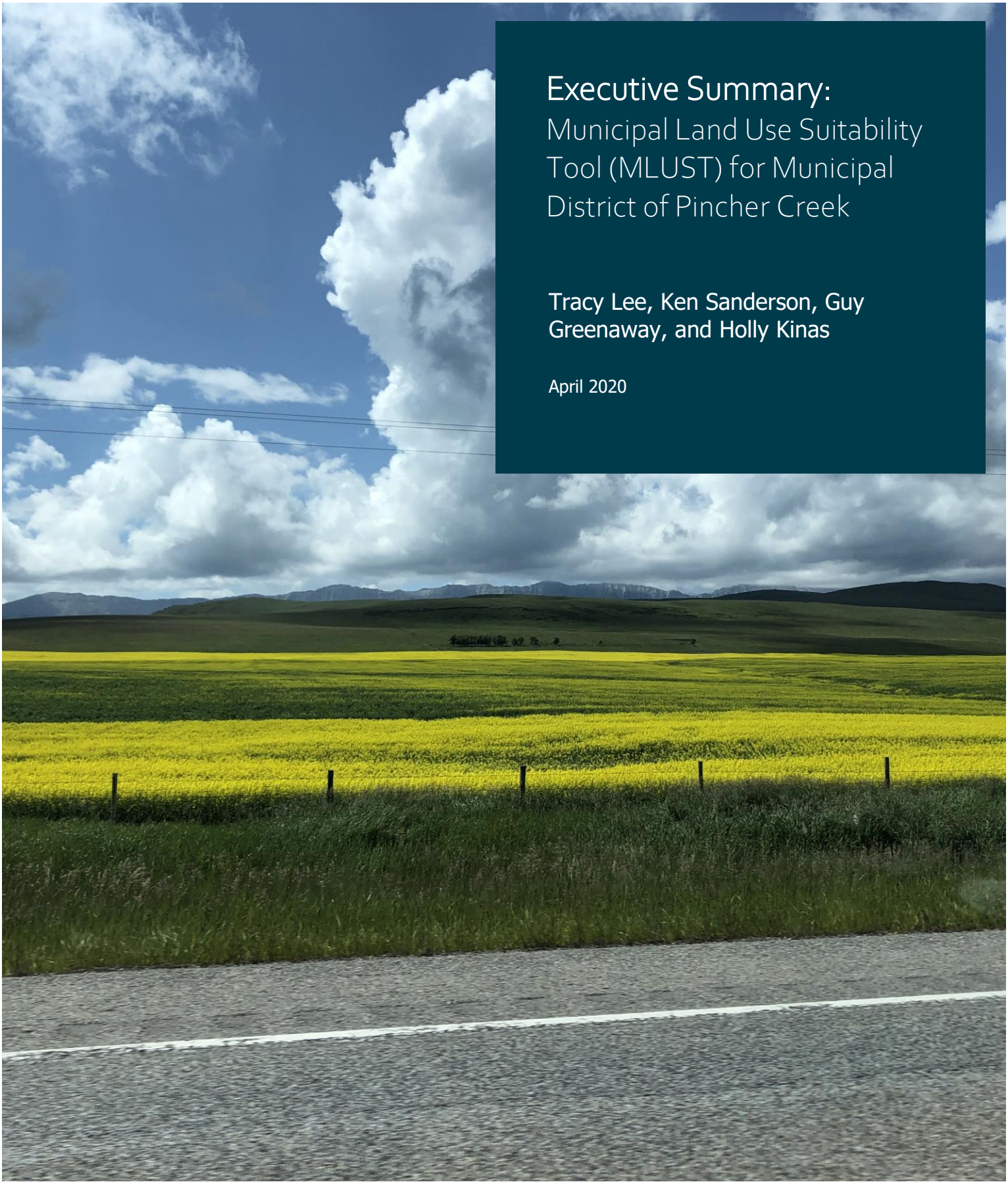

Executive Summary:
Municipal Land Use Suitability Tool (MLUST) for Municipal District of Pincher Creek

Tracy Lee, Ken Sanderson, Guy Greenaway, and Holly Kinas

April 2020

Miistakis Institute

Oldman River Regional Services Commission

M.D. of Pincher Creek

This project was possible through support from Energy Efficiency Alberta

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Executive Summary

When municipal governments consider industrial scale solar or wind energy development, it immediately becomes clear that not everywhere is suitable for those activities, and not everywhere is unsuitable. For some areas it is a clear-cut 'yes' or 'no', but most areas sit somewhere on a continuum between those two extremes.

The Miistakis Institute and the Oldman River Regional Services Commission (ORRSC) developed the Municipal Land Use Suitability Tool (MLUST) to assist the Municipal District of Pincher Creek in identifying where renewable energy development is most suitable in consideration of high valued agricultural, ecological and cultural lands.

The MLUST process took six months to complete, engaged municipal stakeholders, made use of existing spatial datasets, and produced a series of map products to inform planning at the municipal scale.

MLUST engaged the municipal council and staff to identify features they valued on the landscape. Each feature was scored by stakeholders to determine each features conflict with wind and solar energy development. The most suitable areas for renewable energy development coincided with low probable conflict rating of other land uses. Renewable energy development suitability areas were also informed by removing No-Go Areas based on provincial, municipal and organizational regulations and Non-Development Areas based on existing settlement and Infrastructure.

The MLUST process identified 7.0% of the Municipal District of Pincher Creek, or 60,788 acres (246 km^2) as most suitable areas for wind energy development. MLUST identified 5.6% of the Municipal District of Pincher Creek, or 48,680 acres (197 km^2) as most suitable areas for solar energy development.

Here, we summarize the MLUST process that resulted in the identification of wind and solar energy development suitability areas in the Municipal District of Pincher Creek.

Where can renewable energy be developed?

To determine where wind and solar energy developments are suitable we considered resource availability, No-Go Areas as per regulations and Non-Development Areas due to existing settlement and infrastructure. The resources (wind speed and solar radiation) were deemed sufficient throughout the municipality in all calculations, although there are likely areas where wind speed and solar radiation are not optimal.

Removal of No-Go Areas and Settlement and Infrastructure from the land base resulted in 33% (wind) and 28% (solar) of the landscape identified as suitable for renewable

energy development. As a next step we considered the land base suitable for wind and solar energy development in consideration of other land uses.

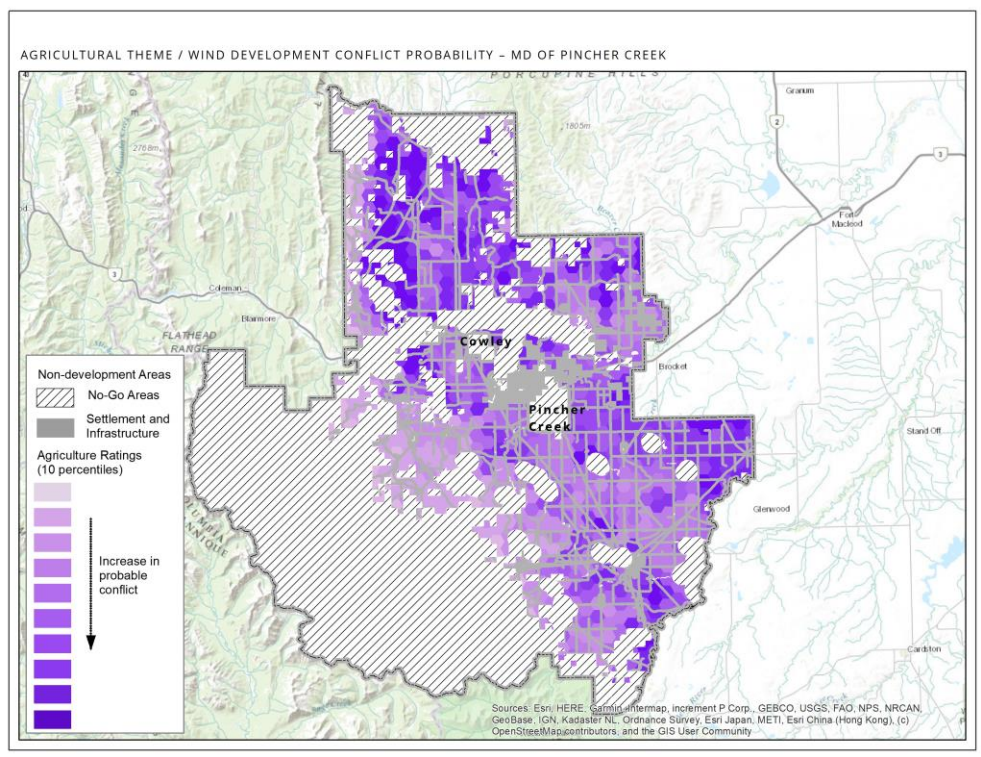
What other land uses did we value?

WE VALUED AGRICULTURE

Municipal stakeholders identified the highest valued lands from an agricultural perspective. They identified three agricultural features (listed in table below) and provided a Conflict Probability Rating based on values from 0 to 100; where higher values equate to a high agriculture value. Once agricultural features were assigned a Conflict Probability Rating, all 3 features were converted into a grid roughly the size of a section, then overlaid and the maximum value was assigned to produce an Agricultural Conflict Probability Rating Map for both wind and solar.

Agricultural Feature	**Conflict Probability Rating (Wind)**	**Conflict Probability Rating (Solar)**
1. Grazing Lands		
Native prairie	83	85
Tame pasture	60	70
2. Land Suitability Rating System (alfalfa, canola, spring grains and brome)		
LSRS Class 1: slight limitations to growth	68	78
LSRS Class 2: moderate limitations to growth	58	68
LSRS Class 3: severe limitations to growth	44	45
LSRS Class 4: very severe limitations to growth	38	33
3. Agricultural support		
Agri-business *	73	68
Agri-community *	68	65

*represent data gaps, features not represented on the map



Agricultural Conflict Probability Rating Map for wind energy development (as the purple colour darkens there is an increasing conflict with agricultural values). Maps to represent the Agricultural Conflict Probability Rating for solar can be found in full report.

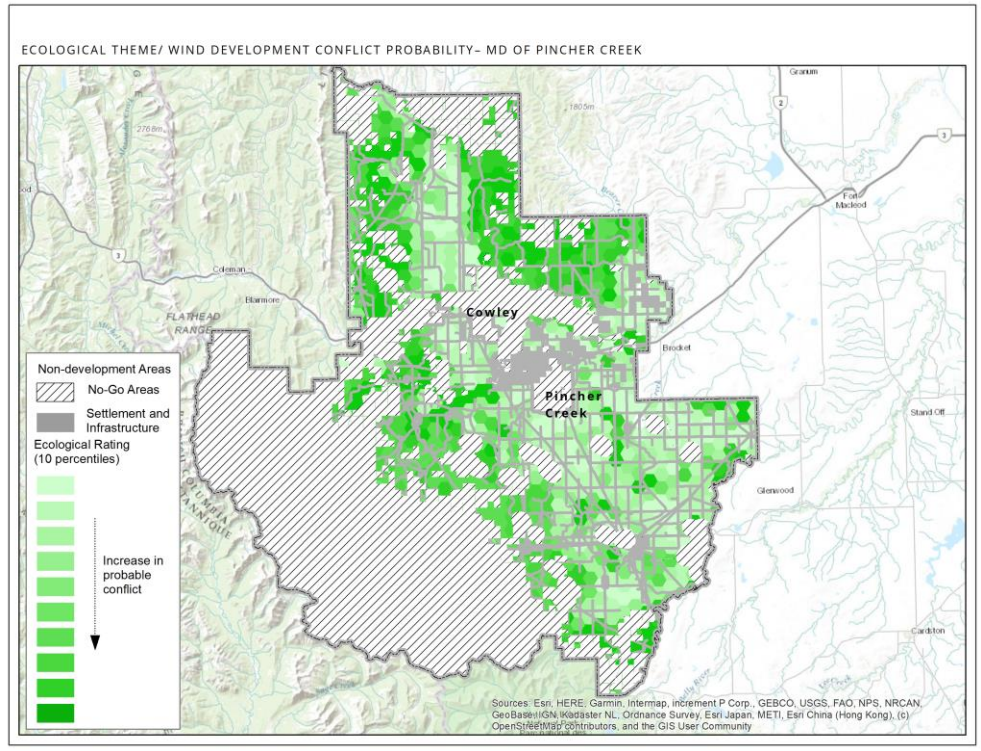
WE VALUED ECOSYSTEMS

Municipal stakeholders identified the highest valued lands from an ecological perspective. They identified five ecological features (listed in table below) and provided a Conflict Probability Rating based on values from 0 to 100; where higher values equate to a high ecological value. Once ecological features were assigned a Conflict Probability Rating, all 5 features were converted into a grid roughly the size of a section, then overlaid and the maximum value was assigned to produce an Ecological Conflict Probability Rating Map for both wind and solar.

Ecological Theme Features	**Conflict Probability Rating (Wind)**	**Conflict Probability Rating (Solar)**
1. Protected Areas		
Conservation easement	81	80
Private land owned for conservation	81	75
2. Wildlife Habitat		
Grizzly bear zones	68	83
Key wildlife and biodiversity zone	78	73

Ecological Theme Features	Conflict Probability Rating (Wind)	Conflict Probability Rating (Solar)
Native prairie	83	85
Riparian	85	85
Escarpment and coulees	75	80
3. Waterways		
Rivers	100	100
Streams and creeks	100	100
4. Waterbodies		
Un-named lake	75	78
Ground water aquifer re-charge*	75	78
5. Wetlands		
Group 1: area of wetland in section very high	100	100
Group 2: area of wetland within section high	75	75
Group 3: area of wetland in section medium	50	50
Group 4: area of wetland in section low	25	25
Group 5: area of wetland in section very low	0	0

*represent data gaps, features not represented on the map

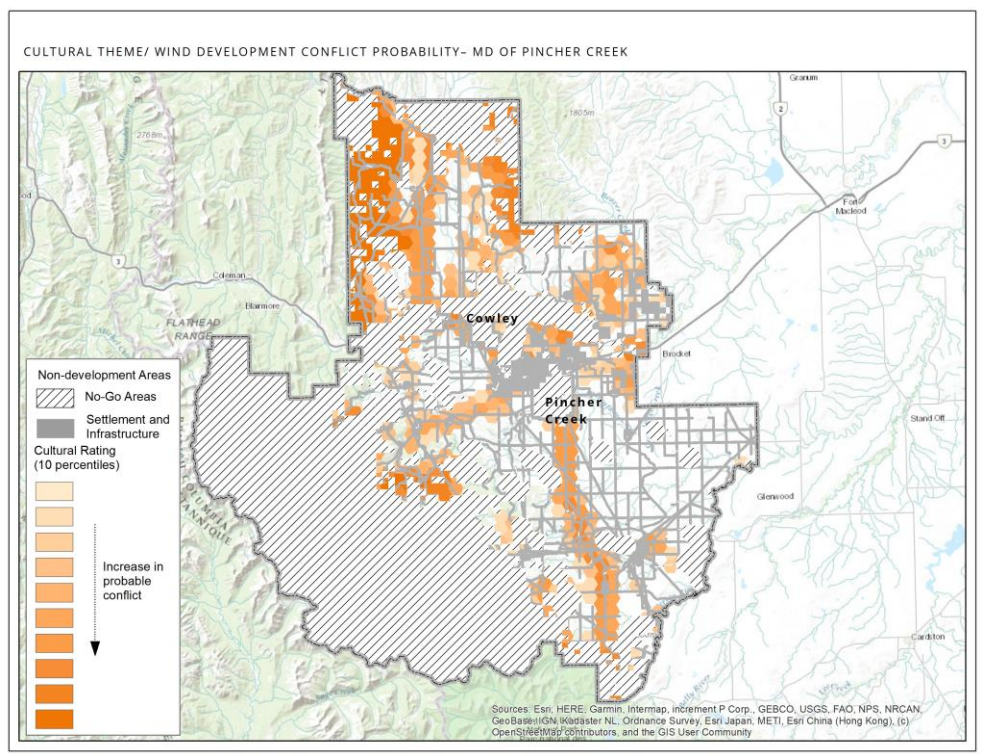


Ecological Conflict Probability Rating Map for wind energy development (as the green colour darkens there is an increasing conflict with ecological values). Maps to represent the Ecological Conflict Probability Rating for solar can be found in full report.

WE VALUED CULTURE

Municipal stakeholders identified the highest valued lands from a cultural perspective. They identified eleven scenic features and two historic resource classes (listed in table below) and provided a Conflict Probability Rating based on values from 0 to 100; where higher values equate to a high cultural value. Once cultural features were assigned a Conflict Probability Rating, all 13 features were converted into a grid roughly the size of a section, then overlaid and the maximum value was assigned to produce a Cultural Conflict Probability Rating Map for both wind and solar.

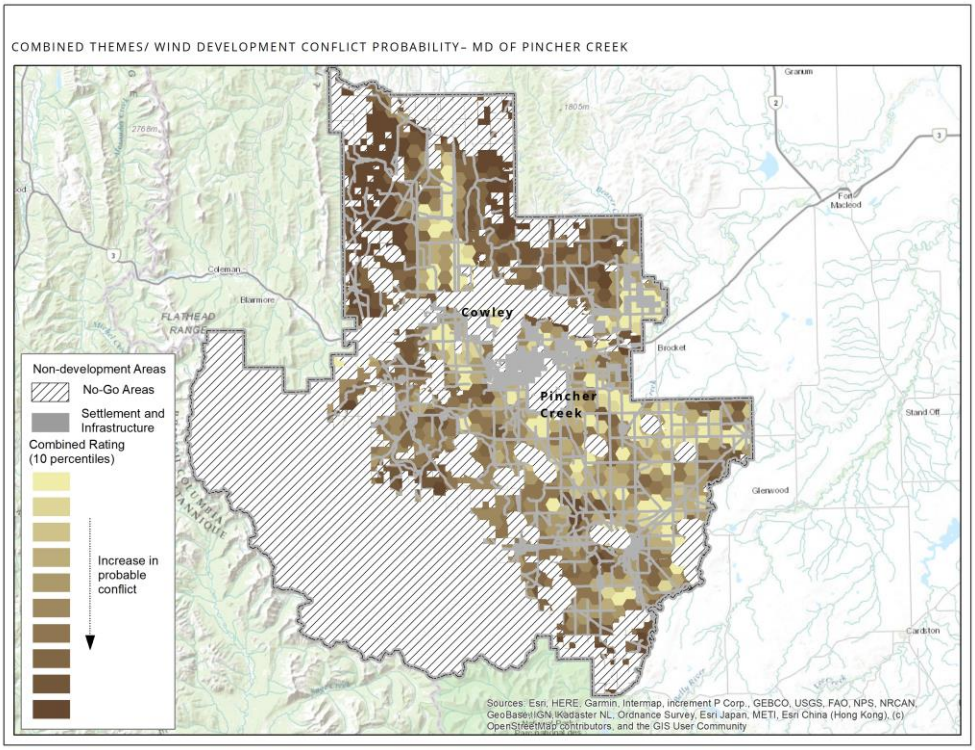
Cultural Feature	Conflict Probability Rating (Wind)	Feature Buffer (m) (Wind)	Conflict Probability Rating (Solar)	Feature Buffer (m) (Solar)
Scenic Resources				
Cowboy Trail	53	1000	60	1000
Waterton Lakes National Park	69	1500	60	1000
Hawks Nest	47	1000	50	1000
Porcupine Hills	66	1000	63	1000
DU Cabin	66	1000	60	1000
Beaver Mines Coal Mining Rail	34	500	40	500
Oldman Dam Stone House	44	500	40	500
West Castle Valley	53	1000	60	1000
Livingston Range	78	1500	63	1000
Heritage Acres	41	500	48	500
Historical Resource Value				
HRV class 3: contains a significant historic resource that will likely require avoidance	83	n/a	75	n/a
HRV class 4: contains a historic resource that may require avoidance	70	n/a	55	n/a



Cultural Conflict Probability Rating Map for wind energy development (as the orange colour darkens there is an increasing conflict with cultural value). Maps to represent the Cultural Conflict Probability Rating for solar can be found in full report.

Combining values……

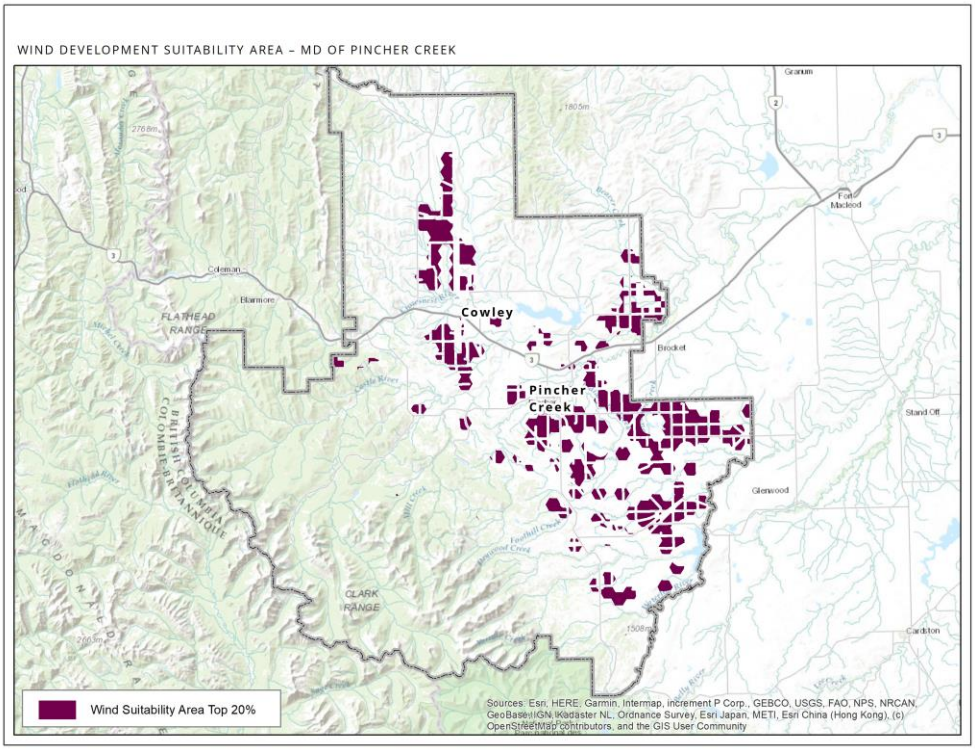
A combined map was developed by overlaying and summing the agricultural, ecological, and cultural Conflict Probability Rating maps. This approach highlighted areas of mutual high Conflict Probability Ratings and identifies on the landscape where renewable energy development may be less suitable.



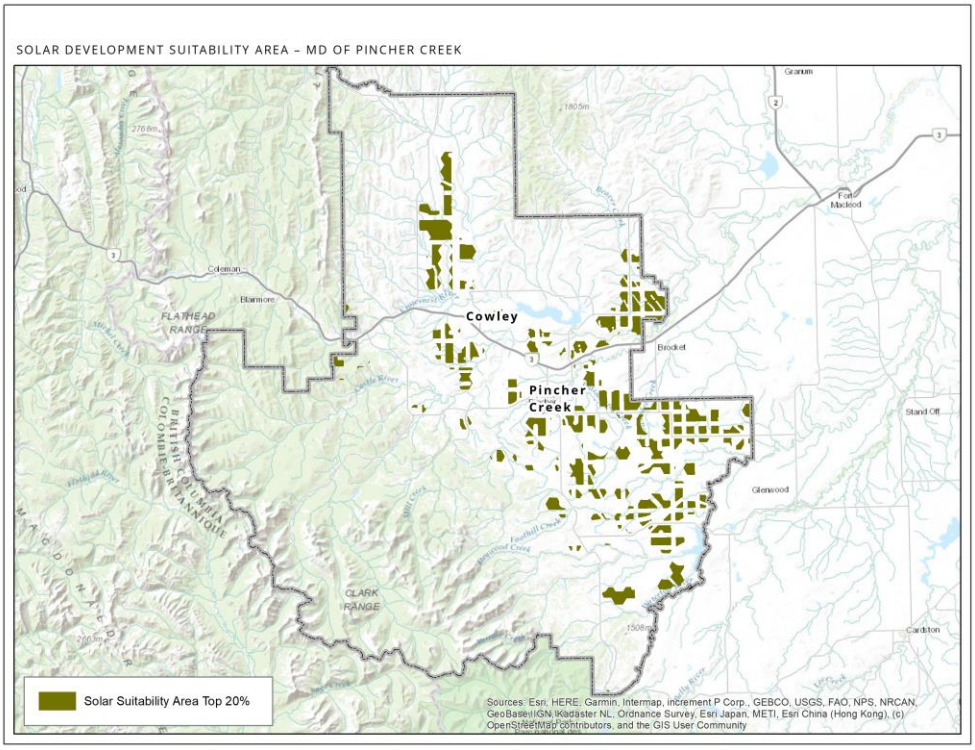
Composite Conflict Probability Rating Map for wind energy development (as the brown colour darkens there is an increasing conflict with other land uses). Map to represent the Combined Conflict Probability Rating for solar can be found in full report.

Most suitable areas for wind and solar energy development

Lastly, to identify the most suitable areas for wind and solar energy development, we used the inverse of the Combined Conflict Probability Rating Maps. On the maps below we highlight the lands that were identified as the most suitable (top 20%) for wind energy development (dark purple) and the lands most suitable (top 20%) for solar energy development (dark yellow). Municipal representatives with assistance from ORRSC can adjust the suitability level to encompass more or less land.



MLUST identified 7.0% of the M.D. of Pincher Creek, or 60,788 acres (246 km^2) as most suitable areas for wind energy development (displayed as dark purple).



MLUST identified 5.6% of the M.D. of Pincher Creek, or 48,680 acres (197 km^2) as most suitable areas for solar energy development (displayed as dark yellow).