



**Environmental and Land Use Report
Lethbridge Area Transmission Development**

Presented to the Alberta Electric System Operator (AESO)

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TABLE OF CONTENTS

1.	INTRODUCTION.....	4
2.	TECHNICAL ALTERNATIVES	4
2.1	Option 1: Reconductor 207L.....	4
2.2	Option 2: New Sub and Various new line options.....	5
2.3	Option 3: Energy Storage.....	6
2.4	Option 5: Voltage Support.....	6
3.	ASSUMPTIONS	6
4.	ENVIRONMENTAL AND LAND USE CONSIDERATIONS	7
4.1	Option 1: Reconductor 207L.....	8
4.1.1	Land Assessment and Environmental Features	8
4.1.2	Conclusion	9
4.2	Option 2: 2A/2B/2C/2D/2E/2F	9
4.2.1	Land Assessment	9
4.2.2	Environmental Features	10
4.2.3	Visual Effects	11
4.2.4	Municipal Land Use Plans.....	11
4.2.5	Conclusion	11
4.3	Option 3A: Energy Storage	12
4.3.1	Land Assessment and Environmental Features	12
4.3.2	Conclusion	13
4.4	Option 5A: Monarch Voltage Support.....	13
4.4.1	Land Assessment and Environmental Features	13
4.4.2	Conclusion	14

LIST OF ACRONYMS

ACCC	Aluminium Conductor Composite Core
ACIMS	Alberta Conservation Information Management System
ACSS	Aluminium Conductor Steel-Supported
AEPA	Alberta Environment and Protect Areas
AESO	Alberta Electric System Operator
BESS	Battery Energy Storage System
EO	Element Occurrences
ESA	Environmental Site Assessment
IBA	Important Bird Area
HRIA	Historical Resources Impact Assessment
HRV	Historical Resource Value
LUB	Land Use Bylaws
MDP	Municipal Development Plans
NID	Needs Identification Document
POI	Point of Interconnection
ROW	Right-of-way
SAM	Study Area Map
SSRP	South Saskatchewan Regional Plan

1. INTRODUCTION

1. In consideration of the AESO's development for the Needs Identification Document (NID); the AESO has requested AltaLink and the City of Lethbridge assess the environmental and land use effects of four preliminary options under consideration. The AESO has forecasted load growth in the region that will lead to potential criteria violations. To mitigate those violations the AESO would like to assess different transmission system options.
2. The aspects considered in this report include:
 - land use including agriculture or other land uses;
 - environmental features (e.g., wildlife sensitivity areas, protected areas); and
 - *Alberta Land Stewardship Act* regional land use plans.
3. This summary provides a desktop level assessment of these aspects and other relevant environmental and land use effects associated with the five technical alternatives under consideration.

2. TECHNICAL ALTERNATIVES

4. In the NID Specification – Lethbridge Area Transmission Development, Project No. 7087, dated July 3, 2025 (V2D1) (the Specification), the AESO directed AltaLink and the City of Lethbridge to consider the following transmission development options (the Options) for the Project:
 - Option 1: Reconductor 207L;
 - Option 2:
 - Option 2A: New 240 kV Substation and line to Bowron
 - Option 2B: New 240 kV Substation and line to Bowron – 2 circuits
 - Option 2C: New 240 kV Substation and line to Chinook
 - Option 2D: New 240 kV Substation and line to Chinook – 2 circuits
 - Option 2E: Expand Chinook to 240 kV and line to Bowron
 - Option 2F: Expand Chinook to 240 kV and line to Bowron – 2 circuits
 - Option 3A: Energy Storage;
 - Option 4A: Phase Shifting Transformer¹;
 - Option 4B: Power Flow Control²;
 - Option 5A: Monarch Voltage Support;
 - Option 5B: Chinook Voltage Support³.
5. The scope for each of these Options are provided below. Responsibilities for the components of the scope are identified as AltaLink (AML) or City of Lethbridge (LTH):

2.1 Option 1: Reconductor 207L

Option 1: Reconductor 207L

6. This option comprises the following key components:
 - Reconductor 207L to a line with a minimum summer continuous rating or 160 MVA (AML);

¹ Option 4A is not discussed in this Environment and Land Use Report as there is no AltaLink scope within this option.

² Option 4B is not discussed in this Environment and Land Use Report as there is no AltaLink scope within this option.

³ Option 5B is not discussed in this Environment and Land Use Report as there is no AltaLink scope within this option.

- ACCC and ACSS should be considered for the new conductor; and
- Make the necessary modifications at the substations to accommodate the higher capability line (LTH/AML).

2.2 Option 2: New Sub and Various new line options

Option 2A: New 240 kV Substation and line to Bowron

7. This option comprises the following key components:

- Add a new substation west of Lethbridge, name to be determined, including one 240/138 kV transformer with a minimum continuous rating of 150 MVA, 240 and 138 kV circuit breakers and associated equipment (AML);
- Re-direct 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML);
- Construct a new 138kV Line, with a minimum summer continuous rating of 120MVA, from new substation to Bowron 674S substation (AML/LTH);
- Add 138 kV circuit breakers and associated equipment required at Bowron 674S substation to accommodate the changes above (AML/LTH).

Option 2B: New 240 kV Substation and line to Bowron – 2 circuits

8. This option is identical to 2A other than the following component:

- Re-direct 967L and 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML).

Option 2C: New 240 kV Substation and line to Chinook

9. This option comprises the following key components:

- Add a new substation west of Lethbridge, name to be determined, including one 240/138 kV transformer with a minimum continuous rating of 150 MVA, 240 and 138kV circuit breakers and associated equipment (AML);
- Re-direct 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML);
- Construct a new 138 kV Line, with a minimum summer continuous rating of 120 MVA, from new substation to Chinook 181S substation (AML/LTH);
- Construct a new 138 kV Line from Chinook 181S to Bowron 674S (AML/LTH);
- Add 138 kV circuit breakers and associated equipment required at Bowron 674S substation to accommodate the changes above (AML/LTH).

Option 2D: New 240 kV Substation and line to Chinook – 2 circuits

10. This option is identical to 2C other than the following component:

- Re-direct 967L and 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML).

Option 2E: Expand Chinook to 240 kV and line to Bowron

11. This option comprises the following key components:

- Expand Chinook 181S substation to a 240 kV substation by adding one 240/138 kV transformer with a minimum continuous rating of 150 MVA, 240 kV and 138 kV circuit breakers and associated equipment required (LTH);
- Re-direct 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with Chinook 181S substation (AML/LTH);
- Construct a new 138 kV Line, with a minimum summer continuous rating of 120 MVA, from Chinook 181S to Bowron 674S substations (AML/LTH); and
- Add 138 kV circuit breakers and associated equipment required at Bowron 674S substation to accommodate the changes above (LTH).

Option 2F: Expand Chinook to 240 kV and line to Bowron – 2 circuits

12. This option is identical to 2E other than the following component:

- Re-direct 967L and 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with Chinook 181S substation (AML/LTH).

2.3 Option 3: Energy Storage**Option 3A: Energy Storage**

13. Option 3A includes the installation of a 35 MW BESS and all associated equipment and material at the Riverbend 618S substation at the 138 kV system level.

BESS Requirements (AML):

- Grid forming capabilities;
- The rated energy capacity for the proposed BESS shall be 260 MWh;
- The facility needs to be able to dispatch power for up to 12 continuous hours per day;
- For any value of real power output between its minimum and maximum, the battery should be capable of producing any amount of reactive power between +/- 0.35 times its maximum power output as measured at POI. It must be able to produce this amount of reactive power under control of its voltage regulating system; and
- In faulted conditions, the battery must remain connected and inject fault current in a balanced ratio of real and reactive power up to or exceeding its maximum steady state current rating.

2.4 Option 5: Voltage Support**Option 5A: Monarch Voltage Support**

14. This option comprises the following key components:

- Add a 24MVar capacitor bank at Monarch 492S substation (AML); and
- Any necessary modifications or changes in the Monarch 492S substation to accommodate the changes above (AML).

3. ASSUMPTIONS

15. AltaLink has applied the following assumptions to complete the assessment of the Options:

- Option 1 does not require additional right-of-way. This may change during preliminary and detailed siting and engineering;

- It is anticipated Option 1 will require structure replacements structures modifications and the replacements will be adjacent to existing structures;
 - All of the options for Option 2 have the same study area;
 - Only one option within Option 2 will be built;
 - Option 2A/2B/2C and 2D are anticipated to have a site development area of approximately 146 m x 112 m for the proposed 240 kV substation;
 - Option 2E and 2F are anticipated to only require a double circuit in-and-out from existing 968L to existing Chinook 181S substation or two double circuits in-and-out from existing 968L/967L to existing Chinook 181S substation;
 - Associated telecommunications infrastructure was not contemplated as part of this document;
 - Option 3 is anticipated to have a site development of 200 m x 175 m for the proposed BESS, along with a 50 m x 50 m area for the associated substation required. The proposed infrastructure will be located a minimum distance of 200 m from the existing Riverbend 618S substation and a minimum distance of 100 m from existing transmission lines in the area; and
 - Option 5A, Monarch 492S substation will require a fence expansion anticipated to be approximately 20 m x 70 m on the east side of the existing substation.
16. These assumptions along with the technical assumptions found in the NID Report, are based on an initial high-level review of the options presented in the AESO Specification. These assumptions may change during preliminary and detailed siting and engineering.

4. ENVIRONMENTAL AND LAND USE CONSIDERATIONS

17. Outlined below are the environmental and land use considerations assessed for each Option. A summary of each of the findings is contained in **Appendix A**.
18. The study area boundaries provide an opportunity to review the potential effects of each Option identified by the AESO. Any substation site location and associated transmission line route configuration, outside of the study area is anticipated to result in a longer transmission line with higher overall effects and is not considered here. AltaLink has included the SAMs in **Appendix B** of this report.
19. All of the study areas are located within the boundary of the SSRP. The SSRP came into effect in September 2014 and was amended in 2018.
20. The SSRP, like all regional plans, is a wide-ranging document that looks to balance a number of effects and provide direction for decision-makers when conducting land use planning. Overall, the implications of the SSRP are similar across all options. The SSRP does not place restrictions for any of the options under consideration.
21. To assist with the assessment of the environmental and land use considerations below, AltaLink has created a series of Generic Base maps included in **Appendix C**. Maps GB1 through GB8 illustrate the land use considerations, including residences and environmental considerations of each study area.

4.1 Option 1: Reconductor 207L

22. The study area for Option 1 is located within the City of Lethbridge and the boundary is set 1000 m from the existing 207L transmission line. It is assumed the scope of work for Option 1 will be located entirely within the existing transmission line right-of-way. The study area is shown on SAM1 in **Appendix B**. A comparative analysis of Option 1 can be found in **Appendix A**, Table 1-1.

4.1.1 Land Assessment and Environmental Features

23. The existing 207L transmission line is located in the Mixedgrass Natural Subregion. The land use in the study area is native prairie and anthropogenic. Existing disturbances are common within the study area and include transmission lines, substations, oil and gas infrastructure, roads, residences, and recreational activities.
24. AltaLink assessed at a desktop level using publicly available datasets and no Federal lands were identified within the study area.
25. The study area is located within the City of Lethbridge. Option 1 considered in this section, has the potential to create some level of residential and visual effects during the construction phase of the Project, that would be temporary. The determination of what may constitute a visual effect can be subjective and perspectives vary between stakeholders. From a visual impact the area is home to an existing transmission line, therefore the reconductoring is anticipated to be minor if not negligible compared to visual impacts created by the existing infrastructure.
26. The study area has minimal oil and gas infrastructure located within it at the south end of the study area.
27. Further assessment of the potential environmental effects outlined below will be completed during the development of the facility application for this Project. Potential environmental effects will require a detailed environmental evaluation that includes field surveys.
28. Wetlands are scattered throughout the study area based on aerial imagery and Grassland Vegetation Inventory review. However, no wetland impacts are expected.
29. The land use on the 207L ROW is native prairie. The surrounding terrain is a coulee landscape that will require access upgrades.
30. Key Range Layers identified by AEPA cover the majority of the study area and include the Sensitive Raptor, Sharp-tailed Grouse, Sensitive Snake Habitat and Sensitive Amphibian Range. Features of concern associated with these layers have the potential to impact the timing of construction.
31. The FWIMS database contains records of several sensitive species in the study area (American White Pelican, Bull Snake, Ferruginous hawk, Northern Long Eared Bat, Northern Leopard Frog, Pileated Woodpecker, and Prairie Rattlesnake). Records of sensitive species may trigger pre-development surveys and additional coordination with the local AEP-Wildlife Biologist to identify any specific features that require alternate dates, setbacks, and/or other mitigation measures.
32. In the ACIMS database, five sensitive EOs are found in the study area. Sensitive EOs are occurrences of species that are rare (or of conservation concern). Depending on the land use, pre-disturbance plant surveys may be needed and additional coordination with the local AEP-

Wildlife Biologist to identify any specific features that require setbacks and/or other mitigation measures.

33. Most of the study area is within a Key Wildlife and Biodiversity Zone. AEPA has published land use guidelines for Key Wildlife and Biodiversity Zones which include avoiding permanent alteration of habitat and Restricted Activity Periods from industrial disturbance from December 15 to April 30. Planned work within the Restricted Activity Period will require mitigation measures reviewed by the local AEP-Wildlife Biologist.
34. ESA's (generally defined as areas that are important to the long-term maintenance of biological diversity, physical landscape features and/or other natural processes) are present in the midpoint and northwest portion of the study area.
35. No IBA's are located in the study area for this option.
36. Most of the study area is rated as a 5 for HRV, believed to contain a historical resource. The midpoint of the study area has ratings of 3 (contains a significant historic resource that will likely require avoidance) and 4 (contains a historic resource that may require avoidance).
37. The land uses, residences, and environmental features are illustrated on GB1-GB3 in **Appendix C**.

4.1.2 Conclusion

38. Overall, Option 1 is feasible from a land use and environmental perspective. It is anticipated that the land use impacts that currently exist along the existing 207L transmission line would be similar where structure replacements are required.

4.2 Option 2: 2A/2B/2C/2D/2E/2F

39. The Option 2 study area spans Lethbridge County and the City of Lethbridge. A comparative analysis of Option 2 can be found in **Appendix A**, Table 2-1.
40. The east study area boundary is set along University Drive West located within the City of Lethbridge. The west study area boundary is set along an undeveloped road allowance. The north and south boundaries are set one mile from existing 968L/967L transmission line, the connection point for all options within Option 2. Setting the boundaries along these areas allows AltaLink to fully assess the area for land use and environmental features that may be affected by the project. Looking outside the study area is anticipated to result in longer transmission line length resulting in higher overall effects. The study area is illustrated on SAM2 in **Appendix B**.
41. AltaLink assessed at a desktop level using publicly available datasets and has identified Federal lands in the north half of the study area while the bottom half is mainly private land.
42. No transportation utility corridors were identified within the study area.

4.2.1 Land Assessment

Agricultural Land

43. Within the study area for these options there is a mix of cultivation, pasture and native prairie. The land uses are illustrated on GB6 for the study area in **Appendix C**.

Residential

44. New transmission facilities can have potential effects to residential properties. These effects can be both physical effects to residential properties, like the removal of trees or outbuildings, and visual (aesthetic) effects which are subjective and vary between stakeholders.
45. Generally, in a rural setting, residential densities are sparse with densities increasing in areas surrounding towns or cities. Locations of residences across the study area are illustrated on GB4 in **Appendix C**.
46. The residential density within the study area is relatively sparse. With a cluster of residences on the east side of the study area.

Oil and Gas Infrastructure

47. Transmission facilities can have an effect on existing oil and gas infrastructure (for example AC interference that needs to be mitigated). Paralleling or sharing oil and gas infrastructure (such as access roads) can also be beneficial from a land use perspective.
48. Within the study area, the study area has minimal oil and gas infrastructure located within it.

Existing Linear Corridors/Transmission Lines

49. AltaLink looked for sites that could be located near or directly adjacent to the existing 968L/967L transmission line for the new 240 kV substation. This would reduce the length of line needed for the in/out connection to existing 968L/967L, potentially reducing the overall impact of the project.

Access

50. Looking for areas within the study area where existing access is available including municipal roads, highways or resource roads in order to minimize the need for additional linear disturbance on the landscape would be beneficial. The study area has existing roads throughout.

4.2.2 Environmental Features

51. Further assessment of the potential environmental effects discussed below will be completed during the development of the facility application for this Project. Potential environmental effects will depend on the specific footprint location(s) and will require a detailed environmental evaluation that includes field surveys.
52. The environmental features listed below are illustrated on GB5 in **Appendix C**.
53. Native grassland is predominant within the study area with cultivated areas located on the south portion and tame pasture on the east portion.
54. Key Range Layers identified by AEPA cover the majority of the study area and include the Sensitive Raptor, Sharp-tailed Grouse and Sensitive Amphibian range. Features associated with these have the potential to impact the location of the proposed facilities and/or timing of construction.
55. In the FWMIS database, sensitive species were found to occupy the study area (Burrowing Owl, Golden Eagle, and Prairie Rattlesnake). Records of sensitive species may trigger pre-development surveys and additional coordination with the local AEP-Wildlife Biologist to identify any specific features that require alternate dates, setbacks, and/or other mitigation measures.

- 56. In the ACIMS database, four sensitive EOs are found in the study area. Depending on the land use, pre-disturbance plant surveys may be needed and additional coordination with the local AEP-Wildlife Biologist to identify any specific features that require setbacks and/or other mitigation measures.
- 57. A section located on the west boundary of the study area is within a Key Wildlife and Biodiversity Zone. AEPA has published land use guidelines for Key Wildlife and Biodiversity Zones which include avoiding permanent alteration of habitat and Restricted Activity Periods from industrial disturbance from December 15 to April 30. Planned work within the Restricted Activity Period will require mitigation measures reviewed by the local AEP-Wildlife Biologist.
- 58. No IBA's are located in the study area for these options.
- 59. A section located on the west boundary of the study area is designated as an ESA.
- 60. The west half of the study area is rated as a 5 for HRV, believed to contain a historical resource. It is expected that a HRIA will be required to support the project siting and Facility Application. It is expected that proposed substation facilities will be able to avoid locations with historical resource.

4.2.3 Visual Effects

- 61. Options considered in this section have the potential to create some level of visual effects. The determination of what may constitute a visual effect can be subjective and perspectives vary between stakeholders.
- 62. Visual effects generally increase with proximity to a transmission facility. Visual impacts can be reduced by consolidating new transmission facilities in areas where transmission facilities already exist.
- 63. It is anticipated that Options 2A/2B/2C/2D will have similar visual effects due to the facility being similar in size. It is also anticipated that Options 2E and 2F will have similar visual effects.

4.2.4 Municipal Land Use Plans

- 64. AltaLink's study area covers Lethbridge County and the City of Lethbridge. These municipalities have MDPs and two LUBs. These documents were reviewed to identify potential conflicts between the electrical solutions identified by the AESO and Municipal Plans. The documents did not include anything that would preclude development in any of the municipalities.
- 65. Regardless of which option is selected by the AESO, consultation with the applicable municipalities would be important to identify potential impacts and areas of concern associated with transmission facilities.

4.2.5 Conclusion

- 66. Overall Options 2A/2B/2C/2D/2E/2F are feasible and expected to have similar potential impacts from a land use and environmental perspective, as the proposed footprint size within each option is expected to be similar in size. Potential land use and environmental impacts and the extent will depend on the specific footprint location as well as any access requirements.

4.3 Option 3A: Energy Storage

67. The study area for Option 3A is located within Lethbridge County and the boundary is set 1500 m from the existing Riverbend 618S substation fenceline. The Riverbend 618S substation is located on a parcel approximately 150 m x 150 m and was built in 1990. The study area is shown on SAM3 in **Appendix B**. A comparative analysis of Option 3A can be found in **Appendix A**, Table 3-1.

4.3.1 Land Assessment and Environmental Features

68. The Riverbend 618S substation is located in the Mixedgrass Natural Subregion. The land use in the study area is comprised of native, cultivated and wetlands. The Riverbend 618S substation is located on cultivated land. Existing disturbances are common within the study area and include transmission and distribution lines, substations, oil and gas infrastructure, roads, residences, and farming activities.
69. Within the northwest corner of the study area Blood Tribe lands are identified. The Blood Tribe is located on the west side of the St. Mary River, if Option 3 scope of work is proposed to impact First Nation lands additional approvals and requirements would be required, the remainder of the study area is private lands.
70. No transportation utility corridors within the study areas are identified.
71. New transmission facilities can have potential effects to residential properties. There are several residences located within Option 3A study area, in the north and east of the study area. The study area does not include any towns or cities. Option 3A considered in this section has the potential to create some level of visual effects. The determination of what may constitute a visual effect can be subjective and perspectives vary between stakeholders. Visual effects generally increase the closer to residences a transmission facility is located.
72. The study area has oil and gas infrastructure located throughout.
73. Looking for areas within the study area where existing access is available including municipal roads, highways or resource roads in order to minimize the need for additional linear disturbance on the landscape would be beneficial. The study area has existing roads throughout.
74. Wetlands are scattered throughout the study area as well as within 100 m of the Riverbend 618S substation based on aerial imagery and Grassland Vegetation Inventory review.
75. Key Range Layers identified by AEPA cover the majority of the study area and include the Sensitive Raptor, Sharp-tailed Grouse, Sensitive Amphibian and Sensitive Snake Habitat range. Features of concern associated with these layers are not anticipated due to surrounding land use impacts and associated anthropogenic disturbances.
76. In the FWMIS database, sensitive species were found to occupy the study area (Upland Sandpiper, Long-billed Curlew, and Ferruginous Hawk). Records of sensitive species may trigger pre-development surveys and additional coordination with the local AEP-Wildlife Biologist to identify any specific features that require alternate dates, setbacks, and/or other mitigation measures.
77. In the ACIMS database, two sensitive EOs are found in the study area. Depending on the land use, pre-disturbance plant surveys may be needed and additional coordination with the local

AEP-Wildlife Biologist to identify any specific features that require setbacks and/or other mitigation measures.

- 78. A Key Wildlife and Biodiversity Zone is located to the west and south of the Riverbend 618S Substation and will not be impacted by this option.
- 79. ESAs have been identified in the north and south of the study area; however will not be impacted by this option.
- 80. No IBA's are located in the study area for this option.
- 81. The study area is primarily rated as a 5 for HRV, believed to contain a historical resource. It is expected that a HRIA will be required to support the project siting and Facility Application. It is expected that proposed substation facilities will be able to avoid locations with historical resource.
- 82. The land uses, residences, and environmental features are illustrated on GB7 in **Appendix C**.

4.3.2 Conclusion

- 83. Overall, Option 3A is feasible from a land use and environmental perspective.

4.4 Option 5A: Monarch Voltage Support

- 84. The study area for Option 5A is located within Lethbridge County and the boundary is set 1000 m from the existing Monarch 492S substation fenceline. The Monarch 492S substation is located on a parcel approximately 150 m x 150 m and was built in 1986. It is assumed the scope of work for Option 5A will be located entirely within AltaLink's owned parcel within the SW 19-10-22-W4. The study area is shown on SAM4 in **Appendix B**. A comparative analysis of Option 5A can be found in **Appendix A**, Table 4-1.

4.4.1 Land Assessment and Environmental Features

- 85. The Monarch 492S substation is located in the Mixedgrass Natural Subregion. The primary land use in the study area is cultivation with a small area of native prairie. Existing disturbances are common within the study area and include transmission and distribution lines, substations, oil and gas infrastructure, roads, residences, farming activities, irrigation, railways and renewable energy facilities.
- 86. AltaLink assessed at a desktop level using publicly available datasets and no Federal lands or transportation utility corridors were identified within the study area.
- 87. New transmission facilities can have potential effects to residential properties. There are three residences located within Option 5A study area, with the closest residence approximately 85 m to the north of the existing Monarch 492S substation. The study area does not include any towns or cities. Option 5A considered in this section has the potential to create some level of visual effects. The determination of what may constitute a visual effect can be subjective and perspectives vary between stakeholders. Visual effects generally increase the closer to residences a transmission facility is located. From a visual impact the area is home to an existing substation and existing transmission line, as well as renewable energy facility within the study area, therefore the fence expansion is anticipated to be minor if not negligible, compared to visual impacts created by the existing infrastructure.

88. The study area has minimal oil and gas infrastructure located within it to the northwest of the existing Monarch 492S substation.
89. Wetlands are identified within the study area based on aerial imagery and Grassland Vegetation Inventory review. However, no wetland impacts are expected for this option.
90. The surrounding land use is native prairie.
91. Key Range Layers identified by AEPA cover the majority of the study area and include the Sensitive Raptor, Sharp-tailed Grouse, and Sensitive Amphibian Range. Features of concern associated with these layers are not anticipated due to surrounding land use impacts and associated anthropogenic disturbances.
92. There are no sensitive species recorded in the FWMIS database.
93. In the ACIMS database, one sensitive EO was found within the study area. Depending on the land use, pre-disturbance plant surveys may be needed and additional coordination with the local AEP-Wildlife Biologist to identify any specific features that require setbacks and/or other mitigation measures.
94. This option is not located within an ESA.
95. No IBA's are located in the study area for this option.
96. No historical resources concerns are expected for this option.
97. The land uses, residences and environmental features are illustrated on GB8 in **Appendix C**.

4.4.2 Conclusion

98. Option 5A is feasible and anticipated to be minor if not have a negligible impact within the study area.

Appendix A – Summary of Environmental and Land Use Considerations

Table 1-1

Technical Alternatives	Land Assessment	Agriculture features	Other Land Use Features	Environmental Features: Wildlife / Protected areas	Visual Effects	Provincial Land Use Plans	Conclusions
Option 1: Reconductor 207L Option 1: Reconductor 207L This option comprises the following key components: - Reconductor 207L to a line with a minimum summer continuous rating or 160MVA (AML) - ACCC and ACSS should be considered for the new conductor - Make the necessary modifications at the substations to accommodate the higher capability line (LTH/AML)	Option 1 impacts are anticipated to be negligible as 207L is an existing transmission line.	Potential agricultural impacts and extent will depend on the specific footprint location.	There are no anticipated impacts to oil and gas infrastructure and minimal if not negligible impacts to residences.	It is anticipated that the land use impacts that currently exist along the existing 207L would be the same as those where structure replacements are required. The land use is Native Prairie. No wetland impacts are expected. Located in the Sensitive Raptor, Sharp-tailed Grouse, Sensitive snake habitat and sensitive amphibian regions. Features of concern associated with these layers have the potential to impact the timing of construction. Sensitive species and plants are recorded in the FWMIS and ACIMS databases, which may trigger pre-development surveys and additional coordination with the local AEP Wildlife Biologist. Project construction timing may be restricted due to the key wildlife biodiversity zone. No historical resource concerns are expected.	The anticipated reconductoring and potential replacement of structures is anticipated to be minor if not negligible compared to visual impacts created by the existing infrastructure.	Located within the boundaries of the South Saskatchewan Regional Plan (SSRP) and implications of the plan are anticipated to be similar across all Options.	Option 1 is feasible from a land use and environmental perspective. Access challenges exist along existing 207L right-of-way. Due to 207L being an existing line and the scope of work requiring reconductoring and potential structure replacements. It is anticipated that the impacts that currently exist along the line would be the same, therefore it is anticipated the impacts to be negligible for Option 1.



Table 2-1

Technical Alternatives	Land Assessment	Agriculture features	Other Land Use Features	Environmental Features: Wildlife / Protected areas	Visual Effects	Provincial Land Use Plans	Conclusions
Option 2: New Sub and Various new line options (2A/2B/2C/2D/2E/2F) Option 2A: New 240 kV Substation and line to Bowron This option comprises the following key components: - Add a new substation west of Lethbridge, name to be determined, including one 240/138 kV transformer with a minimum continuous rating of 150 MVA, 240 and 138kV circuit breakers and associated equipment (AML) - Re-direct 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML) - Construct a new 138kV Line, with a minimum summer continuous rating of 120MVA, from new substation to Bowron 674S substation (AML/LTH) - Add 138kV circuit breakers and associated equipment required at Bowron 674S to accommodate the changes above (AML/LTH) Option 2B: New 240 kV Substation and line to Bowron – 2 circuits This option is identical to 2A other than the following component: - Re-direct 967L and 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML) Option 2C: New 240 kV Substation and line to Chinook This option comprises the following key components: - Add a new substation west of Lethbridge, name to be determined, including one 240/138 kV transformer with a minimum continuous rating of 150 MVA, 240 and 138kV circuit breakers and associated equipment (AML) - Re-direct 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML) - Construct a new 138kV Line, with a minimum summer continuous rating of 120MVA, from new substation to Chinook 181S substation (AML/LTH) - Construct a new 138kV Line from Chinook 181S to Bowron 674S (AML/LTH) - Add 138kV circuit breakers and associated equipment required at Bowron 674S to accommodate the changes above (AML/LTH)	Similar land impacts as all Options expected to be similar in size.	All options expected to have similar potential agricultural impacts. Potential agricultural impacts and the extent will depend on the specific footprint.	Similar residential effects for all options. Similar oil and gas effects due to the low number of wells and pipelines in the study area.	No native prairie will be impacted by this option. No wetlands will be impacted by this option. The study area is located in the Sensitive Raptor, Sharp-tailed Grouse, Sensitive Amphibian and Sensitive Snake Habitat range. Features of concern associated with these layers have the potential to impact the timing of construction. Sensitive species and plants are recorded in the FWMIS and ACIMS databases, which may trigger pre-development surveys and additional coordination with the local AEP Wildlife Biologist. There is a Key Wildlife and Biodiversity Zone within the study area, however, will not be impacted by this option. ESAs have been identified in the study area; however, will not be impacted by this option. No IBA's are located in the study area for this option. It is expected that proposed substation facilities will be able to avoid locations with historical resources.	All options anticipated to have similar visual effects.	Located within the boundaries of the South Saskatchewan Regional Plan (SSRP) and implications of the plan are anticipated to be similar across both Options.	All Options are feasible and are expected to have similar potential impacts from a land use and environmental perspective, as proposed footprint size within each option is expected to be similar in size.



Option 2D: New 240 kV Substation and line to Chinook – 2 circuits

- This option is identical to 2C other than the following component:
- Re-direct 967L and 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with the new substation (AML)

Option 2E: Expand Chinook to 240 kV and line to Bowron

- This option comprises the following key components:
- Expand Chinook 181S to a 240 kV Substation by adding one 240/138 kV transformer with a minimum continuous rating of 150 MVA, 240kV and 138kV circuit breakers and associated equipment required (LTH)
 - Re-direct 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with Chinook 181S (AML/LTH)
 - Construct a new 138kV Line, with a minimum summer continuous rating of 120MVA, from Chinook 181S to Bowron 674S (AML/LTH)
 - Add 138kV circuit breakers and associated equipment required at Bowron 674S to accommodate the changes above (LTH)

Option 2F: Expand Chinook to 240 kV and line to Bowron – 2 circuits

- This option is identical to 2E other than the following component:
- Re-direct 967L and 968L (North Lethbridge 370S to Windy Flats 138S) to connect an in-and-out configuration with Chinook 181S (AML/LTH)

Table 3-1

Technical Alternatives	Land Assessment	Agriculture features	Other Land Use Features	Environmental Features: Wildlife / Protected areas	Visual Effects	Provincial Land Use Plans	Conclusions
Option 3: Energy Storage Option 3A: Energy Storage Option 3A includes the installation of a 35 MW Battery Energy Storage System (BESS) and all associated equipment and material at Riverbend 618S substation at the 138 kV system level. BESS Requirements (AML) • Grid forming capabilities • The rated energy capacity for the proposed BESS shall be 260 MWh. • The facility needs to be able to dispatch power for up to 12 continuous hours per day • For any value of real power output between its minimum and maximum, the battery should be capable of producing any amount of reactive power between +/- 0.35 times its maximum power output as measured at POI. It must be able to produce this amount of reactive power under control of its voltage regulating system. • In faulted conditions, the battery must remain connected and inject fault current in a balanced ratio of real and reactive power up to or exceeding its maximum steady state current rating.	Land impacts will depend on the specific footprint location.	Agricultural impact will depend on the specific footprint location.	Potential residential effect as residences are located in the east and north of the study area. Potential for oil and gas effects as infrastructure is located throughout the study area.	Environment impacts will depend on the specific footprint location. Wetlands are scattered throughout the study area as well as within 100 m of the Riverbend 618S Substation. The study area is located in the Sensitive Raptor, Sharp-tailed Grouse, and Sensitive Amphibian range. Features of concern associated with these layers have the potential to impact the timing of construction. Sensitive species and plants are recorded in the FWMIS and ACIMS databases, which may trigger pre-development surveys and additional coordination with the local AEP Wildlife Biologist. Option is not located in or in vicinity of an ESA or IBAs. No historical resource concerns are expected.	There is potential for visual impact as there are residences located within the north and east portion of the study area.	Located within the boundaries of the South Saskatchewan Regional Plan (SSRP) and implications of the plan are anticipated to be similar across all Options.	Option 3 is feasible from a land use and environmental perspective.

Table 4-1

Technical Alternatives	Land Assessment	Agriculture features	Other Land Use Features	Environmental Features: Wildlife / Protected areas	Visual Effects	Provincial Land Use Plans	Conclusions
Option 5: Voltage Support Option 5A: Monarch Voltage Support This option comprises the following key components: • Add a 24MVar capacitor bank at Monarch 492S (AML) • Any necessary modifications or changes in the Monarch 492S substation to accommodate the changes above (AML)	Land impacts are anticipated to be negligible as AltaLink owns the land for the proposed expansion.	Option 5A would be considered to have a potential impact as a fence expansion is required to the east of the existing substation site on land identified as native prairie. Although an expansion on native prairie lands is required, AltaLink considers this to be fairly negligible impact.	Minimal residences within study area. Minimal oil and gas in the study area and none in the immediate area of the proposed fence expansion.	Option 5 is expected to have low environmental impact. The land use is native prairie. No wetland will be impacted by this option. Located in the Sensitive Raptor, Sharp-tailed Grouse, and Sensitive Amphibian range. Features of concern associated with these layers are not anticipated due to surrounding land use impacts and associated anthropogenic disturbances. Option is not located in or in vicinity of an ESA or IBA No historical resource concerns are expected.	Option 5A is anticipated to be minor if not negligible compared to visual impacts created by the existing infrastructure, as the area is home to an existing substation, transmission line and renewable infrastructure in the area.	Located within the boundaries of the South Saskatchewan Regional Plan (SSRP) and implications of the plan are anticipated to be similar across all options.	Option 5A is feasible from a land use and environmental perspective.



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LEGEND

Existing Substation

Existing Transmission Line

Study Area

Pipeline

Railway

River or Stream

Road

Crown Land

Urban Area

Water Body

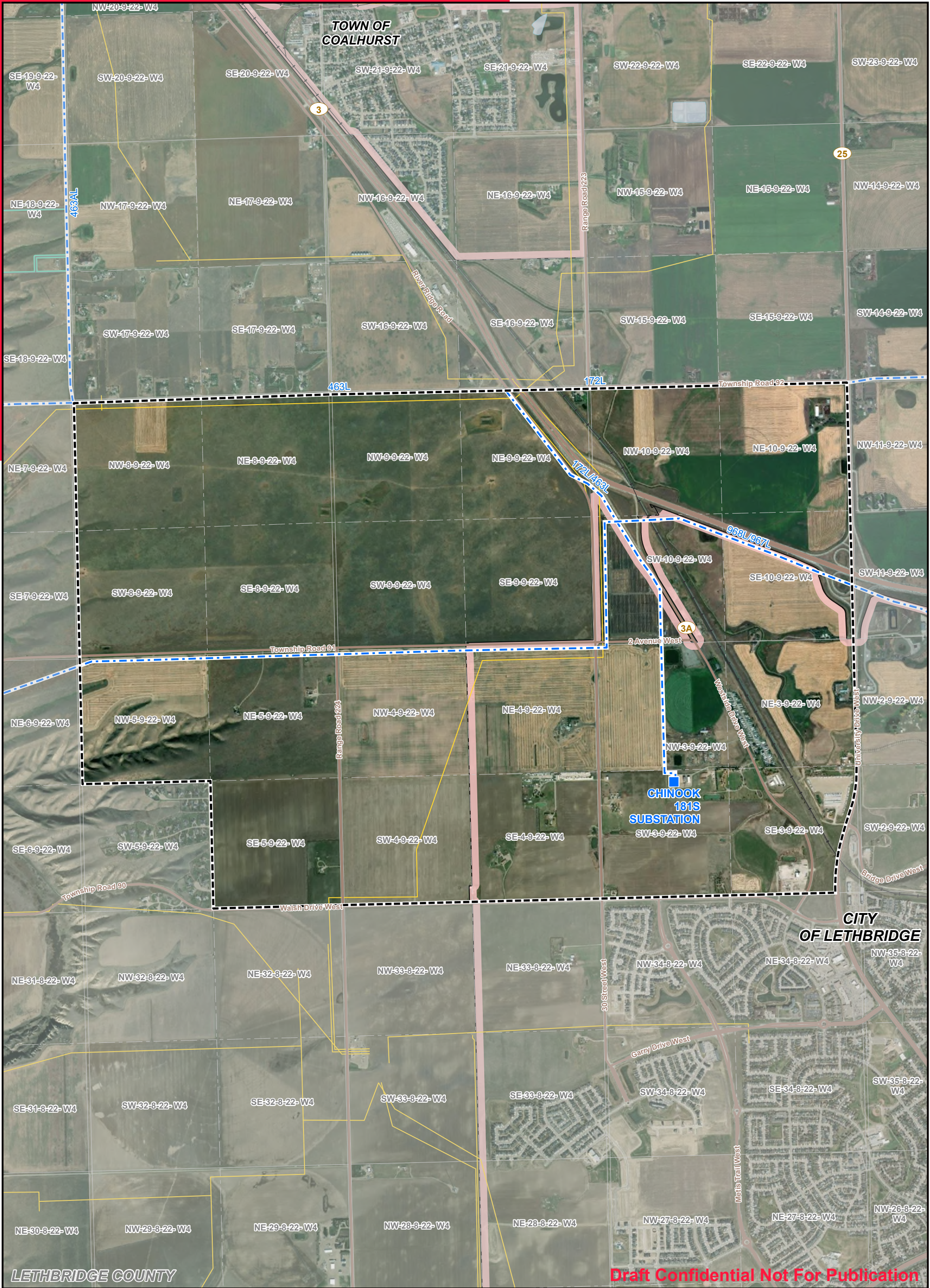
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DRAWN: SG - Maskwa
FILE NO.: Lethbridge-Option1-SAM1
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development
DATE: 2025-09-17

Photography dated: 2024 Source: Southern Alberta, Maxar
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

STUDY AREA **SAM1**

Option 1

Lethbridge Area Transmission Development



LEGEND

- Existing Substation
- Existing Transmission Line
- Study Area
- Pipeline
- Railway
- Road
- Crown Land
- Urban Area
- Water Body

NO.: xxxxxxxxxx
DRAWN: SG - Maskwa
FILE NO.: Lethbridge-Option2-SAM2
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development
DATE: 2025-09-17

N

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0 0.5 1 Miles

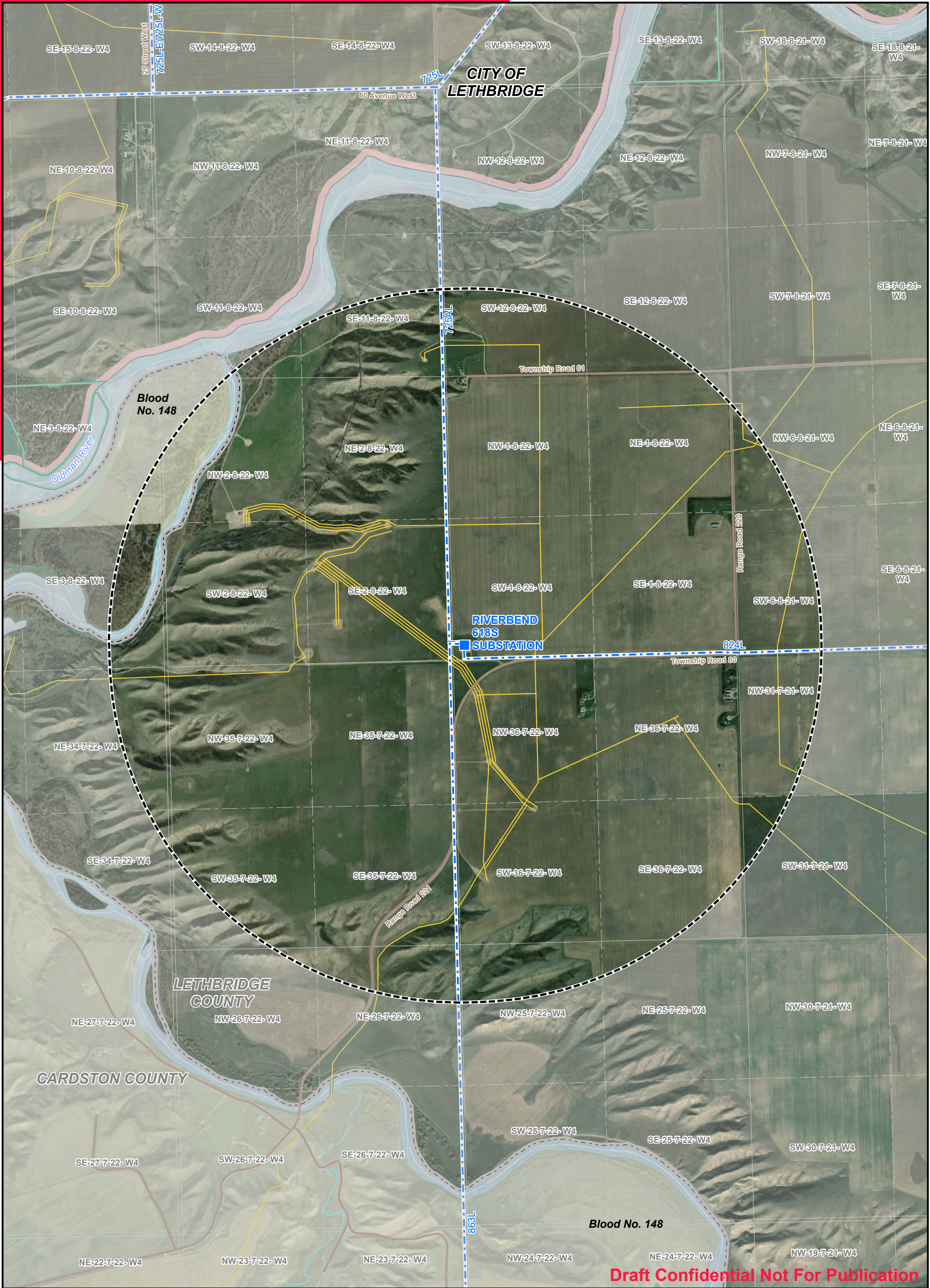
Photography dated: 2024 Source: Southern Alberta, Maxar
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

STUDY AREA **SAM2**

ALTALINK

Option 2A/2B/2C/2D/2E/2F

Lethbridge Area Transmission Development



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LEGEND

Existing Substation

Existing Transmission Line

Study Area

Municipal or County Boundary

Pipeline

Railway

River or Stream

Crown Land

First Nations Reserve

Urban Area

Water Body

NO.: XXXXXXXXXX
DRAWN: SG - Maskwa
FILE NO.: Lethbridge-Option3A-SAM3
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development
DATE: 2025-10-17

Photography dated: 2024 Source: Southern Alberta, Maxar
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

STUDY AREA **SAM3**

Option 3A

Lethbridge Area Transmission Development



LEGEND

■

Existing Substation

Existing Transmission Line

⬜

Study Area

●

Hamlet or Locality

—

Pipeline

—+—

Railway

■

Water Body

NO.: XXXXXXXXXX
DRAWN: SG - Maskwa
FILE NO.: Lethbridge-Option5A-SAM4
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development
DATE: 2025-09-17

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00.250.5

Kilometres

00.250.5

Miles

STUDY AREA

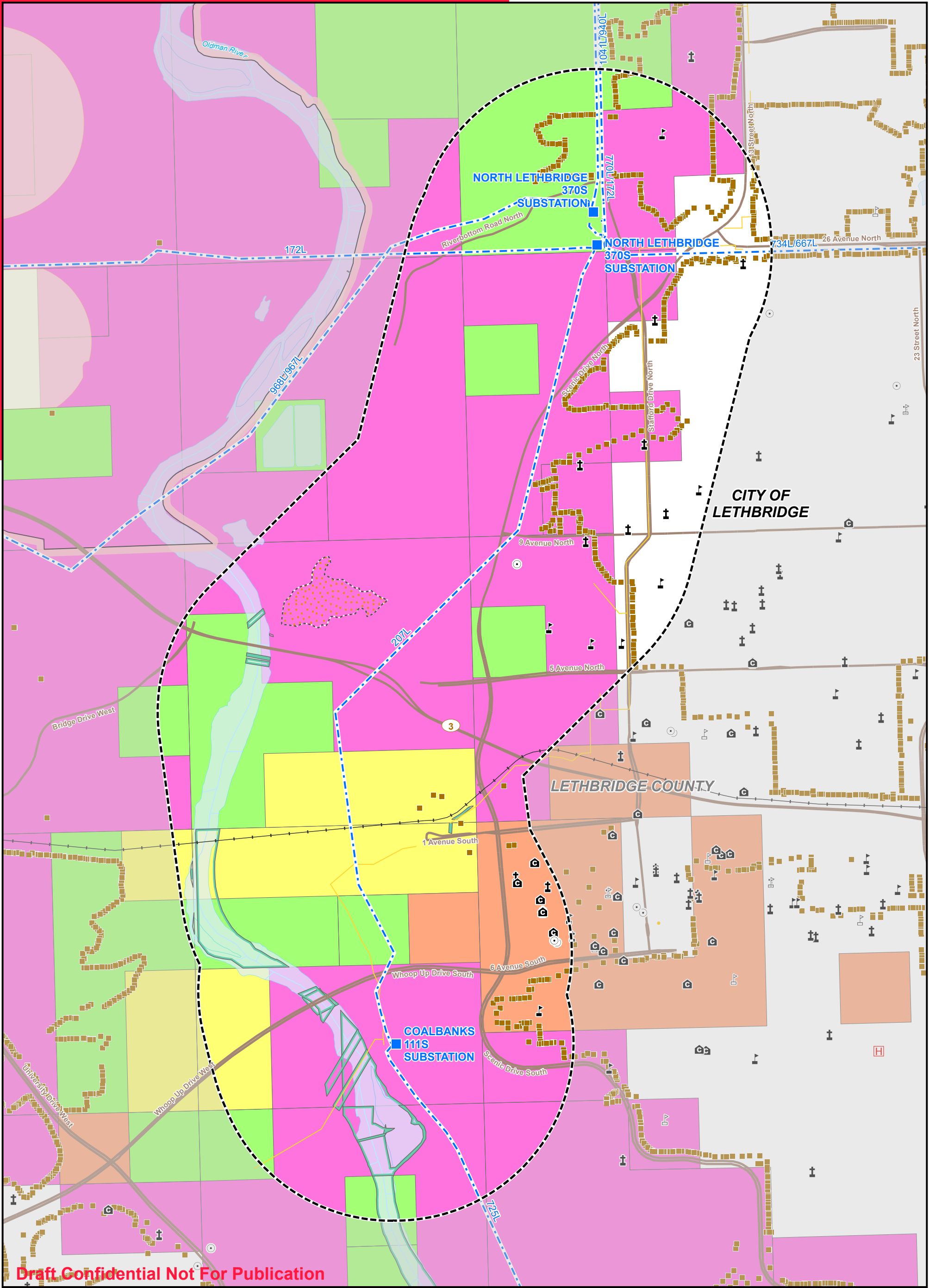
SAM4

ALTALINK

Option 5A

Lethbridge Area Transmission Development

Photography dated: 2024 Source: Southern Alberta, Maxar
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.



LEGEND

■

Existing Substation

Existing Transmission Line

Study Area

Pipeline

Railway

River or Stream

Road

⊙

Helicopter Pad

⊙

Comminication Tower

Ⓜ

Community Centre

Ⓜ

Cemetery

Ⓜ

Church

Ⓜ

Day Care

Ⓜ

Hospital

Ⓜ

Residence

Ⓜ

School

Ⓜ

Wellsite

Ⓜ

Crown Land

Gravel Pit

Irrigated Parcel

Urban Area

Water Body

Historical Resource Value

1

3

4

5

NO.: XXXXXXXXXX
DRAWN: CH - Maskwa
FILE NO.: Lethbridge-Option1-GB1
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development

DATE: 2025-10-23

N

00.250.5Kilometres

00.250.5Miles

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

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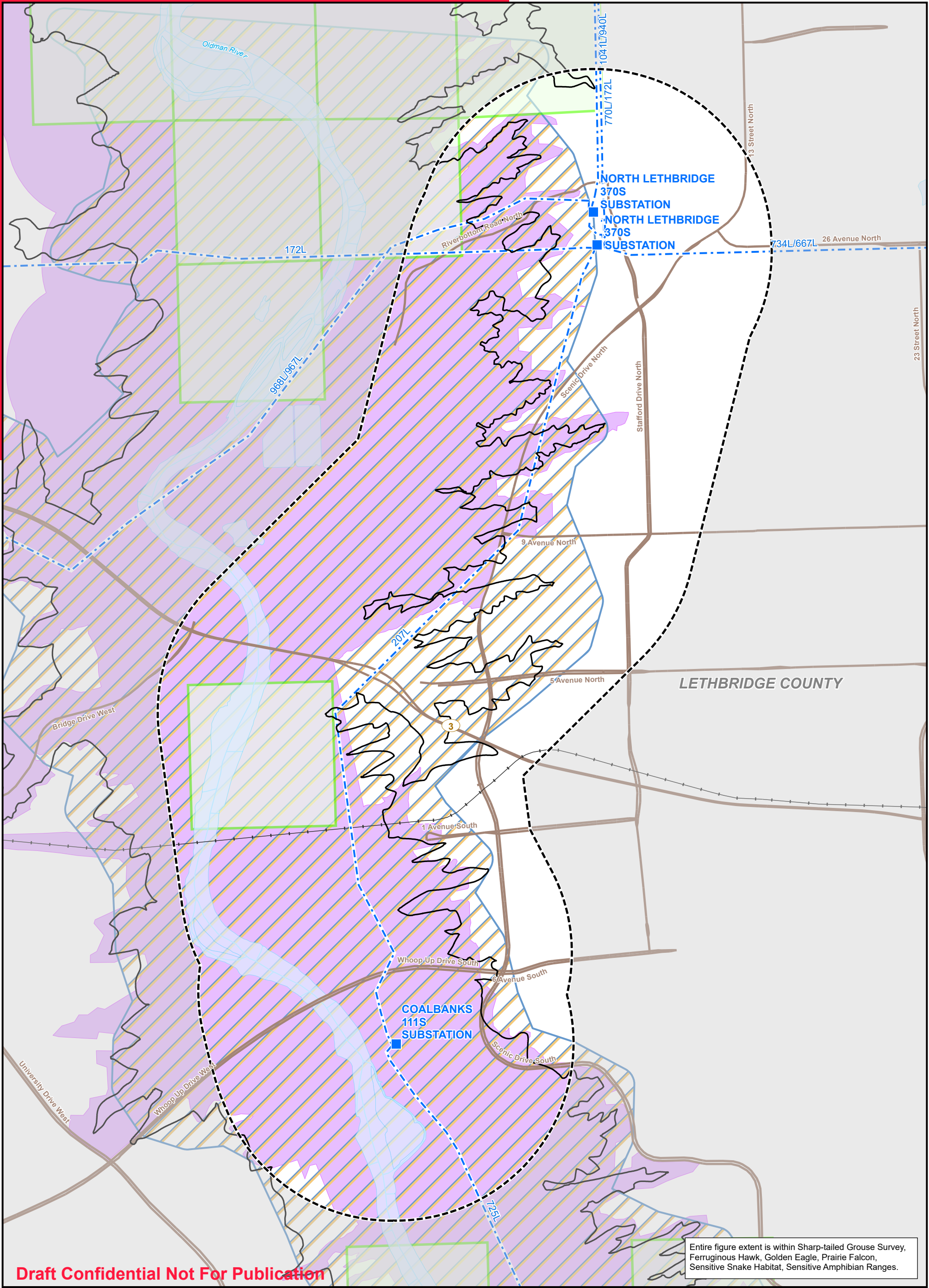
GB1

ALTALINK

Land Use Considerations

Option 1

Lethbridge Area Transmission Development



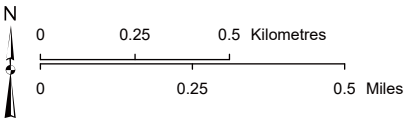
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LEGEND

- Existing Substation
- Existing Transmission Line
- Study Area
- Couleee
- Railway
- Road
- River or Stream
- Environmentally Significant Area
- Key Wildlife And Biodiversity Zones
- Sensitive Snake Hibernacula Range
- Water Body

NO.: XXXXXXXXXX
DRAWN: CH - Maskwa
FILE NO.: Lethbridge-Option1-GB2
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development

DATE: 2025-10-23

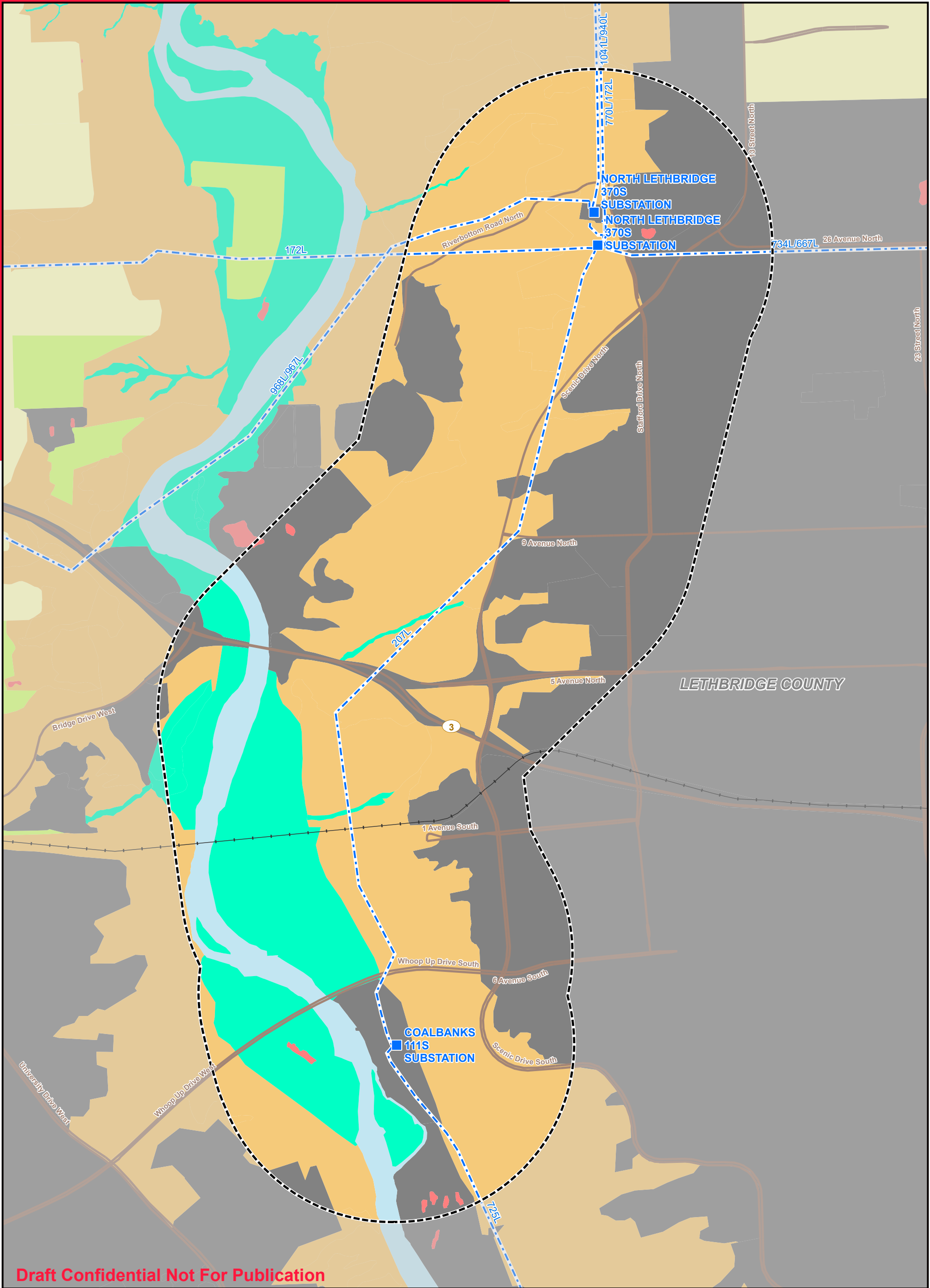


Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

GENERIC BASE **GB2**



Environmental Features
Option 1
Lethbridge Area Transmission Development



LEGEND

Existing Substation

Existing Transmission Line

Study Area

Railway

Road

Grassland Vegetation Inventory

Anthropogenic

Anthropogenic Water Body

Cultivated

Native Prairie

Open Water

Tame Pasture

Wetland

NO.: XXXXXXXXXX
DRAWN: CH - Maskwa
FILE NO.: Lethbridge-Option1-GB3
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development
DATE: 2025-10-23

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0 0.25 0.5 Miles

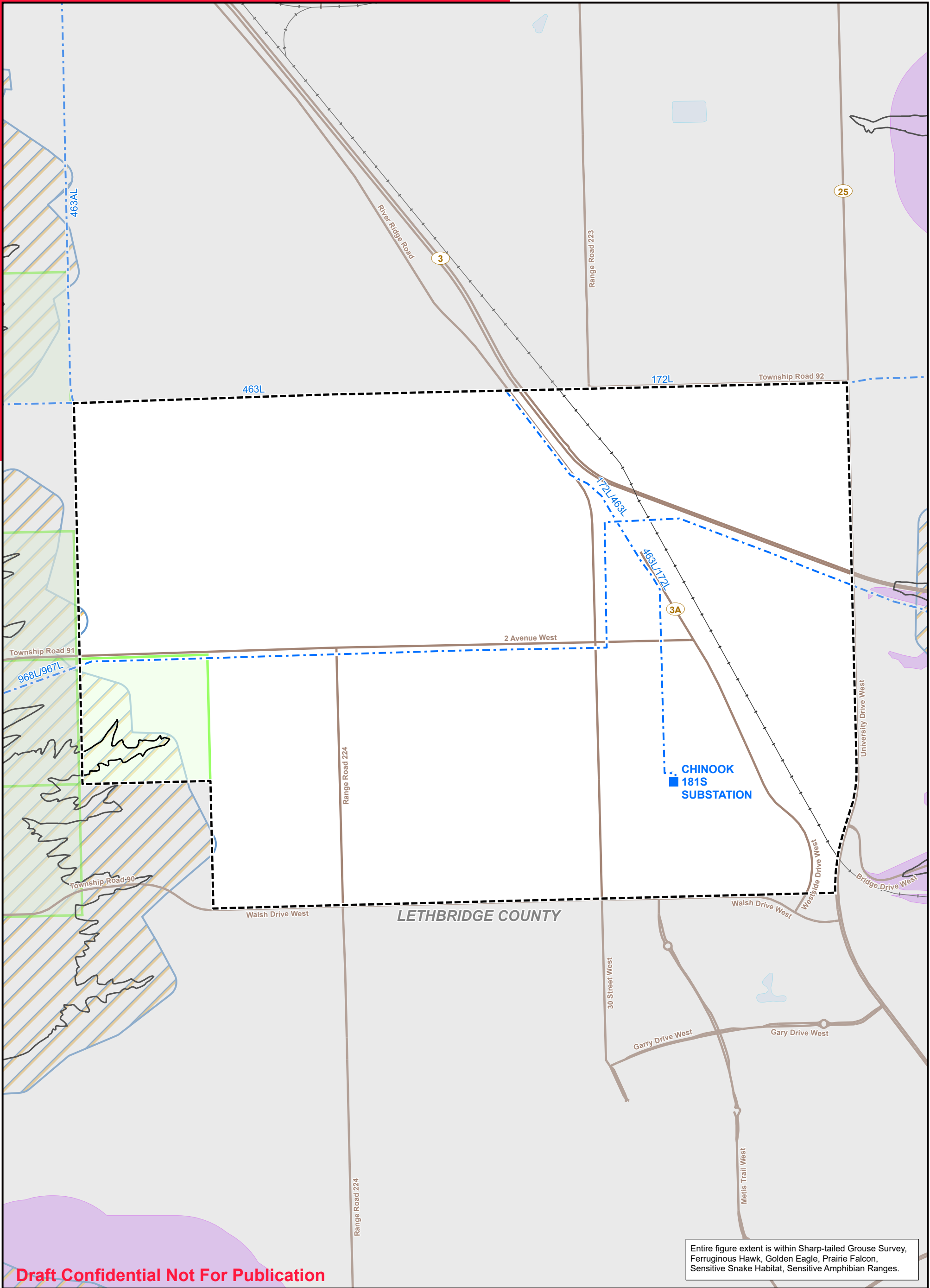
Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.

GENERIC BASE **GB3**

Grassland Vegetation Inventory

Option 1

Lethbridge Area Transmission Development



Entire figure extent is within Sharp-tailed Grouse Survey, Ferruginous Hawk, Golden Eagle, Prairie Falcon, Sensitive Snake Habitat, Sensitive Amphibian Ranges.

- LEGEND**
- Existing Substation

Existing Transmission Line

Study Area

Coulee

Railway

Road

Environmentally Significant Area

Key Wildlife And Biodiversity Zones

Sensitive Snake Hibernacula Range

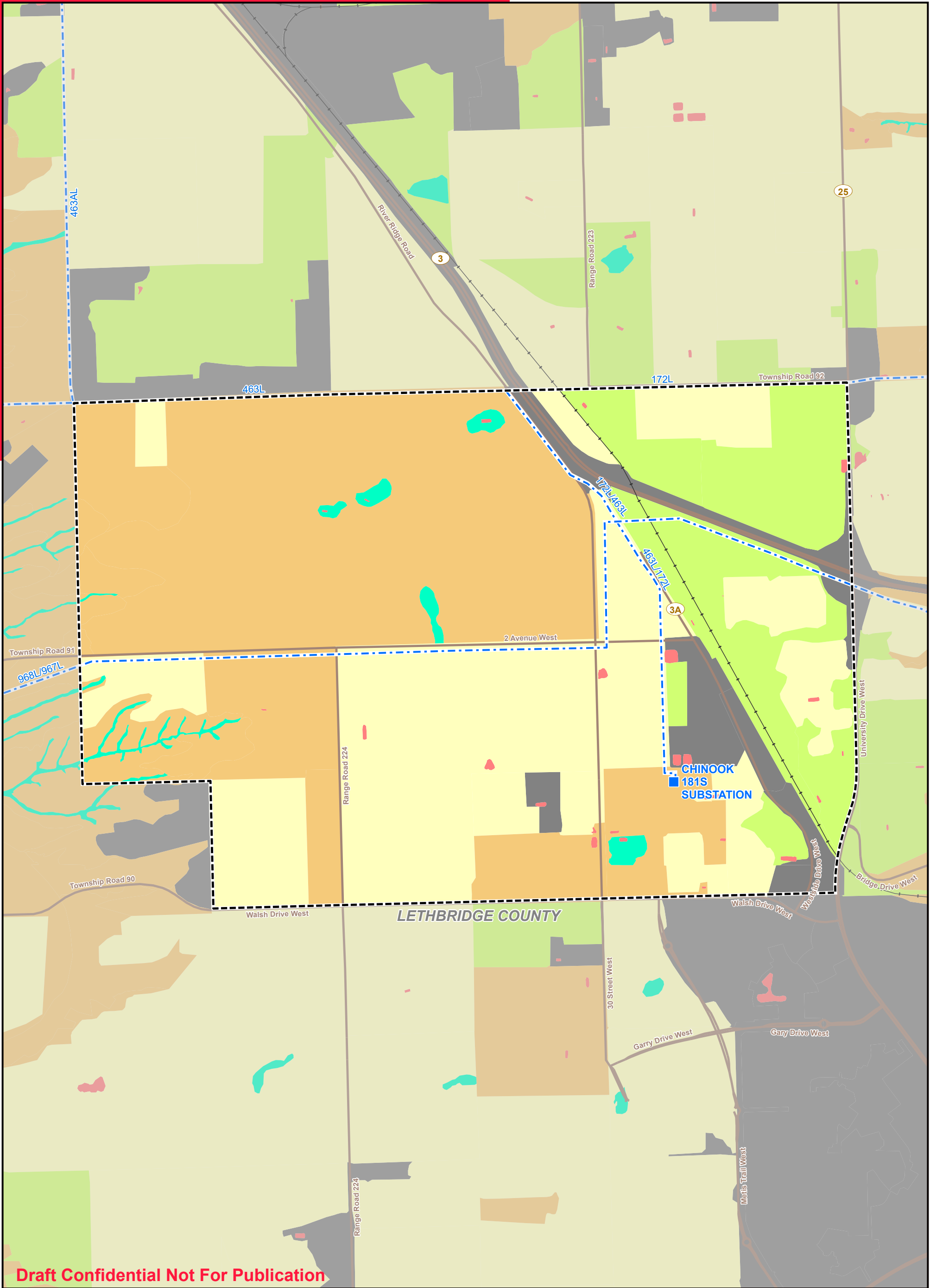
Water Body
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AL FOLDER: Lethbridge Area Transmission Development

DATE: 2025-10-23

N

00.250.5 Kilometres

00.250.5 Miles
- GENERIC BASE **GB5**
-
- Environmental Features**
Option 2A/2B/2C/2D/2E/2F
Lethbridge Area Transmission Development
- Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.



LEGEND

■ Existing Substation

--- Existing Transmission Line

--- Study Area

--- Railway

--- Road

Grassland Vegetation Inventory

■ Anthropogenic

■ Anthropogenic Water Body

■ Cultivated

■ Native Prairie

■ Tame Pasture

■ Wetland

NO.: XXXXXXXXXX
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FILE NO.: Lethbridge-Option2-GB6
REVISION: 0.00.00
AL FOLDER: Lethbridge Area Transmission Development
DATE: 2025-10-23

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0 0.25 0.5 Miles

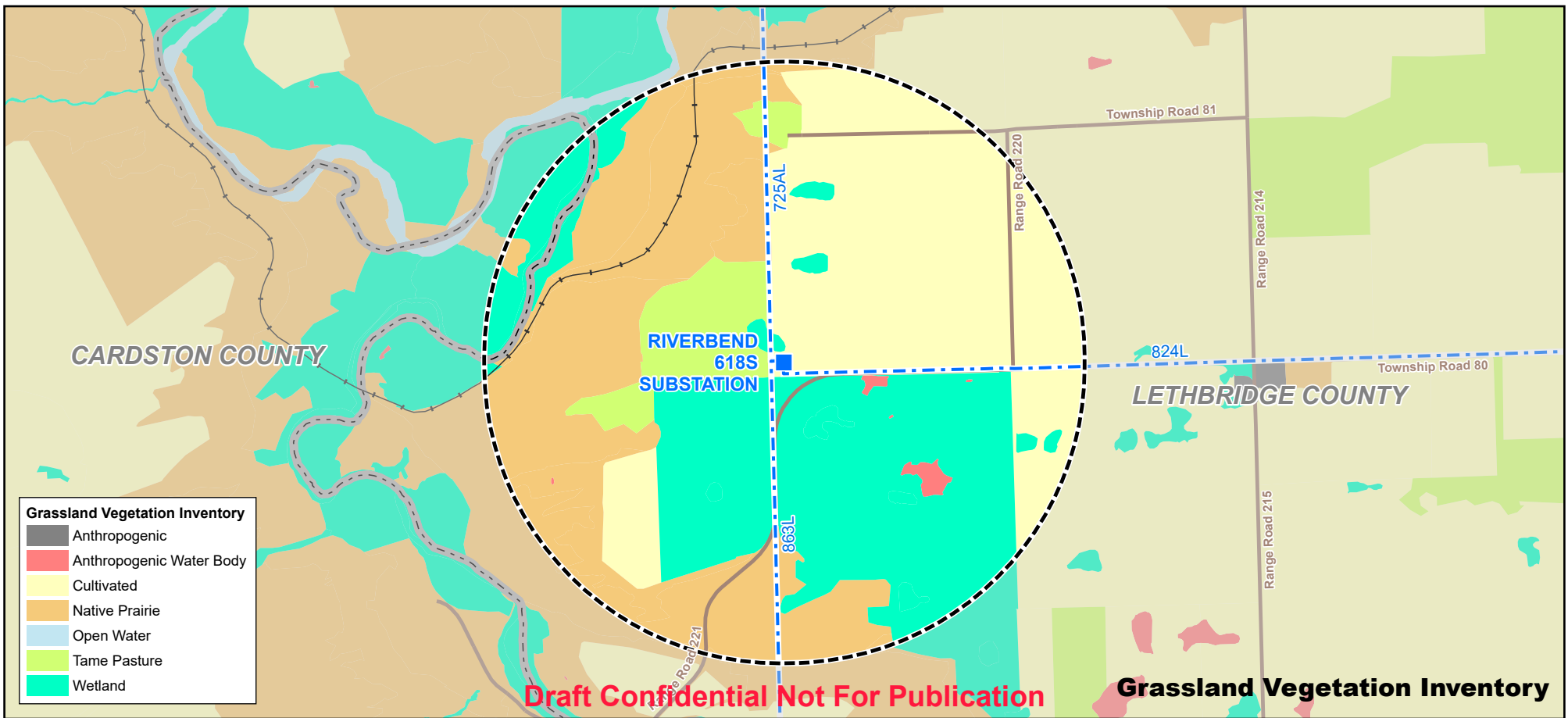
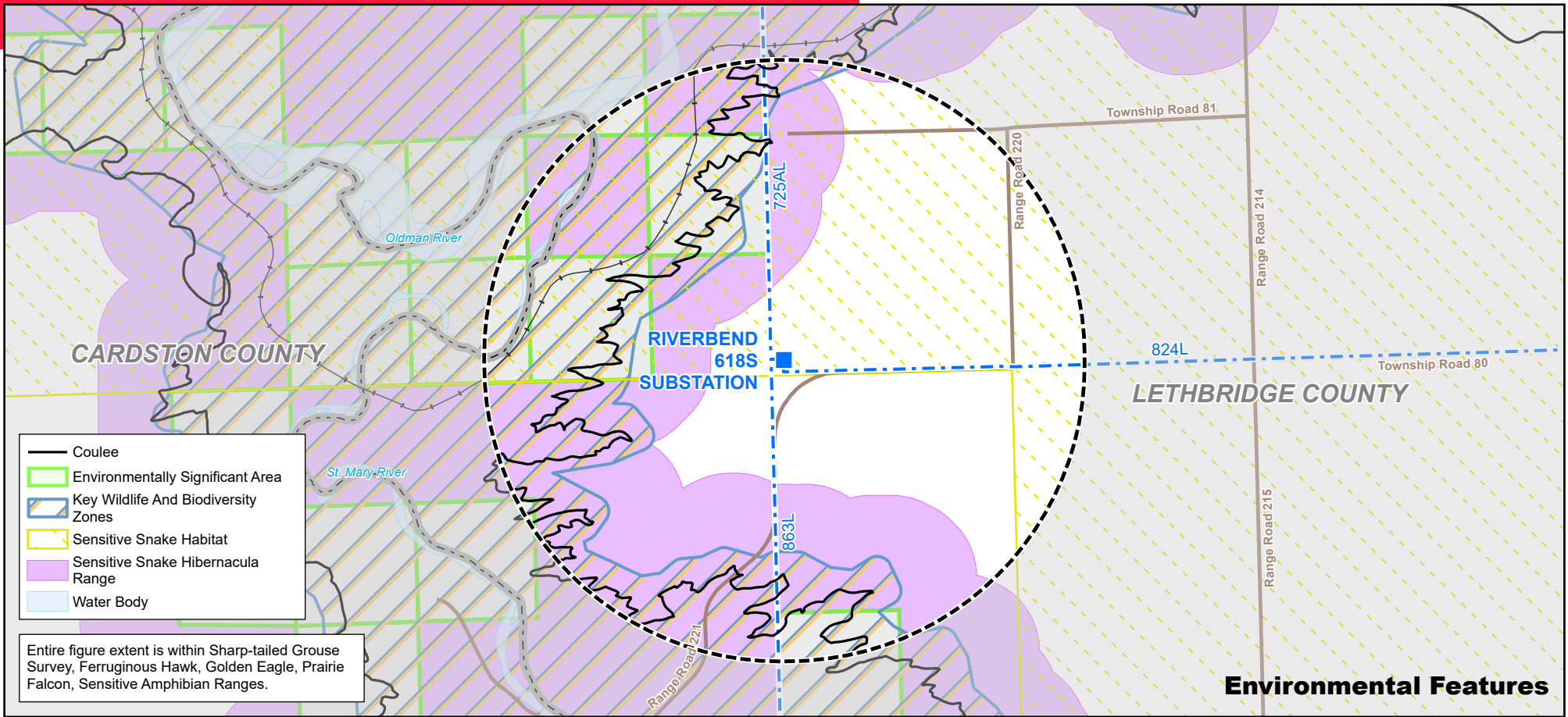
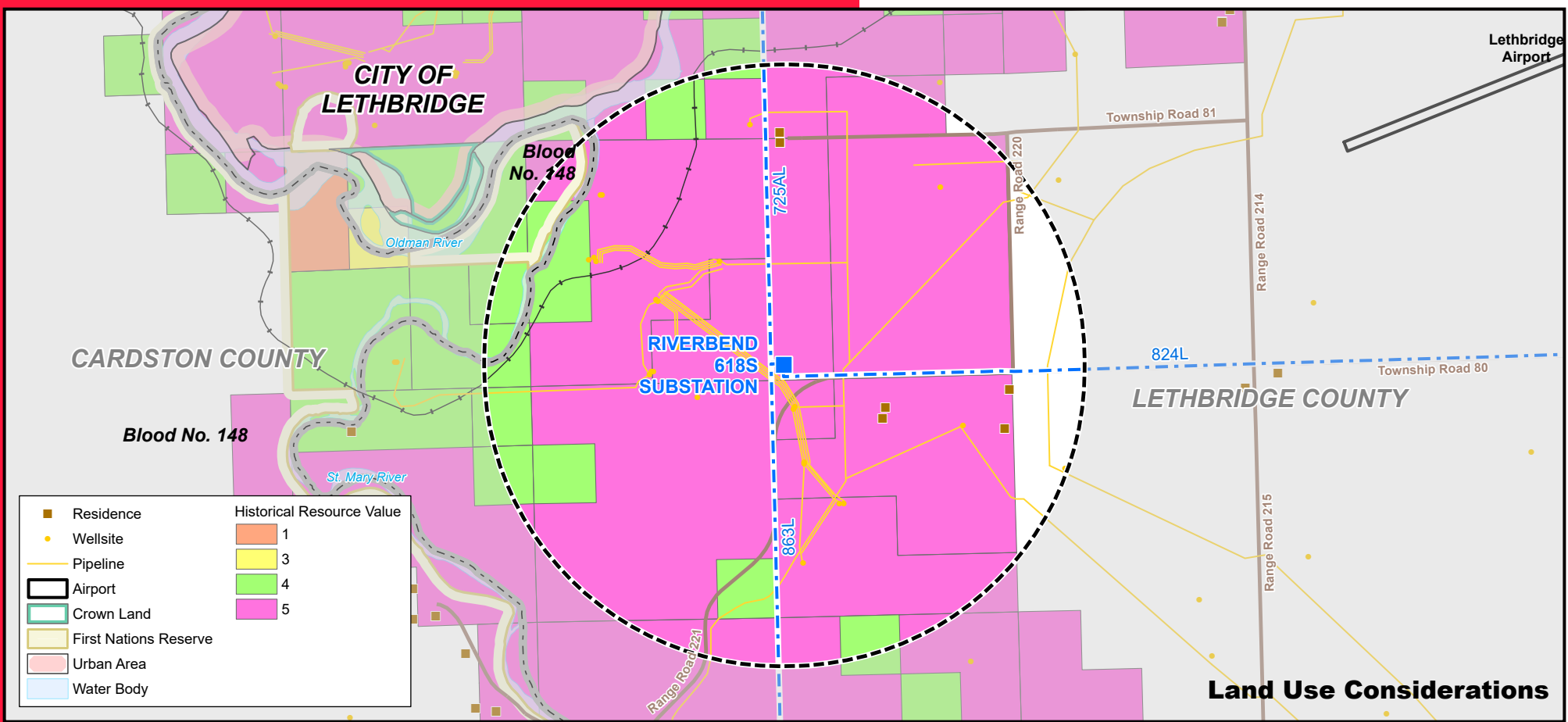
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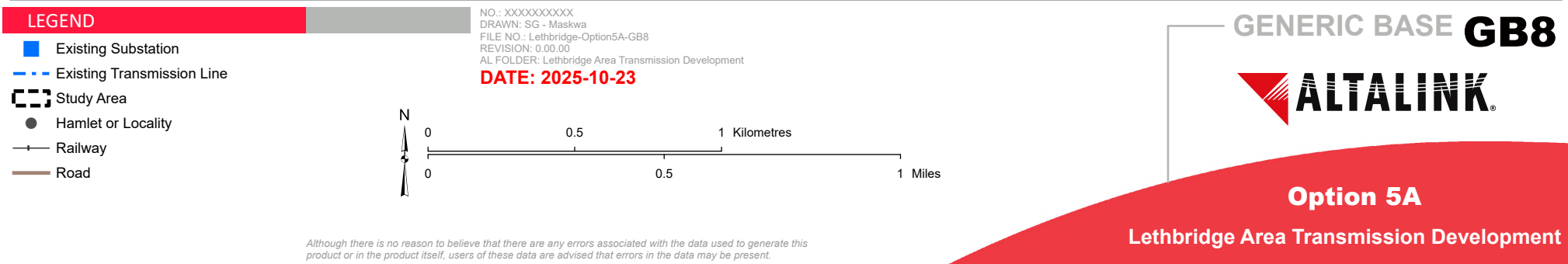
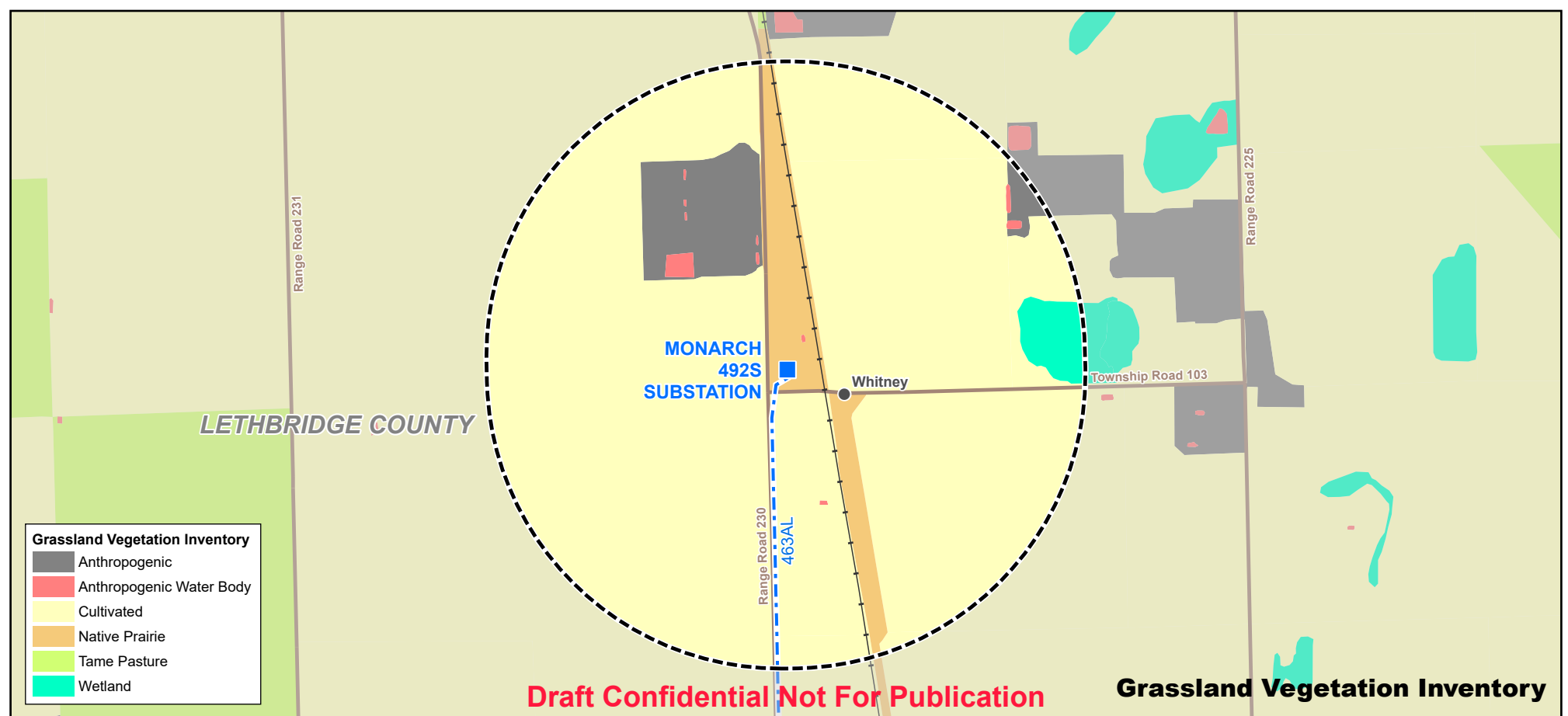
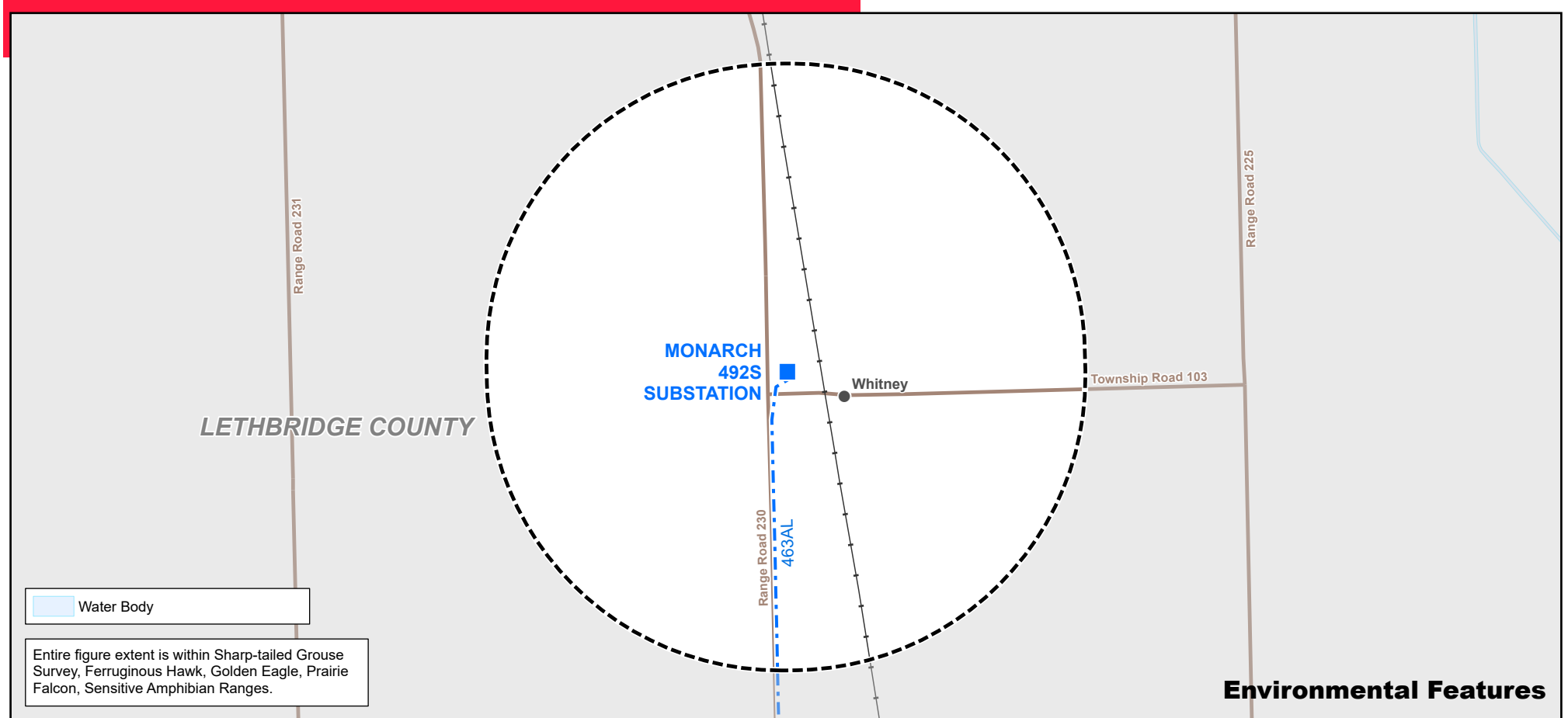
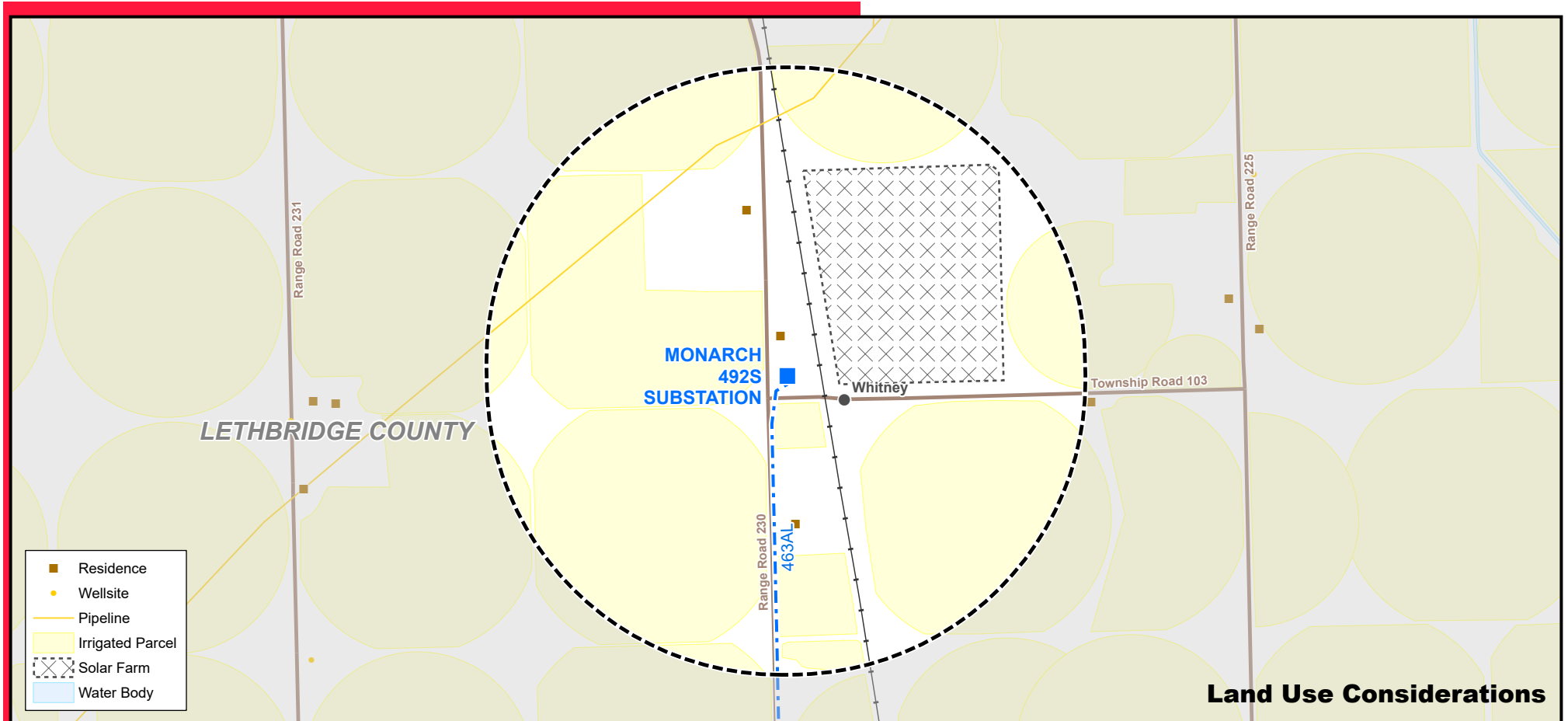
Grassland Vegetation Inventory

Option 2A/2B/2C/2D/2E/2F

Lethbridge Area Transmission Development

Although there is no reason to believe that there are any errors associated with the data used to generate this product or in the product itself, users of these data are advised that errors in the data may be present.





Land Use Considerations		Data Source
Helicopter Pad		Provided by AltaLink Management Ltd. November 2023.
Communication Tower		Access Facility Point (AltaLIS 2023).
Community Centre		Provided by AltaLink Management Ltd. November 2023.
Cemetery		Provided by AltaLink Management Ltd. November 2023.
Church		Provided by AltaLink Management Ltd. November 2023.
Day Care		Provided by AltaLink Management Ltd. November 2023.
Hospital		Provided by AltaLink Management Ltd. November 2023.
Residences		Maskwa Environmental Consulting. October 2025. Utilized residence locations provided by AltaLink Management Ltd (November 2023) and Land Parcels from the City of Lethbridge (September 2025). Additional residences were added via imagery interpretation in August and October 2025. Imagery date: July 2024.
School		Provided by AltaLink Management Ltd. November 2023.
Wellsite		Oil and Gas Wells Surface Hole (AER 2024).
Pipeline		Enhanced Pipeline Graphics File (AER 2024).
Airport		Access and Facility Polygons (Alberta Environment and Parks, Government of Alberta 2023).
Crownland		Digital Integrated Dispositions [DIDs] Application (Altalis 2022). Crownland Reservations (Alberta Environment and Parks 2022).
First Nation Reserves		First Nation Reserves (GeoBase 2017).
Gravel Pit		Access Facility Polygon (AltaLIS 2023).
Historical Resource Value		Alberta Listing of Historical Resources Fall 2025 Edition (Government of Alberta, 2025).
Irrigated Parcels		Maskwa Environmental Consulting. October 2025. Desktop assessment determined by Maskwa based on imagery interpretation. Imagery date: July 2024.
Urban Area		Municipal Areas (Altalis 2023).
Solar Farm		Maskwa Environmental Consulting. October 2025. Desktop assessment determined by Maskwa based on imagery interpretation. Imagery date: July 2024.
Environmental Features		Data Source
Coulee		Maskwa Environmental Consulting. October 2025. Utilized DEM 20k (AltaLIS 2018) to define contours.
Environmentally Significant Area		Environmentally Significant Areas (Government of Alberta 2014).
Key Wildlife and Biodiversity Zones		Wildlife Sensitivity Layers (Alberta Environment and Parks [AEP] 2023).
Sensitive Amphibian Ranges		Wildlife Sensitivity Layers (Alberta Environment and Parks [AEP] 2023).
Sensitive Raptor Range		Wildlife Sensitivity Layers (Alberta Environment and Parks [AEP] 2023).
Sensitive Snake Habitat		Wildlife Sensitivity Layers (Alberta Environment and Parks [AEP] 2023).
Sensitive Snake Hibernacula Range		Wildlife Sensitivity Layers (Alberta Environment and Parks [AEP] 2023).
Sharp-tailed Grouse Survey		Wildlife Sensitivity Layers (Alberta Environment and Parks [AEP] 2023).
Grassland Vegetation Inventory		Data Source
Grassland Vegetation Inventory		Grassland Vegetation Inventory Rangeland View (Government of Alberta 2019).
Base Features		Data Source
Existing Substation		AIES Substation (AESO 2023).
Existing Transmission Line		AIES Transmission Lines (AESO 2023).
Study Area		Created by Maskwa with detailed direction by AltaLink Management Ltd.
Hamlet or Locality		Hamlet Locality Townsite Point (AltaLIS 2025).
Municipal or County Boundary		Municipal District or County (AltaLIS 2025).
Railway		Railway (AltaLIS 2022).
River or Stream		Altalis Base Stream and Flow Representation (Alberta Environment and Parks, Government of Alberta 2021).
Road		Road (AltaLIS 2022).
Water Body		Altalis Base Waterbody Polygon (Alberta Environment and Parks, Government of Alberta 2020).