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Grassy Mountain Coal Project
Wildlife Addendum
Little Brown Bat

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Appendix A Bat Research Permit - 2016

1.0 INTRODUCTION

A discussion of the bat species community along with an impact assessment for little brown myotis (*Myotis lucifugus*) was provided as part of the Grassy Mountain Coal Project's (the Project) Environmental Impact Assessment (EIA), submitted to the Alberta Energy Regulator (AER) and the Canadian Environmental Assessment Agency (CEAA) on August 12, 2016.

The following is an addendum to the EIA to provide the following:

- a summary of additional bat surveys conducted in July 2016 in the wildlife local study area (WLSA) (Figure 1.0-1) of the Project;
- an update to the assessment of little brown myotis, in the context of the assessment provided in the Wildlife Consultant's Report (CR#9); and
- a discussion of bat hibernacula in the Project footprint and WLSA.

Project details (*i.e.*, project description, wildlife baseline) are provided in the EIA (Section C) and its Wildlife Consultant's Report (CR#9), and are not duplicated in this addendum.

2.0 METHODS

2.1 Field Work

Mist netting and acoustic monitoring of bats were conducted at four locations in the WLSA that were considered to be high quality roosting or foraging habitats and one location considered to be a good flight corridor (Station A1) along a cutline through forest (Figure 2.1-1). The high quality habitats were located at marshes surrounded by coniferous or mixedwood forests (Stations A7 and A10), an unnamed tributary to Blairmore Creek within mixed conifer forest (Station A8), and a clearing with abandoned buildings nearby located adjacent to mixedwood forest (Station A12). Mist netting and/or acoustic monitoring were conducted at these five locations in 2014 (MEMS 2016a), and both mist netting and acoustic monitoring were completed at all five locations over two five-day sampling periods in July 2016 (July 5 to 9 and July 25 to 29).

During each July 2016 sampling period, mist netting was conducted for one night at each of the five locations and acoustic monitors were deployed for four nights at each of the five locations. All nets were 38-mm mesh, 75/2 black polyester bat mist nets and were 2.6 m tall with four shelves. At each survey station, nets were assembled in configurations that followed Vonhof (2002). Mist nets were constantly monitored to ensure captured bats were removed soon after capture to minimize potential injuries and to limit the number of escapes. Data collected from captured bats included sex, reproductive condition, age class, and forearm length. Trapping and handling were conducted under Alberta Environment and Parks Research Permit #57703 (Appendix A), and procedures followed recommendations from Vonhof (2002) and directives contained in Class Protocol 004: Bat Handling, Capture and Release (AESRD 2012).

Two Song Meter™ SM3Bat™ and two Song Meter™ SM2Bat™ ultrasonic recorders were deployed at four locations on each of the five survey nights, per sampling period in July 2016. Monitors were set to record between sunset and sunrise during each survey night. Monitor malfunctions resulted in data collected for 15 monitor-nights (out of the intended 20) during the July 5-9 survey and 19 monitor-nights (out of the intended 20) during the July 25-29 survey.

2.2 Data Analysis

All sound files were recorded in full spectrum format and filtered using Kaleidoscope Pro™ from Wildlife Acoustics, Inc. Resulting sound files were analyzed using Kaleidoscope Pro™ with assistance from its Western North America classifier. When possible, sound files were identified as a high-frequency grouping of little brown myotis and long-legged myotis (*Myotis volans*); long-eared myotis (*Myotis evotis*); big brown bat (*Eptesicus fuscus*) and silver-haired bat (*Lasionycteris noctivagans*); and hoary bat (*Lasiurus cinereus*). Because of similarities in call characteristics among some species, it

was not possible to confidently distinguish between small myotis species with high-frequency calls (*i.e.*, little brown myotis and long-legged myotis) and between big brown and silver-haired bats.

2.3 Assessment

The approach to the wildlife assessment is described in Sections 3.2, 5.0, and 6.1 of the Wildlife Consultant's Report (CR#9). The same approach was followed for this addendum, including spatial and temporal boundaries, effects assessment scenarios, Valued Components (VCs), evaluation criteria for environmental effects, and assessment techniques.

3.0 BASELINE BAT COMMUNITY

Based on range distribution maps, six bat species have the potential to occur in the WLSA. These include the big brown bat, silver-haired bat, hoary bat, little brown myotis, long-legged myotis, and long-eared myotis. Little brown myotis is ranked "Endangered" under the federal *Species at Risk Act* (SARA) Schedule 1 as populations in eastern North America have been reported to be decimated by white-nose syndrome, a disease caused by the fungus *Pseudogymnoascus destructans*, which is not yet known to occur in Alberta (COSEWIC 2015, Environment Canada 2015). In Alberta, little brown myotis is listed as "Secure". Silver-haired and hoary bats are rated as "Sensitive" in Alberta because of mortality associated with wind energy projects (AESRD 2013). Big brown bats and long-eared myotis are rated "Secure" in Alberta and long-legged bats are rated "Undetermined"; none of these three species has a COSEWIC or SARA status.

3.1 Mist Netting Results

Five long-eared myotis (adult male), one silver-haired bat (adult male), and one little brown myotis (adult female) were captured in mist nets in July 2016 (Table 3.1-1). All were in good condition with no obvious signs of white nose syndrome. In 2014, three little brown myotis males (two adults, one juvenile) were captured (CR#9 Section 2.4.3.3.1.1).

Table 3.1-1 Summary of Bat Mist Net Surveys - 2016

Station	Date	Nets Used	Time			Temperature (°C)		Catch
			Nets Opened	Nets Closed	Total (hr)	Nets Opened	Nets Closed	
July 5-9 Sampling Session								
A1	July 5	2 x 6 m x 2.6m	21:15	00:30	3.25	10	5	--
A7	July 9	2 x 12 m x 2.6m 1 x 9 m x 2.6m	21:45	23:45 (closed due to wind)	3.0	14	14	--
A8	July 8	1 x 12 m x 2.6m 1 x 9 m x 2.6m	21:45	00:45	3.0	15	12	--
A10	July 7	2 x 12 m x 2.6m 1 x 9 m x 2.6m	21:45	04:00	6.25	17	11	1 silver-haired bat adult male 2 long-eared myotis adult males
A12	July 6	2 x 12 m x 2.6m 1 x 6 m x 2.6m	21:15	00:30	3.25	10	6	--
July 25-29 Sampling Session								
A1	July 29	2 x 12 m x 2.6m	21:00	01:00	4.0	16	16	
A7	July 25	2 x 12 m x 2.6m 1 x 9 m x 2.6m	21:45	00:30 (closed due to thunderstorm)	2.75	21	16	
A8	July 26	2 x 12 m x 2.6m 1 x 9 m x 2.6m	21:30	00:30 (closed due to rain)	3.0	16	15	
A10	July 27	2 x 12 m x 2.6m 1 x 9 m x 2.6m	21:15	02:00	4.75	14	14	3 long-eared myotis adult males
A12	July 28	1 x 12 m x 2.6m 1 x 6 m x 2.6m	21:00	01:00	4.0	21	19	1 little brown myotis adult female

3.2 Acoustic Monitoring Results

The acoustic monitors operated for 118.5 hrs during July 5-9 and 163.8 hr during July 25-29 (Table 3.2-1). Bat activity often declines at temperatures below 10°C; therefore, this was considered when the results from the surveys were interpreted. During the July 5-9 survey, at all five of the monitoring stations the ambient temperature dropped below 10°C for all of or a portion of the monitoring period on 12 of 15 monitor-nights. During the July 25-29 survey, at two of the five monitoring stations the temperature dropped below 10°C for a portion of the monitoring period on three of 19 monitor-nights. When operating hours below 10°C were removed from the data, monitor hours for the July 5-9 survey period decreased to 40.5 hours while those for the July 25-29 survey remained approximately the same (159.0 hours) (Table 3.2-3).

3.2.1 Results from All Ambient Temperatures

All of the species or species groups expected to be in the WLSA were detected during the acoustic surveys. Totals of 21,700 and 24,942 bat passes were recorded during the July 5-9 and July 25-29 acoustic monitoring surveys, respectively, which equate to detection rates of 183.2 and 152.3 bat passes/monitor hr (Table 3.2-1). Detection rates were highest at the two stations located adjacent to open water (wetlands; Stations A7 and A10), which provides suitable foraging habitat for all bat species potentially occurring in the WLSA.

Overall, the little brown myotis/long-legged myotis group (n = 20,371 passes (93.9%) and 20,157 (80.8%) passes during July 5-9 and July 25-29, respectively) was the most abundant species or species group detected, followed by big brown bat/silver-haired bat (n = 4.4% and 10.1% passes), long-eared myotis (1.0% and 6.1% of total passes), and hoary bat (0.7% and 3.0% of total passes).

The 2016 results are comparable with the acoustic results from 2014 (Table 3.2-2).

Table 3.2-1 Bat Species and Species Groups Detected During the Acoustic Survey in the Wildlife Local Study Area - 2016

Species	Survey	Station					Total
		A1	A7	A8	A10	A12	
No. of Passes							
Little brown myotis / Long-legged myotis	July 5-9	60	11,749	97	8,452	13	20,371
	July 26-29	38	8960	650	10072	437	20,157
	Total	98	20,709	747	18,524	450	40,528
Long-eared myotis	July 5-9	2	66	135	7	17	227
	July 26-29	1	72	82	1,330	45	1,530
	Total	3	138	217	1,337	62	1,757
Big brown / Silver-haired bat	July 5-9	10	698	213	31	0	952
	July 26-29	64	803	192	982	478	2,519
	Total	74	1,501	405	1,013	478	3,471
Hoary bat	July 5-9	0	126	21	3	0	150
	July 26-29	8	435	119	112	62	736
	Total	8	561	140	115	62	886
Total	July 5-9	72	12,639	466	8,493	30	21,700
	July 26-29	111	10,270	1,043	12,496	1,022	24,942
	Total	**183**	**22,909**	**1,509**	**20,989**	**1,052**	**46,642**
Monitor Hours	July 5-9	7.85	31.62	31.62	15.65	31.73	118.47
	July 26-29	34.42	34.58	34.53	34.47	25.78	163.78
	Total	**42.27**	**66.2**	**66.15**	**50.12**	**57.51**	**282.25**
Passes per Monitor Hour							
Little brown myotis / Long-legged myotis	July 5-9	7.6	371.6	3.1	540.1	0.4	172.0
	July 26-29	1.1	259.1	18.8	292.2	17.0	123.1
	Total	2.3	312.8	11.3	369.6	7.8	143.6
Long-eared myotis	July 5-9	0.3	2.1	4.3	0.4	0.5	1.9
	July 26-29	0.0	2.1	2.4	38.6	1.7	9.3
	Total	0.1	2.1	3.3	26.7	1.1	6.2

Table 3.2-1 Bat Species and Species Groups Detected During the Acoustic Survey in the Wildlife Local Study Area - 2016

Species	Survey	Station					Total
		A1	A7	A8	A10	A12	
Big brown / Silver-haired bat	July 5-9	1.3	22.1	6.7	2.0	0.0	8.0
	July 26-29	1.9	23.2	5.6	28.5	18.5	15.4
	Total	1.8	22.7	6.1	20.2	8.3	12.3
Hoary bat	July 5-9	0.0	4.0	0.7	0.2	0.0	1.3
	July 26-29	0.2	12.6	3.4	3.2	2.4	4.5
	Total	0.2	8.5	2.1	2.3	1.1	3.1
Total	July 5-9	9.2	399.7	14.7	542.7	0.9	183.2
	July 26-29	3.2	297.0	30.2	362.5	39.6	152.3
	Total	**4.3**	**346.1**	**22.8**	**418.8**	**18.3**	**165.3**

Table 3.2-2 Bat Species and Species Groups Detected During the Acoustic Surveys – 2014 & 2016

Survey	Total	Little Brown Myotis / Long-legged Myotis	Long-eared Myotis	Big Brown / Silver-haired Bats	Hoary Bat
Relative Frequency (%)					
August 9-10, 2014	100	79.3	5.7	7.6	7.4
July 5-9, 2016	100	93.9	1.0	4.4	0.7
July 25-29, 2016	100	80.8	6.1	10.1	3.0
Passes/Monitor Hour					
August 9-10, 2014	180.9	143.5	10.3	13.7	13.4
July 5-9, 2016	183.2	172.0	1.9	8.0	1.3
July 25-29, 2016	152.3	123.1	9.3	15.4	4.5

3.2.2 Results from Ambient Temperatures ≥10°C

When monitoring data (hours and bat passes) collected at ambient temperatures below 10°C were removed, overall bat detection rates were 267 and 157 bat passes/monitor hr for the July 5-9 and July 25-29 surveys, respectively (Table 3.2-3). Ambient nighttime temperatures were often below 10°C during the July 5-9 survey period; detection rates (passes per hour) were substantially higher for this period when data collected when temperatures below 10°C were excluded (Table 3.2-3) *vs.* when data from these temperatures were included (Table 3.2.1). This has implications for any long-term monitoring programs that may be implemented for the Project: data collected on cool nights is not directly comparable to data collected on warm nights.

The little brown myotis/long-legged myotis group comprised the majority of detected passes: 9,535 (88.3%) and 20,157 (80.9%) passes in the July 5-9 and July 25-29 surveys (Table 3.2-3 and 3.2-4). This was followed by big brown bat/silver-haired bat (8.5% and 10.1%), long-eared myotis (1.8% and 6.8%), and hoary bats (1.4% and 2.9%).

The 2016 results are comparable with the acoustic results from 2014 (Table 3.2-4).

Table 3.2-3 Bat Species and Species Groups Detected During the Acoustic Survey in the Wildlife Local Study Area – 2016 (ambient temperature ≥ 10°C)

Species	Survey	Station					Total
		A1	A7	A8	A10	A12	
No. of Passes							
Little brown myotis / Long-legged myotis	July 5-9	0	7,776	97	1,657	5	9,535
	July 26-29	38	8,960	650	10,072	437	20,157
	Total	38	16,736	747	11,729	442	29,692
Long-eared myotis	July 5-9	0	66	128	2	0	196
	July 26-29	1	72	79	1,330	45	1,527
	Total	1	138	207	1,332	45	1,723
Big brown / Silver-haired bat	July 5-9	9	698	213	0	0	920
	July 26-29	64	803	188	982	478	2,515
	Total	73	1,501	401	982	478	3,435

Table 3.2-3 Bat Species and Species Groups Detected During the Acoustic Survey in the Wildlife Local Study Area – 2016 (ambient temperature ≥ 10°C)

Species	Survey	Station					Total
		A1	A7	A8	A10	A12	
Hoary bat	July 5-9	0	126	21	0	0	147
	July 26-29	8	435	106	112	62	723
	Total	8	561	127	112	62	870
Total	July 5-9	9	8666	459	1,659	5	10,798
	July 26-29	111	10,270	1,023	12,496	1,022	24,922
	Total	**120**	**18,936**	**1,482**	**14,155**	**1,027**	**35,720**
Monitor Hours	July 5-9	1.13	18.5	12.93	1.55	6.37	40.48
	July 26-29	33.38	34.58	30.82	34.47	25.78	159.03
	Total	**34.51**	**53.08**	**43.75**	**36.02**	**32.15**	**199.51**
Passes per Monitor Hour							
Little brown myotis / Long-legged myotis	July 5-9	0.0	420.3	7.5	1,069.0	0.8	235.5
	July 26-29	1.1	259.1	21.1	292.2	17.0	126.7
	Total	1.1	315.3	17.1	325.6	13.7	148.8
Long-eared myotis	July 5-9	0.0	3.6	9.9	1.3	0.0	4.8
	July 26-29	0.0	2.1	2.6	38.6	1.7	9.6
	Total	0.0	2.6	4.7	37.0	1.4	8.6
Big brown / Silver-haired bat	July 5-9	8.0	37.7	16.5	0.0	0.0	22.7
	July 26-29	1.9	23.2	6.1	28.5	18.5	15.8
	Total	2.1	28.3	9.2	27.3	14.9	17.2
Hoary bat	July 5-9	0.0	6.8	1.6	0.0	0.0	3.6
	July 26-29	0.2	12.6	3.4	3.2	2.4	4.5
	Total	0.2	10.6	2.9	3.1	1.9	4.4
Total	July 5-9	8.0	468.4	35.5	1,070.3	0.8	266.7
	July 26-29	3.3	297.0	33.2	362.5	39.6	156.7
	Total	**3.5**	**356.7**	**33.9**	**393.0**	**31.9**	**179.0**

Table 3.2-4 Bat Species and Species Groups Detected During the Acoustic Surveys – 2014 & 2016 (ambient temperature ≥ 10°C)

Survey	Total	Little Brown Myotis / Long-legged Myotis	Long-eared Myotis	Big Brown / Silver-haired Bats	Hoary Bat
Relative Frequency (%)					
August 9-10, 2014	100	79.4	5.7	7.6	7.3
July 5-9, 2016	100	88.3	1.8	8.5	1.4
July 25-29, 2016	100	80.9	6.1	10.1	2.9
Passes/Monitor Hour					
August 9-10, 2014	200.7	159.3	11.5	15.2	14.7
July 5-9, 2016	266.7	235.5	4.8	22.7	3.6
July 25-29, 2016	156.7	126.7	9.6	15.8	4.5

4.0 BASELINE CASE ASSESSMENT

Ten VCs were selected for the wildlife assessment, of which one was the bat species little brown myotis (CR#9, Section 4.4.5). As the EIA focussed on all of the identified wildlife VCs, the focus of this addendum is only on the bat species VC. Little brown myotis was selected to be a VC for the EIA because it is a federally-listed species known to occur in the WLSA, and is also an indicator of mature and old growth forest species.

4.1 Little Brown Myotis Status and Habitat Requirements

Little brown myotis is common in Alberta, and likely the most abundant bat species. This species is federally listed as "Endangered" and is a Schedule 1 species under SARA, but is listed as "Secure" in Alberta. Historically, these bats have been common throughout their range, but white-nose syndrome, a disease caused by the fungus *Pseudogymnoascus destructans* that grows on and affects hibernating bats, has decimated many populations in eastern North America. The disease has not reached Alberta, but model predictions estimated it will spread to the western extent of little brown myotis' range by 2025 to 2031 (COSEWIC 2013).

4.1.1 Roosting and Foraging Habitat

Little brown myotis is more abundant in old-growth deciduous and mixedwood forests than in younger forests. This species may preferentially select roosts near surface water and in mature forests because of the abundance of prey (Pattie and Fisher 1999) and the presence of snags and hollow trees.

Little brown myotis are nocturnal aerial insectivores that become active at dusk and do most of their foraging around and over water (Lunde and Harestad 1986), although they will also forage in tree canopies. They feed heavily on aquatic insects and often feed along the margins of lakes and streams early in the evening and then over water later in the night (Belwood and Fenton 1976, Fenton and Barclay 1980, Barclay 1991, Clare *et al.* 2011). They generally prefer to forage over calm ponds than over more turbulent waterbodies (such as rivers) (Mackey and Barclay 1989). They may also forage along the edges of cutblocks, along trails, or in forest gaps (Patriquin and Barclay 2003, COSEWIC 2013) but avoid large, open areas (COSEWIC 2013).

Little brown myotis roosts are typically in large trees, including living, partially alive, and dead trees (Olson 2011). Little brown myotis will also roost under exfoliating tree bark, in cavities excavated by animals, and in knot holes (Olson 2011). Night roosts are usually located in a cavity where large numbers of bats can cluster (Fenton and Barclay 1980). During the day, little brown myotis use day roosts, which are usually different from their night roosts.

4.1.2 Maternity Roosts

Lactating females will use maternity roosts that are separate from the night roosts used by non-lactating females and males (Anthony *et al.* 1981). Reproductive females use roosts with varying characteristics throughout their reproductive cycle. Once little brown myotis pups are able to fly, both they and their mothers may return to using common night roosts (Anthony *et al.* 1981). Little brown myotis rely extensively on tree cavities for roosting and raising young, and the availability of roosts may be limiting to some bat populations (Olson 2011). Females have high fidelity to nursery roosts and return to the same roosts each spring.

4.1.3 Hibernacula

Bat hibernacula are a generally a difficult habitat type to locate. Based on an extensive online literature/information review, there are currently no known or reported hibernacula in the proposed Project footprint or within the WLSA or the wildlife regional study area (WRSA, encompasses area within 10 km of WLSA). To date, few bat hibernacula have been identified in Alberta, and all have been in caves (AEP 2014). The closest of the known hibernacula to the Project is in Banff National Park (Calgary Herald 2016), located 230 km NE of the northern limit of the WLSA.

Suitable bat hibernacula are usually found in karst formations, which contain abundant dark caves with high humidity and constant cool temperatures. Low elevation mines in British Columbia (B.C.) have been shown to be used by bats, with some mines in the West Kootenay (a karst area) containing hibernacula (Birchdale Ecological 2016).

An assessment for karst potential on Grassy Mountain was provided in the Hydrogeology assessment (CR#3, Section 4.4.1). It was reported that five karst springs (associated with carbonates in the Upper Paleozoic sequence) are located approximately 13 km west of the Grassy Project's mine permit boundary; however, no karstic springs were observed or reported within the Project's hydrogeology regional study area, including areas where the Upper Paleozoic sequences outcrop. This is further confirmed by exiting well logs, which detailed geology available to total depth for those areas, which indicate karstic features are not identified on either of the two logs to a maximum depth of 4,417 m and 4,418 m, respectively.

For bats to have the potential to hibernate in the Project footprint (or WLSA), they would require easily accessible locations that provide the correct humidity (>80% RH) and a constant winter temperature of 2°C to 10°C (Environment Canada 2015). As indicated, the Project is not located in a karst area and any abandoned legacy mine portals are closed off, and are not at low enough elevation (to provide the proper temperatures), suggesting the area is not suitable for bat hibernacula.

4.2 Habitat Availability

Critical habitat for little brown myotis has been only partially identified (Environment Canada 2015). Although hibernacula are critical habitat for the species' survival, suitable hibernation habitat has not yet been fully identified and very few hibernacula are currently known in Canada. Similarly, maternity roosts contribute to the species' survival; however, due to a general lack of knowledge about locations and required attributes of these roosts, maternity roosts have not yet been identified as critical habitat for little brown myotis.

Although hibernacula and maternity roosts are identified as limiting habitat types for little brown myotis, the lack of known hibernacula and maternity roosts in the WLSA meant these habitat types were not the most suitable parameters to model as part of the assessment of this species. Instead, non-maternity roosting habitat was modelled; habitats were rated based on their ability to provide suitable day/night roosting trees. In the WLSA, mature and old-growth deciduous forests were given a habitat suitability rating of high and mature and old-growth mixedwood forests were assigned a habitat suitability rating of moderate. Mature and old-growth coniferous forests were given a habitat suitability rating of low, based on male little brown myotis occasionally roosting in conifer snags. Young deciduous and mixedwood forests were rated as low. Young, sapling, and shrubby coniferous forests, and sapling/shrubby deciduous or mixedwood forests, and other non-treed habitats, were given a habitat suitability rating of nil.

Based on this approach, approximately 20.7% of the WLSA was comprised of highly suitable (0.7%) or moderately suitable (20.0%) roosting habitat for little brown myotis under baseline conditions (Table 4.1-1, Figure 4.1-1).

Table 4.1-1 Baseline Habitat Availability for Little Brown Myotis in the Wildlife Local Study Area

Habitat Suitability Class	Area (ha)	%WLSA
High	37.8	0.7
Moderate	1,128.7	20.0
Low	2,638.7	46.7
Nil	1,841.3	32.6
Total	**5,646.4**	**100.0**
Effective Habitat[1]	1,166.5	20.7

[1] Effective Habitat = High + Moderate suitability classes.

4.3 Habitat Connectivity and Movement

Little brown myotis, as well as the other bat species in the region, are likely to move freely through most of the WLSA under the existing baseline conditions as many of the existing disturbance features (*e.g.*, most roads, railway, transmission lines, golf course, built up areas) do not appear to be barriers to movement. Stray artificial light (sky glow) associated with existing urban/rural residential areas and industrial facilities may reduce the overall effectiveness of habitats for bats through disruption of migratory patterns, breeding and reproduction, and predator-prey dynamics (Longcore and Rich 2004, Navara and Nelson 2007, Bat Conservation Trust 2008 and 2011, RCEP 2009). Additionally, commuting bats may avoid higher traffic volume roads, such as Highway 3 (Bennett and Zurcher 2012).

4.4 Mortality Risk

The highest mortality risk to little brown myotis in Canada is white-nose syndrome, which has not yet reached Alberta but may do so within the next one or two decades (COSEWIC 2013). The most likely anthropogenic source of mortality for little brown myotis in the WLSA at baseline is collisions with vehicles, particularly along Highway 3. Additionally, bat colonies are frequently eradicated from buildings because of potential concerns about disease transmission. Natural sources of bat mortality are likely to include predation and starvation.

4.5 Abundance

Little brown myotis are present and appear to be relatively abundant in the WLSA under baseline conditions. Three of the four bats captured with mistnets in 2014 were little brown myotis, and 79% of the identified bat passes from acoustic recordings were attributed to little brown myotis or another small-bodied myotis, long-legged myotis. While only one of seven bats captured in 2016 was a little brown myotis (Table 3.1-1), 87% of all bat passes detected on acoustic monitors in 2016 (Table 3.2-1) belonged to little brown myotis or long-legged myotis.

5.0 APPLICATION CASE ASSESSMENT

The following section describes the predicted effects of Project development on little brown myotis. The inclusion of the 2016 data in the assessment did not result in any changes to the outcome of the assessment provided in the EIA (Section E.9, CR#9 Section 5.3.5).

The wildlife assessment habitat modelling was conducted based on the 2015 Project footprint. Slight modifications of the Project footprint occurred in 2016 (CR#9), with the Project footprint decreasing in area from 1,582.4 ha to 1,520.7 ha (net change of -61.7 ha, or -1.1% of the WLSA). Therefore, the results of the 2015 Project footprint-based wildlife habitat suitability models are anticipated to be conservative.

5.1 Habitat Availability

Approximately 325.8 ha (30%) of effective little brown myotis roosting habitat will be lost by Year 14 from Project development (Table 5.1-1, Figure 5.1-1). Additionally, bats frequently roost in abandoned buildings; however, no old or abandoned buildings occur within the Project footprint and any that occur within the WLSA will not be disturbed and/or removed by the Project.

By Year 27, effective habitat availability for the little brown myotis is expected to be greater than at Year 14, but still 238.1 ha (20.4%) lower than at baseline (Table 5.1-1, Figure 5.1-2). Since disturbed habitats will be progressively reclaimed throughout the life of the Project, effects on bat roosting habitat availability will be temporary and reversible.

Table 5.1-1 Change in Little Brown Myotis Habitat Availability Between the Baseline and Application Cases in the Wildlife Local Study Area

Habitat Suitability Class	Baseline (ha)	Year 14			Year 27		
		Application (ha)	Change		Application (ha)	Change	
			ha	%		ha	%
High	37.8	32.5	-5.3	-14.0	38.4	0.6	1.5
Moderate	1,128.7	808.2	-320.5	-28.4	890.0	-238.7	-21.1
Low	2,638.7	1,801.1	-837.6	-31.7	1,883.7	-754.9	-28.6
Nil	1,841.3	3,004.6	1,163.3	63.2	2,834.3	993.1	53.9
Effective Habitat[1]	**1,166.5**	**840.7**	**-325.8**	**-27.9**	**928.4**	**-238.1**	**-20.4**

[1] Effective Habitat = High plus Moderate habitat suitability classes.

Sensory disturbances in the form of increased noise or the presence of artificial lighting may affect foraging behaviour of little brown myotis in the WLSA. Anthropogenic noise can reduce the foraging efficiency of bat species that rely on sound to hunt (Siemers and Schaub 2010). Bats may also change their behaviour in response to artificial light, such that they may benefit from the increased density of flying insect prey attracted to artificial lighting (Stone *et al*. 2015). Overall, the presence of artificial lights combined with anthropogenic noise may delay emergence in nocturnal species (Stone *et al.* 2015), which may result in reduced foraging time. Several mitigation measures are in place to reduce Project noise (CR#2 Section 5.4) and light (CR#1 Section 5.16.2).

With mitigation (Section 7.0), the effects of the Project on little brown myotis roosting habitat availability are expected to be local in extent, extended in duration, continuous in frequency, reversible in the long term, moderate in magnitude, and not significant. The Project contributions are expected to be negative, the confidence rating of these predictions is high, and the probability of occurrence is high.

5.2 Movement

Commuting or foraging little brown myotis are unlikely to cross the active mine area and will likely travel around it. The access road is not expected to represent a major barrier to the movements of little brown myotis, as they are active at night when traffic levels on the road are lower (EIA Appendix 8). Noise and sensory disturbance will likely present the greatest barrier to movement. Noise from the active mine site will be mitigated through the use of mufflers on all internal combustion engines, installing berms around the southern dump to absorb noise, utilizing mine pit topography to shield noise generated from haul trucks, and conducting blasting during daylight hours (CR#2 Section 5.4)

With mitigation (Section 7.0), the effects of the Project on little brown myotis movements are expected to be local in extent, long in duration, continuous in frequency, reversible in the short term, low in magnitude, and not significant. The Project contributions are expected to be neutral, the confidence rating of these predictions is high, and the probability of occurrence is moderate.

5.3 Mortality Risk

Potential collisions of bats with Project-related infrastructure are expected to be minimal, particularly if the use of artificial lighting is minimized to the extent possible. Significant increases in mortality from vehicle collisions are also unlikely to occur as little brown myotis are generally active when traffic levels are low. The potential for increased wildlife mortality on the access road will be mitigated through enforcing a low speed limit and employee education, and bussing 80% of employees to site (EIA Appendix 8).

There are no known bat hibernacula in the WLSA or the WRSA, and the area contains no karst formations or low-elevation abandoned mines, which provide suitable hibernacula habitat. In the unlikely event a cave or structure containing hibernating bats or active maternity (or day/night) roosts are identified prior to or during construction activities, Benga will contact Alberta Environment and Parks (AEP) and Environment Canada personnel to discuss potential removal and habitat replacement measures.

With mitigation (Section 7.0), the effects of the Project on little brown myotis mortality risk are expected to be local in extent, long term in duration, occasional in frequency, reversible in the short term, low in magnitude, and not significant. Project contributions are expected to be neutral, the confidence rating of these predictions is high, and the probability of occurrence is low.

5.4 Abundance

Little brown myotis abundance in the WLSA may decline during the lifespan of the Project due to some habitat loss as outlined in Section 4.2 of this report. However, with mitigation, Project effects are predicted to be local in extent, long term in duration, continuous in frequency, reversible in the long term, low in magnitude, and not significant. Project contributions are expected to be negative, the confidence rating of these predictions is high, and the probability of occurrence is moderate.

6.0 CUMULATIVE EFFECTS ASSESSMENT

The cumulative effects assessment for the Planned Development Case (PDC) was conducted quantitatively (*e.g.*, habitat suitability modelling) and to provide a context for assessing potential effects on little brown myotis within the WRSA. Available literature and professional judgement were used to establish a conservative 20% habitat change threshold for little brown myotis, as with all other wildlife VCs (CR#9 Section 3.2.5.4.1). Cumulative effects were rated using the same key wildlife issues, spatial and temporal boundaries, and effects prediction criteria used in the Application Case assessment.

The PDC scenario is detailed in CR#9 Sections 6.1 and 6.2. As for the Application Case, habitat suitability modelling for the PDC was conducted based on the 2015 Project footprint.

6.1 Habitat Availability

Very little high or moderate-quality little brown myotis roosting habitat will be affected by the planned developments in the WRSA (Table 6.1-1; Figures 6.1-1 and 6.1-2). By Year 14, <1% of high-quality and approximately 5% of moderate-quality habitat will be lost in the WRSA. By Year 27, this will increase to a loss 1.8% of high-quality habitat and 7.6% of moderate-quality habitat.

The cumulative effects on roosting habitat availability for little brown myotis are predicted to be regional, extended in duration, continuous in frequency, reversible in the long term, and low in magnitude. The effects are predicted to be extended in duration because old deciduous trees are most likely to provide high-quality little brown myotis roosting habitat (CR#9 Appendix C, Section 2.6) and once such trees are removed, it can take decades for suitable roosting trees to regrow. The confidence rating associated with these predictions is moderate, as little brown myotis may also roost in abandoned buildings, the availability of which could not be modelled. The probability of occurrence is moderate and the changes are predicted to not be significant at the regional level, as much less than 20% of effective roosting habitat will be affected by planned developments.

Table 6.1-1 Changes in Little Brown Myotis Habitat Availability between the Baseline and PDC in the Wildlife Regional Study Area

Habitat Suitability Class	Baseline (ha)	Year 14			Year 27		
		PDC (ha)	Change		PDC (ha)	Change	
			ha	%		ha	%
High	2,440.0	2,420.5	-19.5	-0.8	2,396.8	-43.2	-1.8
Moderate	1,151.4	1,094.3	-57.0	-5.0	1,064.1	-87.2	-7.6
Low	37,830.5	31,718.4	-6,112.2	-16.2	31,319.7	-6,510.8	-17.2
Nil	32,125.1	38,313.8	6,188.7	19.3	38,766.4	6,641.3	20.7
Effective Habitat[1]	**35,91.4**	3,514.8	-76.5	-2.1	3,460.9	-130.5	-3.6

[1] Effective Habitat = High plus Moderate habitat suitability classes.

6.2 Movement

Planned development activities in the WRSA are unlikely to negatively affect habitat connectivity and movement for little brown myotis. This species will frequently travel and forage along the edges of clear cuts and in forest gaps (Patriquin and Barclay 2003, COSEWIC 2013). Commuting bats may avoid areas with high levels of anthropogenic noise and artificial lights (such as highways or industrial sites). Little brown myotis are most active at night when levels of anthropogenic noise are generally lower.

The magnitude of cumulative effects on movement for little brown myotis is predicted to not be significant, and the confidence rating associated with this prediction is high.

6.3 Mortality Risk

Increases in mortality risk to little brown myotis are unlikely to occur as a result of the Project based on mitigation measures outlined in Section 7.1. The Highway 3 realignment is also not anticipated to result in direct mortality. Timber harvesting is unlikely to result in bat mortality, unless trees with day roosts or maternity roost are removed during the active bat season. Mortality from this risk is expected to be low and infrequent. Should Teck Coal Limited's planned mining operations (Elkview Baldy Ridge Extension and Michel Creek Coking Coal Project) disturb active hibernacula or maternity roosts, mortality of little brown myotis in the region may increase.

Cumulative effects on mortality risk for little brown myotis are predicted to be regional in extent, short in duration, occasional in frequency, reversible in the short term, and low in magnitude. The

cumulative effects are predicted to be negative, the probability of occurrence is low, and the effects are not significant. The confidence rating associated with this prediction is moderate because it is difficult to predict if and to what degree forestry activities and Teck Coal Limited's mining activities will alter little brown myotis mortality risk.

6.4 Abundance

Changes in abundance are most likely to be correlated with losses in roosting habitat; as a result, cumulative effects on abundance will be regional, extended in duration and long-term (due to a loss of suitable roosting trees), negative, and low in magnitude. The effects are predicted to not be significant at the regional level. The confidence level associated with these predictions is moderate and the probability of occurrence is moderate.

7.0 LITTLE BROWN MYOTIS MITIGATION AND MONITORING

7.1 Mitigation Measures

In CR#9 Section 7.1, a number of standard best management practices and other wildlife mitigation measures to avoid or minimize effects on wildlife are outlined. The mitigation measures specific to bats are presented below:

- tree clearing will be planned to avoid the May to August bat summer season, thereby avoiding incidental mortality of day-roosting bats and occupants of maternity roosts;
- bat houses will be installed in suitable habitats after clearing and during reclamation to provide supplemental roosting locations, and will follow the guidance provided in Alberta Community Bat Program and Government of Alberta (2016);
- if clearing of suitable roosting habitat is required during the May to August period, Benga will develop a mitigation plan in consultation with AEP and Environment and Climate Change Canada;
- avoid direct and indirect impacts to known maternity roosts should any such roosts be located/identified;
- Environment Canada (2015) indicates that bats often swarm in the fall in proximity to hibernacula, and include the identification of location, characteristics, and biophysical attributes of swarming sites as important for identifying critical habitat. Should Benga observe any suspected swarming activity during operations, they will develop a mitigation plan in consultation with AEP and Environment and Climate Change Canada;
- as the presence of artificial lighting can potentially affect bat use of nearby habitats, Benga has developed a visual impact mitigation plan that reduces stray and non-essential artificial lighting to minimize wildlife effects and that will comply with OH&S safety requirements (CR#1 Section 5.16.2).

7.2 Preliminary Wildlife Monitoring Program

At the time of submission of this addendum, a proposed federal recovery strategy is under review for little brown myotis (Environment Canada 2015). The short-term and long-term objectives outlined in the recovery strategy, and any future federal action plans that may be developed from this proposed recovery strategy, will be reviewed and modifications to the wildlife (bat) monitoring plan, would be made if applicable.

For the Project, wildlife monitoring will be used to monitor the effects of the Project on wildlife species at risk or species of management concern during construction and operation of the Project and

post-closure. In particular, the effects of the Project on wildlife VCs (*e.g.*, little brown myotis) will be monitored.

A preliminary wildlife monitoring program is provided in CR#9, Section 7.2. This initial wildlife monitoring approach will enable Benga to evaluate the effectiveness of their wildlife protection, mitigation, and reclamation procedures and to minimize Project effects on wildlife in the WLSA and region. A detailed wildlife mitigation and monitoring plan based on provincial and federal Approval Conditions will be developed following Project approval.

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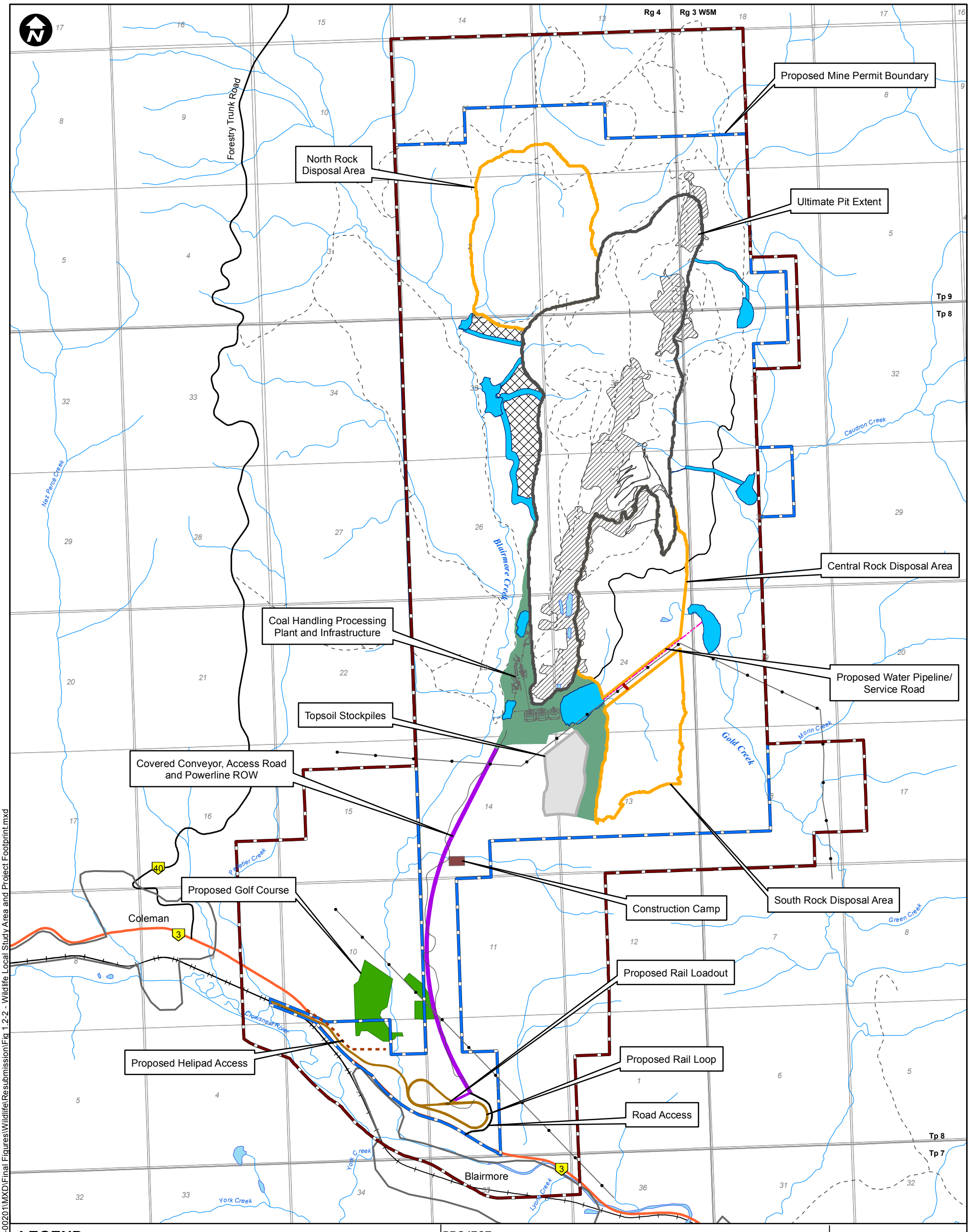
FIGURES



Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Wildlife\Resubmission\Fig 1.2-2 - Wildlife Local Study Area and Project Footprint.mxd

LEGEND

- Primary Highway
- Secondary Highway
- Existing Trails
- Existing Railway
- Existing Access Road
- Existing Powerline
- CHPP Facilities
- Proposed Water Pipeline/ Service Road
- Railway Loop
- Proposed Helipad Access
- Surface Water Drainage
- Waterbody
- Wildlife Local Study Area
- Proposed Mine Permit Boundary
- Ultimate Pit Extent
- Ultimate Rock Disposal Area Extent
- Topsoil Storage
- Construction Camp
- Ponds and Ditches
- Coal Handling Processing Plant and Infrastructure
- Covered Conveyor, Access Road and Powerline ROW
- Proposed Golf Course Area
- Undisturbed Area
- Legacy Mine Disturbance

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

WILDLIFE LOCAL STUDY AREA AND PROJECT FOOTPRINT

NOTES

AltaLIS, 2016; Geobase, 2016; MEMS, 2016; Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

PROJECT:	14-00201-01
DRAWN BY:	SL/JDC
CHECKED BY:	MB
DATE:	JUNE 10, 2016

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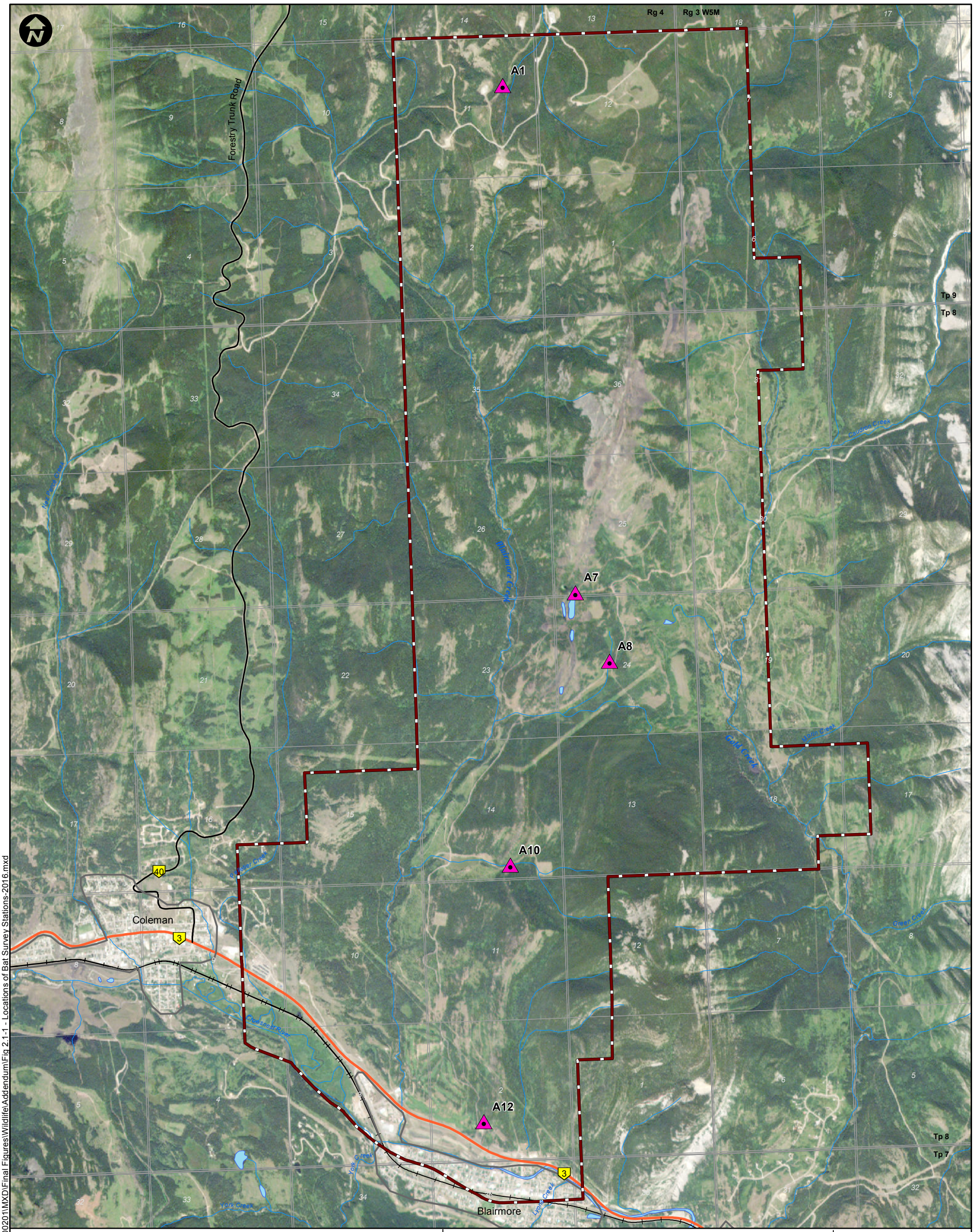
Kilometres

FIGURE

1.0-1



LEGEND

- Bat Survey Location
- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Local Study Area

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LOCATIONS OF BAT SURVEY STATIONS IN THE WILDLIFE LOCAL STUDY AREA - 2016

NOTES

AltaLIS, 2016; Geobase, 2015; MEMS, 2016; RapidEye, 2015
(Image Date: Jul 26/13); Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

PROJECT:	14-00201-06
DRAWN BY:	SL
CHECKED BY:	RM
DATE:	NOVEMBER 30, 2016

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Kilometres

FIGURE 2.1-1

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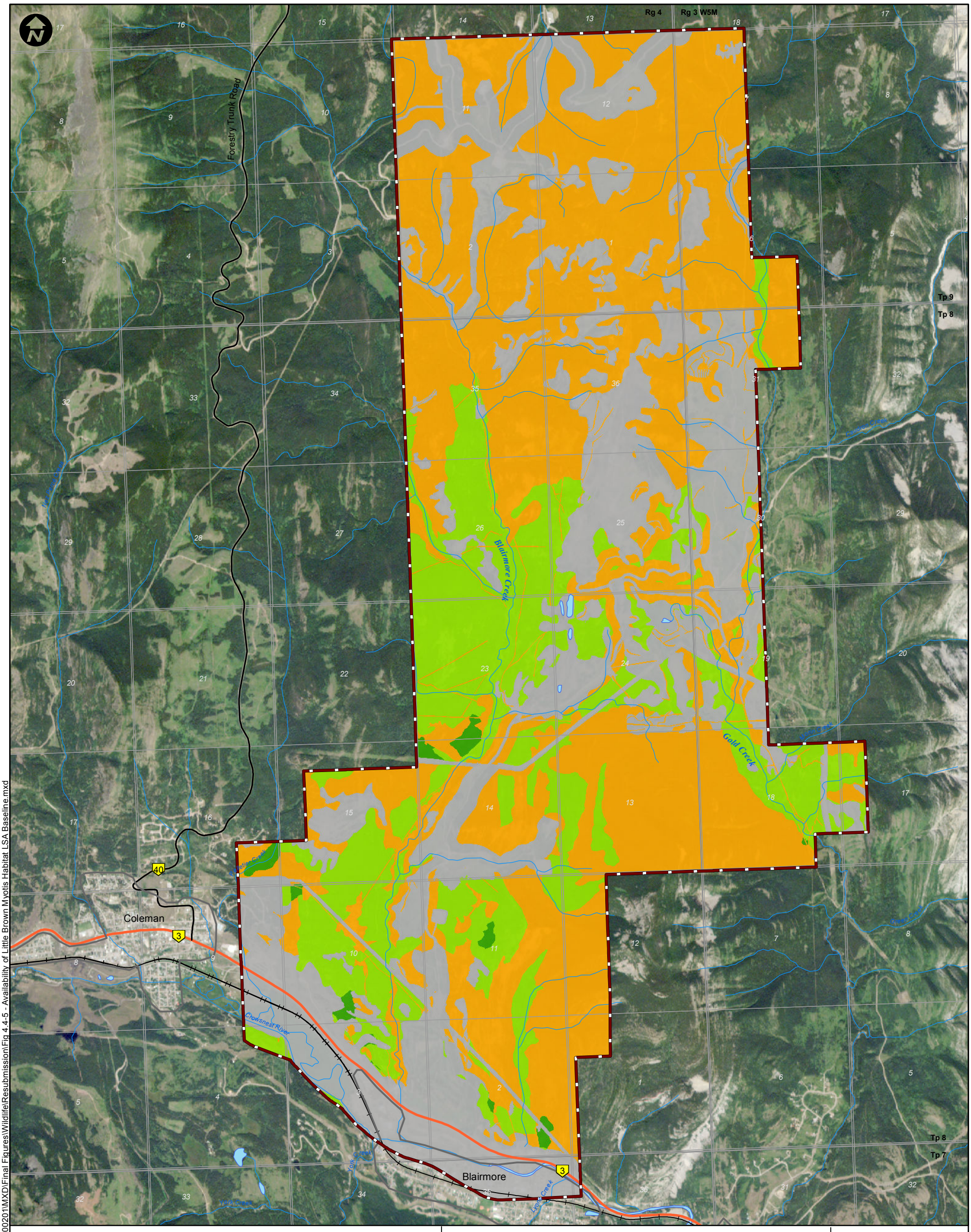

LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Local Study Area

Little Brown Myotis Habitat Suitability

- High
- Moderate
- Low
- Nil

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LITTLE BROWN MYOTIS HABITAT IN THE WILDLIFE LOCAL STUDY AREA - BASELINE CASE

NOTES

AltaLIS, 2015; Geobase, 2015; MEMS, 2015; RapidEye, 2015
(Image Date: Jul 26/13); Riversdale, 2015
Datum/Projection: UTM NAD 83 Zone 11

PROJECT: 14-00201-01
DRAWN BY: HS
CHECKED BY: JP
DATE: OCTOBER 13, 2015

0 0.75 1.5 3
Kilometres

FIGURE
4.1-1

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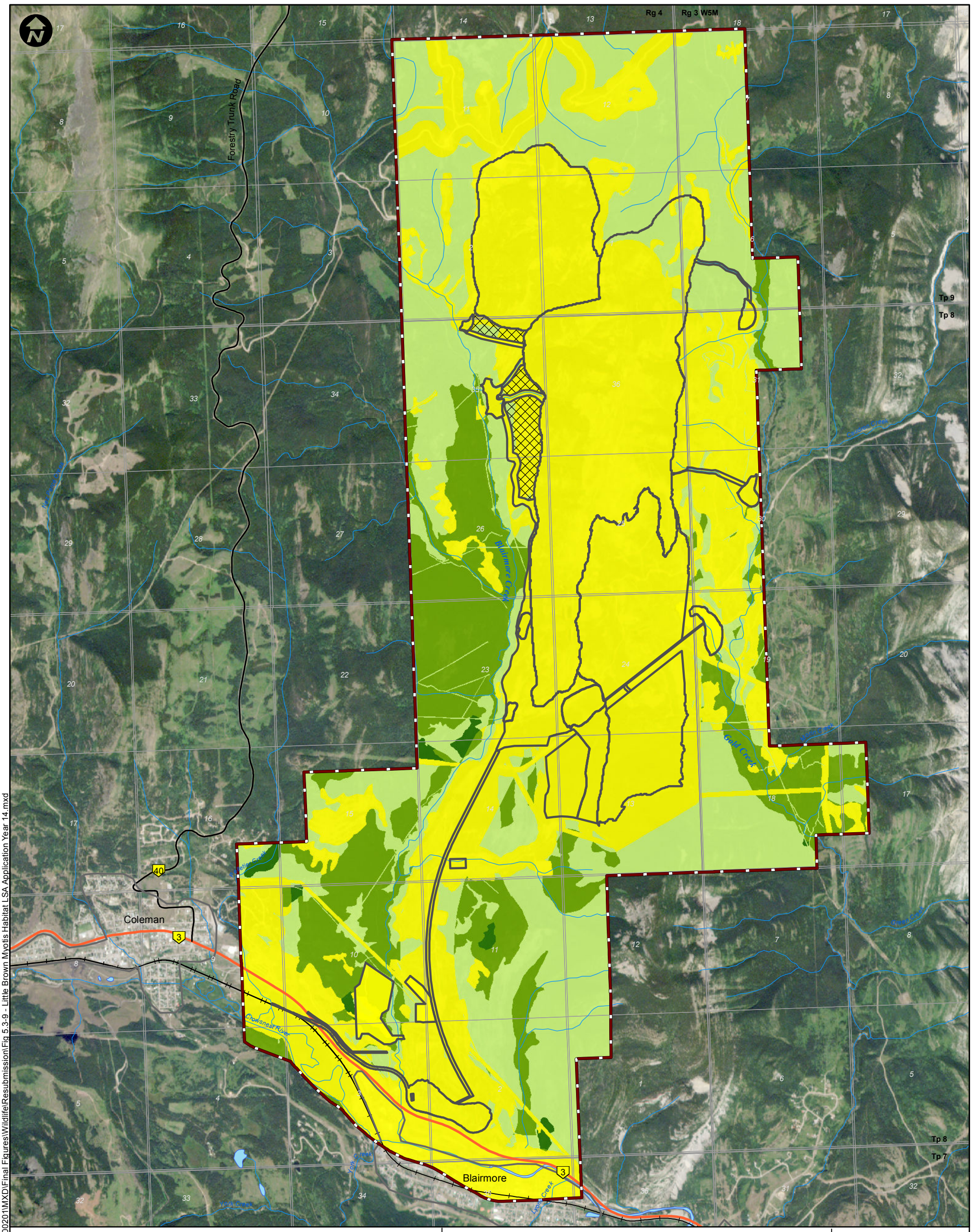


LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Local Study Area
- Project Footprint
- Undisturbed Area

Little Brown Myotis Habitat Suitability

- High
- Moderate-High
- Moderate
- Moderate-Low
- Low
- Nil

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LITTLE BROWN MYOTIS HABITAT IN THE WILDLIFE LOCAL STUDY AREA - APPLICATION YEAR 14

NOTES

AltaLIS, 2016; Geobase, 2015; MEMS, 2016; RapidEye, 2015
(Image Date: Jul 26/13); Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

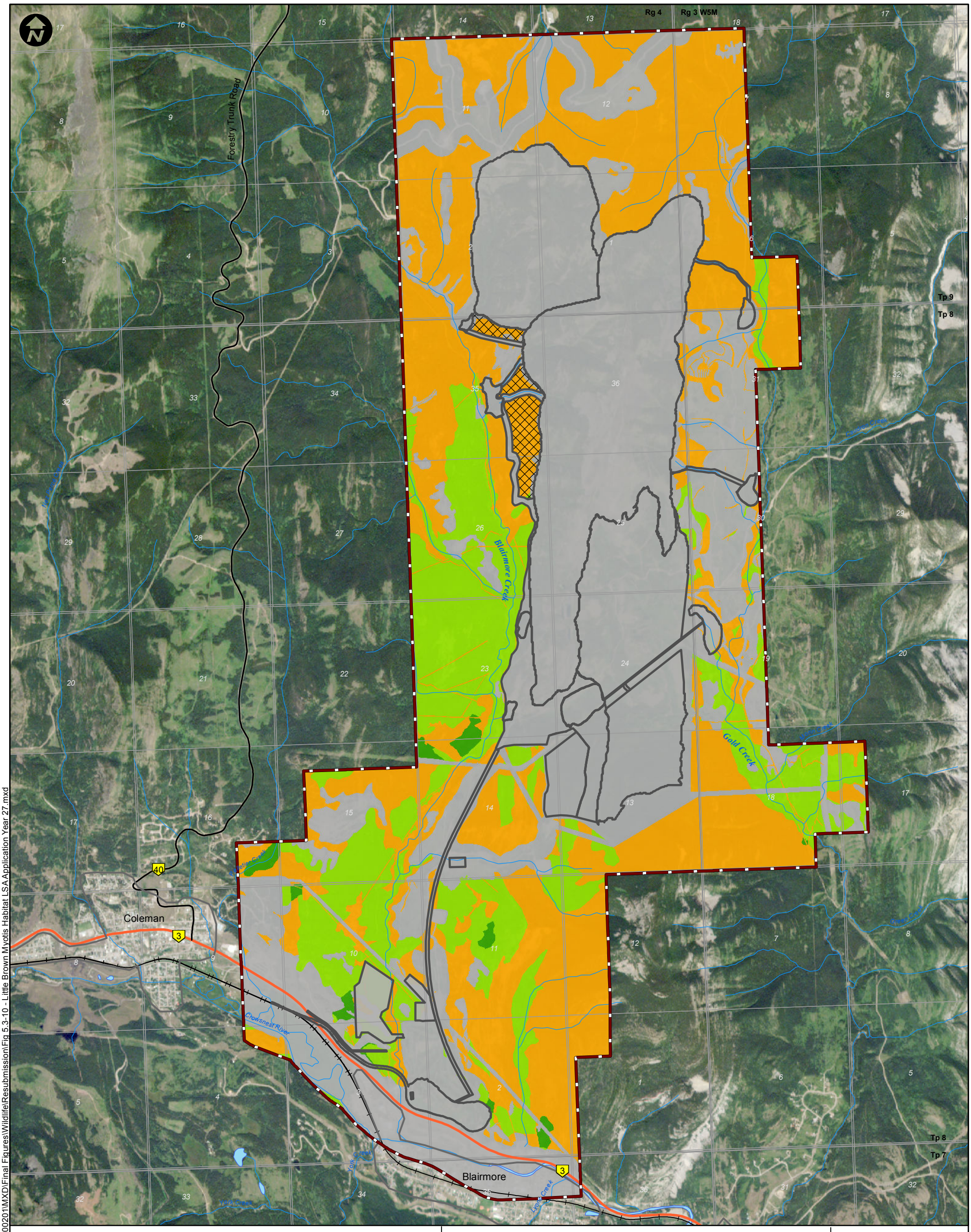
PROJECT: 14-00201-01
DRAWN BY: SL
CHECKED BY: RM
DATE: JUNE 20, 2016

0 0.75 1.5 3
Kilometres

FIGURE

5.1-1

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Wildlife\Resubmission\Fig 5.3-9 - Little Brown Myotis Habitat LSA Application Year 14.mxd



LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Local Study Area
- Project Footprint
- Undisturbed Area

Little Brown Myotis Habitat Suitability

- High
- Moderate
- Low
- Nil

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LITTLE BROWN MYOTIS HABITAT IN THE WILDLIFE LOCAL STUDY AREA - APPLICATION YEAR 27

NOTES

AltaLIS, 2016; Geobase, 2015; MEMS, 2016; RapidEye, 2015 (Image Date: Jul 26/13); Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

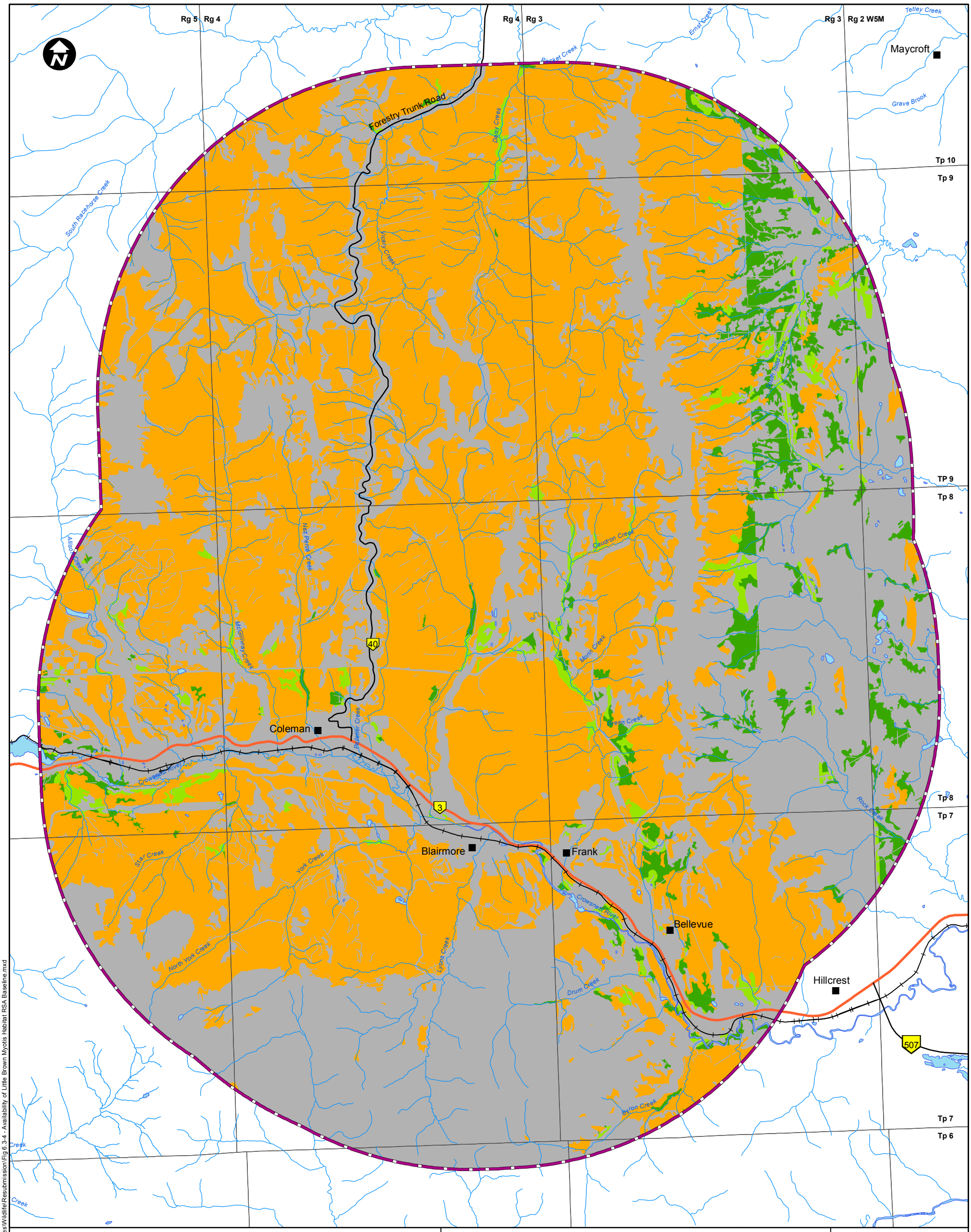
PROJECT:	14-00201-01
DRAWN BY:	SL
CHECKED BY:	RM
DATE:	JUNE 20, 2016

0 0.75 1.5 3
Kilometres

FIGURE

5.1-2

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Wildlife\Resubmission\Fig 5.3-10 - Little Brown Myotis Habitat LSA Application Year 27.mxd



LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Regional Study Area

Little Brown Myotis Habitat Suitability

- High
- Moderate
- Low
- Nil

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LITTLE BROWN MYOTIS HABITAT IN THE WILDLIFE REGIONAL STUDY AREA - BASELINE CASE

NOTES

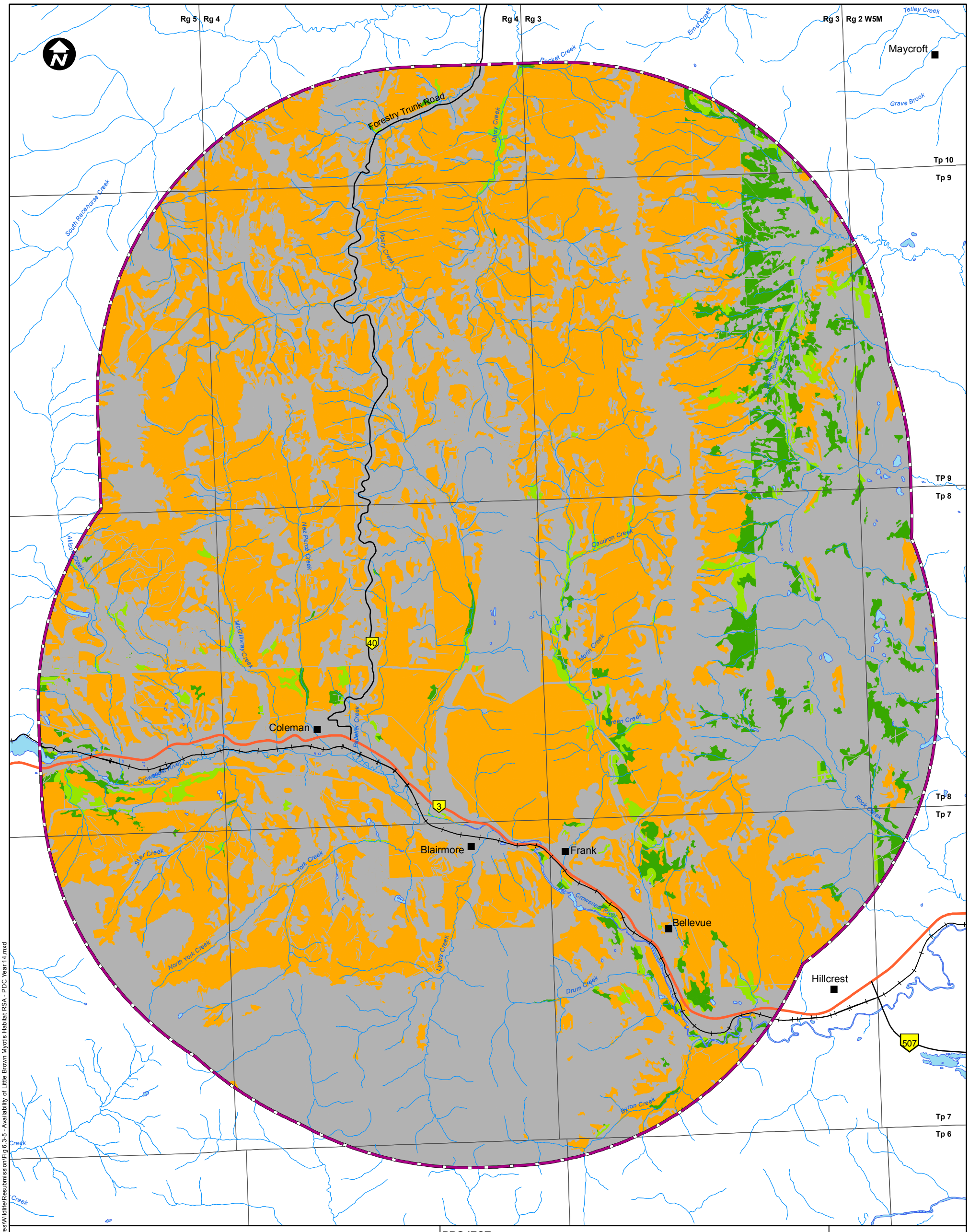
AltaLIS, 2015; Geobase, 2015; MEMS, 2015; Riversdale, 2015
Datum/Projection: UTM NAD 83 Zone 11

PROJECT: 14-00201-01
DRAWN BY: HS
CHECKED BY: JP
DATE: OCTOBER 13, 2015

0 2 4 8
Kilometres

FIGURE
6.1-1

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Wildlife\Resubmission\Fig 6.3-4 - Availability of Little Brown Myotis Habitat RSA Baseline.mxd



LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Regional Study Area

Little Brown Myotis Habitat Suitability

- High
- Moderate
- Low
- Nil

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LITTLE BROWN MYOTIS HABITAT IN THE WILDLIFE REGIONAL STUDY AREA - PDC YEAR 14

NOTES

AltaLIS, 2016; Geobase, 2015; MEMS, 2016; Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

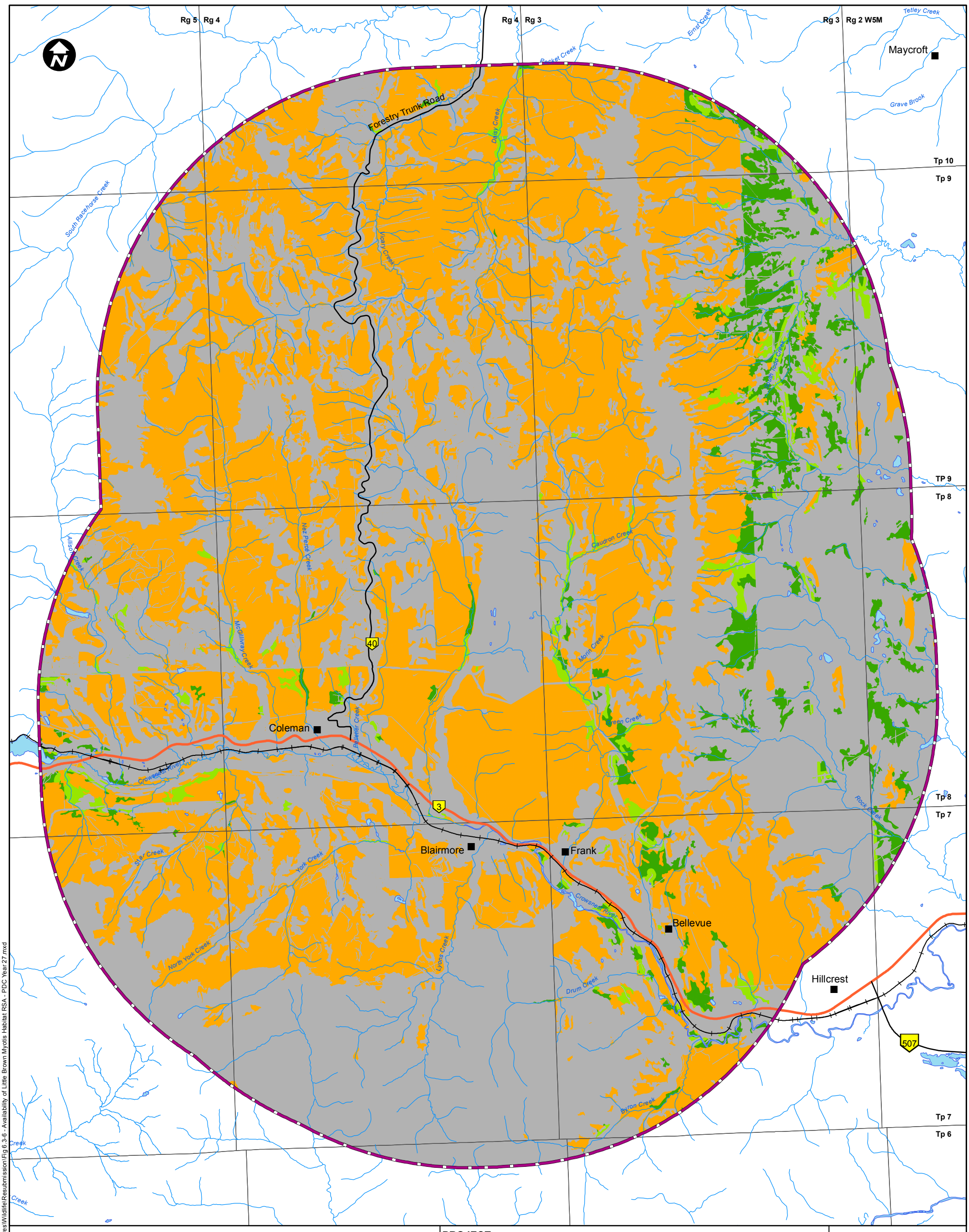
PROJECT:	14-00201-01
DRAWN BY:	SL
CHECKED BY:	RM
DATE:	JUNE 20, 2016

0 2 4 8
Kilometres

FIGURE

6.1-2

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Wildlife\Resubmission\Fig 6.3-5 - Availability of Little Brown Myotis Habitat RSA - PDC Year 14.mxd



LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Surface Water Drainage
- Waterbody
- Wildlife Regional Study Area

Little Brown Myotis Habitat Suitability

- High
- Moderate
- Low
- Nil

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

LITTLE BROWN MYOTIS HABITAT IN THE WILDLIFE REGIONAL STUDY AREA - PDC YEAR 27

NOTES

AltaLIS, 2016; Geobase, 2015; MEMS, 2016; Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

PROJECT: 14-00201-01
DRAWN BY: SL
CHECKED BY: RM
DATE: JUNE 20, 2016

0 2 4 8
Kilometres

FIGURE 6.1-3

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Wildlife\Resubmission\Fig 6.3-6 - Availability of Little Brown Myotis Habitat RSA - PDC Year 27.mxd

APPENDIX A: BAT RESEARCH PERMIT - 2016

Alberta Environment and Parks

Provincial Building, 2nd Floor,
12501-20th Avenue, Blairmore,
AB T0K0E0 (403) 562-3204

May 20th, 2016

Dear Sir/Madam;

Enclosed are the Research Permit # 57703 and the Collection Licence # 57704 along with the General Conditions.

Please sign the Permit(s) where indicated and ensure that the sub-permitted individuals carry a copy of the Permit(s) with them at all times while engaged in any permitted activities.

To avoid unnecessary public or government concerns, it is the responsibility of the licensee to contact the local Fish and Wildlife District office where the work is being conducted prior to conducting any permitted work. As they may be pertinent to your research and/or collection permit, please review and become familiar with the Sensitive Species Inventory Guidelines available on the Alberta Environment and Parks website at:
http://aep.alberta.ca/fish-wildlife/wildlife-management/documents/SensitiveSpeciesInventoryGuidelines-Apr18-2013.pdf

Please remember that it is a condition of your license to submit an annual progress report and your observation on the load form described in the attached General Conditions.

Should you have any questions, please contact me at the above address or at Maria.Didkowsky@gov.ab.ca

Thank you.

<Original signed by>

Maria Didkowsky, MSc., PAg., PBiol.
Wildlife Biologist
Alberta Environment and Parks – Operations
South Saskatchewan Region
Blairmore / Pincher Creek

57703

Alberta

Environment and Parks
Operations Division

General Permit – GP

RESEARCH PERMIT District: Crowsnest

FEE $ NIL

PERMITTEE: Robin Mackey , Millennium EMS Solutions Ltd.

ADDRESS: Suite 325, 1925- 18th Avenue, NE Calgary T2E7T8

IS AUTHORIZED TO: Conduct a baseline raptor nest and habitat inventory on the Riversdale Resources Grassy Mountain project, Crowsnest Pass.

DATE OF ISSUE: May 20th, 2016 DATE OF EXPIRY: August 31st, 2016

<Original signed by>

Signature of Permittee

<Original signed by>

For Minister of Alberta Environment and Parks

IN ACCORDANCE WITH:

Class Protocols are reviewed by the Alberta Wildlife Animal Care Committee and approved by the Director of Wildlife. Class Protocols are available at http://esrd.alberta.ca/FishWildlife/Default.aspx.

In accordance with 'methods specified in Wildlife Research/Collection License application and/or renewals, attached General Conditions, Animal Care Committee Class Protocol #011

Additional Conditions:
Record any incidental observations of alternative wildlife species observed during field work

Additional Researchers: Jesse Patterson Emilie Brien, and Ryan Hrywkiw under the supervision of the licensee

---

****IMPORTANT**
District Office instructions:
Please photocopy this document once it is issued and forward copies to:

Original – Permittee
Copy to – Wildlife Management, Edmonton HQ
Copy to – Licencing & Revenue Services, Edmonton HQ
Copy for - Issuing District

57704

Alberta
Environment and Parks
Operations Division

Licence – CN

COLLECTION LICENCE District:
FEE $ NIL

NAME: Robin Mackey , Millennium EMS Solutions Ltd.

ADDRESS: Suite 325, 1925- 18th Avenue, NE Calgary T2E7T8

Is authorized to collect the following wildlife: Conduct a baseline raptor nest and habitat inventory on the Riversdale Resources Grassy Mountain project, Crowsnest Pass.

This licence authorizes the use of the following equipment and methods: Mist nets, acoustic monitors

This licence is valid (location) South Saskatchewan Region – Blairmore area

EFFECTIVE DATE: May 20th, 2016 DATE OF EXPIRY: August 31st, 2016

Collections are to be conducted by: licensee, Jesse Patterson Emilie Brien, and Ryan Hrywkiw under the supervision of the licensee

<Original signed by>

_____ Date of issue: May 20th, 2016

Signature of Licencee (not valid unless signed by Licencee) **Licence must be carried while collecting.**

_____

For Minister of Alberta Environment and Parks

Conditions:

1. The licence is subject to all conditions listed in the attached Appendix 1.
2. The licencee must keep the appropriate Fish and Wildlife Officer informed of collection activities as they occur.
3. This licence is not transferable.
4. Persons collecting under the authority of this licence must produce a copy of the licence on the request of a Fish and Wildlife Officer when carrying out collection activities.
5. If any information obtained from the collection of any wildlife under this licence is used in a report or publication of any kind, the licencee shall forward a copy of such publication to the Director of Wildlife.
6. Within 7 days of the expiry of the licence, the licencee shall complete the table below, and any other records required by this licence, and return licence and records to the Director of Wildlife.

Collection Date	Species	Sex M/F	Location	Disposition

IMPORTANT

District Office instructions:

Please photocopy this document once it is issued and forward copies to:

Original – Licencee

Copies to: Licencing Services-Edmonton HQ, Region, Issuing District

Alberta Environment and Parks

Appendix 1: Research Permit and Collection Licence General Permit Conditions
Addendum to Research Permit #_57703_____, Collection License #__57704____

1. It is the responsibility of the Licencee to contact the appropriate Senior Area Wildlife Biologist and District Fish and Wildlife Officer and the appropriate landowner prior to the commencement of any Permitted activities. Contact information for Fish and Wildlife available at: http://esrd.alberta.ca/about-us/contact-us/fisheries-wildlife-management-area-contacts.aspx or by calling 310-0000 and asking for the appropriate Fish and Wildlife office.
2. The Permit is valid only for research and collection activities in the specific area and for the dates identified on the Permit.
3. For activities in any Provincial Park, Ecological Reserve, Wildland Provincial Park, Natural Area, or Wilderness Area additional approvals for access may be required. Please contact your local Alberta Tourism, Parks and Recreation authority.
4. Permits are not transferable and must include the names (when known) of all authorized project members who must be prepared to show a copy of the Permit on the request of a Fish and Wildlife Officer.
5. The Licencee is responsible for ensuring that public safety is not endangered by activities associated with the project.
6. The Licencee shall be held accountable for damages to resources or property arising directly or indirectly from the project.
7. The issuance of this Licence does not exempt the holder from any other Canadian Laws that might otherwise apply.
8. All captured animals must be handled in a humane manner and according to the approvals of the Wildlife Animal Care Committee.
9. Animals captured using immobilization drugs must follow the Fish and Wildlife Drug protocols. http://esrd.alberta.ca/fish-wildlife/wildlife-research-collection/documents/WR-ChemicalImmobilizationWildlife-Dosages-2009.pdf
10. A report of the past year's activities is required before Permits are renewed.
11. If radio telemetry is a component of the research, the Licencee is responsible for providing up-to-date information on frequency deployment including date, general location, species, transmitter type, manufacturer, and expected transmitter life to the issuer of the Permit/Licence.
12. All observations made during your project are to be provided within either:
    a. A FWMIS Load Form (all data types excluding bird banding)
    b. Where USFWS bands are used in the project, a "Band Manager" digital export (see attached instructions titled: Submitting Banding Data to Alberta Environment and Sustainable Resource Development). Note: Banding data locations are to be provided as Latitude/Longitude in Degrees-Minutes-Seconds.

This completed file is to be returned to the Alberta Fish and Wildlife, as part of your annual or final report, upon completion of the project (no later than April 1st annually).

FWMIS digital loadform files can be accessed at the following web site:
http://esrd.alberta.ca/fish-wildlife/fwmis/wildlife-load-forms.aspx

Or, by contacting Lonnie Bilyk (Resource Data Biologist) at <contact information removed> or email at Lonnie.Bilyk@gov.ab.ca

Ground-Based Wildlife Surveys: Alberta Wildlife Animal Care Committee Class Protocol #011

Research Licences and Permits

Adopted 21 March, 2012

Class Activity: Ground-Based Wildlife Surveys

This class protocol must be followed for all wildlife surveys conducted from the ground that are designed to elicit a response from an individual, alter the behaviour of an individual, or are being done in close proximity to a den, nest, or house of a wildlife species and which have potential to result in avoidance or abandonment of the site by the individual.

Specific Activities

The following activities require issuance of a wildlife research permit and must be conducted according to this class protocol:

- Call playback - using conspecific or non-conspecific calls to elicit response from a species; Nest searches/nest drags - all physical searches or monitoring of active nests ; including camera use to record nesting activity;
- Den searches - all physical den searches, including camera probing methods;
- Attractants - drawing wildlife into areas through baiting, scent posts, or other attractants;
- Search animals - surveys that employ dogs or other animals to locate wildlife, signs of wildlife, or wildlife habitat;
- Night lighting - use of artificial lights to attract or detect wildlife, for example in surveys for swift fox and Ord's kangaroo rat.

Objectives

The primary objective is to minimize disturbance and potential adverse effects on wildlife. Of particular concern are activities that are designed to elicit a response from an individual, alter the behaviour of an individual, or occur in close proximity to an animal's den, nest, or house.

Primary Contact/Authority

Director of Fish and Wildlife Policy Branch

Applicable Personnel

Project leaders and project teams must comply with this class protocol; they must have adequate experience and skills as outlined below:

Euthanasia

In the event of unforeseen irreversible injury or intolerable pain to a captured individual, euthanasia must be done safely and humanely. The permittee must be properly equipped and prepared to react in these circumstances. Use approved methods for the species/species group as per the Canadian Council on Animal Care **http://www.ccac.ca/en_/standards/guidelines.**

All mortalities that result from survey activities, including euthanized animals, must be reported and submitted upon request to the local Fish and Wildlife office for forwarding to an appropriate diagnostic facility for post-mortem evaluation.

Communications

- All members of the team should understand the inherent risks associated with fieldwork.
- Communication may be necessary with the local community and/or landholders regarding general location of call playback activities and other surveys.
- Prior to commencing surveys the project lead must contact the local Fish and Wildlife office(s) regarding general location and timing of survey activities.

References

Alberta Fish and Wildlife Division. 2010. Sensitive Species Inventory Guidelines: August 2010 Update.(online)
http://srd.alberta.ca/FishWildlife/WildlifeManagement/documents/SensitiveSpeciesInventoryGuidelines-Apr18-2013.pdf 128 pages