and MAAQS for all criteria air pollutants.
Geology and Geochemistry (Section 3.4)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	5,711 acres would be disturbed, and an estimated 104.3 million tons of coal not currently approved under the existing Area B operating permit would be removed. The mining process would alter the overburden geology in the analysis area. The removal of overburden and the Rosebud Coal, and the subsequent replacement of spoil, would result in the alteration of the horizontal continuity of the overburden that would last until the spoil is eroded away. Spoil deposits would be created within the valley bottoms of Richard and Lee Coulees.	2,658 acres would be disturbed within Lee Coulee and an estimated 42.9 million tons of coal not currently approved under the existing Area B operating permit would be removed. The types of geology and geochemistry impacts that would occur under Alternative 3 would be the same as under Alternative 2, but would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and reduced amount of coal removed.
Water Resources – Surface Water (Section 3.5)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	Adverse impacts on surface water include the following: (1) the loss of ephemeral streams, such as Richard and Lee Coulees and their tributaries within the mine disturbance boundary; (2) the loss of existing springs and stock ponds within the mine disturbance boundary; (3) the reduction or elimination of spring flows to wetlands and stock ponds sourced from overburden or spoil ground water; and (4) changes to in-stream and spring-fed pond water quality during mining and after mining and reclamation is completed due to the discharge of ground water from the spoil to undisturbed strata downgradient of the mine and from those undisturbed strata to streams and ponds downslope of the mine. Some surface runoff to streams would be captured in sediment ponds and discharged to streams at permitted MPDES outfalls during mining. Westmoreland Rosebud must obtain MPDES Permit coverage for all discharges from the Project area to surface waters and has submitted an Application to DEQ and the application was determined complete on June 1, 2020. Changes to site hydrology would continue during mining and reclamation until sedimentation ponds are removed and the watershed topography and hydrology are reclaimed to conditions similar to pre-mine conditions. After mining, reclamation would replace a drainage network that approximated the form and function of the pre-mine drainage network. Ponds and small depressions may be included in reclamation to support the postmine land use, including wildlife habitat. In the event that water quantity or quality changes caused by mining render a surface water unfit for designated beneficial uses, 82-4-253, MCA and ARM 17.24.648 require the permittee to provide replacement water immediately on a temporary basis, and to replace water in like quality, quantity, and duration if the loss is caused by mining.	Adverse impacts of Alternative 3 on surface water would be similar to those described for Alternative 2, but would include less area due to the elimination of mining in Richard Coulee. As with Alternative 2, Westmoreland Rosebud must obtain MPDES Permit coverage for all discharges from the Project area to surface waters and has submitted an Application to DEQ for a new MPDES Permit (MT-0032042) to include 18 new outfalls. DEQ determined the application was complete on June 1, 2020. In the event that water quantity or quality changes caused by mining render a surface water unfit for designated beneficial uses, 82-4-253, MCA and ARM 17.24.648 require the permittee to provide replacement water both immediately on a temporary basis, and to replace water in like quality, quantity, and duration if the loss is caused by mining.

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Table E-4. Potential Environmental Impacts (Updated to Include Alternative 3).

Resource	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Water Resources – Ground Water (Section 3.6)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	Removing the alluvium, overburden, and Rosebud Coal within the Project area drainages during mining would likely result in reduced baseflow, if present, in nearby downstream reaches during and after mining until ground water levels have recovered. Soluble salts from spoil would dissolve into ground water, increasing TDS concentrations in ground water. Ground water levels in the unmined portions of the Rosebud Coal would decline as the mined coal is dewatered and removed; the maximum extent of 5 feet of drawdown would be about 5 feet at a distance typically about 1 to 2 miles with slightly greater distance in the downgradient southeastern direction. Up to 16 wells would be impacted by Project activities. Of these, 15 are stock wells and 1 is of unknown purpose. Of the 16 wells, 11 would be removed by mining and 5 are within the disturbance area. Eight of the 11 monitored springs in the Project area would be affected by mining. Spring flows would not be reduced or eliminated until the overburden in the vicinity of the spring was mined out. The hydrologic characteristics of the overburden would change as it becomes spoil, and there would be a slow (greater than 50 years) recovery of ground water levels in the Project area. Alluvial ground water TDS concentrations near the mine would likely increase from pre-mine concentrations due to the expected higher TDS concentration in spoil ground water. Ground water quality changes would not impact existing and listed beneficial uses to support the primary pre-mine uses of domestic and livestock watering. In the event that water quantity or quality changes caused by mining render a surface water unfit for designated beneficial uses, 82-4-253, MCA and ARM 17.24.648 require the permittee to provide replacement water immediately on a temporary basis, and to replace water in like quality, quantity, and duration if the loss is caused by mining.	Adverse impacts to ground water quality and quantity under Alternative 3 would be similar to Alternative 2 but would be less severe due to the reduced removal of coal and elimination of mining in Richard Coulee. Mining in Lee Coulee under Alternative 3 would result in no changes in TDS/SC in Rosebud Creek compared to existing/previous mining. Ground water quality changes would not impact existing and listed beneficial uses to support the primary pre-mine uses of domestic and livestock watering. In the event that water quantity or quality changes caused by mining render a surface water unfit for designated beneficial uses, 82-4-253, MCA and ARM 17.24.648 require the permittee to provide replacement water both immediately on a temporary basis, and to replace water in like quality, quantity, and duration if the loss is caused by mining.

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Table E-4. Potential Environmental Impacts (Updated to Include Alternative 3).

Resource	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Water Resources – Water Rights (Section 3.7)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	Of the 62 surface water rights in and around the analysis area, 42 are not anticipated to be impacted due to their location in drainages or due to remaining water sources that are expected to provide adequate supply. Short-term water quantity (no water quality) impacts are possible in 12 of the 62 surface water rights; all 12 constitute stock use directly from the source. Eight are anticipated to be impacted by the Project due to their proximity location within the disturbance area including seven dams. Of the 14 spring water rights used for stock watering in the impact analysis area (Richard and Lee Coulee drainages), 13 are not likely to be impacted because of their location upgradient or outside of the mining area; and 1 may experience a temporary reduction of flow rate, nearby ground disturbance, or removal of its water source. Of the 48 wells in proximity to the Project area, 16 would be impacted by Project mining as they are either anticipated to be mined out or are in the disturbance area. No wells outside the disturbance area are anticipated to be impacted by drawdown or water quality impacts. If a water right associated with a spring, stream, stock pond, or well became inadequate or unusable for its specified beneficial use due to water quantity or water quality changes attributed to mining, and if the impact was detected and a complaint of harm was filed by a water right holder, DEQ would determine if harm had occurred, and a suitable replacement source would be provided by Westmoreland Rosebud. If a water right associated with a spring, stream, stock pond, or well was impacted during or after mining but still contained sufficient water of adequate quality to meet beneficial use needs, the impact would extend until such time that the impact was detected and a replacement water source was provided or until water quantity returned to pre-mining conditions after reclamation.	Direct impacts of Alternative 3 on water rights would be similar to those described for Alternative 2, but would impact fewer water rights due to the elimination of mining in Richard Coulee. Of the 62 surface water rights in and around the analysis area, 46 are not anticipated to be impacted due to their location in drainages or due to remaining water sources that are expected to provide adequate supply; 12 are anticipated to have short-term impacts to ephemeral flow (11 of which constitute stock use directly from the source and 1 of which constitutes stock use from a dam); and 4 are anticipated to be impacted by the Project due to their location within the disturbance area, all of which are dams used for stock purposes (42A 145437 00, 42A 145440 00, 42A 8207 00, and 42KJ 183306 00). None of the spring water rights are likely to be impacted because of their location outside of the mining area. Of the 48 wells in proximity to the Project area, 7 wells would be removed by mining and require replacement during reclamation. No wells outside the disturbance area are anticipated to be impacted by drawdown or water quality impacts. If a water right associated with a spring, stream, stock pond, or well became inadequate or unusable for its specified beneficial use due to water quantity or water quality changes attributed to mining, and if the impact was detected and a complaint of harm was filed by a water right holder, DEQ would determine if harm had occurred, and a suitable replacement source would be provided by Westmoreland Rosebud. If a water right associated with a spring, stream, stock pond, or well was impacted during or after mining but still contained sufficient water of adequate quality to meet beneficial use needs, the impact would extend until such time that the impact was detected and a replacement water source was provided or until water quantity returned to pre-mining conditions after reclamation.
Vegetation (Section 3.8)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2, and Rosebud Mine facilities would be reclaimed and the areas revegetated 7 years earlier than in Alternative 2.	Vegetation communities on up to 5,711 acres would be lost during mining operations, which would result in a short-term adverse impact on vegetation. Areas that require vegetation clearing and removal would be subject to an overall loss of biodiversity and a short-term loss of productivity during the active mining period. Reclamation would reestablish plant communities, but biodiversity would be reduced and species composition would not be the same. Loss of soil structure, loss of organic matter due to mixing and storage, and loss of microorganisms due to prolonged storage of soil could lower postmining vegetative diversity for an extended period. Mining activities lower the regional water table near the mine pits, which could adversely impact adjacent vegetation communities, especially wetland and riparian areas. Reclamation of the existing ramp roads and the Area B haul road in the existing Area B permit area would be delayed by 15 years, prolonging vegetation reestablishment in those areas.	Vegetation communities on up to 2,568 acres would be lost during mining operations, which would result in a short-term adverse impact on vegetation. The nature of the impacts would be similar to what was described for Alternative 2. Secondary impacts would be similar to those described for Alternative 2. Overall loss of biodiversity, short-term loss of productivity during the active mining period, loss of soil structure, loss of organic matter due to mixing and storage, loss of microorganisms due to prolonged storage of soil, and impacts to water-dependent vegetation communities (wetlands and riparian areas) would be less under Alternative 3 due to the smaller disturbance area and nine-year shorter mine life as compared to Alternative 2.

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Table E-4. Potential Environmental Impacts (Updated to Include Alternative 3).

Resource	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Wetlands (Section 3.9)	No Project impacts.	Project mining activities would directly impact 12.27 acres of palustrine persistent emergent saturated wetlands and two open water features (a shallow pool and a remnant pit pond) in the analysis area. An additional 1.19 acres of wetlands would be impacted from changes to surface and ground water flows within the analysis area, and 6.3 acres of wetlands within the downstream watersheds (per the National Wetlands Inventory) may be impacted by reduction in ground water flows and ephemeral flows or changes in discharge location. All impacted wetlands are nonjurisdictional. Overall, the Proposed Action would have a short-term and long-term adverse impact on wetlands. Reclamation of wetlands onsite would achieve the same functions and values of pre-mining conditions but may not do so for a considerable amount of time. The mitigation of wetlands would provide replacement of the functions and values lost.	Project mining activities would directly impact 1.93 acres of palustrine persistent emergent saturated wetlands and two open water features (a shallow pool and a remnant pit pond) in the analysis area. An additional 1.19 acres of wetlands would be impacted from changes to surface and ground water flows within the analysis area, and 3.13 acres of freshwater ponds and 0.40 acre of wetlands within the downstream watersheds (per the National Wetlands Inventory), may be impacted by reduction in ground water flows and ephemeral flows or changes in discharge location. All impacted wetlands are nonjurisdictional. Overall, Alternative 3 would have a short-term and long-term adverse impact on wetlands, but these would be less than under Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter project duration (nine years shorter). The mitigation of wetlands would provide replacement of the functions and values lost.
Fish and Wildlife Resources (Section 3.10)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2, and Rosebud Mine facilities would be reclaimed and the areas revegetated 7 years earlier than in Alternative 2.	5,711 acres of wildlife habitat would be disturbed in the analysis area. Additional adverse impacts would occur from surface disturbances that remove vegetation, result in direct mortality of or injury to wildlife, or cause behavioral shifts such as a change in movement or displacement to other areas due to increased human activity and noise from blasting and mining operations. Direct impacts on Montana Species of Concern would be considered moderate due to the permanent loss or modification of habitat. Mining and associated land clearing and vegetation removal activities would adversely affect monarch butterflies (ESA candidate species) due to short-term foraging habitat loss and potential loss of breeding habitat. There would be no other impacts on federally listed threatened and endangered species. Greater sage-grouse are not known to occur in the analysis area; however, mining activities would displace any greater sage-grouse that did occur from active mining areas to other areas and would remove general habitat. Mitigation and minimization measures would reduce overall impacts. Reclamation after mining disturbance would establish general habitat.	2,658 acres of wildlife habitat would be disturbed in the analysis area. The nature of the impacts would be similar to what was described for Alternative 2. Direct impacts on Montana Species of Concern would be considered moderate due to the permanent loss or modification of habitat. Impacts on monarch butterflies would be similar to what was described for Alternative 2, but would be limited to a smaller area (2,658 acres instead of 5,711 acres). There would be no other impacts on federally listed threatened and endangered species. Greater sage-grouse are not known to occur in the analysis area; however, mining activities would displace any greater sage-grouse that did occur from active mining areas to other areas and would remove general habitat. The impact of Alternative 3 would be less than Alternative 2 due to the smaller disturbance area; mitigation and minimization measures would reduce overall impacts. Reclamation after mining disturbance would establish general habitat.
Cultural and Historic Resources (Section 3.11)	No Project-related ground disturbance within the analysis area and, therefore, no potential for adverse impacts on cultural resources.	Over the life of the Project, 31 potential historic properties would be adversely affected by ground-disturbing activities on 5,711 acres including 27 properties (primarily prehistoric camps or lithic scatters) determined eligible for listing in the NRHP, 3 that remain unevaluated for listing in the NRHP, and 1 historic district (the Lee Community Historic District). Adverse impacts on the potential historic properties would be resolved through a mitigation plan, to be developed by Westmoreland Rosebud, submitted to DEQ, and approved by DEQ in coordination with the SHPO prior to disturbance. In addition to a previous pedestrian survey, the mine recently conducted an ethnographic overview (Ferguson 2022) to identify any other potential historical properties or traditional cultural properties important to consulting tribal parties. No additional potential historic properties or TCPs were identified from the ethnographic overview (Ferguson 2022).	Over the life of the Project, 8 potential historic properties would be adversely affected by ground-disturbing activities on 2,658 acres, including 7 properties determined eligible for listing in the NRHP and one that remains unevaluated for listing in the NRHP. Adverse impacts on the potential historic properties would be resolved through a mitigation plan, to be developed by Westmoreland Rosebud, submitted to DEQ, and approved by DEQ in coordination with the SHPO prior to disturbance. As described for Alternative 2, an ethnographic overview (Ferguson 2022) was recently conducted.

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Table E-4. Potential Environmental Impacts (Updated to Include Alternative 3).

Resource	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Socioeconomics (Section 3.12)	Economic impacts would be the same as the Proposed Action but would end in 2038 due to mine closure, 7 years earlier than under the Proposed Action.	The Rosebud Mine would be expected to operate until 2045. While operating, the Rosebud Mine would support: 269 direct jobs (53 on the Northern Cheyenne Indian Reservation), 59 indirect jobs (11 on the Northern Cheyenne Indian Reservation), 77 induced jobs (14 on the Northern Cheyenne Indian Reservation), $131 million in annual direct economic output ($25.7 million on the Northern Cheyenne Indian Reservation), $15.5 million in annual indirect economic output ($2.7 million on the Northern Cheyenne Indian Reservation), $9.9 million in annual induced economic output ($1.8 million on the Northern Cheyenne Indian Reservation), $23 million in annual state revenues, and $8 million in annual taxes and royalties.	The Rosebud Mine would be expected to operate until 2042. While operating, the mine would support 195 direct jobs (38 on the Northern Cheyenne Indian Reservation), 43 indirect jobs (8 on the Northern Cheyenne Indian Reservation), 56 induced jobs (10 on the Northern Cheyenne Indian Reservation), $95 million in annual direct economic output ($18.6 million for the Northern Cheyenne Indian Reservation), $11.2 million in annual indirect economic output ($2 million for the Northern Cheyenne Indian Reservation), $7.2 million in annual induced economic output in the three counties, ($1.3 million for the Northern Cheyenne Indian Reservation), $16.6 million in annual state revenues, and $5.2 million in annual taxes and royalties.
Visual Resources (Section 3.13)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2.	No direct visual impacts would occur from Project area mining operations on residences in the city of Colstrip, commercial sites (Key Observation Point [KOP] 7—gas station), local recreation areas such as Winchester Park and Castle Rock Lakes, or locations along State Highway (SH) 39 (KOP 5) in the analysis area. There would be short-term adverse impacts during the life of the mine on vehicular drivers traveling along Airport Road (KOP 3) and limited long-term visual impacts at KOPs 1 and 2. Existing visual impacts on KOP 4 from ramp roads and the haul roads in the existing Area B permit area would continue for an additional 15 years while mining occurs in the AM5 expansion area. Implementation of the Proposed Action would also delay reclamation of mine support facilities in Areas A and C, extending those visual impacts by 7 years.	Visual impacts would be similar to those described for Alternative 2, but would be greatly reduced due to the smaller disturbance area (2,658 acres as compared to 5,711 acres) and the nine-year shorter mine life, allowing the reclamation plan to be implemented soon and the quicker restoration of the landscape.
Land Use and Recreation (Section 3.14)	Existing Permit Area B would be reclaimed and postmining land uses would be achieved 15 years earlier than in Alternative 2.	All current land uses (primarily grazing) and recreation (hunting) within the analysis area would be temporarily disturbed and devoted to mining and associated activities during the 30 years of mining operations. After reclamation, impacts on grazing land and cropland would be long-term, moderate, and beneficial.	Alternative 3 impacts on land uses, recreation, and ownership would be similar to the impacts described for Alternative 2, but would be greatly reduced (2,658 acres under Alternative 3 as compared to 5,711 acres). Reclamation would occur nine years earlier under Alternative 3, allowing for quicker establishment of postmine land uses.
Transportation (Section 3.15)	Existing Permit Area B, including haul roads, would be reclaimed 15 years earlier than in Alternative 2.	No long-term transportation impacts would be expected from construction of the haul and ramp roads as the overall transportation system would not be disrupted, and any adverse impacts on other resources would be short-term and limited to the period of construction and mine operations in the Project area. Public roads, such as SH 39 and the Castle Rock Road, would continue to be maintained by Westmoreland Rosebud for local and regional traffic until mine closure (estimated to be 2047). Employees traveling to and from the Rosebud Mine would contribute to local traffic, but impacts would not change from current conditions.	Impacts on transportation would be similar to those listed for Alternative 2 except there would be only 355 acres of haul roads (includes the Lee haul road) constructed under Alternative 3. Haul road extensions and ramp road construction would only occur in the Lee Coulee area. Impacts from coal transport to the Rosebud and Colstrip Power Plants and fugitive dust impacts would be similar to Alternative 2, except the duration of impacts would be nine years shorter.
Solid and Hazardous Waste (Section 3.16)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2, and Rosebud Mine facilities, including those used for solid and hazardous waste, would be reclaimed 7 years earlier than in Alternative 2.	Alternative 2 would extend the operational life of the Area B permit area by 15 years and the life of the Rosebud Mine and associated facilities, including those used for solid and hazardous waste, by 7 years. As is current practice for Area B and other permit areas, hazardous wastes would be collected in 55-gallon drums at satellite accumulation points within the Project area and transported to the hazardous waste storage area located in Area A for shipment to a TSDF. Final disposal of non-coal solid wastes, if encountered, would be either at the Rosebud County Landfill or in the mine pits in an approved landfill site for solid wastes. Mining-related nonhazardous waste such as nontreated wood, wooden pallets, concrete, and dragline cable and wooden cable spools would be placed in the mine pits.	Impacts would be the same as those described for Alternative 2 except that the duration of mining would be nine years shorter causing a reduction in the duration that solid and hazardous waste would be produced.
Noise (Section 3.17)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2, and Rosebud Mine facilities would be reclaimed 7 years earlier than in Alternative 2, eliminating those noise sources.	The primary sources of noise from the Project area would be blasting, excavation, and hauling of the coal offsite. Blasting within the Project area is expected to occur with similar frequency (1 to 3 days per week for coal and 4 to 6 times per month for overburden) to what is ongoing today in the existing Area B permit area and other actively mined permit areas. Noise from other mining activities in the Project area would be expected to remain the same or become less for some residences. For others, the worst-case mining noise could become 5 to 6 dB louder than it has been in the past when no barriers were between the source and the receiver.	Direct noise impacts due to blasting and mining equipment would be the same as described for Alternative 2, but the duration would be 9 years shorter. Secondary and cumulative noise impacts would also be the same as described for Alternative 2, but 9 years shorter in duration.

Table E-4. Potential Environmental Impacts (Updated to Include Alternative 3).

Resource	Alternative 1 – No Action	Alternative 2 – Proposed Action	Alternative 3 – Lee Coulee Only
Soil (Section 3.18)	No Project impacts. Existing Permit Area B would be reclaimed 15 years earlier than in Alternative 2, and Rosebud Mine facilities would be reclaimed 7 years earlier than in Alternative 2.	A maximum of 5,711 acres would be disturbed by Project activities in the analysis area. Areas cleared of vegetation would be susceptible to soil erosion from wind and water. Soil erosion would also occur as a result of soil removal and storage during mine operations and soil exposure during respreading and stabilization. Erosion impacts would be short-term and adverse and would return to pre-mine erosion rates within 2 years once vegetation stabilizes the surface. Loss of soil structure through mechanical handling followed by tillage to relieve compaction would alter the native soil profile. Degradation of chemical properties in stockpiled soil may include changes in available nutrients, accumulation of ammonium, and the loss of organic carbon through heat and leaching. Impacts on physical, chemical, and biological soil characteristics would be long-term and adverse. It would be many years before these soil characteristics return to pre-mine conditions.	A maximum of 2,658 acres would be disturbed by Project activities in the analysis area. The nature of impacts to soils would be similar to those described for Alternative 2 but would affect less resource area due to the reduced disturbance (3,053 fewer acres) and shorter project duration (nine years shorter).

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1.4.2 Topography

As described in **EIS Section 3.2.1.2, Analysis Area and Methods,** the analysis area for direct and secondary impacts on topography is the 15,153-acre Project area (**Figure E-1**).

1.4.2.1 Direct and Secondary Impacts

Alternative 3 impacts on topography would be the same as those listed for Alternative 2 except that the duration of mining would be 9 years shorter, allowing the reclamation plan to be implemented sooner, and the area disturbed from mining would be reduced from 5,711 acres to 2,658 acres. Under Alternative 3, the location of the mining disturbance would be within the Lee Coulee area, while no topography impacts would occur in Richard Coulee (see **Figure E-1**).

1.4.2.2 Cumulative Impacts

Alternative 3 cumulative impacts on topography would be similar to those described for Alternative 2 (see **EIS Section 3.2.3.3, Cumulative Impacts**) but would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter). The 2021 Richard Spring Fire would not have an impact on Project area topography.

1.4.2.3 Unavoidable Adverse Impacts

Alternative 3 would have short-term unavoidable adverse impacts on topography during mining as the topography is altered in an effort to mine the coal; these impacts would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter). After reclamation activities, no unavoidable adverse impacts would be anticipated for topography.

1.4.2.4 Irreversible and Irretrievable Impacts

Under Alternative 3, alteration of the previously undisturbed pre-mine topography to postmine approximate original contours would be an irreversible impact on analysis area topography. This impact would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres).

1.4.3 Air Quality

As described in **EIS Section 3.3.1.2, Analysis Area and Methods** and shown on **EIS Figure 14**, the analysis area for air quality is selected as the area within 50 kilometers of the Area B disturbance boundary as modified by AM5. As in the case of Alternative 2, direct and secondary air quality impacts of Alternative 3 would occur due to the emission of air pollutants from mining, construction, and reclamation operations. Fugitive dust generating activities such as topsoil and overburden removal and handling, coal removal and processing and transport, blasting of coal and overburden, travel on unpaved haul and access roads, and wind erosion of disturbed areas would be the primary source of particulate dust emissions. Vehicle exhaust would also be a source of particulate matter (PM) emissions as well as gaseous emissions of nitrogen dioxide (NOx), sulfur dioxide (SO2), carbon monoxide (CO), and volatile organic compounds (VOC). Explosives use in coal and overburden blasting would result in gaseous emissions of NOx, SO2, and CO. Like Alternative 2, Alternative 3 does not include construction of any new facilities in the Project area other than haul and ramp roads to serve the additional acreage to be added by AM5. Mining under Alternative 3 is limited to the Lee Coulee drainage area; no mining and only limited minor disturbance (approximately 26 acres) would be permitted in the Richard Coulee drainage area. Overall, there would be less haul and access road construction under Alternative 3 than

Alternative 2 (see **Table E-1**). The construction of haul and access roads would result in fugitive PM dust emissions from earth moving and construction equipment usage as well as PM and NOx and other gaseous emissions from equipment exhaust during the period of construction. As discussed in **EIS Section 3.3.3.2**, Westmoreland Rosebud would use dust control measures in the Project area and other supporting permit areas consistent with MAQP #1483-09, such as applying chemical stabilizer to all permanent haul roads and operating a coal dust suppression system or equivalent at the truck dump. The Project area would also be subject to DEQ air quality regulations ARM 17.8.304(2), 17.8.308(2), and 17.8.308(3) relating to fugitive dust emissions controls and 82-4-231(10)(m), MCA.

1.4.3.1 Direct Impacts

Under Alternative 3, direct air quality impacts would occur due to the emission of criteria air pollutants and hazardous air pollutants from mining and reclamation operations. The average annual production during operations under Alternative 3 (3.7 million tons per year, **Table E-2**) is 27 percent lower than under Alternative 2 (5.1 million tons per year, **EIS Table 8**); hence, the average annual emissions would be correspondingly lower under Alternative 3 compared to the emissions under Alternative 2. For the Alternative 2 air quality impact analysis, direct emissions for the Project area were estimated and modeled using an annual coal production rate of approximately 6.3 million tons per year as disclosed in **EIS Section 3.3.3.2**. Annual production and consequently emissions under Alternative 3 would be lower than those estimated for Alternative 2 in all but two years of the mine life (up to 65 percent lower in 18 years and up to 9 percent higher in two years). Thus, the direct impacts on ambient concentrations of criteria air pollutants and hazardous air pollutants under Alternative 3 would be typically similar to or lower than the modeled impacts discussed under Alternative 2 in **EIS Section 3.3.3.2** with maximum impacts occurring within or near the mine similar to Alternative 2. Additionally, the modeled cumulative concentrations from all sources (including the Project area, Area F, and all other regional emission sources outside the Rosebud Mine) under Alternative 3 would be well below the National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (MAAQS) for all criteria air pollutants (see **Section 1.4.3.3, Cumulative Impacts,** below). Therefore, air quality standards would be met in all years of the mine life (including the two years when modeled production is less than projected production in addition to the 18 years when modeled production is conservatively higher than projected production).

1.4.3.2 Secondary Impacts

Alternative 3's secondary impacts on air quality would result from the atmospheric reaction of direct air emissions downwind. Secondary impacts include the atmospheric formation of ozone from NOx and VOC emissions, secondary PM formation and deposition from NOx and SO2 emissions, and impacts on air quality related values (i.e., visibility and acidic deposition). Similar to direct impacts, secondary air quality impacts under Alternative 3 would be generally comparable to or less than those estimated under Alternative 2 (see **EIS Section 3.3.3.2, Secondary Impacts**).

1.4.3.3 Cumulative Impacts

The cumulative impacts of Alternative 3 would be the collective impacts on air quality in the analysis area due to emissions from past, present, and future actions from all sources of air pollution. Modeled cumulative impacts under Alternative 3 would be similar to those disclosed in **EIS Section 3.3.3.3**, and the cumulative concentrations in the analysis area due to emissions from all sources (including the Project area, other Rosebud Mine areas, and regional emission sources outside the Rosebud Mine including the Colstrip Power Plant) are well below the NAAQS and the MAAQS. Colstrip Units 1 and 2 were retired in January 2020 subsequent to the air modeling study; thus, the modeled cumulative concentrations are a conservative overestimate of actual cumulative air quality impacts expected under Alternative 3.

1.4.3.4 Unavoidable Adverse Impacts

Alternative 3 would result in minor, unavoidable, adverse impacts on air quality, but direct, secondary, and cumulative impacts would be lower than the health-based ambient air quality standards where applicable.

1.4.3.5 Irreversible and Irretrievable Impacts

There would be no known irreversible or irretrievable commitment of air quality resources.

1.4.4 Geology and Geochemistry

As described in **EIS Section 3.4.1.2, Analysis Area and Methods**, the analysis area for impacts on geology is the 15,153-acre Project area (**Figure E-1**).

1.4.4.1 Direct and Secondary Impacts

Geology and geochemistry Alternative 3 impacts would be the same as those listed for Alternative 2 except that the geologic area disturbed from mining would be reduced from 5,711 acres to 2,658 acres and the amount of coal mined would be reduced from 104.3 to 42.9 million tons of coal. Under Alternative 3, the location of mining disturbance would be within the Lee Coulee area. Although there would be limited minor disturbance (26 acres) due to the construction of MPDES outfalls and sediment traps associated with topsoil stockpiles on the ridge between Richard and Lee Coulees, no geologic or geochemistry impacts would occur in Richard Coulee.

1.4.4.2 Cumulative Impacts

Alternative 3 cumulative impacts on geology and geochemistry would be similar to those described for Alternative 2 (see **EIS Section 3.2.3.3, Cumulative Impacts**) but would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and reduced amount of coal removed. The 2021 Richard Spring Fire would not impact the Project area geology and geochemistry.

1.4.4.3 Unavoidable Adverse Impacts

Alternative 3 would have short-term unavoidable adverse impacts on geology during mining as topsoil and spoil piles are created and clinker/scoria pits are mined; impacts would be less than under Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter). After mining and reclamation activities, the removal of the Rosebud Coal and clinker/scoria would represent unavoidable adverse impacts on geology.

1.4.4.4 Irreversible and Irretrievable Impacts

Under Alternative 3, removal of the Rosebud Coal and the associated overburden would be an irreversible and irretrievable impact on geologic features and coal reserves. This would represent an irreversible impact on the analysis area geology but would include less area than under Alternative 2 due to the reduced disturbance (3,053 fewer acres).

1.4.5 Water Resources – Surface Water

Surface water impacts from mining activities may include changes in surface water quantity (presence or flow could apply) or quality for springs, seeps, streams, and ponds. The analysis area associated with surface water impacts encompasses surface watersheds extending through and downstream from the 9,108-acre proposed permit area that receives surface water drainage from the 2,658-acre addition to the disturbance area. The analysis area for surface water is shown on **Figure E-9.**

1.4.5.1 Summary of Actions

Similar to Alternative 2 (see **EIS Section 3.5.3**), Alternative 3 would employ the same surface mining method currently used in Area B and the same type features related to surface water management (e.g., sediment impoundments and best technology currently available [BTCA]) in the Project area (see **EIS Section 2.2.2.2, General Mining Method; EIS Section 2.4.4, Operations Plan**; and **EIS Section 2.4.6.2, Surface Water Management and Sediment-Control Measures**). Existing surface water discharges for Area B would occur in accordance with MPDES Permit MT-0023965; new surface water discharges for the Project area would occur in accordance with a pending MPDES Permit application MT-0032042. Under Alternative 2, 27 outfalls in both Richard and Lee Coulees were proposed for the new MPDES Permit, but under Alternative 3, the number of outfalls proposed would be reduced to 18. Of these, 10 outfalls (AM5-1 through AM5-10) would discharge to Lee Coulee and 8 outfalls (AM5-11 through AM5-18) would discharge to Richard Coulee. The eight outfalls planned to discharge to Richard Coulee are associated with outlets from sediment traps designed to control runoff from topsoil stockpiles to be located on the topographic divide between the Lee Coulee and Richard Coulee drainages.

Postmining for Alternative 3 would be similar to Alternative 2: the watershed topography and hydrology would be restored to reestablish, to the extent possible, the hydrologic balance in the analysis area (see **EIS Section 2.4.6, Protection of the Hydrologic Balance**) but would occur in Lee Coulee only.

1.4.5.2 Summary of Impacts

Adverse impacts of Alternative 3 on surface water would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Although Alternative 3 does not include mining of Richard Coulee, analysis of surface water impacts includes a qualitative evaluation of effects from discharges from the eight MPDES outfalls planned for Richard Coulee:

- The loss of ephemeral streams, such as Lee Coulee and its tributaries within the mine disturbance boundary;
- The loss of existing springs and stock ponds within the mine disturbance boundary in Lee Coulee; and
- The reduction or elimination of spring flows to wetlands and stock ponds sourced from overburden or spoil ground water within the Lee Coulee drainage area.

Similar to Alternative 2, some surface runoff to streams would be captured in sediment ponds and traps and discharged to surface waters at permitted MPDES outfalls during mining for Alternative 3. Westmoreland Rosebud has obtained MPDES Permit coverage (MT-0023965) for all existing discharges from the Project area to surface waters and has submitted an Application (MT-0032042) to DEQ, which is currently under review and would authorize discharges from 18 new outfalls in the Project area to surface waters within the Lee Coulee and Richard Coulee drainage areas (**Figure E-4**).

Similar to Alternative 2, changes to site hydrology in the analysis area would continue for Alternative 3 throughout the Project area during mining and reclamation until sedimentation ponds are removed during the reclamation process and the watershed topography and hydrology are reclaimed to conditions similar to pre-mine conditions.

Similar to Alternative 2, to mitigate the general lack of water near the Project area (due to weather, not because of mining), Westmoreland Rosebud proposes enhancement features within the postmine topography to capture water when available and to use it to enhance habitat for wildlife and livestock and to establish wetlands.

1.4.5.3 Direct and Secondary Impacts

Surface Water Quantity Impacts

Springs – Mining Period (Direct Impacts)

Adverse impacts of Alternative 3 on springs would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Potential impacts on the monitored springs in the Project area during and after mining are summarized in **Section 1.4.6, Water Resources – Ground Water**. Under Alternative 3, three monitored springs (4-2/2a, 4-2/2b, and SP-78) are located within the mining footprint and are expected to be eliminated, as compared to eight monitored springs under Alternative 2. Under Alternative 3, overburden springs located outside of the disturbance area (including 10 monitored springs: SP-300, SP-301, SP-302, SP-304, SP-305, SP-307, SP-308, SP-309, SP-310, and BGDSG) would not be affected by mining, as compared to two monitored overburden springs under Alternative 2. Similar to Alternative 2, the flows of springs near the mining footprint (including monitored spring SP-306) are likely to be reduced or eliminated by mining if the source water is reduced or eliminated by Alternative 3 mining activities. The timing of impacts on the flow of impacted springs would be related to the mining sequence (see revised Application, Operations Plan, October 2021), where spring flows would not be reduced or eliminated until the source material near the spring is mined out.

Springs – Postmining Period (Secondary Impacts)

Similar to Alternative 2, after Alternative 3 mining ceases, pre-mine flow conditions would not return to springs in which source material was removed. As described in **Section 1.4.6, Water Resources – Ground Water**, it is possible that springs from backfilled spoil may develop within or downslope of the disturbance area. For example, in Area C of the Rosebud Mine, two springs have developed in drainage bottoms during reclamation that appear to be a result of preferential subsurface flow paths in the spoil (DEQ 2015a).

Similar to Alternative 2, overall impacts from Alternative 3 on spring flows and the beneficial uses of spring water in the analysis area would continue until reclamation activities and recovery of the ground water table are complete. The impact of the removal of springs on the analysis area would be reduced because of wetland mitigation, postmine reclamation to reestablish the hydrologic balance to the extent possible, and water supply replacement as described in the revised Application.

Streams – Mining Period (Direct Impacts) – Ephemeral Flow

Adverse impacts of Alternative 3 on ephemeral flow would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Because Alternative 3 mining would occur exclusively in Lee Coulee, and because planned facilities in Richard Coulee are limited to topsoil stockpiles, the following narrative is focused on Lee Coulee and includes a brief discussion on Richard Coulee at the end of this section.

Flows in the analysis area streams (see **Figure E-9** and **Section 1.4.5**) are dominated by ephemeral conditions and occur as a result of runoff from storm events or snowmelt. During mining in the Project area, portions of the Lee Coulee drainage would be mined out, and runoff from undisturbed lands upstream of the active pit would be captured in the pit or sediment ponds. Surface runoff from Alternative 3 disturbed areas would be impounded in the mine pits or sediment ponds, resulting in reduced ephemeral and alluvial flows in the Lee Coulee drainage area during precipitation or snowmelt runoff events and altering surface water storage and recharge to ground water. Disturbing the soil surface, altering topography, and removing vegetation would also affect the interception, infiltration, evaporation, sublimation, and transpiration of water at the land surface, thereby affecting stream and alluvial flows in the Lee Coulee drainage area.

Estimated mean annual runoff and peak flows for analysis area streams (see **Figure E-9** and **Section 1.4.5**) and other ungaged streams in southeastern Montana were determined using multiple regression equations developed by the USGS (Sando et al. 2018) based on basin characteristics such as drainage area, percentage of basin covered by forest, precipitation, basin elevation, basin slope, and evapotranspiration. During Alternative 3 mining, the Lee Coulee watershed area contributing to storm water flow would effectively be reduced due to peak storm runoff being directed to mining pits and sediment ponds; thus, it is expected that peak runoff would decrease to areas downstream of the mining pits within Lee Coulee Using the USGS equations (Sando et al. 2018) to estimate peak flows on these streams, percent flow reductions at full mine development are provided in **Table E-5**. To show the impact of a reduction in watershed area, the calculations assume that the percent forest cover in each basin would not change as a result of mining; however, if the percent forest cover decreases, peak flows would increase, and if the percent forest cover increases, peak flows would decrease. See **Section 1.4.5.4, Cumulative Impacts** for a description of the Richard Spring Fire, consideration for which could change the calculations used for results in **Table E-5.** The flows provided in **Table E-5** are for the Lee Coulee mainstem and the Lee Coulee Fossil Fork tributary from the top of each watershed to the downstream, southeastern Project area boundary; flows do not consider existing pre-mine stock ponds or other flow impediments. Peak flows would be reduced by sediment control ponds until the watersheds are fully reclaimed. Smaller reductions in Lee Coulee peak flow would be expected further downstream where there is a larger undisturbed contributing watershed. Impacts on Richard Coulee are not included in the table as the peak flow differences in Richard Coulee are expected to be negligible.

Table E-5. Estimated Peak Flows for Streams in the Project Area before Mining and at Full Mine Development.

Drainage Basin	Watershed Area in Project Area (acres)	Pre-Mine Peak Flow (cfs)			Peak Flow at Full Mine Development (cfs)			Percent Reduction in Peak Flow (cfs)		
		2-yr	10-yr	100-yr	2-yr	10-yr	100-yr	2-yr	10-yr	100-yr
Lee Coulee (Mainstem)	2,430	27	201	905	13	99	469	52	51	48
Lee Coulee (Fossil Fork)	1,470	13	113	573	7	66	348	46	42	39

Source for peak flow calculations: Sando et al. 2018.

Similar to Alternative 2, Alternative 3 disturbed area runoff would be controlled by a network of roadside ditches, sediment-control ponds, and sediment traps. Surface runoff from disturbed areas would be impounded in the mine pits or sediment-control structures in accordance with the Hydrologic Control

Plan (**Figure E-3**). Some of the water stored in the sediment ponds or mine pits would be used (such as for dust control), some would evaporate, and some would infiltrate to the subsurface; this is water that would be lost as surface or subsurface flow in the stream channels. Loss of runoff water due to storage of runoff in the sediment ponds or mine pits, evaporation, or infiltration could affect the local hydrologic balance (USEPA 2001). The volume, timing, and frequency of ephemeral flows would change in the Lee Coulee drainage basin (see **Figure E-9** and **Section 1.4.5**). The impact of reduced peak flows in Lee Coulee may include changes to stream morphology and reduced surface and subsurface (via the alluvium) recharge to Lee Coulee (**Figure E-9**). Reduced peak flows may result in less sediment transport, channel narrowing, and less water storage within channel banks and floodplains. It may be difficult to separate these impacts from the impacts of variability in runoff-producing storm events.

During mining under Alternative 3, water may be discharged from sediment ponds and traps to Lee Coulee and Richard Coulee via MPDES outfalls. Similar to Alternative 2, the sedimentation ponds and traps used for Alternative 3 would be minimally designed to retain up to the volume of runoff produced by the theoretical 10-year, 24-hour storm event, although the ponds are generally oversized to allow capacity for successive storms and minimize maintenance. Runoff from larger events may discharge to the main channels (Application Appendix O). Discharge may also occur when the ponds need to be drained to comply with the minimum 24-hour retention capacity requirement under ARM 17.24.639(2). As with Alternative 2, stored water would be removed using a nonclogging dewatering device or conduit approved by DEQ. Discharges to mine area streams would replace some of the storm water runoff, but the volume, timing, and frequency of such discharges would not be the same as would occur naturally; therefore, impacts on channel morphology would not be offset by discharges at the MPDES outfalls (**Figure E-4**).

In the Richard Coulee drainage area, changes in surface water flow quantity from mining activities are expected to be minor to negligible. As described previously, eight outfalls (MPDES Outfalls AM5-11 through AM5-018) associated with sediment traps are planned to discharge to Richard Coulee from topsoil stockpiles on the topographic divide between the Lee Coulee and Richard Coulee drainages. Since the sediment traps are designed to retain up to the volume of runoff produced by the theoretical 10-year, 24-hour storm event, small ephemeral tributaries located immediately downstream from these outfalls would experience some minor reduced ephemeral flow in the Richard Coulee drainage area during precipitation or snowmelt runoff events. The areas draining to each of the eight outfalls range from 1 acre to 8 acres, which when compared to the total drainage area of Richard Coulee (more than 5,000 acres), these small, localized reductions in ephemeral flow are expected to be negligible within the larger Richard Coulee drainage area.

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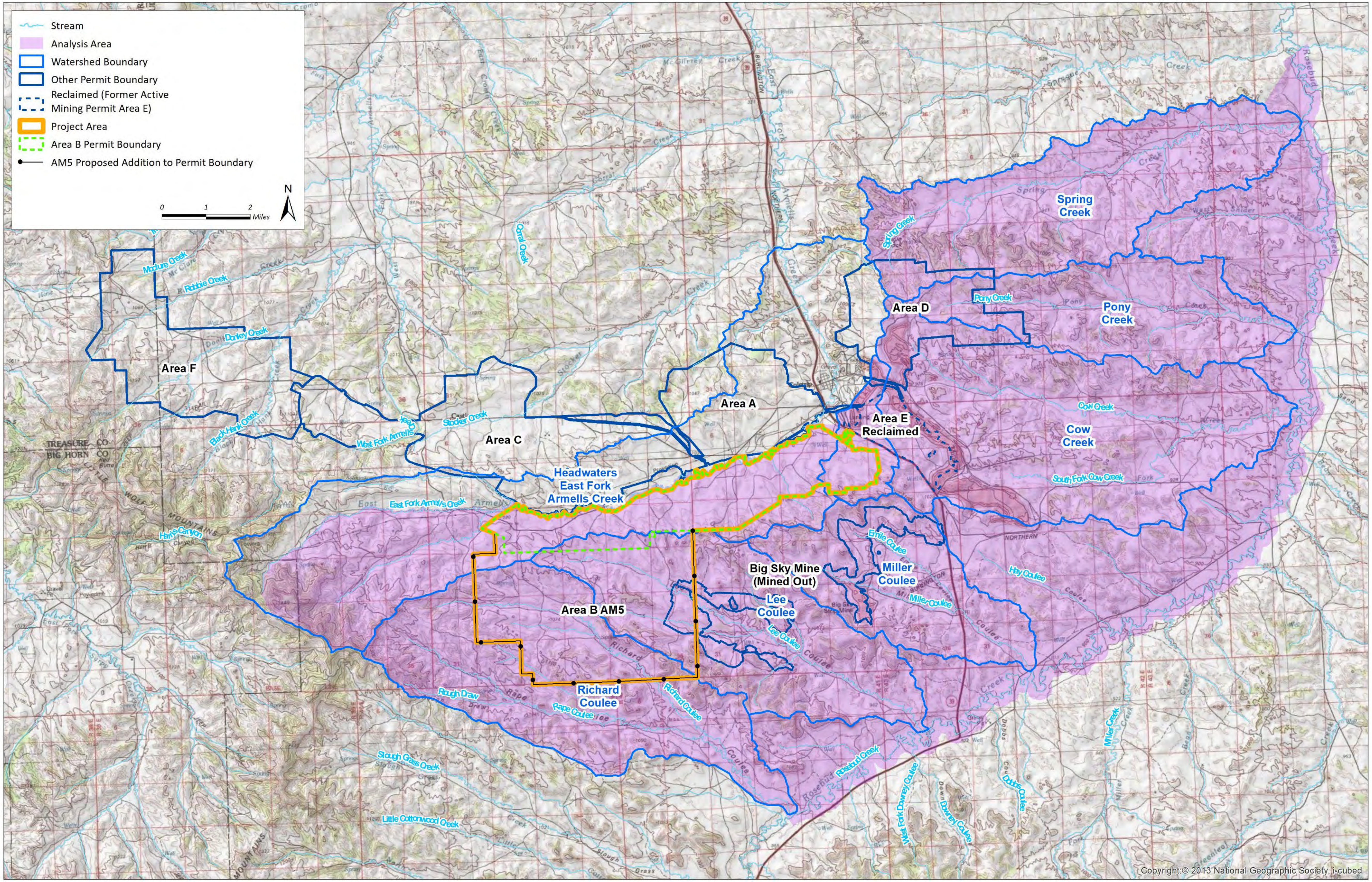

Figure E-9. Surface Water Analysis Area.

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Streams – Mining Period (Direct Impacts) – Base Flow

As described above, Lee Coulee stream flows in the Project area are dominated by ephemeral characteristics where channel thalweg elevations exceed ground water table elevations (Application Appendix O); therefore, similar to Alternative 2, no perennial or intermittent streams with baseflow would be disturbed by the Alternative 3 Project activities. However, similar to Alternative 2, downstream reaches of Lee Coulee may exhibit limited baseflow conditions under Alternative 3. Prior to mining at Big Sky, a "wet reach" existed on Lee Coulee in Sections 24 and 25 in the Project area and in Section 30, just downstream from the Project area. During permitting of Big Sky Area B, this reach was determined to be intermittent. This wet reach was impacted by mining at Big Sky, and reclamation at Big Sky was designed to restore this wet reach when ground water levels recovered postmining. Similar to Alternative 2, mining in the Project area would delay this ground water level recovery and reestablishment of intermittent flow in the wet reach during the mining period. Restoration and maintenance of the wet reach may be partially implemented by pumping ground water from an exempt well (or wells) to the wet reach to offset depletions of intermittent flow caused by delayed ground water level recovery (Revised Appendix O-1 Attachment F, March 2022).

As noted in **Section 1.4.6, Water Resources – Ground Water**, the mine pits would intercept ground water that would otherwise have discharged to alluvium in the Project area drainages. Lee Coulee is ephemeral, indicating that the majority of ground water reaching the alluvium does so without surfacing as stream flow. Similar to Alternative 2, removal of the overburden and Rosebud Coal during Alternative 3 Project activities would temporarily reduce the amount of ground water reaching the downstream alluvial deposits. Similar to Alternative 2, removing the alluvium, overburden, and Rosebud Coal within the Project area drainages would likely result in reduced baseflow in the downstream Lee Coulee "wet reach" during and after mining until ground water levels have recovered. Further downstream, no impacts on baseflow are expected for both Alternative 2 and Alternative 3.

As described in the previous section, changes in surface water flow quantity from mining activities are expected to be negligible in the greater Richard Coulee drainage area due to the small relative drainage area associated with MPDES Outfalls AM5-11 through AM5-018. In addition, no mining is planned in the Richard Coulee drainage. Therefore, Alternative 3 activities are not expected to adversely impact baseflow conditions in the Richard Coulee drainage area.

Streams – Postmining Period (Secondary Impacts) – Ephemeral Flow

Similar to Alternative 2, as the Alternative 3 mine site is reclaimed (**Figure E-6**), the postmine topography, drainage areas, and geomorphic characteristics would be designed to be similar to pre-mine topography (given the constraints of earthmoving equipment, other ongoing reclamation, and the volume of spoil available to fill the pits and reclaim the site topography) (Application Appendix J, Tables J-1 and J-2). As a result, peak flows would return to near pre-mine peak flows (Application Appendix J, Tables J-3 to J-5). MSUMRA (ARM 17.24.601 et seq.) requires that basins be reclaimed to the approximate original stream function. Similar to Alternative 2, to the extent possible during Alternative 3 reclamation, smooth transitions would be constructed between undisturbed and reclaimed land to reestablish surface drainage patterns. The disturbed tributary drainages and stream channels would be reconstructed to the approximate original drainage configurations, with channel geometry similar to pre-mine conditions; however, there would be small differences in watershed areas and shapes postmining that would slightly alter runoff within the watersheds (**Figure E-5**). Similar to Alternative 2, the disturbed stream channels within the Project area formerly governed by geologic structure and the inherent variability of different strata would no longer exist. Geologic structure within the stream channels would not be disturbed upstream or downstream of the Project area. Spoil in the designed postmine drainages may either be covered by several feet of topsoil and vegetated to minimize erosion or left uncovered to replicate pre-mine erosional drainage features.

Similar to Alternative 2, although overall ephemeral stream flows after reclamation would be similar to pre-mine ephemeral stream flows, ephemeral stream flow may be reduced through portions of the Alternative 3 reclaimed area with low slopes because the vertical percolation rate in the spoil may be greater than in the overburden (see **Section 1.4.6, Water Resources – Ground Water**) and vegetative cover in Alternative 3 reclamation may also be greater than in the native condition. Some surface flow may infiltrate into the spoil rather than flowing in surface channels to the lower portion of the watershed, as has been observed at the Big Sky Mine during reclamation (DEQ 2015b). The extent to which surface flow across the spoil would be reduced would depend on topography; where fairly flat, there may be very limited flow after Alternative 3 reclamation. Similar to Alternative 2, areas with low slopes are limited in the Alternative 3 postmine topography; thus, overall reductions in flow due to increased infiltration should be minor. Similar to Alternative 2, impacts from Alternative 3 on ephemeral stream flows in the analysis area would continue until reclamation activities and removal of sediment ponds are complete.

Streams – Postmining Period (Secondary Impacts) – Base Flow

Similar to Alternative 2, after Alternative 3 mining activities, as ground water levels recover and the spoil resaturates, ground water would begin to flow from the spoil to alluvium and downslope stream channels. It is not known how much time would be required to resaturate the spoil, but based on Westmoreland Rosebud's ground water model, it would take more than 150 years for the ground water table to reestablish after site reclamation (revised Application Appendix O, 2021) and may take hundreds of years (Nicklin 2017). Forty years of spoil water level monitoring in other previously mined areas at the Rosebud Mine show that ground water levels are still recovering in most locations. Similar to Alternative 2, ground water contributions to intermittent flow from the Alternative 3 reclaimed area would eventually return to the downstream wet reach of Lee Coulee. In addition, the location of ground water discharge and base flow in the downstream reach may change due to the change in water source (from overburden and Rosebud Coal to spoil).

The impacts of reducing ground water contributions to stream flow in the Lee Coulee wet reach were partially mitigated by Big Sky Mine during reclamation by the construction of permanent impoundments with equal or greater aquatic habitat. Similar to Alternative 2, impacts from Alternative 3 would be mitigated through wetland mitigation and postmine reclamation to minimize disturbance of hydrologic balance, as described in the Application. Similar to Alternative 2, impacts from Alternative 3 on ground water contributions to stream flows and to the overall beneficial uses of stream flows in the analysis area (see **Figure E-9** and **Section 1.4.5**) would continue until reclamation activities (9 years earlier under Alternative 3 than under Alternative 2) and recovery of the ground water table are complete.

Ponds – Mining Period (Direct Impacts)

Adverse impacts of Alternative 3 on ponds would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Ponds located within the mining footprint (including three monitored ponds: PO-300, PO-304, and PO-308) would be eliminated, thereby reducing surface water storage, as compared to six monitored ponds under Alternative 2. Four monitored ponds (PO-302, PO-303, PO-307, and PO-309) and other ponds with primary water sources outside of the Alternative 3 disturbance area would not be affected by mining, as compared to one monitored pond that would be left undisturbed under Alternative 2. The water supply of ponds located within Lee Coulee and downstream from the disturbance area (including three monitored ponds: PO-305, BBIO1, and BBIO2) may be reduced during mining due to the impoundment of runoff or a reduction in ground water inflow that is a

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source of supply to the ponds, as compared to four monitored ponds under Alternative 2. The water supply of one pond (PO-301) located within Richard Coulee and downstream from MPDES Outfalls AM5-11 through AM5-018 (sediment traps TA-Rich-1 through TA-Rich-8) may be reduced during mining due to the impoundment of runoff that is a source of supply to the pond, although this impact is expected to be minor due to the small relative drainage area of the eight sediment traps (approximately 26 acres combined) as compared to the drainage area of Pond PO-301 (approximately 600 acres).

Ponds – Postmining Period (Secondary Impacts)

Similar to Alternative 2, after mining, some ponds would be reestablished, and some sediment ponds may be retained to provide water supplies for wildlife and livestock; thus, overall impacts from Alternative 3 on pond water supply in the analysis area (**Figure E-9**) would continue until reclamation activities are complete, which would occur 9 years earlier than under Alternative 2. As discussed in **Section 1.4.7, Water Resources – Water Rights**, if a pond with a water right for stock watering were to become unusable, a suitable replacement source would be provided by Westmoreland Rosebud.

Floodplains – Mining Period (Direct Impacts)

Adverse impacts of Alternative 3 on floodplains would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Similar to Alternative 2, the 100-year floodplain on Lee Coulee in the Alternative 3 analysis area would remain intact without mining, haul roads, or sediment controls. Where haul roads cross streams, culverts would be installed that are designed for the 10-year, 24-hour storm event (see **Figure E-3**). Similar to Alternative 2, structural BTCA, described in **EIS Section 2.4.6.2, Surface Water Management and Sediment-Control Measures**, would be used for Alternative 3 to control sediment movement and erosion and stabilize the haul roads. The disturbance area of the sediment ponds or traps to Project area streams would be very small compared to the area of the 100-year floodplains in the analysis area. Flooding would continue to occur due to large storms. Runoff from storms greater than the 10-year, 24-hour event would flow over any haul roads, and some would flow through the culverts. It is likewise not expected that any other mine structures or mine activities would damage the floodplains or cause an increased hazard to life downstream of the Project area. While mining is not planned to occur in Richard Coulee for Alternative 3, as described previously, infrequent surface water discharges would occur from eight sediment traps to eight MPDES outfalls in Richard Coulee. Due to the relatively small drainage area of the sediment traps, Alternative 3 actions are not expected to adversely impact Richard Coulee floodplains.

Surface Water Quality Impacts

Springs – Mining Period (Direct Impacts)

Adverse impacts of Alternative 3 on the water quality of springs would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Under Alternative 3, three monitored springs (4-2/2a, 4-2/2b, and SP-78) are located within the mining footprint and are expected to be eliminated, as compared to eight monitored springs under Alternative 2. Similar to Alternative 2, due to its proximity to the proposed Alternative 3 mining footprint (180 feet) and location within a highwall reduction area, spoil spring SP-306 is likely to experience physical disturbance and reduction or cessation of flow, which may alter water quality constituents consistent with physical impacts. The water quality of overburden springs located outside or upgradient of the Alternative 3 disturbance area (including 10 monitored springs: SP-300, SP-301, SP-302, SP-304, SP-305, SP-307, SP-308, SP-309, SP-310 and

BGDSG) would not be affected by mining, as compared to two monitored springs that would not be impacted under Alternative 2.

Springs – Postmining Period (Secondary Impacts)

The water quality of spoil would generally have higher dissolved solids concentrations than that of overburden or the Rosebud Coal (as described in **Section 1.4.6, Water Resources – Ground Water**); therefore, similar to Alternative 2, any springs that develop in or near the Alternative 3 mined area from spoil ground water would likely have higher dissolved solids concentrations than pre-mine springs.

Streams – Mining Period (Direct Impacts)

Adverse impacts of Alternative 3 on streams would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Similar to Alternative 2, runoff from Alternative 3 disturbed lands would be intercepted and treated by the implementation of sediment-control measures. Sedimentation ponds would be minimally designed for total containment of runoff from the 10-year, 24-hour precipitation event plus storage of 3 years of sediment yield from disturbed areas in the mine area, although they are generally oversized to allow capacity for successive storms and minimize maintenance. Locations of sedimentation ponds and associated ditches are shown on **Figure E-3** (see also **EIS Section 2.4.6.2, Surface Water Management and Sediment-Control Measures**). Similar to Alternative 2, during Alternative 3 mining activities, runoff from undisturbed land above the pit would be intercepted by the pit or by impoundments or traps in the drainages above the pit. Very large runoff events would be intercepted by the pit. A system of ditches and traps proposed for the perimeter haul road is shown in the Approximate Hydrologic Control Plan (revised Application Exhibit D, October 2021) and discussed in **EIS Section 2.4.6.2, Surface Water Management and Sediment-Control Measures**. Under Alternative 3, the Richard haul road extension would not be constructed. Similar to Alternative 2, Alternative 3 ditches along the Lee haul road would direct runoff to either sedimentation ponds or sediment traps. In areas where the Lee haul road crosses the ephemeral drainages, runoff from the road embankment would be collected by sediment traps. Ditches would roughly parallel the roads to intercept runoff from disturbed lands. Topsoil storage areas in Richard Coulee would include sediment traps to control surface runoff from disturbed areas. This containment system should prevent any sediment or untreated runoff from leaving the Project area for runoff events from precipitation less than the design 10-year, 24-hour event. All discharges from the proposed mining areas to state surface waters would be required to comply with applicable MPDES Permit effluent limits.

Under Alternative 3, Westmoreland Rosebud would also use other sediment-control measures for roads and other disturbed areas as described for Alternative 2 in **EIS Section 2.4.6.2, Surface Water Management and Sediment-Control Measures**. Assuming all runoff from disturbed lands is effectively captured and treated before release to any of the unmined streams in the analysis area, and all discharges at MPDES Permit outfalls meet effluent limits, adverse impacts on stream water quality should be minimal, and beneficial uses should be protected.

Similar to Alternative 2, for Alternative 3, if a precipitation event occurred that was greater than the culverts, sediment ponds, ditches, and other erosion-control structures were designed for, they would not be capable of routing, holding, or treating sediment-laden runoff and may themselves cause erosion of roads, upland disturbed and undisturbed areas, and channels and floodplains in and downslope of the analysis area. Some storm water runoff would be captured in the mine pits, but other runoff from disturbed areas in such circumstances may reach streams and ponds in the unmined areas, temporarily increasing suspended sediment, dissolved solids, and total metal concentrations in streams and ponds. These potential storm water runoff quality impacts under Alternative 3 resulting from larger storm events would be primarily limited to Lee Coulee with much less impact on Richard Coulee, as opposed to a larger area under Alternative 2 that includes large areas of both Lee Coulee and Richard Coulee. Due to the relatively small drainage area planned under Alternative 3 for topsoil storage, sediment traps, and MPDES Outfalls AM5-11 through AM5-018 in Richard Coulee (1 to 8 acres per facility), surface water impacts on tributaries are expected to be minor near the disturbed areas to negligible within the larger Richard Coulee drainage area (more than 5,000 acres).

Similar to Alternative 2, during Alternative 3 mining activities, the quality of storm water flow from undisturbed areas in the Project area would be the same as before mining commenced if no untreated storm water runoff was released from the disturbed areas. Alternative 3 includes 2,658 acres of new Project-related disturbance areas, as opposed to 5,711 acres of new Project-related disturbance areas under Alternative 2. The quality of water where it flows ephemerally in nearby downgradient sections of Lee Coulee and Richard Coulee, if such surface water flows remained, would be similar to the existing water quality (see **EIS Appendix B**).

Streams – Postmining Period (Secondary Impacts)

Secondary adverse impacts of Alternative 3 on streams would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. As noted in the Application Appendix O-1, probable hydrologic consequences of surface water quality during the postmining period are generally expected to exhibit the following characteristics:

- Postmine surface water quality at the Lee Coulee wet reach would reflect a combination of postmine surface water quality from runoff (similar to pre-mine runoff water quality) and postmine ground water quality from spoil (similar to ground water quality from spoil at Big Sky Mine, or higher than pre-mine baseline conditions).
- Postmine ephemeral surface water quality in Lee Coulee to the east of the permit boundary and in Richard Coulee would reflect pre-mine conditions.

As discussed in **Section 1.4.6, Water Resources – Ground Water**, after backfilling and once the spoil resaturates, ground water may discharge from the spoil to alluvium along the major drainages, and some of the alluvial water could discharge to streams where the ground water table intersects the stream bottom. The Lee Coulee wet reach is the only location downstream from the mine on Lee Coulee where ground water is currently discharging. Similar to Alternative 2, for Alternative 3, ground water discharge or hyporheic exchange (the mixing of surface and shallow subsurface water through porous sediment surrounding a river) from the spoil to streams, if it occurred, could result in changes in water quality in the drainages close to mining compared to pre-mining conditions. Similar to Alternative 2, any ground water discharge or hyporheic exchange to the streams near reclaimed pits between spoil materials and surface water could have higher dissolved solids and some metal concentrations, compared to pre-mine conditions. As discussed in **EIS Section 3.6, Water Resources – Ground Water**, the quality of spoil ground water in other areas mined by Westmoreland Rosebud is highly variable, so it is difficult to predict to what extent ground water discharge from the spoil in the analysis area would affect surface water quality, and if changes in water quality due to ground water discharge from the spoil would be distinguishable from natural water quality variability. Restoration and maintenance of the wet reach using pumped ground water is not expected to adversely impact Lee Coulee intermittent flows as the water quality of the pumped (replacement) water would be equal to, or superior to, the water quality present in the alluvium downgradient of the permit boundary.

Based on spoil water quality presented in **EIS Section 3.6, Water Resources – Ground Water**, TDS, sulfate, calcium, sodium, magnesium, and manganese concentrations in spoil may exceed recommended limits for livestock, other ruminants, and aquatic life; however, these parameters also exceeded these recommended limits in pre-mining ground water, and AM5 would not likely cause additional increases beyond existing conditions in Big Sky Area B spoil. Similar to Alternative 2, for Alternative 3, if ground water discharge from spoil was the major or only source of water to a stream, surface water may also exceed these recommended limits (which were also sometimes exceeded in surface water in the pre-mine condition). DEQ also evaluated probable impacts on TDS concentrations in Rosebud Creek resulting from the Project and the cumulative impacts from all previous, existing, and anticipated mining that contributes to the Rosebud Creek watershed (DEQ 2021). As part of this analysis, DEQ determined mining in Lee Coulee would result in no changes in TDS in Rosebud Creek compared to existing/previous mining (DEQ 2021). Similar to Alternative 2, the overall impacts of Alternative 3 on surface water quality and associated beneficial uses of streams in the analysis area would continue until reclamation activities and flushing of spoil ground water are complete. Alternative 3 impacts on streams would be less severe than Alternative 2 due to Alternative 3 including fewer impacted streams and reclamation activities that would occur 9 years earlier than Alternative 2.

Ponds – Mining Period (Direct Impacts)

Adverse impacts of Alternative 3 on ponds would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Ponds located within the mining footprint (including three monitored ponds: PO-300, PO-304, and PO-308) would be eliminated, as compared to six monitored ponds eliminated under Alternative 2. During mining, for ponds in which water supply was reduced due to the impoundment of runoff (including three monitored ponds: PO-305, BBIO1, and BBIO2), the quality of the pond water may change due to the reduction in sediment-laden runoff entering the pond and reduced total metals associated with the suspended solids in the water, as compared to four monitored ponds under Alternative 2.The water quality of ponds with primary water sources that are outside of the disturbance area (including four monitored ponds: PO-302, PO-303, PO-307, and PO-309) would not be affected by mining, as compared to one monitored pond that would not be impacted under Alternative 2. As noted previously, a reduction of water supply to pond PO-301 in Richard Coulee due to reduced discharges from MPDES Outfalls AM5-011 through AM5-018 is expected to be minor; therefore, the quality of the pond water is not expected to show a measurable change due to Alternative 3 activities.

Ponds – Postmining Period (Secondary Impacts)

Similar to Alternative 2, the overall impacts on water quality and associated beneficial uses of ponds in the Alternative 3 analysis area would continue until reclamation activities are complete, which would occur 9 years earlier under Alternative 3. Postmine ponds would be supplied water from storm water runoff; therefore, the water quality of the ponds would be similar to that of existing ponds in which the only source of water is storm runoff.

Sediment Yield – Postmining Period (Secondary Impacts)

Impacts of Alternative 3 on sediment yield would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. Input parameters for the WEPP model are described in **EIS Section 3.5.3.2, Alternative 2 – Proposed Action. Table E-6** provides a summary of results comparing pre-mine and postmine sediment yields for specific portions of the Project area. Impacts on Richard Coulee are not included in the table as the pre-mine to postmine changes in sediment yield in Richard Coulee are expected to be negligible.

Table E-6. Pre-mine and Postmine Sediment Yields for Portions of the Project Area.

Project Area Portion	Range of Sediment Yield (ton/acre/year)		Average Sediment Yield (ton/acre/year)		
	Pre-mine	Postmine	Pre-mine	Postmine	Difference
Area B + AM5	0.000–1.804	0.005–0.177	0.181	0.078	-0.10
Lee Coulee	0.004–0.449	0.005–0.177	0.104	0.081	-0.02

As shown in the last column of **Table E-6**, average postmine sediment yields would be less than average pre-mine sediment yields for Alternative 3, including a reduction of 0.10 tons per acre per year (as opposed to a reduction of 0.12 tons per acre per year under Alternative 2) for Area B plus AM5 and a reduction of 0.02 tons per acre per year (as opposed to a reduction of 0.05 tons per acre per year under Alternative 2) for Lee Coulee. These results show similar trends between Alternative 2 and Alternative 3 (reduction of sediment yields), with less pronounced differences under Alternative 3 as compared to Alternative 2.

Changes in sediment yield indistinguishable from those caused by fluctuations in natural processes would not have impacts on streams. Larger changes in sediment yield may have localized impacts on stream morphology and water quality (in Lee Coulee under Alternative 3 as opposed to Lee and Richard Coulees under Alternative 2). Although some localized subbasins may show increases in sediment yield (43 subbasins under Alternative 2 as opposed to 35 subbasins under Alternative 3), the overall impact of Alternative 3 is to reduce sediment yields within the analysis area, as shown in **Table E-6** (similar to Alternative 2). These changes in sediment yield are likely to be indistinguishable from variability due to natural processes. The overall impact on surface water quality due to changes in sediment yield in the analysis area would continue until reclamation activities and removal of sediment ponds are complete, which would occur 9 years earlier under Alternative 3.

1.4.5.4 Cumulative Impacts

The surface water cumulative impacts analysis area is shown on **Figure E-9** and includes the Lee Coulee and Richard Coulee watersheds. The past, present, and future actions that would contribute to cumulative impacts on ground water are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**. As described above in **Section 1.3.2**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including the majority of the Project area, in the summer of 2021. It is currently unclear what water quality and quantity impacts on the affected environment have resulted from the Richard Spring Fire. Wildfire impacts would first be detected in surface water as precipitation interacts with the charred remains of the impacted land surface. Impacts on surface water would include an increase in turbidity of surface water as ash is transported downgradient and erosion of the land surface increases from the loss of vegetation. Water quality effects due to wildfire can result in pH changes as well as the addition of nutrients, dissolved organic carbon, major ions, and metals. The loss of vegetation from the wildfire can also alter the quantity of water within a watershed due to the reduction of water uptake by vegetation and the increase in evaporation rate due to ground temperatures increasing from the loss of shade-producing vegetation.

In general, cumulative impacts of Alternative 3 on surface water quantity and quality would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.3, Cumulative Impacts**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee and the shorter Project duration (9 years shorter). Similar to Alternative 2, Alternative 3 would contribute:

- Long-term adverse cumulative impacts on surface water hydrology due to changes in stream and spring flows and loss of ponds or reduction in water supply to ponds.

- Short-term and long-term adverse cumulative impacts on surface water quality due to backfilling with spoil and surface disturbances.

1.4.5.5 Unavoidable Adverse Impacts

Unavoidable adverse impacts of Alternative 3 on surface water would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.4, Unavoidable Adverse Impacts**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. The following sections describe unavoidable adverse impacts on surface water resources within the Alternative 3 analysis area.

Inside Permit Boundary

- Permanent loss of three springs (4-2/2a, 4-2/2b, and SP-78) and associated wetlands (see **Section 1.4.9, Wetlands**) that would be removed during mining, as compared to a loss of eight springs under Alternative 2;
- Permanent loss of three ponds (PO-300, PO-304, and PO-308) and associated wetlands (see **Section 1.4.9, Wetlands**) that would be removed during mining, as compared to six ponds under Alternative 2;
- Temporary loss of surface water channels (Lee Coulee and its tributaries) within the mine disturbance area, as compared to Lee and Richard Coulees under Alternative 2;
- Temporary reduction of ground water contributions to springs (SP-306) that may have their source water reduced during mining, which may also alter ground water quality constituents corresponding with the physical impacts, similar to Alternative 2;
- Temporary reduction of surface water or ground water contributions to ponds (PO-305) that may have their source water reduced during mining, which may also reduce sediment-laden runoff entering the ponds and reduce total metals associated with suspended solids, similar to Alternative 2;
- Temporary reduction of surface water contributions (volume, timing, and frequency) from upstream and within the mine disturbance area to downstream ephemeral streams and floodplains (measurable impacts in Lee Coulee with minor to negligible impacts in Richard Coulee), as compared to measurable impacts in both Lee and Richard Coulees under Alternative 2;
- Temporary reduction of ground water contributions to Lee Coulee wet reach intermittent flow, similar to Alternative 2; and
- Temporary increase of suspended sediment, dissolved solids, and total metal concentrations in streams (measurable impacts in Lee Coulee with minor to negligible impacts in Richard Coulee) from runoff of a precipitation event that is greater than erosion-control structures were designed for, as compared to measurable impacts in both Lee and Richard Coulees under Alternative 2.

Outside Permit Boundary

- Temporary reduction of surface water or ground water contributions to two ponds (BBIO1 and BBIO2), as compared to three ponds under Alternative 2, that may have their source water reduced during mining, which may also reduce sediment-laden runoff entering the ponds and reduce total metals associated with suspended solids;
- Temporary reduction of surface water contributions (volume, timing, and frequency) from upstream and within the mine disturbance area to downstream ephemeral streams and floodplains (Lee Coulee), as compared to Lee and Richard Coulees under Alternative 2; and
- Temporary reduction of ground water contributions to Lee Coulee wet reach intermittent flow.

1.4.5.6 Irreversible and Irretrievable Impacts

Irreversible and irretrievable impacts of Alternative 3 on surface water would be similar to those described for Alternative 2 (see **EIS Section 3.5.3.5, Irreversible and Irretrievable Impacts**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee. The following irreversible and irretrievable impacts on surface water resources within the Alternative 3 analysis area would occur:

- Permanent loss of three springs (4-2/2a, 4-2/2b, and SP-78) and associated wetlands (see **Section 1.4.9, Wetlands**) that would be removed during mining, as compared to loss of eight springs under Alternative 2;
- Permanent loss of three ponds (PO-300, PO-304, and PO-308) and associated wetlands (see **Section 1.4.9, Wetlands**) that would be removed during mining, as compared to six ponds under Alternative 2;
- Minor reduction in stream flow in reclaimed stream channels within the mine disturbance area because the permeability of the spoil material is higher than that of the undisturbed native material, similar to Alternative 2; and
- Minor changes in stream flow and sediment yield in channels (Lee Coulee) near the mine disturbance area due to changes in postmine watershed characteristics and channel morphology, as compared to Lee and Richard Coulees under Alternative 2.

The loss of wetlands in the Project area and the hydrologic conditions that support the wetlands is discussed in **Section 1.4.9, Wetlands**. Similar to Alternative 2, new springs may appear along Project area drainages after the spoil is resaturated postmining (Project area drainages are different between Alternatives 2 and 3). Based on Westmoreland Rosebud's ground water model, it would take more than 50 years for the ground water table to be reestablished after site reclamation (Application Appendix O) and may take hundreds of years (Nicklin 2017). Forty years of spoil water level monitoring in other previously mined areas at the Rosebud Mine show that ground water levels are still recovering in most locations. Similar to Alternative 2, after Alternative 3 mining activities, some ponds may be constructed or retained to provide water supplies for wildlife and livestock. Because impacts on the hydrologic balance in the Project area would be minimized, there would be no other irreversible or irretrievable impacts associated with Alternative 3.

1.4.6 Water Resources – Ground Water

As described in **EIS Section 3.6.1.2, Analysis Area and Methods**, the analysis area for direct and secondary impacts on ground water quantity and quality is the proposed 15,153-acre Project area and the surrounding area where direct impacts on ground water quantity are predicted to occur as determined by ground water modeling. Within the Project area, the Rosebud Coal would be removed in select areas, resulting in ground water drawdown in the remaining portions of the Rosebud Coal. Outside of the Project area, the analysis area includes areas where ground water drawdown is predicted to be greater than 5 feet as a result of the Proposed Action. Model predicted drawdown at the end of mining is shown on **Figure E-10** and **Figure E-11**.

1.4.6.1 Direct and Secondary Impacts

Ground Water Quantity

As discussed in **EIS Section 3.6.3.2, Alternative 2 – Proposed Action**, most of the Tongue River Member sedimentary units in the Project area are saturated and contain ground water. However, due to the overall low hydraulic conductivity, only some of the units are capable of producing water to a well.

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Ground water in the more continuous and permeable bedrock units such as sub-McKay sandstones and the Rosebud Coal of the AM5 expansion area flows from the upland areas west-northwest of the Project area to the southeast, which is also the trend of Lee Coulee. Saturated zones in bedrock that overlie the coal (overburden) are typically perched on low-permeability layers and can be discontinuous. Where those low-permeability layers associated with the overburden intersect the ground surface, the overlying saturated zones can be exposed to form seeps and springs. Within the Alternative 3 AM5 expansion area, removal of the coal and the eventual replacement of the coal by spoil would occur in the upstream reaches of Lee Coulee and would have impacts on ground water quantity in the analysis area during mining and until ground water levels recover. The impacts discussion is organized by timeframe and provided below.

Mining Period – Direct Impacts

In Alternative 3, removal of overburden would remove saturated zones within the overburden. As in Alternative 2, this would result in a more homogeneous mixture of sedimentary lithologies such as shale, siltstone, and sandstone that would be replaced in the mined areas as spoil. It is unlikely that significant quantities of ground water would flow into the mine pits from the overburden walls because of the overall low hydraulic conductivity and the discontinuous nature of the saturated zones in the overburden. Due to the characteristics of the overburden, it is likely that ground water drawdown in the overburden would extend only a short distance from the pits being mined.

As in Alternative 2, removal of the Rosebud Coal under Alternative 3 would likely result in low to moderate ground water inflow to the pits, some of which would be pumped from the pits into storage ponds. Some of the inflowing ground water would evaporate from the walls of the pits due to low inflow rates. The mine pits would intercept ground water that would otherwise have discharged to alluvium in the Project area drainages. Lee Coulee is ephemeral, indicating that the majority of ground water reaching the alluvium does so without surfacing as stream flow. Removal of the overburden would temporarily reduce the amount of ground water reaching the downstream alluvial deposits. Removing the alluvium, overburden, and Rosebud Coal within the Project area drainages would likely result in reduced baseflow, in the downstream Lee Coulee wet reach during and after mining until ground water levels have recovered. The direction of groundwater flow in the unmined Rosebud Coal upgradient of Alternative 3 AM5 mining would not change as a result of mining since the ground water flow direction would be toward the pits. The direction of ground water flow in the McKay Coal and lower strata would not be altered due to mining.

As in Alternative 2, ground water levels in the unmined portions of the Rosebud Coal would decline as the mined coal is dewatered and removed. Drawdown created by removal of the coal would extend out from the mined areas as more of the coal is dewatered and removed. The maximum depth of drawdown in the Rosebud Coal would be limited by the depth of the coal. Under Alternative 3, the Westmoreland Rosebud ground water model indicated that the maximum drawdown in the Rosebud Coal at the end of mining (Year 2041) would be about 80 feet in the Lee Coulee mining area (as compared to 90 feet under Alternative 2), which represents an additional 70 feet of drawdown from this alternative relative to the drawdown occurring from mining of existing permit areas (**Figure E-10**; Revised Application Appendix I-B, March 2022). The modeling also indicated that the maximum drawdown in the McKay Coal at the end of mining (Year 2041) would be about 30 feet in the Lee Coulee mining area (as compared to 47 feet under Alternative 2), which represents an additional 20 feet of drawdown from this alternative relative to the drawdown occurring from mining of existing permit areas (**Figure E-11**; Revised Application Appendix I-B, March 2022). Ground water drawdown associated with restoring and maintaining the Lee Coulee wet reach using ground water pumping would likely occur in the vicinity of the pumping well(s). Under either Alternative 2 or Alternative 3, Westmoreland Rosebud would be required to replace any water supply where reduced bedrock inflow or drawdown precluded the beneficial use.

Ground water drawdown in the Rosebud **(Figure E-10)** and McKay **(Figure E-11)** Coals outside of the Project area to the southeast would reduce ground water levels in private wells screened in one or both of the coal units. Based on the well assessment outlined in Westmoreland Rosebud's revised Application (Revised Appendix O-1 Section 3.3.8, March 2022), mining associated with this alternative is not expected to result in additional impacts on private wells outside the permit boundary. Within the mining footprint, six wells would be removed by mining and require replacement during reclamation, as compared to 16 wells that would be impacted by Alternative 2.

Under Alternative 3, three unmonitored springs in the Project area would be affected by mining due to their location in the area being mined (4-2/2a, 4-2/2b, and SP-78), as compared to the eight monitored springs under Alternative 2. Spoils (Big Sky Mine) spring SP-306 (G013a and G013b) would likely be affected by mining due to its location being less than 0.1 mile downgradient of the AM5 expansion mine cuts (Revised Appendix O-1). Spring flows would not be reduced or eliminated until the overburden in the vicinity of the spring was mined out.

As in Alternative 2, areas of clinker would not be disturbed under Alternative 3 except for scoria pits where clinker would be mined for use as road material. As in Alternative 2, MPDES outfalls located downgradient of the scoria pits and topsoil stockpiles would trap sediment and storm water runoff and create areas where ground water recharge would be focused. The ground water recharge would be minor and in response to precipitation events.

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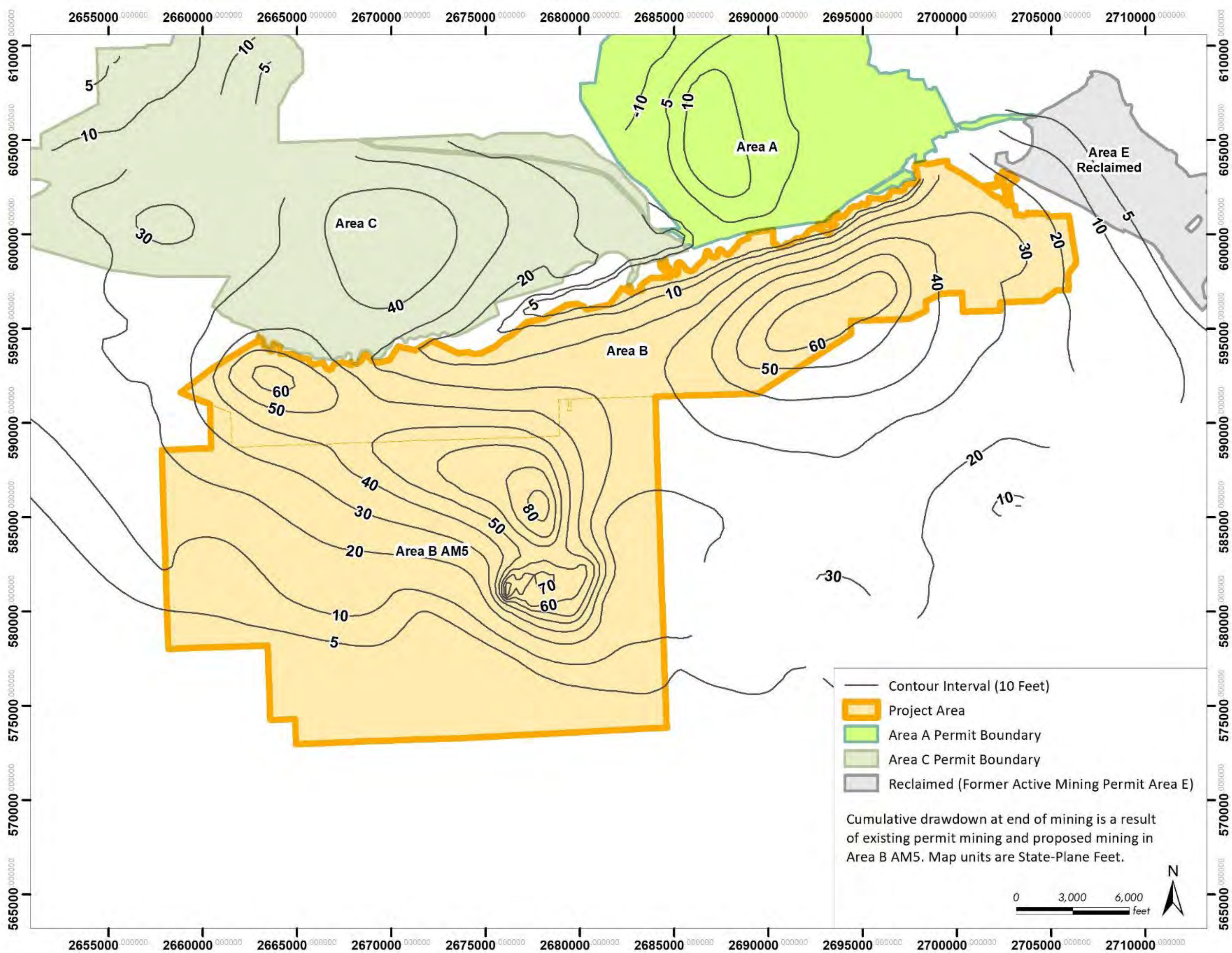

Figure E-10. Ground Water Drawdown in the Rosebud Coal at End of Mining.

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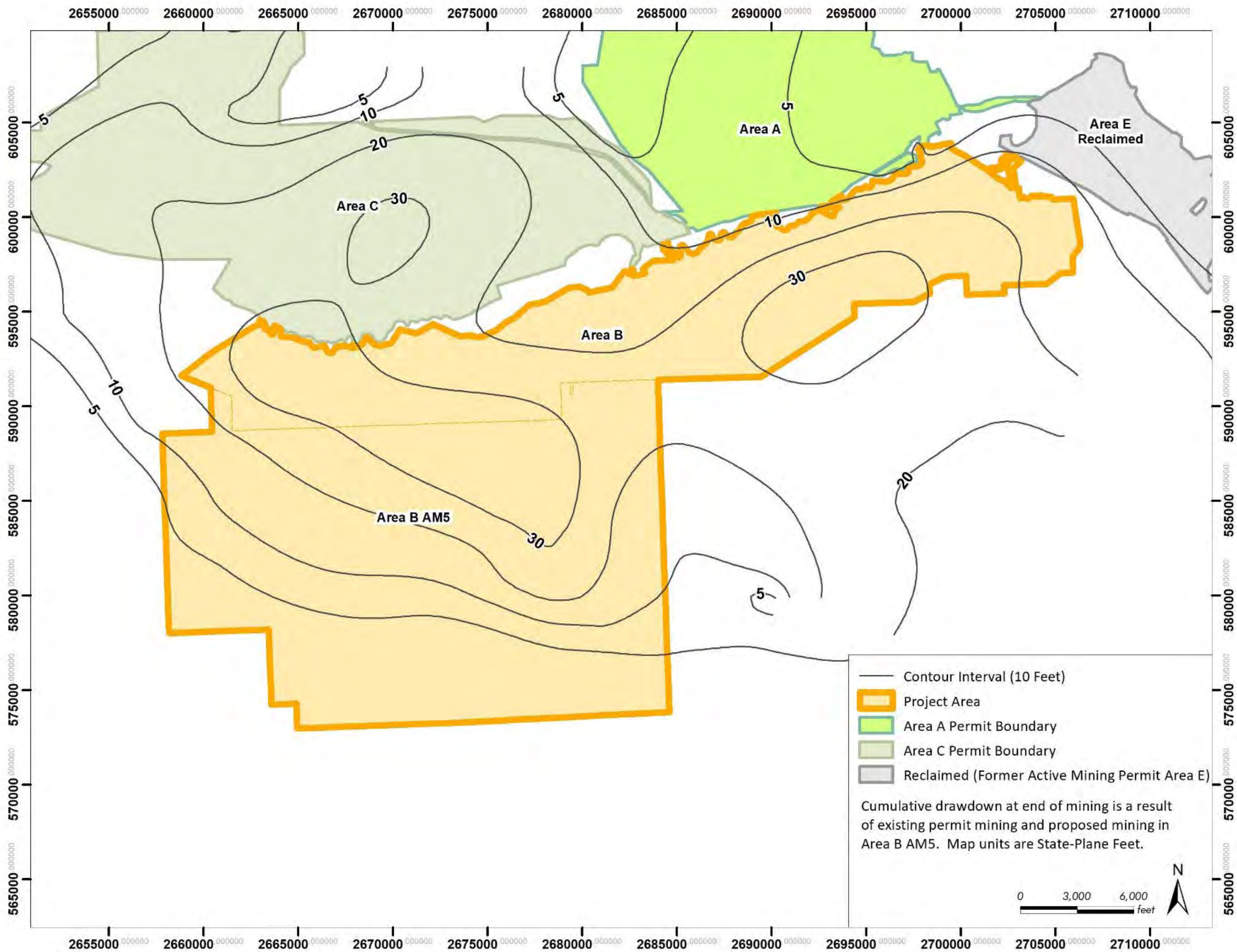

Figure E-11. Ground Water Drawdown in the McKay Coal at End of Mining.

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Postmining Period – Secondary Impacts

Under Alternative 3, the postmining impacts on ground water quantity would include a change in hydrologic characteristics of the overburden as it becomes spoil and the slow (greater than 50 years) recovery of ground water levels in the Project area.

Under both Alternatives 2 and 3, removal of the overburden and Rosebud Coal by mining would temporarily reduce lateral inflow to the alluvium of Lee Coulee immediately downstream of the Project mine pits until the pits are backfilled along with lowering ground water levels throughout the Project area. Ground water that currently discharges to the alluvium would be intercepted by pit dewatering during mining and would discharge to the reclaimed spoil placed in the pits after mining. Until the spoil is resaturated, less ground water would reach the alluvium. It is not known how much time would be required to resaturate the spoil, but the process is expected to require many decades due to the nature of the spoil (as discussed below). Because intermittent flow existed before Big Sky mining in Lee Coulee, the location of pre-mining wet or flowing reaches in the permit area would likely change and may no longer flow in the reaches after mining activities until after ground water recovery is complete. Ground water quality impacts are described below.

The overburden consists of a mixture of lithologies in a layered sequence. Removal and replacement of overburden would tend to homogenize the various lithologies, eliminating the higher hydraulic conductivity sandstone layers in the overburden. The result would be to mix fine-grained and coarse-grained material, leading to overall slightly lower horizontal hydraulic conductivity (see **EIS Section 3.6.3.2, Alternative 2 – Proposed Action, Ground Water Quantity, Postmining Period – Secondary Impacts**.

For Alternative 3, the Westmoreland Rosebud ground water model indicated that residual drawdown in the Rosebud and McKay Coals upgradient of the Project area would require more than 50 years to recover to pre-mine conditions (Revised Application Appendix I-B, March 2022). The Westmoreland Rosebud ground water model indicated that the maximum drawdown in the Rosebud Coal 50 years after the end of mining (Year 2091) would be about 60 feet (as compared to 45 feet under Alternative 2). This represents an additional 20 feet of drawdown from this alternative relative to the drawdown occurring from mining of existing permit areas and a reduction of about 10 feet in drawdown due only to AM5 mining as compared to Alternative 2 (**Figure E-12**; Revised Application Appendix I-B, March 2022). The modeling also indicated that the maximum drawdown in the McKay Coal 50 years after the end of mining would be about 30 feet (as compared to slightly more than 30 feet under Alternative 2), which represents an additional 10 feet of drawdown from Alternative 3 relative to the drawdown occurring from mining of existing permit areas (**Figure E-13**; Revised Application Appendix I-B, March 2022). Ground water modeling results of the full recovery steady state simulation following all mining indicates that residual drawdown of just over 5 feet within AM5 would persist in the Rosebud Coal and spoil (as compared to 15 feet under Alternative 2), and no drawdown would persist within the McKay Coal (as compared to 10 feet under Alternative 2). This permanent change in ground water levels is a result of the different hydraulic properties of the spoil compared with the overburden and Rosebud Coal.

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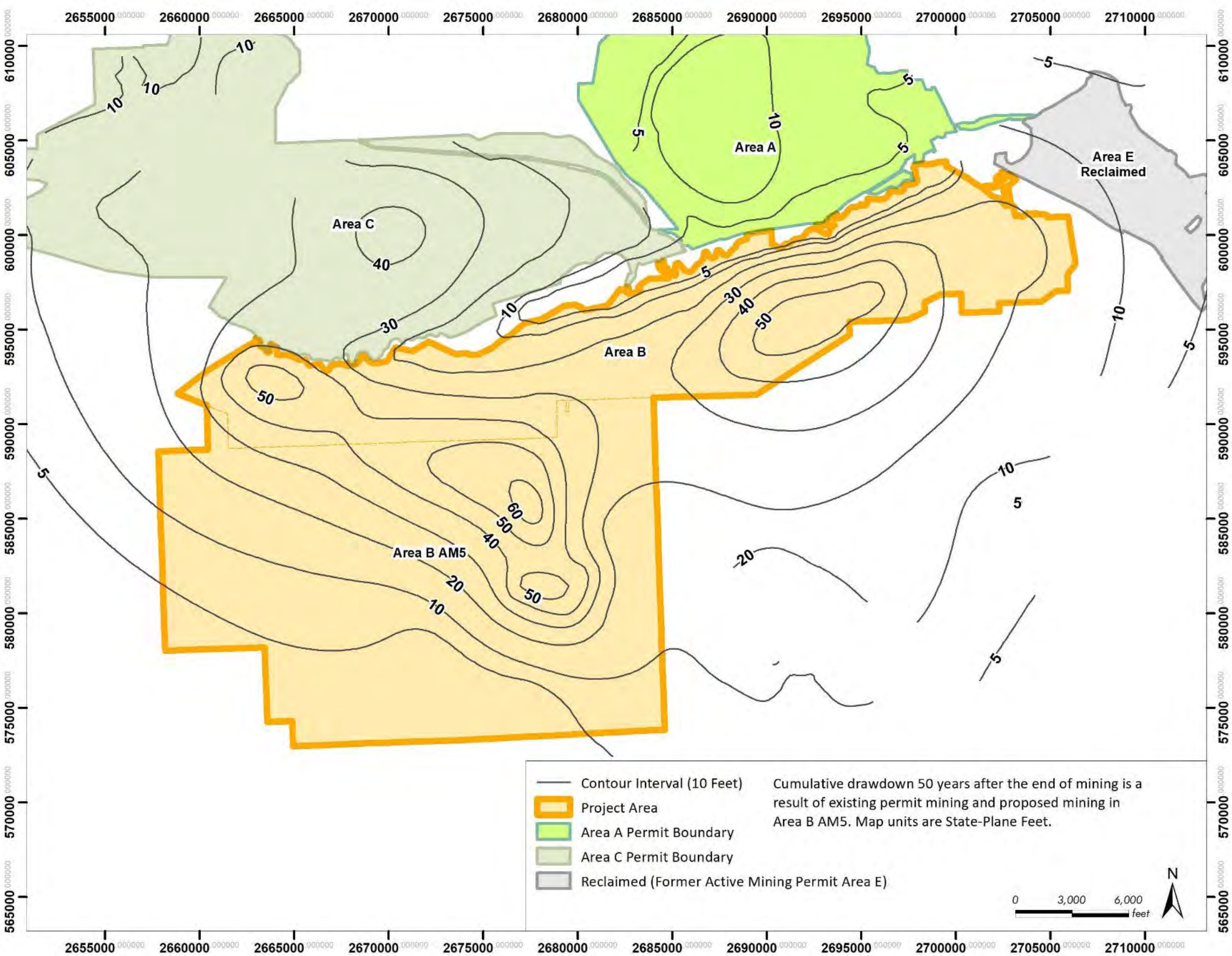

Figure E-12. Ground Water Drawdown in the Rosebud Coal 50 Years after End of Mining.

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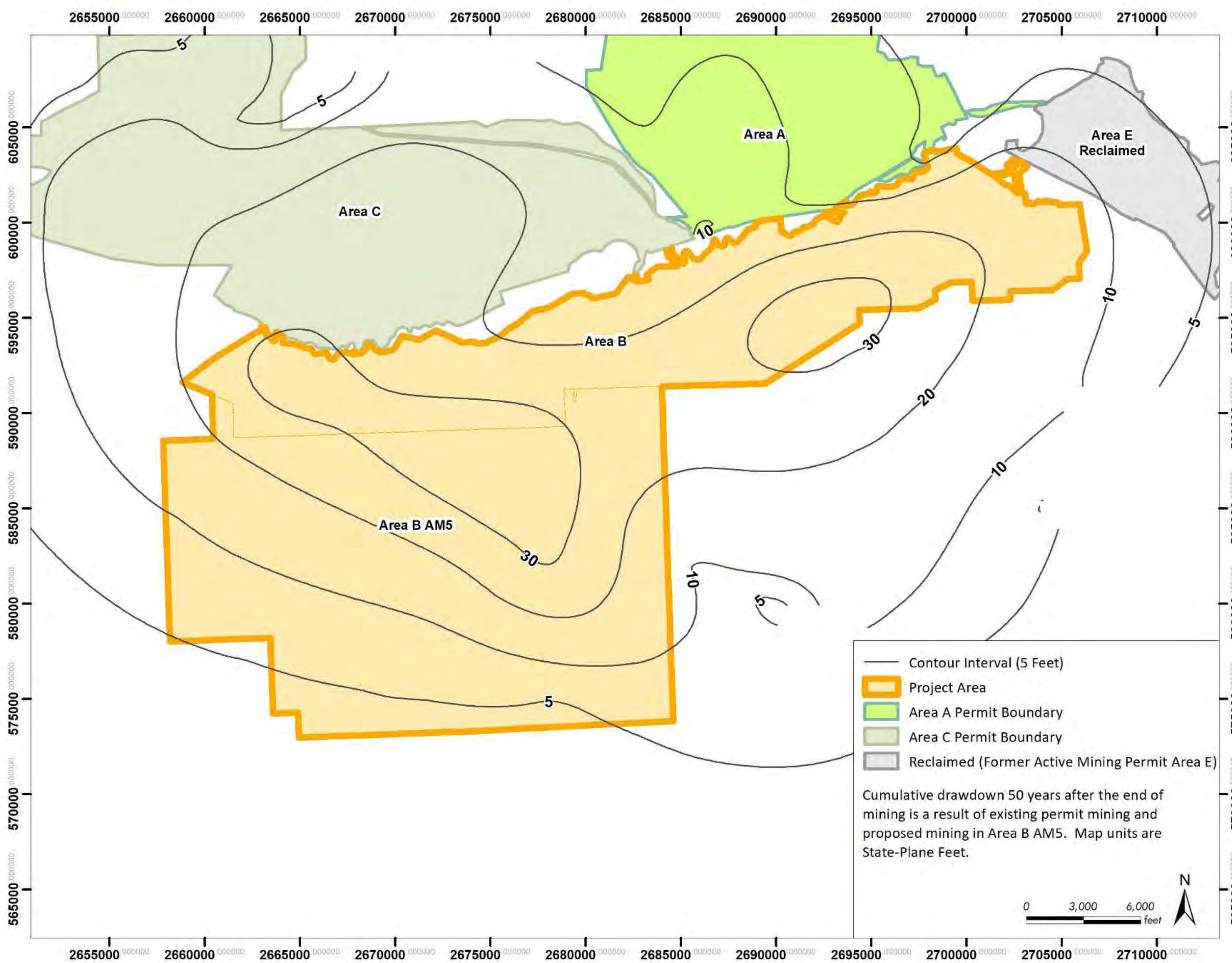

Figure E-13. Ground Water Drawdown in the McKay Coal 50 Years after End of Mining.

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Ground Water Quality

Mining Period – Direct Impacts

Under Alternative 3, the primary change to ground water quality would result from removing the Rosebud Coal and replacing the coal with overburden as spoil. As in Alternative 2, removing and returning the overburden material to the pits as spoil under Alternative 3 would mix and homogenize the overburden lithologies, exposing fresh mineral surfaces to water during the resaturation process. As discussed in **EIS Section 3.6.3.2, Alternative 2 – Proposed Action, Ground Water Quality**, the concentration trend for TDS in the Project area over a 40-year data collection period varies significantly between locations, with some showing rapid and large increases and others showing minimal increases over the same period. After nearly 40 years of ground water sampling, TDS concentrations in the spoil show varying trends with few common patterns. In general, most spoil TDS concentrations are more variable and tend to increase during the initial saturation of the spoil than later in time and some wells appear to be near or have reached equilibrium. Less common are other wells that have shown increases or decreases in TDS concentrations after the initial period of variability. It has been postulated that the quality of water in spoil will improve as soluble salts and metals are flushed from the system, but existing monitoring data provide no indication that this has occurred within the current timeframes.

It is unlikely that ground water quality in upgradient areas would be affected by mining because the regional flow direction is toward the mined areas.

Postmining Period – Secondary Impacts

During the postmine period after resaturation of the spoil, flushing of the spoil would proceed generally from northwest to southeast as the ground water gradient is reestablished. Within the Lee Coulee drainage, ground water would flow from the spoil to a small portion of undisturbed strata and then into spoil from the Big Sky Mine. Physical processes such as dilution and dispersion and geochemical processes such as sulfate reduction, mineral precipitation, adsorption, and cation exchange within the undisturbed strata receiving the ground water affected by the spoil have the potential to reduce TDS concentrations within the undisturbed strata ground water (Revised Application Appendix O, March 2022).

During the postmine period, alluvial ground water TDS concentrations near the mine would likely increase from pre-mine concentrations due to the expected higher TDS concentration in spoil ground water. Overburden ground water TDS concentrations within Lee Coulee are less than the combined TDS average for Areas A, B, and C (Application Appendix O). Under either Alternative 2 or 3, the predicted average TDS concentration in Lee Coulee would be 2,546 mg/L (Revised Application Appendix O, March 2022). Since the majority of spoil ground water will discharge to Lee Coulee alluvium, impacts are expected. A mass balance analysis performed for the AM5 PHC (Revised Application Appendix O Attachment B) calculated a TDS increase of 4 percent into the alluvium from bedrock contributions related to AM5 mining in Lee Coulee; however, this increase would not result in an increase in ground water use classification (Class II) outside the permit boundary, because a greater increase has already occurred due to Big Sky mining. A mass balance analysis was also performed to determine the potential change in TDS from ground water entering the Lee Coulee Pond (PO-311) due to mining. The analysis indicated that the TDS concentration of ground water entering the pond would increase about 11.4 percent due to AM5 mining activities; however, this increase would not result in an increase in ground water use classification (Class II) for ground water entering the pond (Revised Application Appendix O Attachment B). DEQ also evaluated probable impacts on EC/TDS concentrations in Rosebud Creek resulting from the Project and the cumulative impacts from all previous, existing, and anticipated mining that contributes to the Rosebud Creek watershed (DEQ 2021). DEQ's analysis determined that mining in Lee Coulee would result in no additional increases in TDS/SC in Rosebud Creek compared to existing and previous mining.

1.4.6.2 Cumulative Impacts

The past, present, and future actions that would contribute to cumulative impacts on ground water are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**. As described above in **Section 1.3.2**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including the majority of the Project area, in the summer of 2021. It is currently unclear what water quality and quantity impacts on the affected environment have resulted from the Richard Spring Fire. Wildfire impacts would first be detected in surface water as precipitation interacts with the charred remains of the impacted land surface. Impacts on surface water would include an increase in turbidity of surface water as ash is transported downgradient and erosion of the land surface increases from the loss of vegetation. Water quality affects due to wildfire can result in pH changes as well as the addition of nutrients, dissolved organic carbon, major ions, and metals. The loss of vegetation from the wildfire can also alter the quantity of water within a watershed due to the reduction of water uptake by vegetation and the increase in evaporation rate due to ground temperatures increasing from the loss of shade-producing vegetation. Water quality effects in ground water from changes to surface water would likely be more pronounced in shallow alluvial ground waters relative to deeper bedrock ground waters, where the effects of pH changes would be better buffered and nutrient increases could be mitigated by geochemical conditions due to the longer residence times of ground water in a deeper saturated zone relative to a shallower saturated zone.

Cumulative impacts of Alternative 3 on ground water quantity and quality would be similar to those described for Alternative 2 (see **EIS Section 3.6.3.3, Cumulative Impacts**) but would be less severe than Alternative 2 due to the reduced removal of coal, the elimination of mining in Richard Coulee, and the shorter Project duration (9 years shorter).

TDS is the main indicator parameter of spoil impacts on water quality. In overburden well data from Areas A, B, and C, TDS impacts have generally not been observed (Application Appendix O). DEQ's (2021) evaluation determined that AM5 mining in Lee Coulee would result in no additional increases in TDS/SC in Rosebud Creek compared to existing and previous mining.

1.4.6.3 Unavoidable Adverse Impacts

As discussed above, under Alternative 3, unavoidable adverse impacts on overburden and Rosebud Coal ground water quantity would occur as ground water seeped into the mined pits during mining. At the end of mining, backfilling of the mine pits with spoil would result in unavoidable adverse impacts on ground water quality. As compared to Alternative 2, these unavoidable, adverse impacts would be less severe than Alternative 2 due to the reduced removal of coal and elimination of mining in Richard Coulee.

1.4.6.4 Irreversible and Irretrievable Impacts

The Rosebud Coal aquifer within the mine pit footprint would be irreversibly and irretrievably lost due to mining. The coal would be replaced with spoil, which would have very different hydrologic characteristics and water quality.

Springs in the Project area would be irreversibly and irretrievably lost due to mining. It is possible that after the spoil resaturates, new springs may appear along the various drainages.

Ground water quality in the saturated zones that would develop in the spoil would require an undetermined but significant amount of time (greater than 50 years) to reach equilibrium and begin to improve. Water quality in the spoil would likely never return to exactly the same as pre-mining quality; as defined under MEPA, this would be a commitment of resources that cannot be reversed except over an extremely long time period. Irreversible and irretrievable impacts of Alternative 3 would be less severe than those of Alternative 2 due to the reduced removal of coal and elimination of mining in Richard Coulee.

1.4.7 Water Resources – Water Rights

The analysis areas associated with surface water rights and ground water rights are the same impact analysis areas described and depicted in **Sections 1.4.5** and **1.4.6** above, and specifically encompass surface watersheds extending through and downstream from the 15,153-acre proposed Project area that receives surface water drainage from the 8,194-acre disturbance area as modified by AM5 under Alternative 3.

1.4.7.1 Direct Impacts

Direct impacts of Alternative 3 on water rights would be similar to those described for Alternative 2 (see **EIS Section 3.7.3.2, Alternative 2 – Proposed Action**) but fewer water rights would be impacted as compared to Alternative 2 due to the elimination of mining in Richard Coulee. There are approximately two dozen surface water rights downgradient from the Project area within the Lee Coulee drainage, two of which are for irrigation (42A 27204 00 and 42A 27210 00) and the remaining of which are for stock watering. Westmoreland Rosebud conducted an impact assessment of 62 surface water rights in and around the AM5 proposed addition to the permit boundary (Application Appendix O-1, Table 2). Of the 62 surface water rights, for Alternative 3:

- 46 (as compared to 42 under Alternative 2) are not anticipated to be impacted due to their location in drainages or due to remaining water sources that are expected to provide adequate supply;
- 12 (as compared to 12 under Alternative 2) are anticipated to have short-term impacts on ephemeral flow (11 of which constitute stock use directly from the source and 1 of which constitutes stock use from a dam); and
- 4 (as compared to 8 under Alternative 2) are anticipated to be impacted by the Project due to their location within the disturbance area, all of which are dams used for stock purposes (42A 145437 00, 42A 145440 00, 42A 8207 00, and 42KJ 183306 00).

The following sections provide detailed descriptions of water rights impacts from Alternative 3.

Water Rights for Springs

There are four spring rights used for stock watering in the Alternative 3 impact analysis area in Lee Coulee drainage **(Figure E-9** and **Table E-7**). None of the springs listed in **Table E-7** are the same as any of the springs that have been monitored by Westmoreland Rosebud (see **Section 1.4.5, Water Resources – Surface Water**). Of the four spring water rights listed in **Table E-7**, none of them (as compared to one under Alternative 2) are likely to be impacted because of their location outside of the mining area. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

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Table E-7. Potential Impacts on Spring Water Rights in the Analysis Area.

DNRC Water Right Number	Water Source	Potential Impact During Active Mining	Potential Impact Postmining
42A 27318 00	Unknown	Not likely, outside of mining area. Likely destroyed by Big Sky Area B mining activities.	Not likely, outside of mining area. Likely destroyed by Big Sky Area B mining activities.
42A 27319 00	Unknown	Not likely, outside of mining area. Likely destroyed by Big Sky Area B mining activities.	Not likely, outside of mining area. Likely destroyed by Big Sky Area B mining activities.
42A 27333 00	Rosebud Coal	Not likely, outside of mining area	Not likely, outside of mining area
42A 8206 00	Overburden	Not likely, outside of mining area	Not likely, outside of mining area

Surface Water Rights

During Alternative 3 mining activities in Lee Coulee (as compared to Alternative 2 mining activities in Lee and Richard Coulees), runoff from disturbed areas would be detained and contained in mining pits or sediment-control structures, resulting in a loss of water downstream. Similar to Alternative 2, Lee Coulee and some of its tributaries in the Project area would be mined, temporarily reducing ephemeral stream flows. Impounded water would be discharged at times, after sediment settling treatment, from the sediment ponds to MPDES outfalls, changing the timing of water availability to downstream surface water users for precipitation events less than the 10-year, 24-hour defined event, or as the result of a planned discharge event. Some of the impounded water would be used for dust control or would evaporate or infiltrate. In addition, similar to Alternative 2, removal of the alluvium/colluvium, overburden, and Rosebud Coal within the Project area drainages would likely result in continuation of reduced baseflow in the Lee Coulee wet reach during and after mining until ground water levels have approached equilibrium. Alternative 3 impacts on stream flow are described in greater detail in **Section 1.4.5, Water Resources – Surface Water**. Due to the typically ephemeral nature of stream flow in Lee Coulee, it is not possible to quantify the impacts on water rights for these drainages. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

Within the Lee Coulee drainage area, there are 16 inventoried ponds, 10 of which have year-round surface water rights with allowable diversion volumes of 30 gallons per day per animal (Montana Department of Natural Resources & Conservation 2018; Application Appendix O-1, Table 2). Similar to Alternative 2, ponds located within the Alternative 3 disturbance area would be lost due to mining. Water supply to ponds located near mining disturbance within the permit boundary may be disrupted due to:

- Reductions in stream flow as a result of impounding water during mining
- Reductions in stream flow due to the loss of mined sections of the watersheds
- Reductions in or elimination of ground water discharge from mined material to receiving streams

As discussed in **Section 1.4.5, Water Resources – Surface Water**, the water quality of the stock ponds may be degraded as a result of mining. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

Ground Water Rights

Ground water wells located within the Alternative 3 disturbance area, described in **Section 1.4.6, Water Resources – Ground Water**, would be removed as a result of mining. Westmoreland Rosebud's ground water model estimated that drawdown in the Rosebud Coal at the end of mining (Year 2041) would be about 80 feet in the Lee Coulee mining area (as compared to 90 feet under Alternative 2), and drawdown

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in the McKay Coal would be about 40 feet in the Lee Coulee mining area (as compared to 47 feet under Alternative 2) (see **Section 1.4.6, Water Resources – Ground Water**). Ground water drawdown in the Rosebud (**Figure E-10**) and McKay (**Figure E-11**) Coals outside of the Project area to the southeast would reduce ground water levels in private wells screened in one or both of the coal units. Based on the well assessment outlined in Westmoreland Rosebud's revised Application (Revised Appendix O-1 Section 3.3.8, October 2021), mining associated with this alternative is not expected to result in additional impacts on private wells outside the permit boundary.

Westmoreland Rosebud provided an impact assessment of 48 individual wells in proximity to the Project area (Application Appendix O-1, Table 5). Due to multiple sources of well data and limited information for some wells, some wells may be represented by more than one record. In general, wells would not be affected by mining if they are located outside the permit area or if they are screened in the Sub-McKay unit. Of the 48 wells, 17 (42A 108358 00, 42A 27339 00, 42A 52220 00, 42KJ 108499 00, 42KJ 183322 00, 42KJ 183328 00, 42KJ 183536 00, 42KJ 42802 00, 42KJ 8205 00, 42KJ 8210 00, 205, 212, 212086, BUN9100, BUN9120, BUN9210, and BUN9200) would be impacted by Project mining. As noted in **Section 1.4.6, Water Resources – Ground Water**, within the mining footprint, 7 wells would be removed by mining and require replacement during reclamation, as compared to 16 wells that would be impacted by Alternative 2. Impacts for some wells may not be assessable due to a lack of information on the screened interval, static water level, or water column. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

1.4.7.2 Secondary Impacts

Secondary (postmining) impacts of Alternative 3 on water rights would be similar to those described for Alternative 2 (see **EIS Section 3.7.3.2, Alternative 2 – Proposed Action**) but would be less severe than Alternative 2 due to the elimination of mining in Richard Coulee.

Water Rights for Springs

Secondary (postmining) impacts on spring water rights from Alternative 3 are described in **Table E-7**, which shows that no spring water rights are expected to be impacted postmining, as compared to one spring water right impacted postmining under Alternative 2.

Surface Water Rights

After mining, when the site was reclaimed and the hydrologic balance restored in accordance with MSUMRA requirements for Phase IV bond release (ARM 17.24.1116(6)(d); see also **EIS Section 1.6.4, Bond Release**), Alternative 3 impacts on surface water rights would diminish and would likely return to near pre-mine conditions, similar to Alternative 2. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

Stock ponds with water rights located near the Alternative 3 disturbance area whose source of supply was runoff would return to near pre-mine conditions after reclamation was completed and the hydrologic balance restored to the extent possible, similar to Alternative 2. The ponds would fill when precipitation events occurred, resulting in stream flow and direct runoff to the ponds. For stock ponds located near the Alternative 3 disturbed area whose source of supply was at least in part spring flows, there would not be a return to pre-mine conditions, similar to Alternative 2. Stock ponds for livestock and wildlife watering in the Alternative 3 Project area would be reestablished or mitigated by Westmoreland Rosebud during postmining reclamation, similar to Alternative 2. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

Ground Water Rights

Westmoreland Rosebud's ground water model showed that 50 years after the end of mining, there would still be residual drawdown in the coal aquifers outside of the mined area (Application Appendices I-A and I-B). No wells outside the disturbance area are anticipated to be impacted by drawdown or water quality impacts. The process of addressing potential impacts is described in the EIS section **Replacement Water Sources and Replacement Process**.

1.4.7.3 Cumulative Impacts

The Alternative 3 cumulative impacts analysis area for water rights includes the watersheds in which impacts on water rights may be expected to occur, including the watersheds shown on **Figure E-9** and described in **Section 1.4.5, Water Resources – Surface Water** and **Section 1.4.6, Water Resources – Ground Water**. The past, present, and future actions that would contribute to cumulative impacts on ground water are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**.

Cumulative impacts of Alternative 3 on water rights would be similar to those described for Alternative 2 (see **EIS Section 3.7.3.3, Cumulative Impacts**) but would impact fewer water rights as compared to Alternative 2 due to the elimination of mining in Richard Coulee and the shorter Project duration (9 years shorter).

Past, current, and related future actions under concurrent consideration that would affect surface and ground water resources and therefore surface and ground water rights include past, present, and future mining activities in the Alternative 3 analysis area, and the use of surface and ground water for agriculture, including livestock watering. These activities result in ground water drawdown in area wells and affect water availability, either in terms of volume or timing, that may result in long-term impacts on existing surface and ground water rights.

1.4.7.4 Unavoidable Adverse Impacts

Unavoidable adverse impacts from Alternative 3 include water rights that become unusable for their specified purpose due to flow or water quality changes, similar to Alternative 2. If a water right became unusable, a suitable replacement source would be provided by Westmoreland Rosebud as described in the EIS section **Replacement Water Sources and Replacement Process**.

1.4.7.5 Irreversible and Irretrievable Impacts

Because any adversely affected water rights would be replaced with an adequate water supply for Alternative 3, no irreversible or irretrievable impacts would occur, similar to Alternative 2.

1.4.8 Vegetation

As described in **EIS Section 3.8.1.2, Analysis Area and Methods**, the analysis area for impacts on vegetation is the 15,153-acre Project area (**Figure E-1**).

1.4.8.1 Direct Impacts

Alternative 3 would result in the removal and loss of vegetation communities on up to 2,568 acres in the analysis area during mining operations in the Project area, as compared to 5,711 acres under Alternative

2, resulting in short-term adverse impacts on vegetation. The upland grassland community would be most affected, with up to 1,493 acres disturbed, followed by conifer/sumac communities with a total of 587 acres impacted. Existing reclamation areas make up the third-most impacted vegetation community with 241 acres impacted. **Table E-8** lists the acreages of disturbance for each vegetation type in the analysis area and the proposed postmine revegetation target acres for each type.

Table E-8. Vegetation Impacts and Proposed Revegetation Acreages Under Alternative 3.

Vegetation Type	Vegetated Acres in Analysis Area	Acres Disturbed	Postmine Revegetation Target Acres within Disturbance Area
Lowland			
Deciduous tree/shrub (woody draw)	106	33	33
Grassland	14	0	17
Silver sagebrush		0	38
Upland			
Grassland	5.035	1,493	1,664
Conifer	2,891	522	314
Sagebrush			
• Big sagebrush	477	34	128
• Silver sagebrush	722	97	194
Skunkbush sumac	547	65	189
Mixed shrub	293	54	70
Improved pasture (disturbed grassland improved)	116	26	0
Revegetation (existing reclamation area)	1,857	241	N/A
Other			
Cropland	102	0	0
Wetlands/wet meadows	11	1	TBD
Ranch yard	4	0	8
Sandstone rock	6	5	2
Pond	62	5	0
Total	**12,243**[1]	**2,578**[2]	**2,658**

Table source: Westmoreland Rosebud's October 6, 2021, deficiency response.

[1]Total acreage of the analysis area, which is the same as the Project area, is 15,153 acres and includes nonvegetated areas (active mining, roads, and other disturbance in the Project area).

[2]Disturbance includes an additional 80 acres of active mining areas or disturbed areas that are not included in this total.

Vegetation removal under Alternative 3 would result in an overall loss of biodiversity and a short-term loss of productivity in the analysis area during the active mining period, but it would occur on 3,053 fewer acres (53 percent less) than under Alternative 2. As described for Alternative 2 in the EIS, reclamation would reestablish plant communities, but biodiversity would be reduced, and species composition would not be the same (Holl 2002). Reclamation and vegetation reestablishment would occur 9 years earlier than under Alternative 2. After reclamation of mine disturbances, shrublands and grasslands can take many years to reestablish a community with a diversity of plants similar to preexisting conditions. As discussed in **Section 1.4.18, Soils**, loss of soil structure, loss of organic matter due to mixing and storage, and loss of microorganisms due to prolonged storage of soil could lower postmining

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vegetation production and diversity for an extended period; this impact would be less than Alternative 2, however, due to the shorter duration of soil storage.

Upon completion of mining in the Project area, disturbed areas would be reclaimed and revegetated as described for Alternative 2 in **EIS Section 2.4.5, Reclamation Plan**.

Success of reclamation would be measured through monitoring as described for Alternative 2. Ongoing monitoring of existing reclamation activities at other permit areas of the Rosebud Mine indicates that revegetation in most areas is equal to or exceeds reference-area cover values and production values. As described for Alternative 2, the seed mixes for revegetation would be dominated by native species; however, it is likely over the long term that reclaimed areas would have fewer native species than existing communities.

Overall, Alternative 3 would have a short-term adverse effect on vegetation due to the removal of 2,568 acres of vegetation by mining and associated activities in the analysis area; however, these impacted areas would be 53 percent smaller as compared to Alternative 2 and would be reclaimed 9 years earlier than under Alternative 2. Some long-term adverse impacts on vegetation may occur due to decreased vegetation diversity and due to the potential for changes to vegetation communities from the reduced amount of surface and ground water in the area (see **Sections 1.4.5** and **1.4.6**, respectively).

As with Alternative 2, no impacts on sensitive plant species are anticipated under Alternative 3 because none of the potential sensitive species were found in the analysis area.

1.4.8.2 Secondary Impacts

Secondary impacts would be similar to those described in **EIS Section 3.8.3.2, Alternative 2 – Proposed Action, Secondary Impacts**, and in **Section 1.4.9, Wetlands**. Alternative 3 may result in new or expanded populations of noxious weeds by disturbing 2,568 acres of land that could become potential paths for dispersal of weed seeds; impacts, however, would be 53 percent less as compared to Alternative 2 because 3,053 fewer acres would be disturbed. Existing weed populations could disperse to newly disturbed areas and other areas via vehicular traffic or soil transport. An increase in abundance and distribution of noxious weeds has the potential to displace native species and reduce vegetation diversity. The noxious weed control plan would prevent any large populations of noxious weeds from establishing within the Project area. With the implementation of the noxious weed control plan, reclamation plan, and BMPs, Alternative 3 would have a short-term adverse impact on surrounding vegetation.

1.4.8.3 Cumulative Impacts

The past, present, and future actions that would contribute to cumulative impacts on vegetation are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**, and include agriculture, land disturbance, wildland fires, and mining. As described above in **Section 1.3.3**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including a majority of the Project area, in the summer of 2021. Effects of wildland fires include alteration of vegetation communities such as reduced tree and shrub cover, increases or decreases in nonnative and noxious weed species, increases in nutrients in the soil, and reduction in insect pests that may be adversely affecting native vegetation. Overall, past and future wildland fires would contribute both beneficial and adverse cumulative impacts on vegetation.

As with Alternative 2, Alternative 3 would contribute short-term adverse cumulative impacts on vegetation from removal of vegetation for mining activities, but the impact would be less than under Alternative 2. Alternative 3 would also contribute long-term adverse cumulative impacts on vegetation due to decreased vegetation diversity and due to the potential for changes to vegetation communities from the reduced amount of surface and ground water in the area, but, again, the impact would be less than under Alternative 2. Overall, when combined with other past, present, and related future actions, Alternative 3 would have a long-term adverse impact on vegetation, but the impact would be less than what was described for Alternative 2 in **EIS Section 3.8.3.3, Cumulative Impacts**.

1.4.8.4 Unavoidable Adverse Impacts

An unavoidable loss of native species and changes to species composition would occur during mining operations under Alternative 3 but would be less than described for Alternative 2. Reclamation of disturbed areas after mining would occur 9 years earlier under Alternative 3 than under Alternative 2 and would include revegetating most disturbed areas to pre-mining vegetation production over the long term. As with Alternative 2, vegetation communities would be altered, and not all native species would reestablish. Introduced species have the potential to increase. This loss of some native species and increase in introduced species would be unavoidable impacts of the Project but would be less as compared to Alternative 2.

1.4.8.5 Irreversible and Irretrievable Impacts

As described for Alternative 2, Alternative 3 would disturb vegetation communities dominated by native species, the impacts of which would be subsequently mitigated by revegetation. Revegetated areas would eventually return to predisturbance productivity (9 years earlier than under Alternative 2), but vegetation diversity would be lower than existing conditions. The loss of some native plant species in Alternative 3 would be an irreversible resource commitment but would be less as compared to Alternative 2.

1.4.9 Wetlands

As described in **EIS Section 3.9.1.2, Analysis Area and Methods**, the analysis area for impacts on wetlands is the 15,153-acre Project area (**Figure E-1**). The analysis of secondary impacts on wetlands is the same as the surface water analysis area (**Figure E-9**). The secondary impact analysis is based on the surface water analysis and National Wetland Inventory data because a wetland delineation was not completed for areas outside of the permit area boundary.

1.4.9.1 Direct Impacts

Under Alternative 3, 1.93 acres of palustrine persistent emergent saturated wetlands would be directly impacted by mining activities in the analysis area (**Table E-9**) as compared to 12.27 acres under Alternative 2. One 0.14-acre open water feature (4-4/8) would also be directly impacted by mining activities in the analysis area, as compared to direct impacts on two open water features under Alternative 2. Wetlands would be impacted by surface mining, construction of the Lee haul road extension and ramp roads, spoil areas, or changes to surface and ground water hydrology due to mining activities.

Ephemeral flows in Richard Coulee could be affected by changes in surface water flows. Outfalls 011 and 012 would discharge in the Richard Coulee drainage area and are about 1 mile upstream from wetland G054. As described above in **Section 1.4.5**, changes in surface water flow quantity from mining activities are expected to be minor to negligible in the Richard Coulee drainage area due to the small relative drainage area associated with the outfalls. As a result, impacts on Richard Coulee and wetland G054 are expected to be minor to negligible.

Overall, Alternative 3 would have short-term and long-term adverse impacts on wetlands (**Figure E-14**; see **EIS Section 3.1.1, Definitions Used for Impact Analyses**), but these would be less severe than Alternative 2 due to the decreased disturbance area. **Table E-9** lists each wetland that would be impacted under Alternative 3.

Table E-9. Wetland Impacts Under Alternative 3.

Wetland Identification	Size (acres)	Direct Impact (acres)	Reason for Impact
4-2/2	0.98	0.98	Mining
G011	0.51	0.51	Topsoil stockpile location
G012	0.05	0.05	Stockpile access road
G013 (a and b)	0.39	0.39	Boxcut spoil area
Total	**1.93**	**1.93**	

In total, Alternative 3 would have a direct long-term impact on 1.93 acres of wetlands. Based on the Alternative 3 mining sequence (Revised Application, October 2021), most of these direct impacts would occur years after mining begins. No additional impacts on wetlands would occur from delayed reclamation in Area B along the Lee haul road and ramp roads.

Alternative 3 would not require any CWA Section 404 permits because the wetlands identified in the analysis area were determined to be nonjurisdictional. MSUMRA and the associated rules (ARM 17.24.751(2)(f)) require wetlands to be restored. The watershed topography and hydrology would be reclaimed to reestablish to the extent possible the hydrologic balance in and near the analysis area; however, as discussed above and in **Section 1.4.6, Water Resources – Ground Water**, ground water discharge to the channels that support wetlands would not begin until after ground water levels recovered after mining, and discharges to the drainages may occur at different locations than where they occurred before mining. In addition, pre-mine flow conditions may not return to springs whose aquifer sources were removed. There would be no impact on springs supported by aquifers that were not impacted by mining, and these springs would remain fully functional. New wetlands may appear along drainages in the analysis area postmining after the spoil resaturates. As with Alternative 2, reclamation of wetlands onsite would achieve the same functions and values of pre-mining conditions. The mitigation of wetlands under either Alternative 2 or 3 would provide replacement of the functions and values lost.

As discussed in **EIS Section 2.4.9.5, Wetland Mitigation Plan**, Westmoreland Rosebud has developed a wetland mitigation plan to mitigate for the loss of wetland functions and values from the proposed Project; this plan would be implemented under either Alternative 2 or 3. As described in **EIS Section 3.9.3**, a wetland functional assessment was completed on the wetlands to determine the functions and values that need to be replaced. Based on the functional assessment completed, a total of 8.9 functional units would be impacted by Alternative 3, as compared to 66 functional units that would be impacted under Alternative 2. Westmoreland Rosebud has completed preliminary research into available mitigation options in the watershed service area and would consult with DEQ to establish a mutually agreed-upon plan to mitigate for the loss of wetland functions and values. After consultation, Westmoreland Rosebud would develop a detailed mitigation plan for DEQ approval detailing how impacted wetlands would be mitigated. Options that have been researched are described in **EIS Section 2.4.9.5, Wetland Mitigation Plan**.

Westmoreland Rosebud has identified several potential wetland mitigation sites that could be enhanced or expanded in the Rosebud and Armells Creek Drainages, including Wetlands G019, 32A, 049, and 27A (see **Table 11** in **EIS Section 2.4.9.5, Wetland Mitigation Plan**). Wetland G019 may be impacted from changes to surface and ground water flows (see **Section 1.4.9.2, Secondary Impacts**), and mitigation in this wetland may not be successful if changes to hydrology are observed.

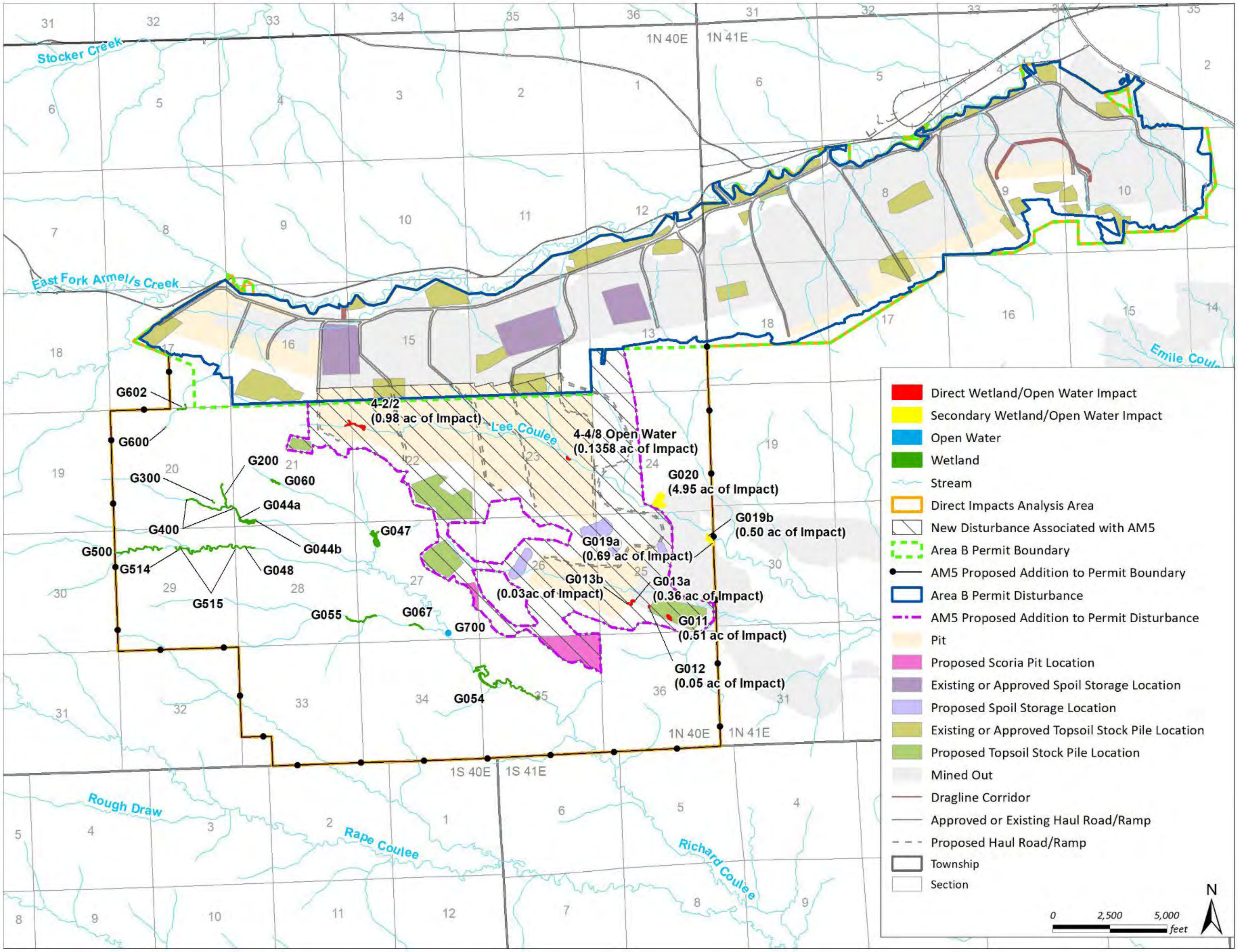

Figure E-14. Wetland Impacts (Alternative 3).

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1.4.9.2 Secondary Impacts

Secondary impacts from changes to surface and ground water flows within the analysis area are described in **EIS Section 3.9.3.2, Alternative 2 – Proposed Action, Secondary Impacts**.

The National Wetland Inventory (NWI) shows an additional 3.13 acres of freshwater ponds and 0.40 acre of wetlands within the downstream watersheds/secondary impacts analysis area, as compared to 6.3 acres of wetlands within the downstream watersheds/secondary impacts analysis area under Alternative 2. As stated in **Section 1.4.5, Water Resources – Surface Water**, ground water contributions to stream flow from the reclaimed area would eventually return to the downstream wet reach of Lee Coulee, but it may take several years to recover. In addition, the location of ground water discharge and baseflow in the downstream reach may change due to the change in water source. Ephemeral flows may also be affected; however, changes are anticipated to be minor. The reduction in ground water flows and ephemeral flows or changes in discharge location may adversely impact about 3.13 acres of freshwater ponds and 0.40 acre of downstream wetlands shown on NWI mapping.

1.4.9.3 Cumulative Impacts

Alternative 3 cumulative impacts on wetlands would be similar to those described for Alternative 2 (see **EIS Section 3.9.3.3, Cumulative Impacts**) but would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and reduced amount of coal removed. As described above in **Section 1.3.3**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including a majority of the Project area, in the summer of 2021. Effects of wildland fires include alteration or reduction of wetland habitat, depending on the severity of the fire.

Alternative 3 would contribute long-term adverse cumulative impacts on wetlands but would contribute less cumulative impacts than under Alternative 2. This would occur due to changes to hydrology, which may adversely affect wetlands. Alternative 3 would also contribute short-term and long-term adverse cumulative impacts on wetlands due to surface disturbances but, again, would contribute less cumulative impacts than under Alternative 2. Overall, when combined with other past, present, and related future actions, Alternative 3 would have a long-term adverse impact on wetlands.

1.4.9.4 Unavoidable Adverse Impacts

Alternative 3 would result in a loss of wetland functions and services, biodiversity, and species composition under Alternative 3 where wetlands are affected; these impacts would be less severe than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter). This loss would be an unavoidable adverse impact. DEQ anticipates that impacts on wetlands and streams would be mitigated and wetland functions and services would return to the area over time. DEQ would be responsible for establishing and approving any wetland mitigation requirements for nonjurisdictional wetlands associated with the Project.

1.4.9.5 Irreversible and Irretrievable Impacts

Under Alternative 3, the loss of wetlands in the analysis area whose water supply would be permanently affected by mining activities would represent an irreversible impact on analysis area wetlands, but this would be less severe than under Alternative 2 due to the reduced disturbance (3,053 fewer acres).

Changes to surface water and ground water hydrology in the analysis area are discussed in **Section 1.4.5, Water Resources – Surface Water** and **Section 1.4.6, Water Resources – Ground Water**.

1.4.10 Fish and Wildlife Resources

As described in **EIS Section 3.10.1.2, Analysis Area and Methods**, the analysis area for impacts on fish and wildlife is the 15,153-acre Project area (**Figure E-1**) plus a 1-mile buffer for all species addressed, except for the greater sage-grouse (*Centrocercus urophasianus*), for which a 4-mile buffer was used (**EIS Figure 55**).

1.4.10.1 Direct Impacts

Fish and Wildlife Species

Alternative 3 impacts on fish and wildlife resources would be the same as those listed for Alternative 2 except that the disturbance area would be reduced from 5,711 acres to 2,658 acres, resulting in reduced habitat impacts under Alternative 3 as compared to Alternative 2. In addition, the duration of mining would be 9 years shorter, allowing the reclamation plan to be implemented sooner and habitat to be restored more quickly under Alternative 3.

Special Status Species

Federally Listed Threatened, Endangered, and Candidate Species

Similar to Alternative 2, mining and associated land clearing and vegetation removal activities would adversely affect monarch butterflies due to short-term foraging habitat loss and potential loss of breeding habitat on up to 2,658 acres; however, impacts would be less than under Alternative 2, which would impact up to 5,711 acres. Foraging habitat for adult monarchs includes a variety of nectar-producing plant species, and foraging habitat for this species is present throughout the Project area. Larval food plants, *Asclepias* spp., occur in the grassland, sagebrush, and woody draw vegetation communities (Cedar Creek Associates 2016). Direct impacts on adult monarch butterflies are unlikely because of the mobility of this species. Direct impacts could occur on larval butterflies or larval food plants during land clearing activities. Direct short-term impacts on vegetation communities are described in **Section 1.4.8, Vegetation**. After reclamation and restoration of plant communities, it is possible that monarch butterfly habitat would be reestablished. Long-term adverse impacts on monarch butterfly would likely occur from surface mining activities.

For all other federally listed species (whooping crane, black-footed ferret, and pallid sturgeon), based on the best current data and scientific information available, direct impacts of expansion of mining in the analysis area under Alternative 3 would be similar to those for Alternative 2 and would not result in adverse impacts on these federally listed species or any designated critical habitat. Impacts determinations for these species are described in the **EIS Section 3.10.3.2**.

Montana Natural Heritage Program Species of Concern

Several Montana Natural Heritage Program (MNHP) Species of Concern (SOC) in **EIS Table 4** have potential to occur in the analysis area based on the presence of suitable habitat. Alternative 3 direct disturbance of 2,658 acres of wildlife habitat may impact several MNHP SOC, but impacts on SOC would be less as compared to direct disturbance of 5,711 acres under Alternative 2.

Greater Sage-Grouse

As described in **EIS Section 3.10.3.2**, no greater sage-grouse leks or core habitat are present in the greater sage-grouse analysis area. However, the greater sage-grouse analysis area is located entirely within general habitat for greater sage-grouse, as defined in EO 12-2015 (ICF 2018). Westmoreland Rosebud consulted with the Montana Sage Grouse Habitat Conservation Program on compensatory mitigation and specifically to make a financial contribution to the greater sage-grouse stewardship account. Alternative 3 direct disturbance of 2,658 acres may impact greater sage-grouse general habitat, but impacts would be less as compared to direct disturbance of 5, 711 acres under Alternative 2. These impacts under Alternative 3 would be covered by the previously implemented compensatory mitigation.

1.4.10.2 Secondary Impacts

Secondary impacts would be similar to those described in **EIS Section 3.10.3.2, Alternative 2 – Proposed Action, Secondary Impacts** except that the disturbance area would be reduced from 5,711 acres to 2,658 acres, resulting in reduced secondary impacts such as displacement and changes in behavior, as compared to Alternative 3. In addition, the duration of mining would be 9 years shorter, allowing the reclamation plan to be implemented sooner and habitat to be restored more quickly under Alternative 3.

With the implementation of the reclamation plan and BMPs, Alternative 3 would have a short-term adverse impact on wildlife habitat.

1.4.10.3 Cumulative Impacts

The past, present, and future actions that would contribute to cumulative impacts on wildlife habitat are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**, and include agriculture, land disturbance, wildland fires, and mining. As described above in **Section 1.3.3**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including a majority of the Project area, in the summer of 2021. Effects of wildland fires include alteration of wildlife habitat such as reduced tree and shrub cover, increases or decreases in nonnative and noxious weed species, and increases in nutrients in the soil. Overall, past and future wildland fires would contribute both beneficial and adverse cumulative impacts on fish and wildlife habitat.

As with Alternative 2, Alternative 3 would contribute short-term adverse cumulative impacts on wildlife habitat from removal of vegetation for mining activities resulting in habitat fragmentation and wildlife displacement, but the impact would be less than under Alternative 2. Overall, when combined with other past, present, and related future actions, Alternative 3 would have a long-term adverse impact on wildlife habitat, but the impact would be less than what was described for Alternative 2 in **EIS Section 3.10.3.3, Cumulative Impacts**.

1.4.10.4 Unavoidable Adverse Impacts

An unavoidable loss of native species habitat and changes to species composition would occur during mining operations under Alternative 3 but would be less than described for Alternative 2. Reclamation of disturbed areas after mining would occur 9 years earlier under Alternative 3 than under Alternative 2 and would include revegetating most disturbed areas to pre-mining vegetation production over the long term. As with Alternative 2, vegetation communities would be altered, and not all native species would reestablish. Introduced species have the potential to increase. This loss of some native species and increase in introduced species would be unavoidable impacts of the Project but would be less as compared to Alternative 2.

1.4.10.5 Irreversible and Irretrievable Impacts

As described for Alternative 2, Alternative 3 would disturb wildlife species individuals and local populations. Alternative 3 would likely result in shifts in species composition from species that are less tolerant of disturbance to species that are able to adapt more readily to disturbance and increased human presence, but to a lesser extent than Alternative 2. As revegetation and reclamation of disturbed areas occurred, it is likely that species composition diversity would eventually increase, but not to the levels of predisturbance diversity due to an anticipated reduction in overall vegetation diversity. The temporary loss of native wildlife habitat under Alternative 3 would be an irreversible resource commitment, but the loss would be less than under Alternative 2.

There would be no irreversible or irretrievable commitment of resources for federally listed threatened or endangered species. The action alternatives may disturb wildlife SOC individuals and local populations.

1.4.11 Cultural and Historic Resources

The direct and secondary impacts analysis area for cultural resources focuses on the area where new Project-related disturbance would occur. This includes the 2,658-acre disturbance area associated with the Project activities (**Figure E-1**). The area of potential effects (APE) is defined as the 15,153-acre Project area, which includes the AM5 expansion area and a portion of the existing Area B permit area. The APE is the analysis area for cumulative impacts and includes both disturbance that has already been permitted and new disturbance that would occur as part of the proposed Project.

1.4.11.1 Direct Impacts

Under Alternative 3, Project activities would directly disturb 2,658 acres within the 8,194-acre area of permitted disturbance, as compared to 5,711 acres within a 11,202-acre area of permitted disturbance under Alternative 2. Impacts on cultural and historic properties under Alternative 3 are generally the same as under Alternative 2, but 8 potential historic properties would be adversely affected by ground-disturbing activity over the life of the Project for Alternative 3 as opposed to 31 historical properties impacted by Alternative 2. The 8 potential historic properties under Alternative 3 include 7 properties determined eligible for listing in the NRHP and 1 that remains unevaluated for listing in the NRHP. Similar to Alternative 2, adverse impacts on the potential historic properties would be resolved through a treatment plan, to be developed by Westmoreland Rosebud. No additional potential historic properties or TCPs were identified during the ethnographic study (Ferguson 2022).

1.4.11.2 Secondary Impacts

Secondary impacts on cultural and historic resources would be the same as described for Alternative 2 (see **EIS Section 3.11.3.2**).

1.4.11.3 Cumulative Impacts

The past, present, and future actions that would contribute to cumulative impacts on cultural and historic resources are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**. As described above in **Section 1.3.2**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including the majority of the Project area, in the summer of 2021. Effects of wildland fires include burning of any intact structural features and surface artifacts.

The short- and long-term cumulative impacts of Alternative 3 on cultural and historical resources would be similar to those described for Alternative 2 (see **EIS Section 3.11.3.3, Cumulative Impacts**) but would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres).

1.4.11.4 Unavoidable Adverse Impacts

Alternative 3 would have unavoidable adverse impacts on cultural resources due to Project activities. The nature of the impacts would be the same as those described for Alternative 2 (**EIS Section 3.11.3.4**); however, but would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and fewer historic properties affected.

1.4.11.5 Irreversible and Irretrievable Impacts

The nature of impacts would be the same as those described for Alternative 2 (**EIS Section 3.11.3.5**); however, but would include less area than than Alternative 2 due to the reduced disturbance (3,053 fewer acres).

1.4.12 Socioeconomics

As described in **EIS Section 3.12.1.2, Analysis Area and Methods**, the analysis area for socioeconomic effects is Rosebud, Treasure, and Big Horn Counties (**EIS Figure 67**).

1.4.12.1 Environmental Consequences

This section discloses the impacts on socioeconomic conditions in the analysis area resulting from Alternative 3. The **EIS Section 3.12.3, Socioeconomics, Environmental Consequences** describes how the annual economic effects associated with continued operation of the Rosebud Mine would be the same for Alternatives 1 (No Action Alternative) and 2 (Proposed Action), but the difference between these alternatives is that selection of Alternative 2 would extend the life of the Rosebud Mine (and the annual direct, indirect, and induced socioeconomic effects at current levels) by 7 years beyond the life of the mine as currently permitted (see **EIS Section 2.2.4, Life of Operations**). Based on the revised Application, Alternative 3 would extend the life of mine by 4 years as compared to 7 years under Alternative 2, and average annual production would be reduced to 3.7 million tons per year as compared to 5.1 million tons per year under Alternative 2.

Alternative 3 Direct Effects

The **EIS Section 3.12.3.1** describes the direct economic effects for Alternatives 1 and 2. Under Alternative 3, the mine's operational life would be extended by 4 years, from 2038 until 2042, supporting 195 direct jobs and $95 million in annual direct economic output, and 38 direct jobs and $18.6 million in annual direct economic output for the Northern Cheyenne Indian Reservation (see **Table E-10**). In comparison, Alternative 2 would support 269 direct jobs and $131 million in annual direct economic input, and 53 direct jobs and $25.7 million in annual direct economic output for the Northern Cheyenne Indian Reservation.

Table E-10. Rosebud Mine Annual Direct Economic Effects Under Alternative 3.

Location	Employment - Current Conditions (through 2042)	Total Annual Output under Current Conditions (through 2042)
Rosebud County	195	$95,043,000
Treasure County	0	$0
Big Horn County	0	$0
Total	**195**	**$95,043,000**
Northern Cheyenne Indian Reservation	38	$18,648,000

Source: BBC 2021.

Alternative 3 Indirect Effects

The **EIS Section 3.12.3.1** describes the indirect economic impacts for Alternatives 1 and 2. The estimated indirect economic effects on the region from the Rosebud Mine under Alternative 3 are shown in **Table E-11**. Indirect effects likely would continue to occur outside of the three-county analysis area—particularly in Yellowstone County, which includes the city of Billings. Billings is the largest city and the primary regional trade center in southeastern Montana.

Under Alternative 3, the Rosebud Mine would be expected to operate until 2042, supporting 43 indirect jobs and $11.2 million in annual indirect economic output, and 8 indirect jobs and $2 million in annual indirect economic output for the Northern Cheyenne Indian Reservation (**Table E-11**). Alternative 2, in comparison, would support 59 indirect jobs and $15.5 in annual indirect economic output, and 11 indirect jobs and $2.7 million in annual indirect economic output for the Northern Cheyenne Indian Reservation. Under Alternative 3, mine life would be extended by an additional 4 years (until 2042), continuing to support the 43 indirect jobs and $11.2 million in annual indirect economic output over this time.

Table E-11. Rosebud Mine Indirect Annual Economic Effects Under Alternative 3 (Through 2042).

Location	Employment under Current Conditions (through 2042)	Total Annual Output under Current Conditions (through 2042)
Rosebud County	40	$10,132,000
Treasure County	1	$770,000
Big Horn County	2	$339,000
Total	**43**	**$11,241,000**
Northern Cheyenne Indian Reservation	8	$1,988,000

Source: BBC 2021.

Alternative 3 Induced Effects

Table E-12 shows the estimated induced effects of the Rosebud Mine under Alternative 3 in Rosebud, Big Horn, and Treasure Counties and in the Northern Cheyenne Indian Reservation. Under Alternative 3, the Rosebud Mine would be expected to operate until 2042, supporting 56 induced jobs and $7.2 million in annual induced economic output in the three counties as compared to 77 induced jobs and $9.9 million in annual induced economic input under Alternative 2. Alternative 3 also would support 10 induced jobs and $1.3 million in annual induced economic output for the Northern Cheyenne Indian Reservation as compared to 14 induced jobs and $1.8 million in annual induced economic output under Alternative 2. Under Alternative 3, mine life would be extended by 4 years (as compared to 7 years under Alternative 2), continuing to support the induced jobs and economic output over this time.

Table E-12. Rosebud Mine Induced Economic Effects Under Alternative 3 (Through 2042).

Location	Employment under Current Conditions (through 2042)	Total Annual Output under Current Conditions (through 2042)
Rosebud County	53	$6,744,000
Treasure County	2	$368,000
Big Horn County	1	$72,000
Total	**56**	**$7,184,000**
Northern Cheyenne Indian Reservation	10	$1,323,000

Source: BBC 2021.

Alternative 3 Total Socioeconomic Effects

The total regional economic employment and output of the mine is derived by combining the direct, indirect, and induced effects described in previous sections. The majority of the economic effects would continue to occur at or near the mine, and Rosebud County would continue to experience the majority of beneficial economic effects until the end of operational mine life. However, because indirect and induced spending occurs across the larger regional economy, both Big Horn and Treasure Counties would continue to experience some economic effects due to mine operations until the end of operational mine life (**Table E-13**).

Table E-13. Rosebud Mine Total Annual Economic Effects.

Location	Employment under Current Conditions through 2042	Total Annual Output under Current Conditions through 2042
Rosebud County	288	$111,919,000
Treasure County	4	$1,138,000
Big Horn County	2	$411,000
Total	**294**	**$113,467.000**
Northern Cheyenne Indian Reservation	57	$21,959,000

Source: BBC 2021.

The Rosebud Mine would support about 294 direct, indirect, and induced jobs throughout the tri-county analysis area and continue to stimulate $113.5 million in annual economic output through 2042 (**Table E-13**). About 57 of these jobs and $22 million of the annual total output would occur within the Northern Cheyenne Indian Reservation. In comparison, Alternative 2 would support 405 direct, indirect, and induced jobs throughout the tri-county analysis area and continue to stimulate $156.4 million in annual economic output through 2045 (**EIS Section 3.12.3.1**) and 78 indirect jobs and $30.3 million within the Northern Cheyenne Indian Reservation. Economic impacts on the Crow Reservation were not calculated given the small economic impacts projected to occur in Big Horn County compared with Rosebud County (BBC 2021).

1.4.12.2 Government Revenue Impacts – All Alternatives

Another important component of the mine's economic impact is the resulting fiscal revenues provided to local governments, the state of Montana, and the federal government.

Based on the BBC Effects Analysis (2021), the Rosebud Mine would provide $28.5 million in annual direct revenues to Rosebud County, the state of Montana, and the federal government in 2021 under current conditions (**Table E-14**). These revenues would include federal and state payroll and income

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taxes, severance taxes, resource indemnity trusts, gross proceeds taxes, and property taxes. State and federal royalties would also provide substantial revenue.

Table E-14 depicts the projected government revenues supported by operations of the Rosebud Mine in Alternative 3. Under Alternative 3, these revenues would continue 4 years longer (2042) than the No Action Alternative (2038). The Rosebud Mine would directly generate $16.6 million in annual state revenues in 2021 under current conditions as compared to $22.9 million under Alternative 2. Local governments and the federal government would each receive about $5.2 million in annual taxes and royalties under current conditions for Alternative 3, compared to $7.1 million for Alternative 2.

Table E-14. Projected Effects of Mine Operations on Government Revenues Under Alternative 3 (through 2042).

	Local Governments	State of Montana	Federal Government
Direct	$5,156,000	$16,646,000	$5,159,000
Indirect	$328,000	$204,000	$376,000
Induced	$178,000	$132,000	$309,000
Total	**$5,661,000**	**$16,982,000**	**$5,844,000**

1.4.12.3 Cumulative Impacts

Cumulative impacts on socioeconomics are similar to the impacts described in **EIS Section 3.12.3.3**; however, Alternative 3 would contribute less to the cumulative socioeconomic impacts on the local and regional economy.

1.4.12.4 Unavoidable Adverse Impacts

Secondary impacts from Alternative 3 would be the same as those described in **EIS Section 3.12.3.4**.

1.4.12.5 Irreversible and Irretrievable Impacts

Secondary impacts from Alternative 3 would be the same as those described in **EIS Section 3.12.3.5**.

1.4.13 Visual Resources

As described in **EIS Section 3.13.1.2, Analysis Area and Methods**, the analysis area for impacts on visual resources is the 15,153-acre Project area (**Figure E-1**). The viewshed is the landscape that can be directly seen under favorable atmospheric and topographic conditions from a given viewpoint. Based on rolling hillsides and terrain, the viewshed is defined as the Project area plus a 5-mile buffer. This is the area where line-of-sight may allow Project activities to be viewed and the horizon does not obstruct the view of an observer. Seven KOPs were identified in the analysis area to assess visual impacts. These KOPs were identified as areas with sensitive viewers in the analysis area. KOPs were located near residences, along Airport Road, along SH 39, and at a gas station on the western edge of the city of Colstrip.

1.4.13.1 Direct Impacts

Under Alternative 3, mining would occur within the Project area, but the disturbance area would be reduced to 2,658 acres as compared to 5,711 acres under Alternative 2, resulting in reduced visual impacts under Alternative 3. In addition, the duration of mining would be 9 years shorter, allowing the reclamation plan to be implemented sooner and the landscape to be restored more quickly under

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Alternative 3. **EIS Sections 3.13.2** and **3.13.3** describe the analysis methods for visual resources as well as the Key Observation Points (KOPs) (**EIS Figure 68**) used for the Project area analysis and associated impacts on the KOPs. Under Alternative 3, approximate distances of KOPs to the proposed disturbance in the Project area are much greater than those under Alternative 2. **Table E-15** shows the distances from KOPs to the Project area and the associated visual impacts.

Table E-15. Approximate Distances from Key Observation Points to the Project Area Under Alternative 3.

Label	Location	Direction from Project Area	Distance to Project Area/ Disturbance Area (Miles)	Visual Impacts
KOP 1	Residence 1	NW of the Project area	0.8/2.3	Current topography shields the view of the Alternative 3 disturbance area. This hillside would be removed under Alternative 2 but would remain under Alternative 3.
KOP 2	Residence 2	NW of the Project area	0.4/1.8	Current topography shields the view of the Alternative 3 disturbance area. This hillside would be removed under Alternative 2 but would remain under Alternative 3.
KOP 3	Airport Road	NW of the Project area	0.1/1.5	Possibly visible in the foreground–middle ground as mining progresses—short-term impact but 9 years in duration under Alternative 3 as compared to 15 years under Alternative 2; small area visible and existing mining.
KOP 4	Residence 3	N of the Project area	0.2/1.0	Ramp roads and spoil piles are currently visible in Area B and would remain visible as mining progresses—9 years in duration as compared to 15 years under Alternative 2—long-term changes to topography would be noticeable.
KOP 5	SH 39	SW of the Project area	4.1/5.1	Not visible due to topography and distance—no impact.
KOP 6	Airport	N of the Project area	0.1/1.1	Possibly visible as mining progresses—long-term impact from reclaimed lands in direct view, but mining duration would be 9 years under Alternative 3 as compared to 15 years under Alternative 2.
KOP 7	Colstrip Gas Station	NE of the Project area	0.7/4.7	Not visible due to topography and reclamation of existing permit areas—no impact.

1.4.13.2 Secondary Impacts

No secondary impacts are expected for visual resources. Changes to the visual resource would not result in subsequent impacts.

1.4.13.3 Cumulative Impacts

Alternative 3 cumulative impacts on visual resources would be similar to those described for Alternative 2 (see **EIS Section 3.13.3.3, Cumulative Impacts**) but would be reduced as compared to Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter). The 2021 Richard Spring Fire also has impacted visual resources in the majority of the Project area, burning the shrubs, grasses, and trees in the analysis area and leaving large swaths of blackish charred areas. The visual impacts from the Richard Spring Fire will continue until the burned areas have become naturally revegetated over the next several years. Combined with the impacts on visual resources from other active mining areas and wildland fires in the analysis area, Alternative 3 would have a short-term contribution to cumulative impacts.

Cumulative visual impacts from the continued combustion of coal at the Colstrip Power Plant would be the same as described in **EIS Section 3.13.3.3**.

1.4.13.4 Unavoidable Adverse Impacts

Unavoidable adverse impacts under Alternative 3 would be similar to those described in **EIS Section 3.13.3.4**, but these impacts would be less under Alternative 3 because of the reduced disturbance and shorter Project duration as compared to Alternative 2.

1.4.13.5 Irreversible and Irretrievable Impacts

Irreversible and irretrievable impacts under Alternative 3 would be similar to those described in **EIS Section 3.13.3.5**, but these impacts would be less under Alternative 3 because of the reduced disturbance as compared to Alternative 2.

1.4.14 Land Use and Recreation

As described in **EIS Section 3.14.1.2, Analysis Area and Methods**, the analysis area for impacts on land use and recreation is the 15,153-acre Project area (**Figure E-1**).

1.4.14.1 Direct Impacts

Alternative 3 impacts on land uses, recreation, and ownership would be similar to the impacts described in **EIS Section 3.14.3.2**, but Alternative 3 acres impacted would be greatly reduced (2,658 acres under Alternative 3 as compared to 5,711 acres under Alternative 2). The duration of mining would be 9 years shorter, allowing the reclamation plan to be implemented sooner. Under Alternative 3, the location of the mining disturbance would be within the Lee Coulee area. There would be limited, minor disturbance on approximately 26 acres as a result of construction of the MPDES outfalls and sediment traps on the ridge between Richard and Lee Coulees and associated discharges to Richard Coulee.

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1.4.14.2 Secondary Impacts

Secondary impacts under Alternative 3 would be similar to those described in **EIS Section 3.14.3.2**, but these impacts would be less under Alternative 3 because of the reduced disturbance as compared to Alternative 2.

1.4.14.3 Cumulative Impacts

Alternative 3 cumulative impacts on land use would be similar to those described for Alternative 2 (see **EIS Section 3.14.3.3, Cumulative Impacts**) but would be less than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter). The 2021 Richard Spring Fire has impacted land uses including grazing and cropland. Effects of wildland fires include alteration of grazing areas and wildlife habitat such as reduced tree and shrub cover, increases or decreases in nonnative and noxious weed species, and increases in nutrients in the soil.

1.4.14.4 Unavoidable Adverse Impacts

Unavoidable adverse impacts under Alternative 3 would the same as those described in **EIS Section 3.14.3.4**.

1.4.14.5 Irreversible and Irretrievable Impacts

Irreversible and irretrievable impacts under Alternative 3 would be similar to those described in **EIS Section 3.14.3.5**, but these impacts would be less under Alternative 3 because of the reduced disturbance as compared to Alternative 2.

1.4.15 Transportation

As described in **EIS Section 3.15.1.2, Analysis Area and Methods**, the analysis area for access and transportation includes the 15,153-acre Project area, existing permit areas of the Rosebud Mine, and county roads (**EIS Figure 2**).

1.4.15.1 Direct Impacts

Alternative 3 impacts on transportation would be similar to those listed for Alternative 2 (**EIS Section 3.15.3.2**), except there would be 355 acres of haul roads constructed under Alternative 3 as compared to 457 acres of haul roads under Alternative 2. In addition, haul road extensions and ramp road construction would occur only in the Lee Coulee area under Alternative 3, as compared to Alternative 2, where haul road extensions and ramp road construction would occur in the Lee Coulee and Richard Coulee areas. Reclamation of haul roads under Alternative 3 is estimated to be completed by 2044 as compared to 2047 under Alternative 2.

Alternative 3 transportation impacts from coal transport to the Rosebud and Colstrip Power Plants and fugitive dust impacts would be similar to Alternative 2, except the duration of impacts would be shorter under Alternative 3.

1.4.15.2 Secondary Impacts

Secondary impacts from Alternative 3 would be the same as those described in **EIS Section 3.15.3.2**.

1.4.15.3 Cumulative Impacts

Cumulative impacts from Alternative 3 would be the same as those described in **EIS Section 3.15.3.3**.

1.4.15.4 Unavoidable Adverse Impacts

No unavoidable adverse transportation impacts would occur under any of the alternatives.

1.4.15.5 Irreversible and Irretrievable Impacts

No irreversible and irretrievable transportation impacts would occur under any of the alternatives.

1.4.16 Solid and Hazardous Waste

As described in **EIS Section 3.16.1.2, Analysis Area and Methods**, the direct and secondary impacts analysis area for solid and hazardous waste includes existing Areas A, B, C, and F of the Rosebud Mine site and the proposed AM5 expansion area (**EIS Figure 71**); Area D, which is being reclaimed, is not in the analysis area.

1.4.16.1 Direct and Secondary Impacts

Impacts of Alternative 3 related to solid and hazardous waste would be the same as those listed for Alternative 2 (see **EIS Section 3.16**) except that the duration of mining would be 9 years shorter, reducing the duration that solid and hazardous waste would be produced.

1.4.16.2 Cumulative Impacts

Alternative 3 cumulative impacts related to solid and hazardous waste would be similar to those described for Alternative 2 (see **EIS Section 3.16.3.3, Cumulative Impacts**) but would be 9 years shorter in duration than under Alternative 2. The 2021 Richard Spring Fire would not impact solid and hazardous waste.

1.4.16.3 Unavoidable Adverse Impacts

Short-term unavoidable adverse impacts on solid and hazardous waste would occur during mining. After reclamation activities, which would occur 9 years earlier under Alternative 3 than under Alternative 2, no unavoidable adverse impacts would be anticipated for solid and hazardous waste.

1.4.16.4 Irreversible and Irretrievable Impacts

There would be no irreversible or irretrievable commitment of resources related to solid or hazardous waste under Alternative 3 because waste is not considered a resource.

1.4.17 Noise

As described in **EIS Section 3.17.1.2, Analysis Area and Methods**, the noise analysis area includes the existing permit areas of the Rosebud Mine and the 15,153-acre proposed Project area, but also extends to the nearest noise-sensitive receptors (i.e., residences) and the city of Colstrip (**EIS Figure 72**).

1.4.17.1 Direct Impacts

Under Alternative 3, as with Alternative 2, blasting in the Project area, including the AM5 expansion area, is expected to occur with similar frequency to what is ongoing today in the existing Area B permit area and other actively mined permit areas (see **EIS Section 3.17.3.2**). A typical schedule includes coal blasting 1 to 3 days per week and overburden blasting four to six times per month. Predicted overpressure levels from blasting would be the same as provided in **EIS Table 68**. The duration of blasting impacts would be 9 years shorter under Alternative 3 than under Alternative 2.

As with blasting noise, impacts from other mining-related noise, such as excavating and hauling, currently exist in the analysis area; impacts under Alternative 3 would be the same as described for Alternative 2 (see **EIS Section 3.17.3.2** and **Table 67**). The duration of mine-related impacts would be 9 years shorter under Alternative 3 than under Alternative 2.

1.4.17.2 Secondary Impacts

Secondary impacts at residences near the Rosebud Power Plant and the Colstrip Power Plant would be the same as described for Alternative 2 (see **EIS Section 3.17.3.2**). The duration of secondary noise impacts would be 9 years shorter under Alternative 3 than under Alternative 2.

1.4.17.3 Cumulative Impacts

Noise as a result of Alternative 3 would have long-term cumulative impacts on the Colstrip residences directly west of the Colstrip Power Plant, to a lesser extent on the other residences in Colstrip, and to the least extent on the more distant residences more than 2 miles away. The duration of these cumulative impacts would be 9 years shorter as compared to Alternative 2. All other related past, present, and future actions identified in this section would have minimal short- and long-term cumulative impacts on noise, and these impacts would be as described for Alternative 2 (see **EIS Section 3.17.3.3, Cumulative Impacts**).

1.4.17.4 Unavoidable Adverse Impacts

No unavoidable adverse impacts are associated with noise.

1.4.17.5 Irreversible and Irretrievable Impacts

No irreversible or irretrievable impacts are associated with noise.

1.4.18 Soil

As described in **EIS Section 3.18.1.2, Analysis Area and Methods**, the soil analysis area is the 15,153-acre Project area (**Figure E-1**).

1.4.18.1 Direct Impacts

Under Alternative 3, Project activities would directly disturb 2,658 acres within the 8,194-acre area of permitted disturbance, as compared to 5,711 acres within a 11,202-acre area of permitted disturbance under Alternative 2. Impacts on soil would determine, in part, the potential success of reclaiming the land to postmining uses. As with Alternative 2, Westmoreland Rosebud’s proposed operations plan, reclamation plan, and measures to control onsite erosion and sediment transport would mitigate some

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disturbance impacts and increase reclamation success; however, some direct impacts, which are typical of any operation where soil is removed, would persist. Direct impacts on soil would include:

- Soil erosion in disturbed areas (prior to salvage) and stockpiled soils
- Changes in physical, chemical, and biological characteristics of soil through handling for salvage, storage, and reapplication (leading to reduced soil productivity and disruption of soil development processes)

Soil Erosion

Areas cleared of vegetation as a result of Alternative 3 activities would be susceptible to soil erosion from wind and water as described in **EIS Section 3.18.3.2, Alternative 2 – Proposed Action, Direct Impacts, Soil Erosion)**. To avoid soil erosion due to wind and water, soil salvage would be conducted immediately following vegetative removal of trees and shrubs while herbaceous species would remain intact. Disturbed area erosion generally does not include developed soils. Under Alternative 3, the erosional impact area is expected to be approximately 53 percent smaller than under Alternative 2 because 3,053 fewer acres would be disturbed. Reclamation would also occur 9 years earlier as compared to Alternative 2, decreasing the duration of soil impacts on soils stockpiled no longer than 10 years. Erosion impacts on soil resources would be short-term and adverse and are expected to return to pre-mine erosion rates within 2 years once vegetation stabilizes the surface.

Changes to Physical, Chemical, and Biological Soil Characteristics

Soil characteristics that would be impacted by Alternative 3 would be the same as described in **EIS Section 3.18.3.2, Alternative 2 – Proposed Action, Direct Impacts, Changes to Physical, Chemical, and Biological Soil Characteristics**. Under Alternative 3, the area sustaining impacts on physical, chemical, and biological soil properties is expected to be approximately 53 percent less than under Alternative 2 because 3,053 fewer acres would be disturbed. (Note: Impacts on soil properties are the same in any size area.)

1.4.18.2 Secondary Impacts

Secondary impacts on soil resources include the potential for wind and water transport offsite, causing impacts on offsite resources. This secondary impact would be unlikely because soil is generally salvaged immediately following vegetative removal, reducing the likelihood of soil loss. Water erosion runoff would be directed to sediment-storage structures where soils can be retrieved and rarely moves offsite. Offsite sediment could occur during very heavy storm events where disturbances are unprotected. In general, the larger the disturbance, the greater the potential for soil erosion. Potential acreages for secondary impacts on soil resources are expected to be approximately 53 percent less than under Alternative 2 because 3,053 fewer acres would be disturbed than under Alternative 3.

1.4.18.3 Cumulative Impacts

The past, present, and future actions that would contribute to cumulative impacts on soil are the same as described in **EIS Section 3.1.4, Actions Considered in the Cumulative Impacts Analyses**. As described above in **Section 1.3.2**, the Richard Spring Fire burned 171,130 acres in the vicinity of the Rosebud Mine, including the majority of the Project area, in the summer of 2021. Effects of wildland fires include breakdown in soil structure, reduced moisture retention and capacity, and development of water repellency, all of which increase susceptibility to erosion. One of the most important impacts on soils results from the combustion of organic matter. Consumption of organics can range from scorching (producing black ash) to complete ashing (producing white ash), depending on fire severity, moisture content, and thickness of the organic layer. The effects of fire on soils are a function of the amount of heat released from combusting biomass and the duration of combustion.

The short- and long-term cumulative impacts of Alternative 3 on soils would be similar to those described for Alternative 2 (see **EIS Section 3.18.3.3, Cumulative Impacts**) but would be less (severity is the same, only in a smaller area) than Alternative 2 due to the reduced disturbance (3,053 fewer acres) and shorter Project duration (9 years shorter).

1.4.18.4 Unavoidable Adverse Impacts

Alternative 3 would have unavoidable adverse impacts resulting from a maximum disturbance of 2,658 acres of soil due to Project activities. The nature of impacts would be the same as those described for Alternative 2 (**EIS Section 3.18.3.4**); however, impacts would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres).

1.4.18.5 Irreversible and Irretrievable Impacts

Some soil would be irreversibly lost under Alternative 3 during soil removal and storage, construction and operation of the mine, and reclamation before the reestablishment of vegetation. The nature of impacts would be the same as those described for Alternative 2 (**EIS Section 3.18.3.5**); however, impacts would include less area than Alternative 2 due to the reduced disturbance (3,053 fewer acres). In addition, about 1.93 acres of wetland soil may be disturbed and potentially lost under Alternative 3 (as compared to 12.73 acres under Alternative 2).

1.5 REGULATORY RESTRICTIONS OF PRIVATE PROPERTY

The Montana Environmental Policy Act requires state agencies to evaluate regulatory restrictions proposed to be imposed on private property rights as a result of actions of state agencies, including an analysis of alternatives that reduce, minimize, or eliminate the regulation of private property (75-1-201(1)(b)(iii), Montana Code Annotated). Alternatives and mitigation measures required by federal or state laws and regulations to meet minimum environmental standards, as well as actions proposed by or consented to by the applicant, are not subject to a regulatory restrictions analysis.

No aspect of the alternatives under consideration would restrict the use of private lands or regulate their use beyond the permitting process prescribed by the Montana Strip and Underground Mine Reclamation Act. The conditions that would be imposed by the Montana Department of Environmental Quality in issuing the permit would be designed to make the Project meet minimum environmental standards or have been proposed and/or agreed to by Westmoreland Rosebud Mining, LLC. Thus, no further analysis is required.

1.6 REFERENCES

References for Appendix E are listed below in alphabetical order. All other references are listed in the Final EIS.

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