

Appendix D.2 - Reasonably Foreseeable Development Scenario for the December 11, 2018 Lease Sale

Billings Field Office Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in the RFD developed for the BiFO FEIS, and is incorporated by reference into this EA (See BiFO FEIS, Chapter 4, pages 4-422 through 4-443). The RFD contains the number of potential oil and gas wells that could be drilled and produced in the BiFO area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area.

The Billings Resource Management Plan guides management for the approximately 434,158 acres of federally managed surface and about 690,000 subsurface (oil and gas mineral estate) acres administered by the Billings Field Office (BiFO) in western Big Horn, Carbon, Golden Valley, Musselshell, Stillwater, Sweet Grass, Wheatland and Yellowstone counties.

Table 1: Oil & gas production (including associated gas) and new well completions for counties with proposed parcels. Source: Montana Board of Oil and Gas Online Data 7/18/2018.

County	2017 Annual Oil Production (in bbls)	2017 Annual Gas Production (in Mcf)	2017 New Well Completions
Musselshell	126,798	4,425	0
Sweet Grass	0	13,153	0
Carbon	318,368	1,008,882	0
Total:	445,166	1,026,460	0

Table 2: Well count by county and status for counties with proposed parcels. Source: Montana Board of Oil and Gas Online Data 7/18/2018.

County	Producing Oil Wells	Producing Gas Wells	Shut-In Wells	TA	Active Injection	Total
Musselshell	46	0	90	5	32	173
Sweet Grass	0	3	8	0	0	11
Carbon	52	28	41	4	15	140

Total:	98	31	139	9	47	324
---------------	----	----	-----	---	----	-----

Conventional oil and natural gas occurrence and development potential ranges from Low to Moderate across the entire field office area. The occurrence potential for coal bed natural gas (CBNG), and gas from organic shales ranges from Low to High. Development potential for CBNG ranges from Low to Moderate; development potential for gas from organic shales ranges from Low to Moderate.

There is potential for the drilling of CBNG wells in the coal fields within the Big Horn and Bull Mountain Basins. It is likely that there will be further drilling for CBNG when the price of natural gas again increases. The BLM believes that CBNG drilling and development would be similar to conventional shallow well drilling. There are no identified areas of High forecasted drilling activity (greater than 5 wells drilled per year). Areas of Low drilling activity are forecasted to have no more than one well drilled per township per year. Areas of Moderate drilling activity are forecasted to have between one and five wells drilled per township per year. The ‘Moderate’ potential areas were delineated from the extent of existing oil and gas fields, and the resource plays that may encourage further drilling activity. The ‘Low’ potential areas are lands that have been sparsely explored, have no established production, and are not within identified geological structures (especially surface exposed structures that have drawn past drilling activity).

Of the 14 parcels being offered 13 have, “moderate,” development potential, and 1 has, “low,” development potential (Table 3). Table 3 provides an approximation of the amount of wells to be drilled on the offered parcels during 2011-2030. From this table it is estimated that a total of 2 wells will be drilled annually on the 14 parcels under the Proposed Action (Alternative B). Depending on the location of the well, each well would result in a range of 3.5 to 5.5 acres of short-term surface disturbance and 1.75 to 2.75 acres of long-term surface disturbance. With 2 wells drilled annually, that equates to a range of 7 to 11 acres of short-term disturbance and 3.5 to 11 acres of long-term disturbance per year. Under Alternative C, all of the Billings Field Office parcels would be deferred.

Table 3: Development potential of all offered parcels.

Parcel	County	Total Acres	Potential	Wells/Acre	Alt B (Proposed) Wells/acre/year	Alt C
MTM108952H8	CARBON	320.17	Moderate	0.0002170	0.0695	<i>Deferred</i>
MTM108952HC	CARBON	1841.09	Moderate	0.0002170	0.3995	<i>Deferred</i>
MTM108952KB	CARBON	439.30	Moderate	0.0002170	0.0953	<i>Deferred</i>
MTM108952KC	CARBON	79.99	Moderate	0.0002170	0.0174	<i>Deferred</i>

Parcel	County	Total Acres	Potential	Wells/Acre	Alt B (Proposed) Wells/acre/year	Alt C
MTM108952HW	CARBON	40.08	Moderate	0.0002170	0.0087	<i>Deferred</i>
MTM108952KG	CARBON	1083.37	Moderate	0.0002170	0.2351	<i>Deferred</i>
MTM108952DT	MUSSELSHELL	1037.46	Moderate	0.0002170	0.2251	<i>Deferred</i>
MTM108952HV	MUSSELSHELL	159.94	Moderate	0.0002170	0.0347	<i>Deferred</i>
MTM108952KH	MUSSELSHELL	239.96	Moderate	0.0002170	0.0521	<i>Deferred</i>
MTM108952KJ	MUSSELSHELL	338.84	Moderate	0.0002170	0.0735	<i>Deferred</i>
MTM108952KK	MUSSELSHELL	771.27	Moderate	0.0002170	0.1674	<i>Deferred</i>
MTM108952KL	MUSSELSHELL	1125.76	Moderate	0.0002170	0.2443	<i>Deferred</i>
MTM108952KM	MUSSELSHELL	337.69	Moderate	0.0002170	0.0733	<i>Deferred</i>
MTM108952GU	SWEET GRASS	75.46	Low	0.0000434	0.0033	<i>Deferred</i>
Total					2	0

Butte Field Office Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in the RFD developed for the Butte FEIS (Appendix M), and is incorporated by reference into this EA. The RFD contains the number of potential oil and gas wells that could be drilled and produced in the Butte area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area. Actual drilling proposals that result from leasing will likely differ in location from those anticipated by the RFD.

Areas within the Butte RFD were designated as having moderate, low, and very low potential for the occurrence and development of oil and gas resources; there were no areas of “high” development potential. High development potential areas occur only within proven producing petroleum provinces or in areas with a significant number of hydrocarbon “Shows.” Areas of moderate development potential have a significant thickness of sedimentary section present that includes possible source and reservoir rocks. An area having a low potential for development has a thin sedimentary section present or there is insufficient subsurface data available to analyze the potential. It also lacks source or reservoir rocks or is metamorphosed. An area of very low development potential has no sedimentary section at the surface or insufficient data for a different classification.

The RFD split its analysis in the Butte Field Office Planning Area into five general geographic areas. It predicted conventional oil and gas exploration in Areas 1-4 and coalbed natural gas in Area 5. The two proposed parcels are in Lewis and Clark and Park counties. One of the proposed

leases is along the eastern edge of Area 4 (east of Livingston, MT). The other is located along the northern edge of Area 2 (north of Helena, MT). Both leases rank Moderate to Low for oil & gas development potential. Refer to Table 4 below and Figure A.1 to Appendix M of the Butte FEIS

Table 4 Butte Parcel Development Potential

Parcel	Area	Development Potential	Alt B (Proposed Action)	Alt C
MTM 79010-S1	Area 2 (north edge)	Moderate / Low	1,463.26	1463.26
MTM 108952-FY	Area 4 (east edge)	Moderate / Low	762.38	Deferred
Total			2,225.64	1463.26

Area #2 - Area #2 is referred to as the “Imbricate Thrust Zone”. The area occurs to both the north and east of Helena, Montana. Area 2 is thought to have moderate oil and gas potential.

In Lewis and Clark county, 32 wells have been drilled from 1910-2014. Of these 32, five were drilled within the Butte Field Office Boundary from 1929-2005. Four were plugged and abandoned, and one is “unknown” status (Montana Board of Oil and Gas Conservation). The RFD for the Butte FEIS forecasted five wells drilled in this area. One of these wells was predicted to have significant shows of oil and gas warranting offset drilling of two additional wells. Refer to Table 5.

Area #4 consists of the “Crazy Mountain Oil and Gas Play.” This area occupies most of the northern portions of Gallatin and Park Counties in the easternmost portion of the Planning Area as a broad extensive area of potential oil and gas resources. In particular, the area east of Livingston appears to have a moderate potential. In Park County, there are currently 33 wells that have been drilled between 1914 and 2008. Six wells have been drilled since 1986. These six wells were drilled in 2007 and 2008. Of the thirty-three wells drilled in Park County, 29 are plugged and abandoned, three are “unknown” status, and one is “water well, released” status (Montana Board of Oil and Gas Conservation interactive database). The RFD for the Butte FEIS forecasted four wells drilled in this area including one deep well east of Livingston around the interstate and three shallow wells. According to the forecast, the deep well and one of the shallow wells would yield discoveries that warranted step-out drilling of two holes for each discovery. A step-out well is an offset well drilled to produce the same resource encountered in a successful wildcat well. Refer to Table 5.

Table 5: Drilling activity forecast for Area 2 and Area 4. Appendix M to Butte FEIS.

Forecast Area	Total Wildcats	Wildcat Discoveries	Step-out Wells	Commodity
Area 2	5	1	2	Gas
Area 4	1	1 deep	2	Gas
Area 4	3	1 shallow	2	Oil

The estimated surface disturbance for conventional oil and gas wells within the Butte Field Office are as follows:

- The maximum area cleared per well pad would be 3.5 acres (about 380 ft. x 400 ft.) and 2.3 acres would be stabilized in about 2 years.
- The maximum area cleared per access road per well would be 17 acres about 40 ft. x 18480 ft.) and 9 acres would be stabilized in about 2 years.
- All field gathering pipelines for gas (2-4 inch diameter) will follow existing or new access roads and no additional disturbance would result.
- The maximum area cleared for trunk lines to transport gas from four different fields to the existing transmission lines running through the Butte Field Office would be 254.5 acres (about 25 ft. x 443,520 ft.) and the entire area of disturbance would be stabilized in about 2 years. All perennial stream crossings would use horizontal drilling to avoid disturbance to the stream, its bed, and banks.
- Produced oil would be trucked from the well sites.
- Dry and abandoned wells would be reclaimed.

The proposed parcels include 2,225,64 federal mineral acres (Alternative B) and 1463.2 acres (Alternative C). Based on the moderate to low development potential of the parcels in question, the effects analysis for this EA is assuming up to one wildcat well may be drilled. If successful, it may prompt the development of up to one step-out well. Each of these two wells would be for conventional oil and gas. Based on the disturbance estimates listed in the RMP, the surface disturbance for both Alternatives B and C would be:

- Per well: 3.5 acres (well pad), 17 acres (access roads), and 7.3 acres (trunk lines)
- Surface disturbance per well = 27.8 acres
- Total for 2 wells = 55.6 acres

Dillon Field Office Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in pages 43 through 48 and Appendix M of the Dillon, MT FEIS, which is incorporated by reference into this EA. The RFD in Appendix M contains the number of potential oil and gas

wells that could be drilled and produced in the Dillon Field Office Planning Area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area. Actual drilling proposals that result from leasing will likely differ in location from those anticipated by the RFD.

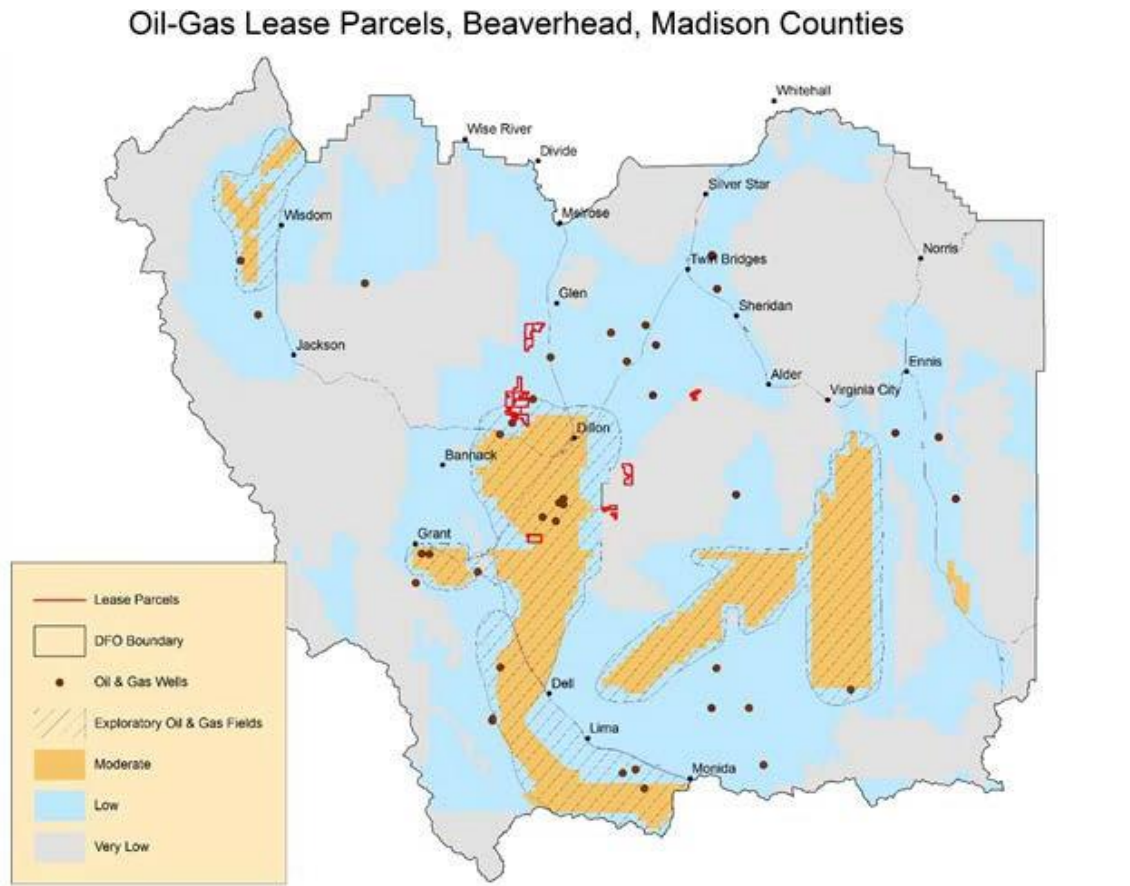
The Dillon Field Office Planning Area has areas with moderate, low, and very low potential for the occurrence and development of oil and gas resources; there are no areas of “high” development potential. High development potential areas occur only within proven producing petroleum provinces or in areas with a significant number of hydrocarbon “Shows.” Areas of moderate development potential have a significant thickness of sedimentary section present that includes possible source and reservoir rocks. An area having a low potential for development has a thin sedimentary section present or there is insufficient subsurface data available to analyze the potential. It also lacks source or reservoir rocks or is metamorphosed. An area of very low development potential has no sedimentary section at the surface or insufficient data for a different classification.

The Dillon Field Office Planning Area contains four exploratory oil & gas fields. The Dillon RFD forecasts two wells per field. Four of the fifteen lease parcels are located in the “Dillon” field (around and to the Southwest of Dillon, MT). Two are along the northern edge of the field, and the remaining nine lease parcels are North and East of the Dillon Field. Refer to Table 6 and Figure 1.

Table 6: Parcel Development Potential

Parcel	Field	Development Potential	Alt B (Proposed Action) Acres	Alt C Acres
MTM 105431-GY	None	Very Low	398.69	Deferred
MTM 105431-GQ	None	Very Low	920	Deferred
MTM 105431-GR	None	Very Low	640	Deferred
MTM 105431-GK	None	Very Low	521.44	Deferred
MTM 105431-GL	None	Very Low	200	Deferred
MTM 105431-GU	None	Low	729.6	Deferred
MTM 105431-GV	None	Low	1,189.73	Deferred
MTM 105431-GW	None	Low	791.69	Deferred
MTM 105431-GM	Dillon	Moderate	1,158.92	Deferred
MTM 105431-GD	None	Low	784.93	Deferred
MTM 105431-GF	Dillon (edge)	Low	1,200	Deferred
MTM 105431-GG	Dillon (edge)	Low	1,080	Deferred
MTM 105431-GH	Dillon	Low	1,200	Deferred
MTM 105431-GJ	Dillon	Low	1,040	Deferred
MTM 105431-GX	Dillon	Low	1,034.02	Deferred
Total:			12,889.02	0

Figure 1 Oil & Gas Development Potential



Of the fifteen lease parcels, one is located in Madison county and fourteen are located in Beaverhead county. Twelve exploratory oil & gas wells have been drilled in Madison county from 1939 to 1984. Of the twelve, five are plugged and abandoned, one is “abandoned” status, four are “water well, released” status, and two are “unknown” status. Thirty exploratory oil & gas wells have been drilled in Beaverhead county from 1898 to 1996. Twenty nine are plugged and abandoned, and one is “water well, released” status. Neither county has had a successful producible oil & gas well (Montana Board of Oil and Gas Conservation interactive database).

The Dillon RFD estimates surface disturbance from oil & gas drilling and development:

- Field development activities that cause surface disturbance include access roads, well sites, production facility sites, flow line and utility line routes and waste disposal sites.
- Development of producible wells may include pipelines, electrical transmission lines, separators, dehydrators, sump pits, and compressor stations. Sometimes oil and gas processing facilities are built in or adjacent to the field.
- The maximum area cleared per well pad would be 3.5 acres. A typical well pad will require a cut 10 feet deep against the hill and a fill 8 feet high on the outside. Eventually, when the well is plugged and abandoned, excavated material is put back in its original

place.

- Access roads are typically 14-18 feet wide. Roads to producing wells are upgraded to all-weather roads as necessary. Roads to abandoned wells would be reclaimed.
- Oil and gas are transferred from the well to storage facilities through small diameter (<6 inches) flow lines. Flow lines can be on the surface, buried or elevated. Produced water, gas or polymerized liquid is transferred from storage facilities to injection wells for secondary recovery.
- Well spacing ranges from 40 to 640 acres.
- Dry and abandoned wells are reclaimed.
- Total surface disturbance is estimated at 65.4 acres per well.

Under the Proposed Action (Alternative B), the proposed parcels include 12,889.02 federal mineral acres. Based on the moderate to very low development potential of the parcels in question, the effects analysis for this EA is assuming up to one well may be drilled. Based on the disturbance estimates in the RFD, the surface disturbance would be 65.4 acres. Under Alternative C, all parcels in the Dillon Field Office would be deferred.

HiLine Planning Area (Glasgow/Havre) Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in the RFD developed for the HiLine FEIS (Volume II, pages 450-453) and Appendix E.1 (Volume III, pages 1265 - 1283), and is incorporated by reference into this EA. The RFD contains the number of potential oil and gas wells that could be drilled and produced in the HiLine area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area. For the HiLine planning area, the selected alternative was Alternative E.

The HiLine planning area contains about 15,873,473 surface acres of all mineral ownership types. Total federal oil and gas mineral ownership, in the HiLine planning area, amounts to about 4,307,538 acres, or about 27 percent of total acres. Bureau-managed oil and gas mineral lands are lowest in Glacier County (about 6,165 acres), Liberty County (about 53,964 acres), Hill County (about 72,419 acres), Chouteau County (about 112,272 acres) and Toole County (about 113,879 acres). The remaining three counties (Blaine, Phillips, and Valley) contain the remaining 3,121,468 acres of Bureau-managed oil and gas mineral lands. Together this amounts to 3,480,167 acres of Bureau-managed oil and gas mineral lands.

Production from all mineral ownership types in the HiLine planning area totaled 950 thousand barrels of oil and 20 billion standard cubic feet of natural gas in 2017. Seven new well completions occurred in 2017: three dry holes, one injection/disposal well, and three oil wells. This data was compiled using the Montana Board of Oil and Gas interactive website. See Table 7 for breakdown by county.

Table 7: Oil & Gas production and new well completions by county. Montana Board of Oil and Gas.

County	2017 Annual Oil Production (in bbls)	2017 Annual Gas Production (in Mcf)	2017 New Well Completions
Blaine	247,902	3,494,973	3 (Dry)
Chouteau	0	667,855	0
Glacier	303,450	855,120	1 (Disposal)
Hill	939	3,059,898	0
Liberty	78,983	740,747	0
Phillips	0	8,315,144	0
Toole	251,859	2,122,468	3 (Oil)
Valley	66,753	762,667	0
Total:	949,886	20,018,872	7

8,749 producing, shut-in, temporarily abandoned, and active injection wells reside in the HiLine planning area. This data was compiled using the Montana Board of Oil and Gas interactive website. See Table 8 for breakdown by county and well status.

Table 8: Well count by county and status. Montana Board of Oil and Gas.

County	Producing Oil Wells	Producing Gas Wells	Shut-In Wells	Temporarily Abandoned	Active Injection	Total
Blaine	48	605	447	4	18	1,122
Chouteau	0	101	44	0	0	145
Glacier	465	204	665	99	103	1,536
Hill	1	525	213	1	4	744
Liberty	82	151	183	4	31	451
Phillips	0	1,378	338	2	0	1,718
Toole	872	696	1,196	9	52	2,825
Valley	21	17	161	0	9	208
Total:	1,489	3,677	3,247	119	217	8,749

For a selected alternative (Alternative E), unconstrained reasonable foreseeable development projection we estimate that during the 20-year planning cycle of 2011 to 2030, as many as 5,908 wells would be drilled in the HiLine planning area (Table 9). Up to 144 of these wells could be coalbed gas wells. Of the 5,764 remaining wells, 1,024 wells are projected to lie within the Bowdoin Dome Natural Gas Project Area (BNGPA).

Table 9: Total wells projected to be drilled within the HiLine Planning Area for the selected alternative (Alternative E) for the period 2011-2030. The projections of the percent of total future Federal wells drilled for this period is also presented in parentheses. (October 29, 2012)

	CBNG Wells (% Federal Wells)	Non-CBNG Wells Excluding BNGPA (% Federal Wells)	Non-CBNG Well BNGPA (% Federal Wells)	Total Wells
<i>Alternative E</i>	144 (12.50%)	4,740 (25.11%)	1,024 (54.69%)	5,908

Development potential is defined as high, moderate, low, and very low and it is related to the relative hydrocarbon prospectivity (occurrence potential) of the area. Areas of high prospectivity (high potential for the occurrence of hydrocarbons) will tend to be areas of high development potential. The converse is also true, in the areas of low prospectivity (low potential for the occurrence of hydrocarbons) will also tend to be areas of low development potential. High development potential indicates areas where we estimate average drilling density would be 110 well locations per township (one township is about 36 square miles) during 2011-2030. Moderate development potential indicates 60 wells per township; low development potential indicates 10 well locations per township; and very low development potential is defined as 0.5 wells per township.

Of the 25 parcels being offered 12 have very low development potential, 11 have low development potential, 2 have moderate development potential, and 0 have high development potential (Table 10). Table 10 provides an approximation of the amount of wells to be drilled on the offered parcels during 2011-2030. From this table it is estimated that a total of 4-5 (four to five) wells will be drilled on the 25 parcels that are being offered under the Proposed Action (Alternative B). Under Alternative C, thirteen parcels would be deferred; two to three wells may be drilled on the remaining 12 parcels.

Table 10: Development potential of all offered HiLine parcels.

Parcel	County	Total Acres	Potential	Wells/Acre	Alt B Wells	Alt C Wells
MTM 108952-H3	Blaine	639.64	Low	0.000434	0.28	0.28
MTM 108952-KD	Blaine	80	Low	0.000434	0.03	0 - Deferred
MTM 108952-HE	Blaine	555.05	Moderate	0.002604	1.45	0 - Deferred
MTM 108952-G9	Blaine	4	Moderate	0.002604	0.01	0.01
MTM 108952-H4	Blaine	430.5	Low	0.000434	0.19	0 - Deferred
MTM 108952-H7	Blaine	50.26	Low	0.000434	0.02	0.02
MTM 108952-J4	Toole	1,000.17	Low	0.000434	0.43	0.43
MTM 108952-J6	Toole	1,182.92	Low	0.000434	0.51	0.51
MTM 108952-J7	Toole	185.76	Low	0.000434	0.08	0.08
MTM 108952-J8	Toole	913.02	Low	0.000434	0.4	0.4
MTM 108952-J9	Toole	1,156.86	Low	0.000434	0.5	0.5
MTM 108952-KF	Toole	202.14	Very Low	0.000022	0.00	0.00
MTM 108952-KE	Toole	320	Very Low	0.000022	0.01	0.01
MTM 108952-KT	Glacier	482.87	Low	0.000434	0.21	0.21
MTM 108952-KU	Glacier	7.28	Low	0.000434	0.00	0.00

Parcel	County	Total Acres	Potential	Wells/Acre	Alt B Wells	Alt C Wells
MTM 102757-GC	Valley	1,600	Very Low	0.000022	0.03	0 - Deferred
MTM 102757-GD	Valley	2,333	Very Low	0.000022	0.05	0 - Deferred
MTM 102757-GE	Valley	1,096.55	Very Low	0.000022	0.02	0 - Deferred
MTM 102757-GF	Valley	255.12	Very Low	0.000022	0.01	0 - Deferred
MTM 102757-GG	Valley	1,107.67	Very Low	0.000022	0.02	0 - Deferred
MTM 102757-GH	Valley	1,720	Very Low	0.000022	0.04	0 - Deferred
MTM 102757-GJ	Valley	2,240	Very Low	0.000022	0.05	0 - Deferred
MTM 102757-GK	Valley	440	Very Low	0.000022	0.01	0 - Deferred
MTM 102757-GL	Valley	240	Very Low	0.000022	0.01	0 - Deferred
MTM 105431-HQ	Valley	320	Very Low	0.000022	0.01	0 - Deferred
Total		18,562.81			4.37	2.45

Surface disturbance estimates use Alternative E Development Scenario from the HiLine FEIS (Appendix E.1 table E.1.17 page 1281). For oil & gas wells other than coalbed gas and Bowdoin Dome area, each well could result in approximately 5.2 acres of short-term surface disturbance and approximately 0.92 acres of long-term surface disturbance. For Alternative B, 4-5 wells equates to a range of approximately 20.8 to 26 acres of short-term disturbance and 3.7 to 4.6 acres of long-term disturbance. For Alternative C, two to three wells would equate to a range of approximately 10.4 to 15.6 acres of short-term disturbance and 1.84 to 2.76 acres of long-term disturbance.

Miles City Field Office Reasonably Foreseeable Development Scenario

The Reasonably Foreseeable Development (RFD) for this EA is based on information contained in Minerals Appendix of the Resource Management Plan (RMP) developed for the Miles City Field Office in the minerals Appendix (Min-90 – 92), and is incorporated by reference into this EA. The RMP contains the number of potential oil and gas wells that could be drilled and produced in the Miles City Field Office Area, and was used to analyze the potential number of wells drilled for the nominated lease parcels. These well numbers are only an estimate based on historical drilling, geologic data, resource expertise, and current development in the area.

The Miles City Field Office planning area contains approximately 12.5 million surface acres of all mineral ownership types. Total federal oil and gas mineral ownership, in the Miles City Field Office planning area, amounts to about 5.7 million acres, or about 45.6 percent of total acres.

Table 11: Oil & gas production (including associated gas) and new well completions for counties with proposed parcels. Source: Montana Board of Oil and Gas Online Data 7/18/2018.

County	2017 Annual Oil Production (in bbls)	2017 Annual Gas Production (in Mcf)	2017 New Well Completions
Bighorn	50,501	345,400	3
Custer	0	38,701	0
Rosebud	172,097	8,333	0
Carter	13,137	0	0
Fallon	3,343,474	6,927,046	1

County	2017 Annual Oil Production (in bbls)	2017 Annual Gas Production (in Mcf)	2017 New Well Completions
Dawson	616,519	340,167	0
Roosevelt	2,539,799	2,972,636	4
Sheridan	676,203	388,128	0
Total:	7,411,730	11,020,411	8

Table 12: Well count by county and status for counties with proposed parcels. Source: Montana Board of Oil and Gas Online Data 7/18/2018.

County	Producing Oil Wells	Producing Gas Wells	Shut-In Wells	TA	Active Injection	Total
Bighorn	40	88	176	3	7	314
Custer	0	4	2	0	0	6
Rosebud	52	0	110	3	50	215
Carter	1	0	25	8	1	35
Fallon	421	593	491	92	300	1,897
Dawson	55	0	22	6	20	103
Roosevelt	240	0	118	25	33	416
Sheridan	123	0	176	8	61	368
Total:	932	685	1,120	145	472	3,354

The RMP estimates that during the 20-year planning cycle of 2011-2030, approximately 7,524 wells will be drilled. The distribution of well density is broken down by development potential.

Development potential is defined as high, medium, and low and is related to the relative hydrocarbon prospect potential of the area.

Under the Proposed Action (Alternative B), of the 49 parcels being offered 14 have, “low,” development potential, 33 have, “medium,” development potential, and 2 have, “high,” development potential (Table 13). Table 13 provides an approximation of the amount of wells to be drilled on the offered parcels during 2011-2030. From this table it is estimated that a total of 7-9 wells may be drilled on the 49 parcels. The RMP projects 46% of new wells to be oil wells and the remaining to be gas wells. Therefore, the Reasonably Foreseeable Development for the Miles City Field Office Lease Parcels is 3-4 oil wells and 4-5 gas wells. Surface disturbance is estimated from the baseline scenario of the Miles City Field Office RMP, based on historical data for oil and gas wells in the area. Short term disturbance is estimated to be 16.8-22.05 acres and long term surface disturbance is estimated to be 6.32-8.27 acres.

Under Alternative C, 39 of the Miles City parcels would be deferred, and 10 parcels (4,909 acres) would be offered for lease. Based upon development potential, up to two wells would be drilled. Short term disturbance is estimated to be 4.2-5.5 acres, and long term surface disturbance is estimated to be 1.58-2.07 acres.

Table 13: Development potential of all offered Miles City parcels.

Parcel	County	Total Acres	Potential	Wells/Acre	Alt B Wells	Alt C Wells
MTM105431M7	BIG HORN	316.70	Medium	0.0003591	0.1137	0 - Deferred
MTM105431M8	BIG HORN	166.75	Medium	0.0003591	0.0599	0 - Deferred
MTM108952HG	BIG HORN	852.99	Medium	0.0003591	0.3063	0.3063
MTM108952HH	BIG HORN	1153.03	Medium	0.0003591	0.4141	0.4141
MTM108952HJ	BIG HORN	40.73	Medium	0.0003591	0.0146	0 - Deferred
MTM108952HK	BIG HORN	1204.73	Medium	0.0003591	0.4327	0 - Deferred
MTM108952HL	BIG HORN	40.48	Medium	0.0003591	0.0145	0 - Deferred
MTM108952HM	BIG HORN	160.72	Medium	0.0003591	0.0577	0 - Deferred
MTM108952HP	BIG HORN	781.39	Medium	0.0003591	0.2806	0 - Deferred
MTM108952HQ	BIG HORN	25.84	Medium	0.0003591	0.0093	0.0093
MTM108952HR	BIG HORN	1282.53	Medium	0.0003591	0.4606	0 - Deferred
MTM108952HT	BIG HORN	79.93	Medium	0.0003591	0.0287	0 - Deferred
MTM108952HU	BIG HORN	391.76	Medium	0.0003591	0.1407	0 - Deferred
MTM108952JA	BIG HORN	80.11	Medium	0.0003591	0.0288	0 - Deferred
MTM108952HN	BIG HORN	480.07	Medium	0.0003591	0.1724	0 - Deferred
MTM1054318D	CUSTER	641.58	Low	0.0001078	0.0691	0 - Deferred
MTM108952H9	DAWSON	1408.94	Medium	0.0003591	0.5060	0.5060
MTM108952HX	DAWSON	107.77	Medium	0.0003591	0.0387	0.0387
MTM108952HY	DAWSON	140.59	Medium	0.0003591	0.0505	0.0505
MTM108952JW	DAWSON	122.45	Medium	0.0003591	0.0440	0 - Deferred
MTM108952JX	DAWSON	714.23	Medium	0.0003591	0.2565	0.2565
MTM108952KA	DAWSON	319.96	Medium	0.0003591	0.1149	0.1149
MTM108952CG	FALLON	400.20	Low	0.0001078	0.0431	0 - Deferred
MTM108952CH	FALLON	640.56	Low	0.0001078	0.0690	0 - Deferred
MTM108952CJ	FALLON	479.39	Low	0.0001078	0.0517	0 - Deferred
MTM108952CM	FALLON	320.55	Low	0.0001078	0.0345	0 - Deferred
MTM108952H6	ROOSEVELT	79.82	High	0.0006156	0.0491	0.0491
MTM108952HF	ROSEBUD	1121.26	Medium	0.0003591	0.4027	0 - Deferred
MTM108952JB	ROSEBUD	319.67	Medium	0.0003591	0.1148	0 - Deferred
MTM108952JE	ROSEBUD	320.17	Medium	0.0003591	0.1150	0 - Deferred
MTM108952JF	ROSEBUD	560.93	Medium	0.0003591	0.2014	0 - Deferred
MTM108952JH	ROSEBUD	674.65	Medium	0.0003591	0.2423	0 - Deferred
MTM108952JJ	ROSEBUD	680.91	Medium	0.0003591	0.2445	0 - Deferred
MTM108952JK	ROSEBUD	80.01	Medium	0.0003591	0.0287	0 - Deferred
MTM108952JN	ROSEBUD	2086.73	Medium	0.0003591	0.7494	0 - Deferred
MTM108952JP	ROSEBUD	1120.60	Medium	0.0003591	0.4024	0 - Deferred
MTM108952JQ	ROSEBUD	348.21	Medium	0.0003591	0.1251	0 - Deferred
MTM108952JR	ROSEBUD	739.82	Medium	0.0003591	0.2657	0 - Deferred
MTM108952JU	ROSEBUD	1939.90	Medium	0.0003591	0.6967	0 - Deferred
MTM108952JC	ROSEBUD	119.84	Low	0.0001078	0.0129	0 - Deferred
MTM108952JD	ROSEBUD	320.60	Low	0.0001078	0.0346	0 - Deferred

Parcel	County	Total Acres	Potential	Wells/Acre	Alt B Wells	Alt C Wells
MTM108952JG	ROSEBUD	398.77	Low	0.0001078	0.0430	0 - Deferred
MTM108952JM	ROSEBUD	1985.11	Low	0.0001078	0.2139	0 - Deferred
MTM108952JT	ROSEBUD	1921.98	Low	0.0001078	0.2071	0 - Deferred
MTM108952JV	ROSEBUD	640.57	Low	0.0001078	0.0690	0 - Deferred
MTM108952KN	ROSEBUD	1571.10	Low	0.0001078	0.1693	0 - Deferred
MTM108952KP	ROSEBUD	0.12	Low	0.0001078	0.0000	0 - Deferred
MTM108952KQ	ROSEBUD	1.91	Low	0.0001078	0.0002	0 - Deferred
MTM108952HD	SHERIDAN	120.11	High	0.0006156	0.0739	0.0739
Total (rounded to nearest whole number)					8	2

North Dakota Reasonably Foreseeable Development Scenario

The RFD for this EA is based on information contained in the RFD developed in 2009 and revised in 2011 for the NDFO RMP. The NDFO RFD contains projections of the number of possible oil and gas wells that could be drilled and produced within each of the five development potential areas specified as very high, high, moderate, low, and very low development potential areas. The number of projected new federal wells was determined by multiplying lease acreage by the forecast well pad spacing and wells per well pad. Where the number of wells in a parcel within a county had a projection of equal to or greater than 1 in 1000 (0.001) the well number was rounded up to one.

The lease parcel located in Bowman County (NDM102757-FB) is located in Township T. 129 N, R. 106 W, 5TH PM. 101 wells have been drilled in this township according to the North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division. Of the 101 wells, 98 were drilled into the Little Missouri field. One Cedar Hills well was drilled (plugged and abandoned). Two wildcats were drilled (both were dry holes). Of the Little Missouri wells, fifty-six (56) are active dry gas wells, four (4) are active oil and gas wells, one (1) is an active water injector well, six (6) are shut-in, one (1) is temporarily abandoned, twelve (12) are dry holes, and eighteen (18) are plugged and abandoned. Refer to Table 14.

Table 14: Township T. 129 N, R. 106 W, 5TH PM Well Statuses (101 wells) (NDIC)

Resource	Producing	Water Injector	Shut-in	Temporarily Abandoned	Dry Holes	Plugged and Abandoned
Dry Gas	56	0	5	0	11	11
Oil & Gas	4	1	1	1	3	8

2017 production from active dry gas wells (96 wells) in the Little Missouri field averaged 6.7 Mcf (thousand standard cubic feet) per day per well. Field production peaked in 2006 with average production per active dry gas well (80-106 wells) reaching 37.4 Mcf per day per well. Refer to Table 15.

Table 15: Little Missouri Field Dry Gas Production (NDIC)

Year	Total Gas (Mcf)	Productive Wells	Average Flowrate Per Well(Mcf/day)
2017	233,258	96	6.65
2006	1,385,412 (peak)	80 to 106	37.4

The lease parcel located in Bowman County (NDM102757-FB) is in the Very High development potential area. The NDFO RFD scenario forecasts greater than 20 well pads per township with 1 well per pad in this area. No lease parcels are located in High, Moderate, Low, or Very Low development potential areas, which correspond to {10 to 20, 2 to 10, 1 to 2, and less than 1} well pads per township, respectively. The RFD also forecasts well density per pad. The RFD forecasts 1 well per well pad throughout Bowman county. Refer to Figure 2 and Table 16.

These well numbers are only an estimate based on the NDFO RFD which is based on USGS assessments, past and current development, resource expertise, and NDIC feedback and data, and may change in the future if new technology is developed or new fields and formations are discovered.

Figure 2 (left): North Dakota Field Office Planning Area Development Potential, (right): Existing Oil and Gas Wells near Lease Parcel NDM 102757-FB

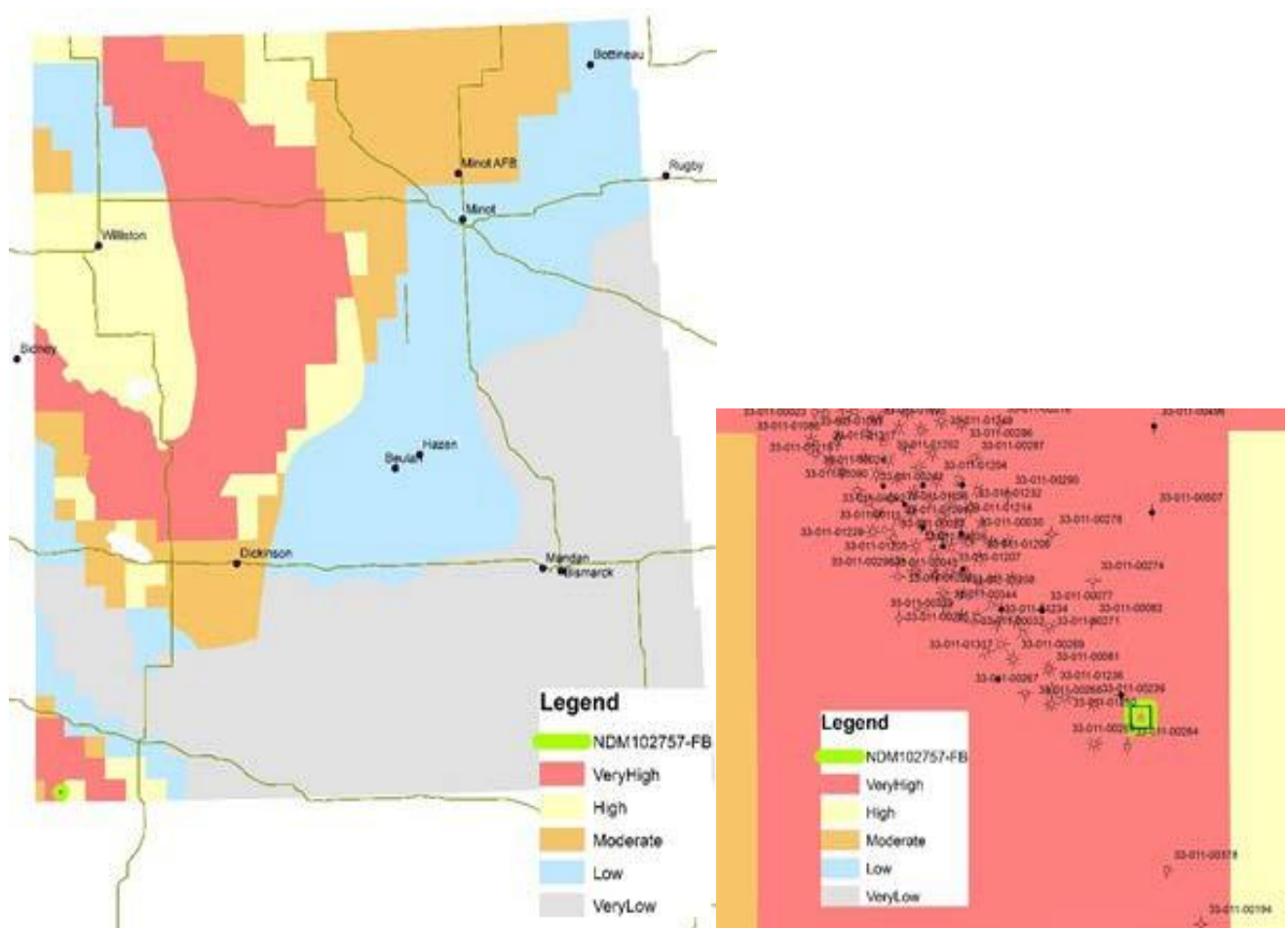


Table 16: Parcel Development Potential

Parcel	Acres	Development Potential	Wells Per Township	Wells Per Pad	Field	Alt B Total Wells	Alt C Total Wells
NDM 102757-FB	40.0	Very High	Greater than 20	1	Little Missouri (Gas)	Greater than 0.034 (1 Well)	0 - Deferred

This RFD uses projections from the RFD developed in 2009 and revised in 2011 for the NDFO RMP to estimate potential surface disturbance. For new exploratory and development gas wells, each well pad could result in approximately 1.1 acres (0.6 for access roads and 0.5 acres for well pad) of short-term surface disturbance. For new producing gas wells, each well pad could result in approximately 0.55 acres (0.3 acres for access roads and 0.25 acres for well pad) of long-term surface disturbance. This RFD estimates that one gas well may be drilled under Alternative B (Proposed Action) and that it may be productive. For one producing gas well the total surface disturbance is 1.1 acres (short-term) and 0.55 acres (long-term). Under Alternative C, the North Dakota parcel would be deferred.