AGENDA
COUNCIL COMMITTEE MEETING
MUNICIPAL DISTRICT OF PINCHER CREEK
June 24, 2025
11:00 am
Council Chambers

1) Approval of Agenda

2) Delegations

    a) 11:00 am – Pincher Creek & District Food Bank
    b) 11:30 am – Brownfield Report

3) Closed Session

    a) Public Works Call Log – ATIA Sec. 24.1
    b) Draft Traffic Bylaw 1365-25 – ATIA Sec. 28.1

4) Round Table

5) Adjournment

Pincher Creek & District Community Food Centre

Presentation to MD Council

June 24, 2025

Mission

The mission of the Pincher Creek and District Community Food Centre is to reduce hunger by ensuring community members in need within the Town and M.D. of Pincher Creek have access to nutritious foods.

Background

- In 2020, a group of engaged citizens formed a society and took over responsibility of the local food bank which was under temporary management by the Town of Pincher Creek.
- Created Board of Directors, hired full-time coordinator, secured a permanent location, established sustainable partnerships with local businesses, achieved charitable status under the Income Tax Act.
- In 2024-25, upgraded Food Centre with prep kitchen, undertook food hamper nutritional analysis and have substantially completed requirements to meet accreditation under Food Banks Canada.

Who we are

- Davina Brown (Chairperson)
- Janet Elder (Vice Chairperson)
- Rose Murfin (Treasurer)
- Vanessa Sparks-Pomreinke (Secretary)
- Anne Gover (Director, past Chairperson)
- Darryll Crowshoe (Director)
- Diane Bowen-Oczkowski (Director)
- Chantal Laliberte (Director)
- Mary Krizan (Director)
- Kat Allen (Coordinator)

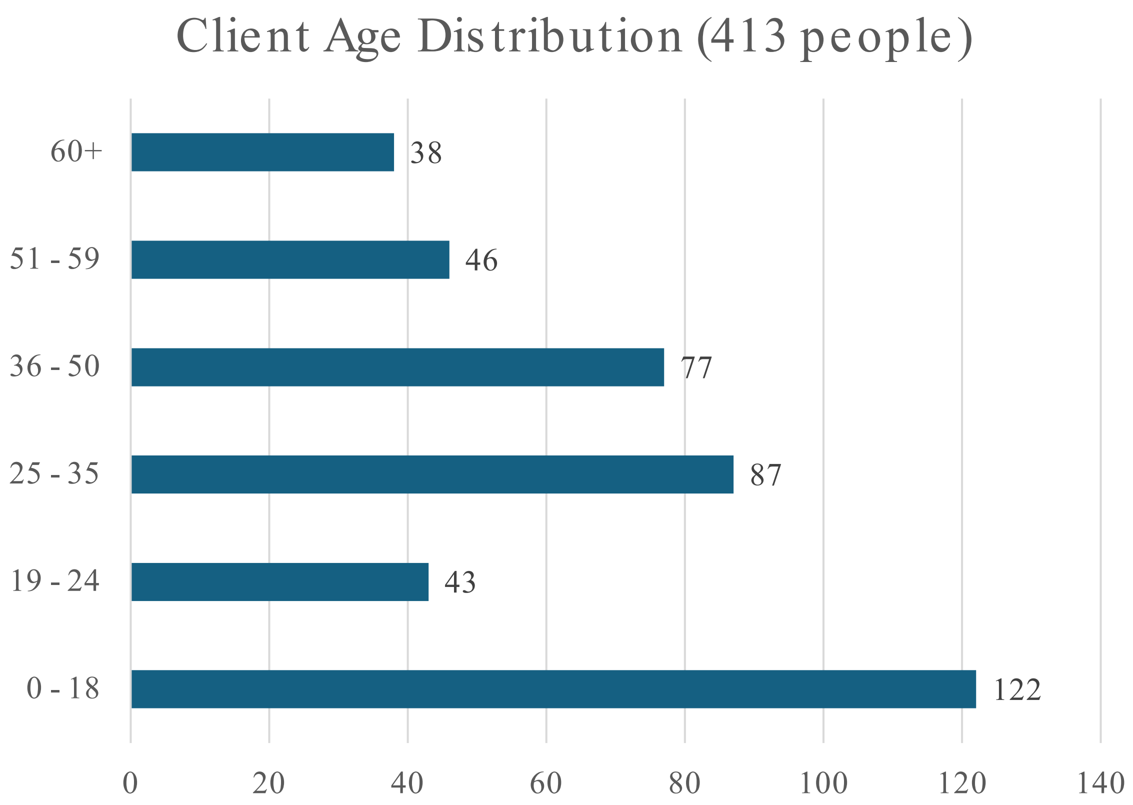
Plus our many volunteers!

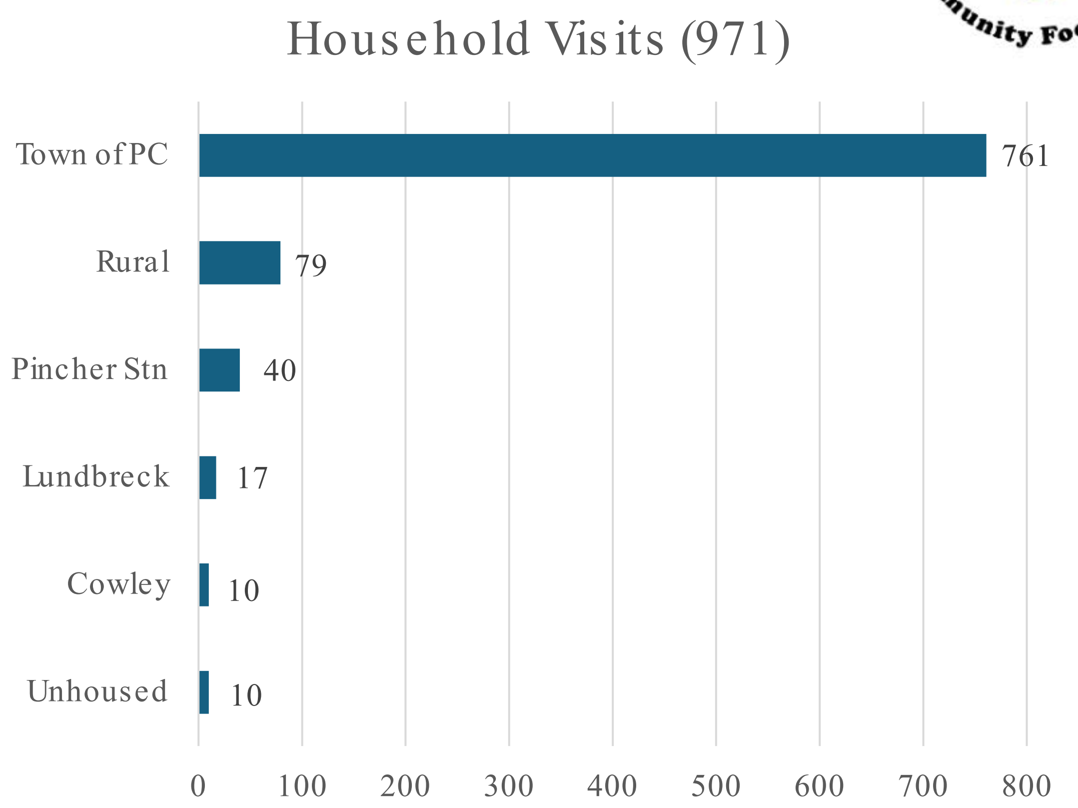
Prep Kitchen in the Food Centre

Who We Serve

- Town of Pincher Creek; Hamlets of Pincher Station, Beaver Mines, Lundbreck and Twin Butte; Castle Mountain and Village of Cowley
- Clients served
  - 413 people in 2024-25, up from 197 in 2023-24
  - On average, 85 households per month benefit
- Access to food hampers is provided at no financial cost to recipients and is not conditional on volunteering, donating and/or participating in any faith-based activities.
- Eligibility based on a means test.

2024-25 Food Hamper Program





Financial Summary
May 1, 2024 – April 30, 2025

Income	$383,258	Expenses	$352,442
Donations in-kind	$170,781	Food / equip from donations in-kind	$170,781
Donations (cash)	$101,096	Food purchased	$25,946
Grants	$90,386	Grant expenses	$79,957
Other Income	$20,995	Operations	$75,758

Surplus $30,816

Donations in-kind from citizens through the fall food drive hosted by Church of Jesus Christ and Latter-Day Saints, Walmart, Co-op, Canada Bread, Interfaith Food Bank Lethbridge, Back Country Butchers


Pincher Creek & District
Community Food Centre
THANK YOU
FOR YOUR SUPPORT!
Food Banks Canada
Banques alimentaires Canada
FOOD BANKS
alberta
(Member of)

December 31, 2024

Pincher Creek Brownfield Solar Analysis

Prepared By:
Lauren Young

Reviewed By:
Tristan Walker, P.Eng

MASSIF ENERGY

Executive summary

This report presents an analysis of brownfield sites within the Municipal District (MD) of Pincher Creek, exploring their potential for solar energy development. With 180 brownfield sites identified, an estimated installed capacity of 165 MW is possible with 250 GWh of annual generation potential, enough to power 35,000 houses.

This study examines three primary categories of brownfields: abandoned wells, orphaned wells, and gravel pits. The results of the Pincher Creek Renewable Energy Conversion Systems Open House revealed strong community support for developments on brownfield sites, motivating further exploration of potential locations, which are examined in this report. Solar development on brownfield sites avoids the displacement of active agricultural or ecologically valuable land, ensuring that these installations contribute to renewable energy production without competing for other critical land uses which has been noted as a priority within the MD.

The report provides an in-depth analysis of the of brownfield sites within the MD, their respective areas, and their estimated solar generation capacity. A total of 142 sites are evaluated, spanning over 335 hectares of land. Of these 142 Sites, 111 abandoned wells, 22 gravel pits, and 9 orphaned wells are analysed. The analysis also considers key factors such as proximity to existing power lines, no go zones established by the Municipal Land Use Suitability Tool (MLUST) report, and the status of land remediation. The results of this study estimated a potential 250 GWh of electricity generation from solar energy conversion systems on existing brownfield sites, with gravel pits and abandoned wells offering the largest areas for development.

The best sites for solar development are determined based on several criteria, including proximity to power lines, available area, and overall generation capacity. A comprehensive ranking system is employed to identify the top 15 sites, taking into account factors such as installation costs, payback periods, and emissions reductions. The top 15 sites are capable of hosting 62 MW, generating a total of 93 GWh annually, earning $7 MM per year and reducing emissions by 53,000 tonnes annually.

Next steps for the project involve engaging with landowners, Fortis, funders, conducting further feasibility studies, and developing detailed business plans to ensure sustainable economic benefit continues within the region.

Table of Contents

Introduction

The Municipal District of Pincher Creek contracted Massif Energy to conduct a review of brownfield sites within the MD to determine suitability for solar development to align with the regional values of preserving agricultural land. With over 200 brownfield sites within the MD, utilizing these areas for renewable energy development provides an opportunity to generate renewable electricity while maintaining the agricultural land base for farming and ranching activities. Brownfields are previously developed lands with low agricultural value, making them ideal for renewable energy projects which can provide ground coverage for topsoil regeneration and add value to landowners while the sites undergo natural remediation. These sites also present fewer conflicts with other land uses, such as agriculture or viewscape preservation.

The Pincher Creek Renewable Energy Conversion Systems Open House, held on October 16, 2024, allowed residents to express their concerns regarding renewable energy developments within the MD. The open house was designed to foster an inclusive space for participants to learn more about the MD's approach to renewable energy developments. Feedback from the accompanying survey provided further insights into public opinion and allowed participants to provide direct feedback to the MD. Results from the survey indicated that there was strong support for renewable energy developments on brownfield sites. Of 88 responses, 58% of respondents indicated support towards developments on brownfields, and development close to existing infrastructure was noted as the top priority for guiding future development.

This report explores different types of brownfield sites within the MD and provides a list of sites considered optimal for solar generation based on location, proximity to power lines, and status of the brownfield sites. The MD of Pincher Creek is shown in Figure 1 with the solar and wind nogo areas developed through the Municipal Land Use Tool highlighted in orange, Fortis power lines in red, and brownfield sites in blue and green. The majority of brownfields are made up of abandoned wells and centered around the Waterton gas complex and highway 22. A full list of the brownfield sites in the MD is included in Appendix A.

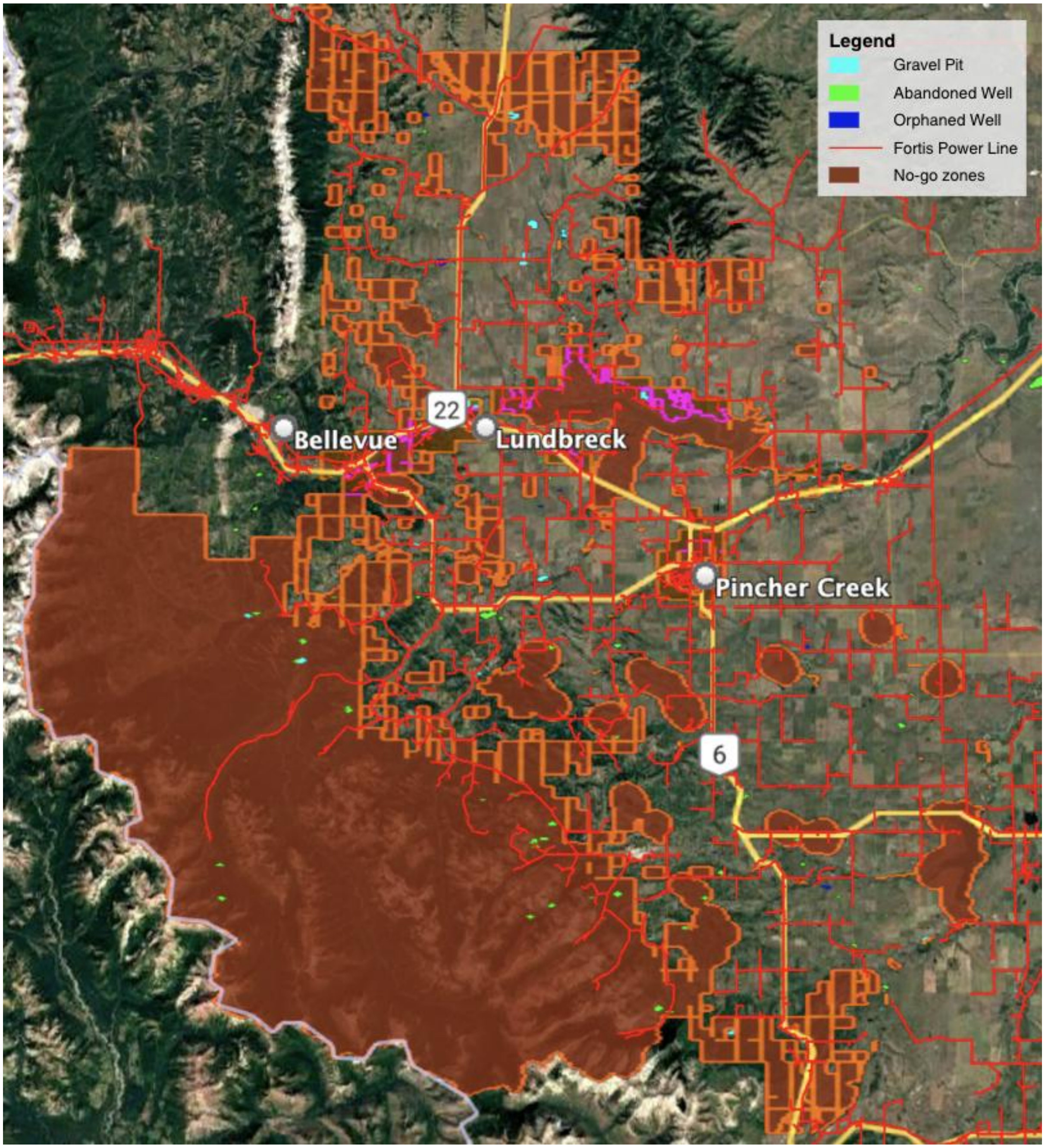


Figure 1. Map of the MD of Pincher Creek including wind/solar no-go zones (orange) and Fortis power lines (red)

Several categories of brownfield sites are identified and explored, specifically abandoned wells, orphaned wells, and gravel pits. Alberta is home to about 170,000 abandoned oil and gas wells that are no longer in operation [1]. Although abandoned, these wells remain the responsibility of the company that owns them. Orphaned wells in Alberta are sites without a legally or financially responsible party, often left with unresolved liabilities and unreclaimed land [2]. The Orphan Well Association (OWA) oversees management of these sites and works alongside industry, government, and public stakeholders to ensure safety and reduce environmental risks [2]. Gravel pits are large areas of land that are used for mining gravel and sand. These brownfields are ideal for solar installations as they typically are larger in area compared to orphaned and abandoned wells. Gravel pits are also poorly suited for farming and grazing due to the long-term presence of gravel on the land, making solar installations a beneficial use of land while soil remediation occurs.

For the purposes of this study, single-axis tracking panels have been chosen for modeling as they increase energy generation by 15% to 25% by following the sun's movement, improving efficiency, and maximizing energy output, especially in large-scale installations with abundant sunlight [3]. Single-axis tracking panels are estimated to require 4 – 7 acres of land per MW [3]. Using the assumption of 5 acres/1 MW, a project size factor of 0.0494 kw/m^2 is used to approximate total generation capacity at each site. The estimated annual generation is calculated using the NREL's PV Watts Calculator with the location set to Pincher Creek which indicates a net annual generation of 1,509 kWh/kW installed [4]. In total, 180 brownfield sites are noted within the MD. Of those 180 brownfield sites listed on various resources, 38 sites do not have a visibly disturbed area are not included, leaving a total of 142. A summary of the types of brownfields included in this report is shown in Table 1 broken down by brownfield category with 9, 111, and 22 sites for orphaned wells, abandoned wells, and gravel pits respectively.

Table 1. Summary of the brownfield types with estimated size and generation potential

Brownfield type	Number	Total area (Hectares)	Estimated size (MW)	Estimated annual generation (GWh)
Orphaned Wells	9	23	11.4	17
Abandoned Wells	111	141	69.7	105
Gravel pits	22	171	84.6	127
Total	142	335	165.7	250

To better visualize the location of the brownfield sites within the MD, Figure 2 illustrates Pincher Creek divided into sections. The following images (Figures 3-10) provide a more granular view of each section of the MD, enabling better visibility on the brownfield sites located within the MD. Green areas indicate abandoned wells, dark blue areas indicate orphaned wells, and light blue areas indicate gravel pits.

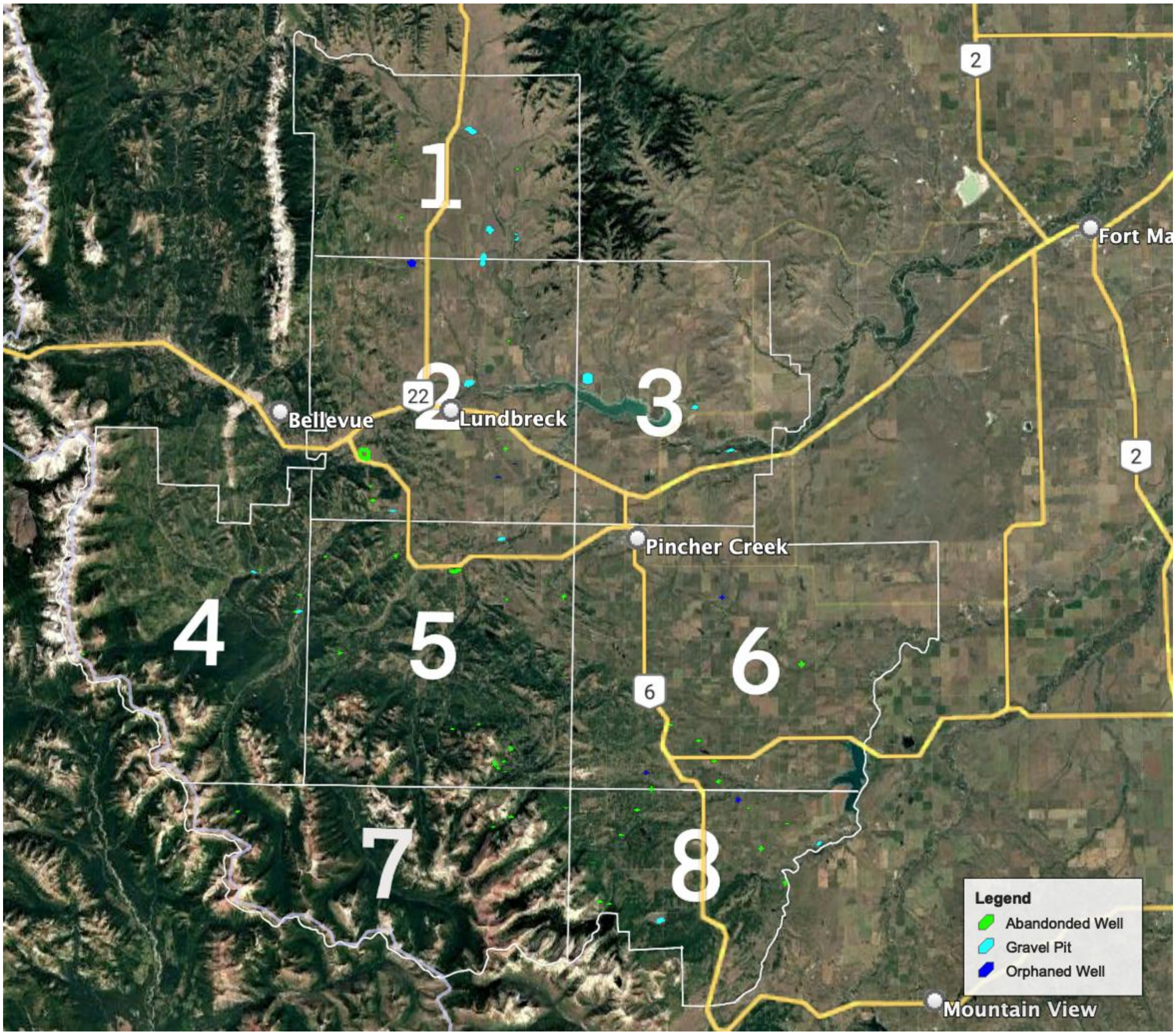


Figure 2. The MD of Pincher Creek divided into sections for easier visualization

The northern segment of the MD is shown below in Figure 3 with Highway 22 running through the center and includes gravel pits, abandoned wells, and orphaned wells. Feeder line capacity in this region is generally poor with most being below 150 kW.

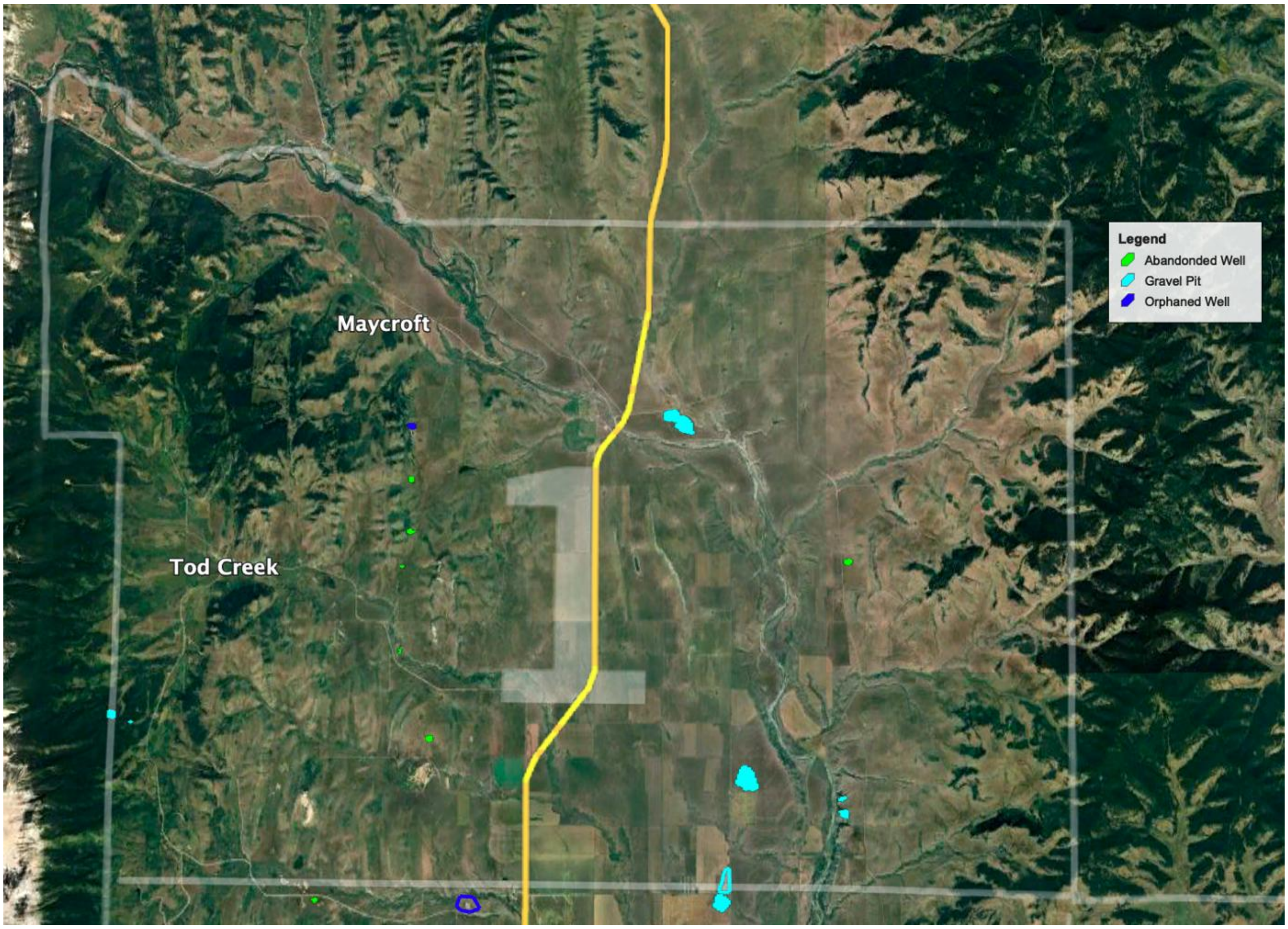


Figure 3. Section 1 of the MD of Pincher Creek

The north-central segment of the MD is shown below in Figure 4 centered around the Hamlet of Lundbreck, intersected by Highway 22, Highway 507, and Highway 3. This segment includes gravel pits, abandoned wells, and orphaned wells. The feeder line capacity is better than average here with availability along Highway 22 and Lundbreck ranging from 150 kW to 1700 kW.

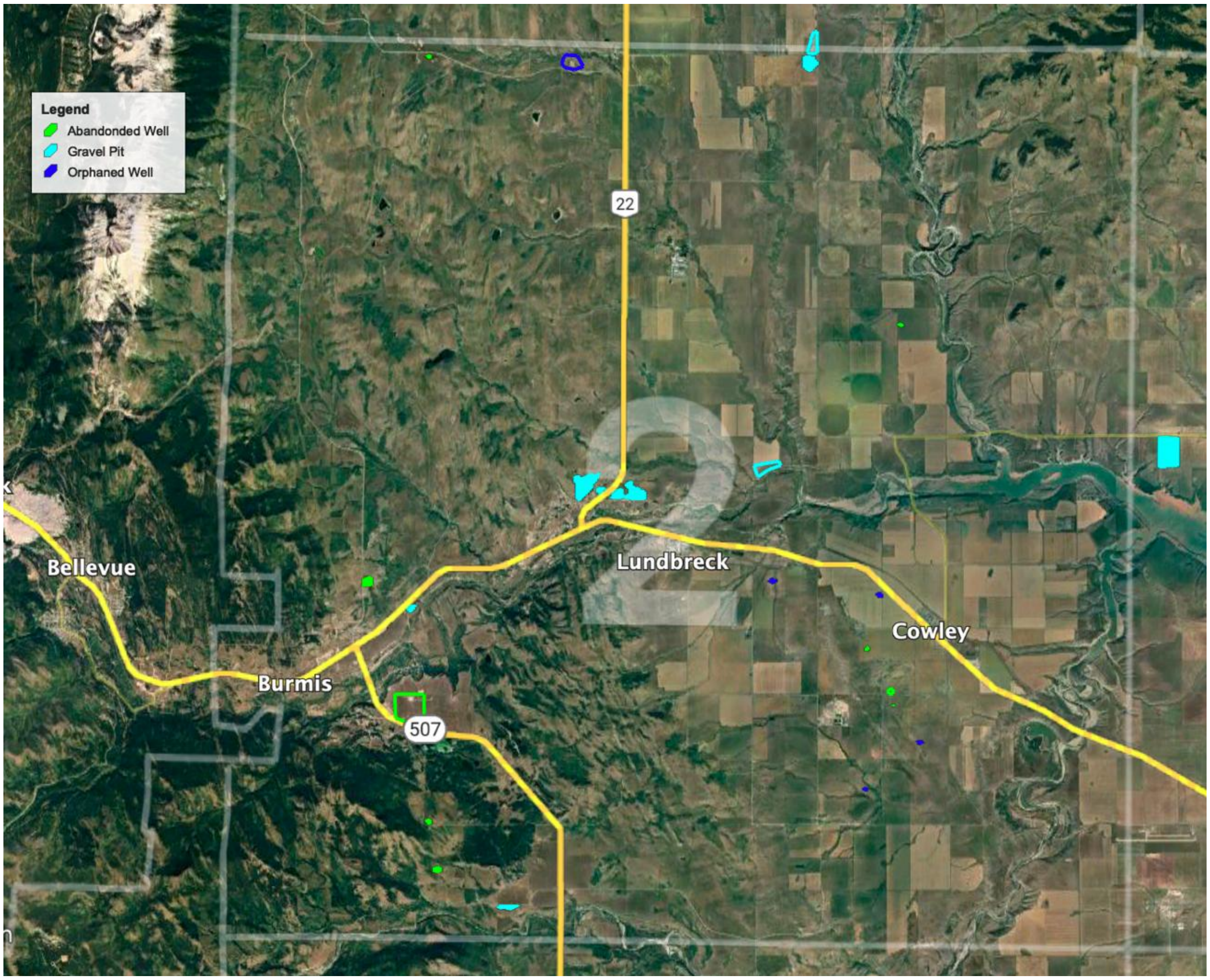


Figure 4. Section 2 of the MD of Pincher Creek

The northeastern segment of the MD is shown below in Figure 5 and primarily includes gravel pits. The Crowsnest Highway runs through section 3 of the MD and includes Summerview, and Pincher Station to the south. Capacity availability on the feeder lines in the region are all below 150 kW.

Figure 5. Section 3 of the MD of Pincher Creek

The western segment of the MD is shown below in Figure 6 and includes gravel pits and abandoned wells. The segment is located south of Bellevue and Burmis, and borders the Rocky Mountains. There is minimal feeder line availability in this region and it is all below 150 kW.

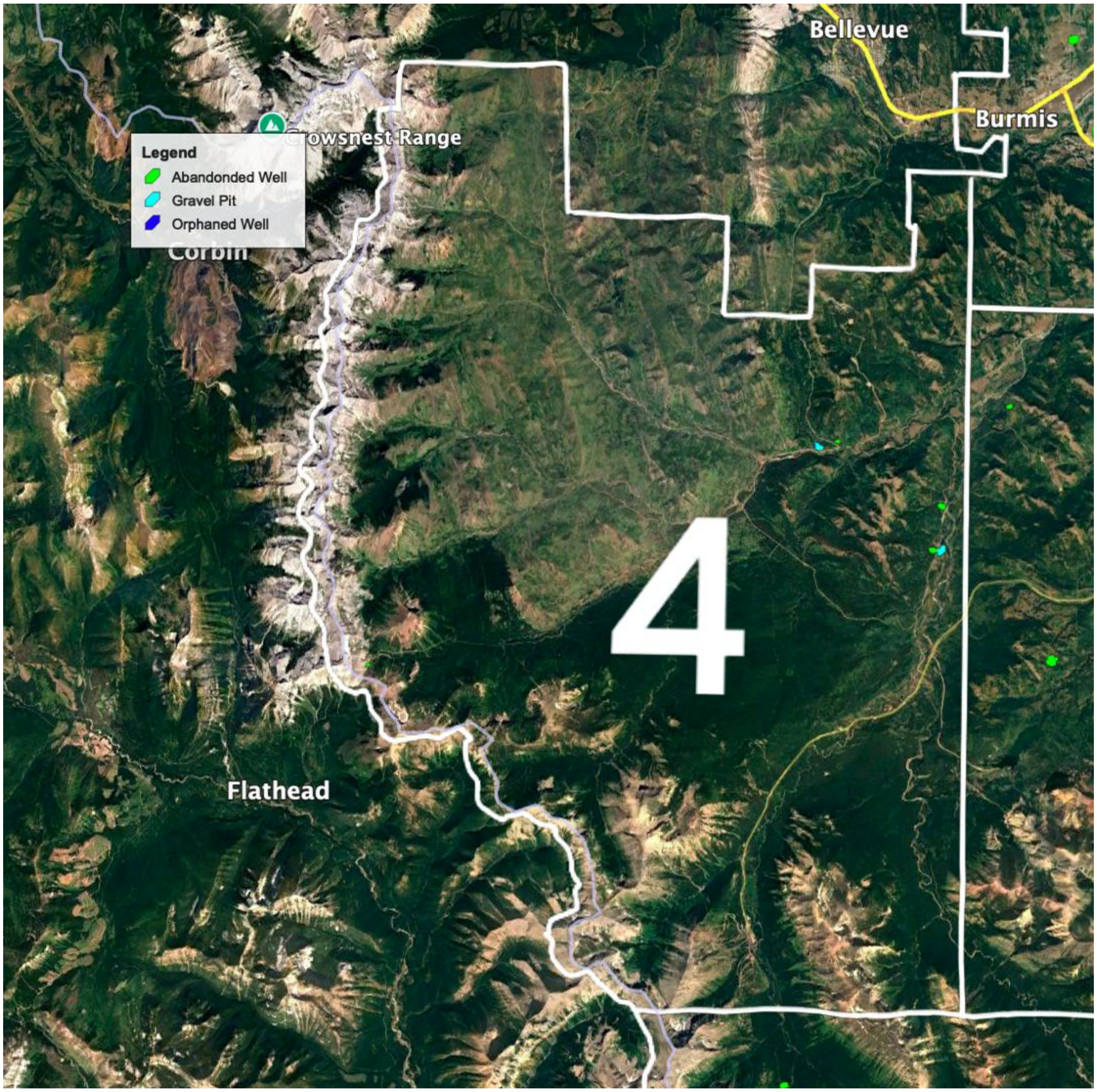


Figure 6. Section 4 of the MD of Pincher Creek

The south-central segment of the MD is shown below in Figure 7 and includes gravel pits and abandoned wells. The Beaver Mines Hamlet is located in the north of section 5, and many gas wells are located in the foothills of the Rocky Mountains as part of the Shell/Waterton Complex. There are many feeder lines throughout this region with most having a hosting capacity of 150 kW. The feeder lines in proximity to the Waterton gas plant have higher capacities ranging from 900 kW to 5,400 kW.

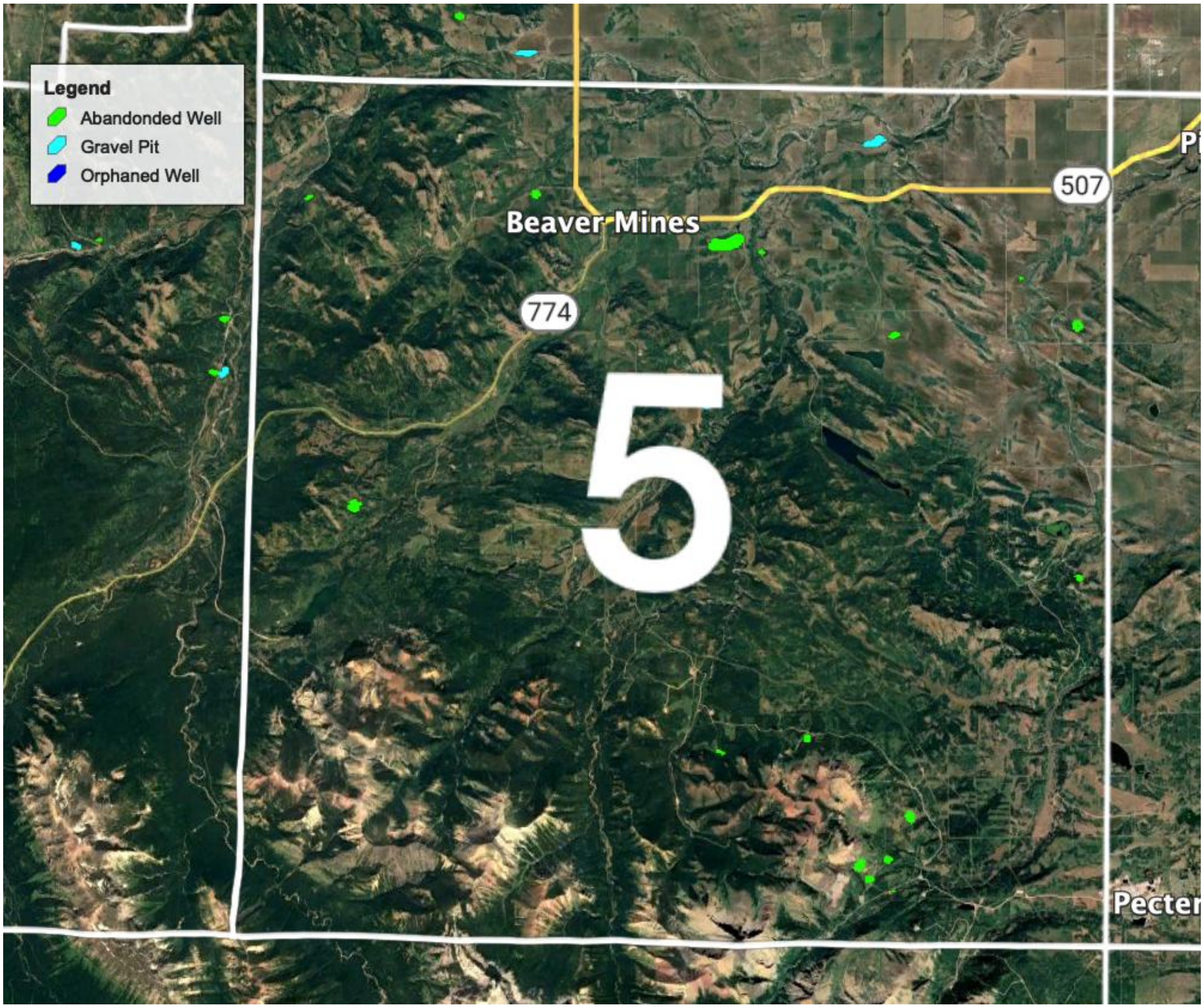


Figure 7. Section 5 of the MD of Pincher Creek

The eastern segment of the MD includes abandoned wells and orphaned wells. The Drywood Gas Complex is located in the south with the Waterton Gas Plant located in the southwest. Highway 6 runs through the middle of section 6 of the MD as shown in Figure 8. While having feeder lines throughout the region, the capacity remains all below 150 kW.

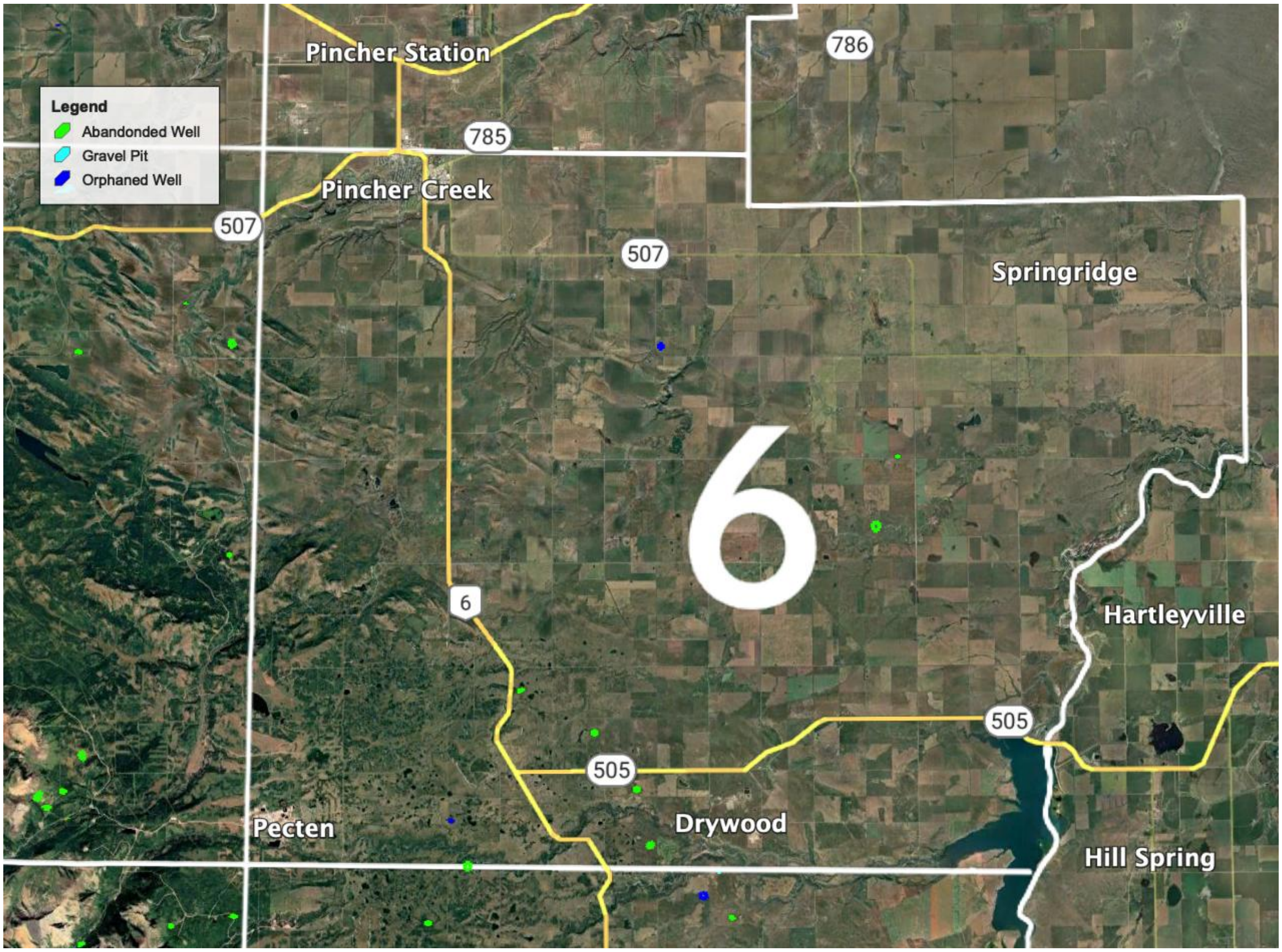


Figure 8. Section 6 of the MD of Pincher Creek

Section 7 of the MD borders Waterton National Park and includes abandoned wells from the Waterton Gas Complex. This section includes the southern region of the MD and is illustrated in Figure 9. The feeder lines in South Drywood and Spionkop valleys have the most available capacity ranging from 800 to 1,300 kW.

Figure 9. Section 7 of the MD of Pincher Creek

The southeastern segment of the MD borders the Northern section of Waterton National park and is shown below in Figure 10. Highway 6 runs through the middle and includes gravel pits, abandoned wells, and orphaned wells. There is little feeder line capacity in this region.

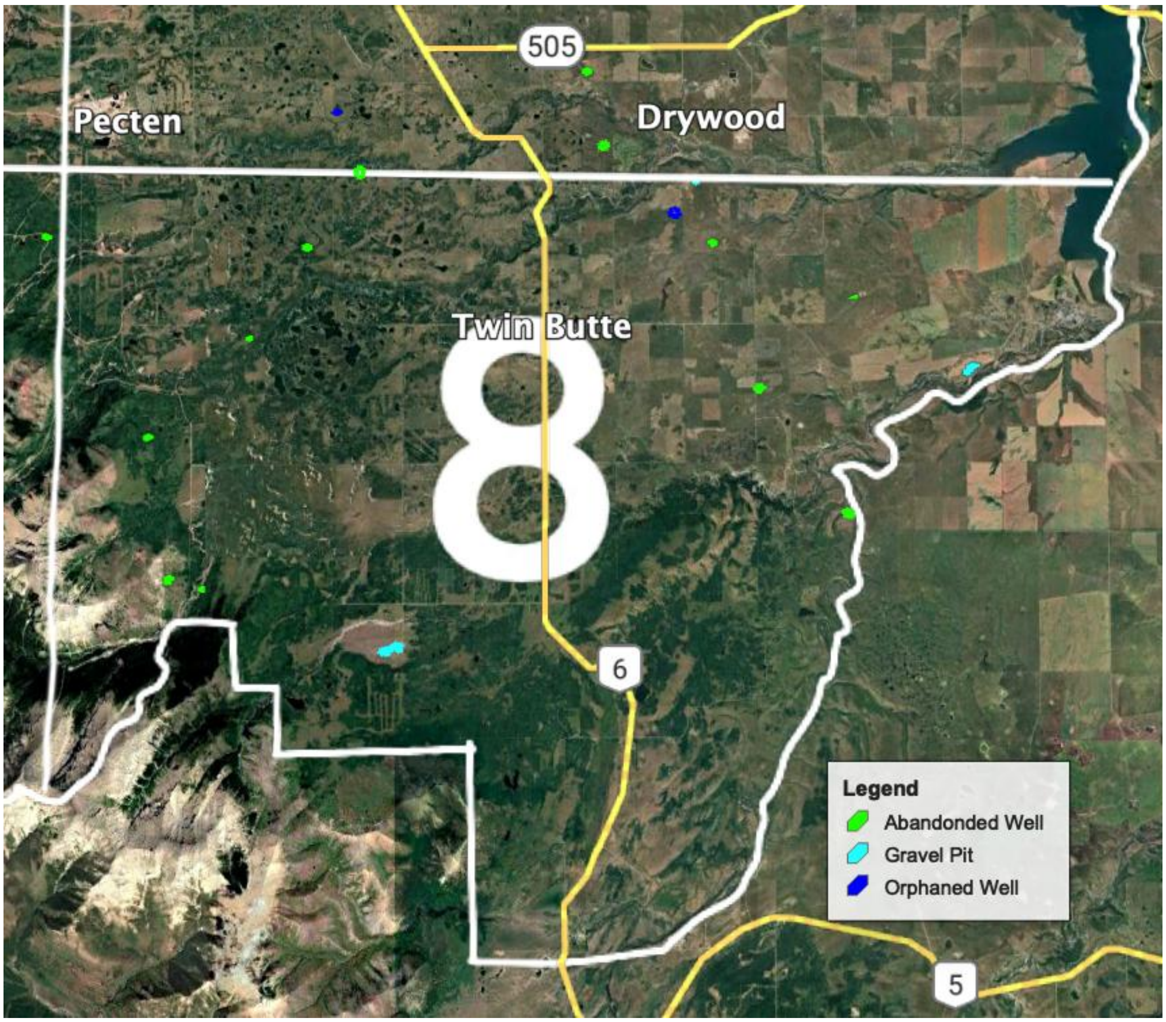


Figure 10. Section 8 of the MD of Pincher Creek

Abandoned wells

Abandoned wells are categorized into three primary status types: Abandoned, Reclamation Exempt, or Reclamation Certified. Each category reflects the current condition and historical handling of the well site:

1. **Abandoned Wells:** These are wells that have been permanently sealed and removed from service. Their primary function has ceased, and the well is no longer in use. These wells have not yet received a reclamation certificate which will be provided once the site has been returned to an equivalent land capacity [5].
2. **Reclamation Certified Wells:** These are sites that have undergone reclamation and have been officially returned to an equivalent land capacity. This certification indicates that the site has been remediated to meet environmental and land-use standards, ensuring it can support its previous or a comparable purpose [5].
3. **Reclamation Exempt Wells**: These refer to wells decommissioned prior to the enforcement of reclamation requirements. Specifically, these are wells on private lands decommissioned before 1963 or those on crown lands decommissioned before 1978. Because these wells predate reclamation legislation, they are exempt from formal reclamation obligations [5].

The Alberta Energy Regulator (AER) Abandoned Well Map Viewer is used to identify abandoned wells in the region [6]. This tool provides detailed information about wells in Alberta, including their location, status, ownership, and additional attributes. Using this resource, the coordinates of the abandoned wells are extracted and subsequently visualized in Google Earth Pro.

In Google Earth Pro, the exact location of each well is pinpointed, and the area of disturbance for each well is mapped using the polygon tool. The area calculation process focuses on identifying and outlining the visibly disturbed land surrounding the well site.

Wells without a clear or identifiable disturbed area are excluded from the study. This ensures that the analysis is based solely on sites with evident surface impacts, maintaining accuracy and relevance in the data collection process. The size of each installation is estimated using the 5 acre per MW ratio noted above, and annual generation is calculated using the PV Watts online calculator. An overview of the abandoned wells broken down by their status is shown in Table 2 including total area, estimated size, and their respective potential annual generation capacity.

Table 2. Summary of Abandoned Wells within the MD

Status	Total Sites	Area (hectares)	Estimated size (MW)	Estimated annual generation (GWh)
Abandoned	38	90	44.5	67
Reclamation Exempt	38	16	7.7	11.7
Reclamation Certified	35	35	17.5	26.5
Total	111	141	69.7	105.2

Orphaned wells

Orphaned wells within the MD are located using the Orphan Sites Interactive Map provided by the orphan well association [7]. The status of wells is categorized as decommissioning, closed, or environmentally reclaimed. In Alberta in 2024, there are 1,627 wells for decommissioning and over 7,000 sites to be reclaimed [8].

1. **Undergoing decommissioning:** These wells are undergoing the decommissioning process which involves proper sealing and closed according to AER guidelines. Decommissioned wells are also known as abandoned wells, and some wells listed in this section overlapped with abandoned wells. The wells that were double counted are only included in the Abandoned Wells section.
2. **Closed Wells**: These wells have been properly sealed and closed according to AER guidelines and have been properly decommissioned.
3. **Environmentally Reclaimed Wells:** These wells have been restored to their equivalent land capacity, and the land is now available for farming, pastureland, recreation, or growing a community.

The locations of the orphan wells are recorded using the interactive map noted above which is used to identify and outline their area Google Earth Pro. Wells in the Orphan Sites Interactive Map are not labelled with distinctive identifiers, so they are labelled in the format Orphan Well # for the purposes of this report. Areas of disturbance are marked using the polygon feature and recorded using excel. The different Orphaned wells are broken down by status and summarized in Table 3. Some orphaned wells shown in the online map are also included in the abandoned wells database and therefore are removed from this section to avoid double counting.

Table 3. Summary of Orphaned Wells within the MD

Status	Total Sites	Total Area (hectares)	Estimated size (kW)	Estimated annual generation (GWh)
Decommissioning	5	4	1,955	2.95
Closed	1	13	3,075	4.6
Environmentally Reclaimed	3	6	6,372	9.6
Total	9	23	11,403	17.2

Gravel pits

There are 27 total gravel pits within the MD who's status are categorized as active, inactive, or empty. Active pits are still operational and will not be considered for development at this time. Inactive and empty pits are analyzed for their development suitability. Gravel pits are either owned privately or by the MD. Of the 27 gravel pits identified, 22 are visible utilizing Google Earth. Of these 22 pits, 15 sites are currently active pits and will be considered for future development, while the remaining 7 are analyzed in this report. A summary of the gravel pits within the MD and their estimated size and capacity is shown in Table 4.

Table 4. Summary of Gravel Pits within the MD

Status	Total Sites	Total area (hectares)	Estimated size (MW)	Estimated annual generation (GWh)
Active	15	136	67	101
Inactive	7	35	17	26
Total	22	171	84	127

Preferred sites

The following section outlines the preferred sites for development, based on distance to power lines, highest capacity of the associated feeder line, disturbed area, and favourable site conditions.

Preferred sites based on distance to feeder lines

The preferred sites based on distance to existing powerlines is determined by utilizing the distance tool in Google Earth. The site's distance is measured from the center of the brownfield polygon to the nearest powerline provided by the Fortis hosting capacity map [9]. The 15 following brownfield sites in Table 5 are located beside existing feeder lines and thus have a distance of 0.

Table 5. Summary of brownfield sites with a proximity of 0 meters from powerlines

Site Name	Site Name
Abandoned Well 0206236	Abandoned Well 0253086
Abandoned Well 0013351	Olson Gravel Pit
Abandoned Well 0422274	Scotton Gravel Pit
Abandoned Well 0020361	Sapeta Gravel Pit
Abandoned Well 0086279	Orphan Well 6
Abandoned Well 0022216	Orphan Well 9
Abandoned Well 0272551	-

Preferred sites for highest capacity

The carrying capacity of the powerlines closest to the mapped brownfields is recorded using the Fortis hosting capacity map. The majority of feeder lines within the MD have a carrying capacity equivalent to 150 kW or less. Sites with high carrying capacities are located primarily in the southern region of the MD in proximity to the Waterton gas complex, or around the Hamlet of Lundbreck and North on Highway 22. Figure 11 shows the distribution of the sites in proximity to high capacity lines within the MD.

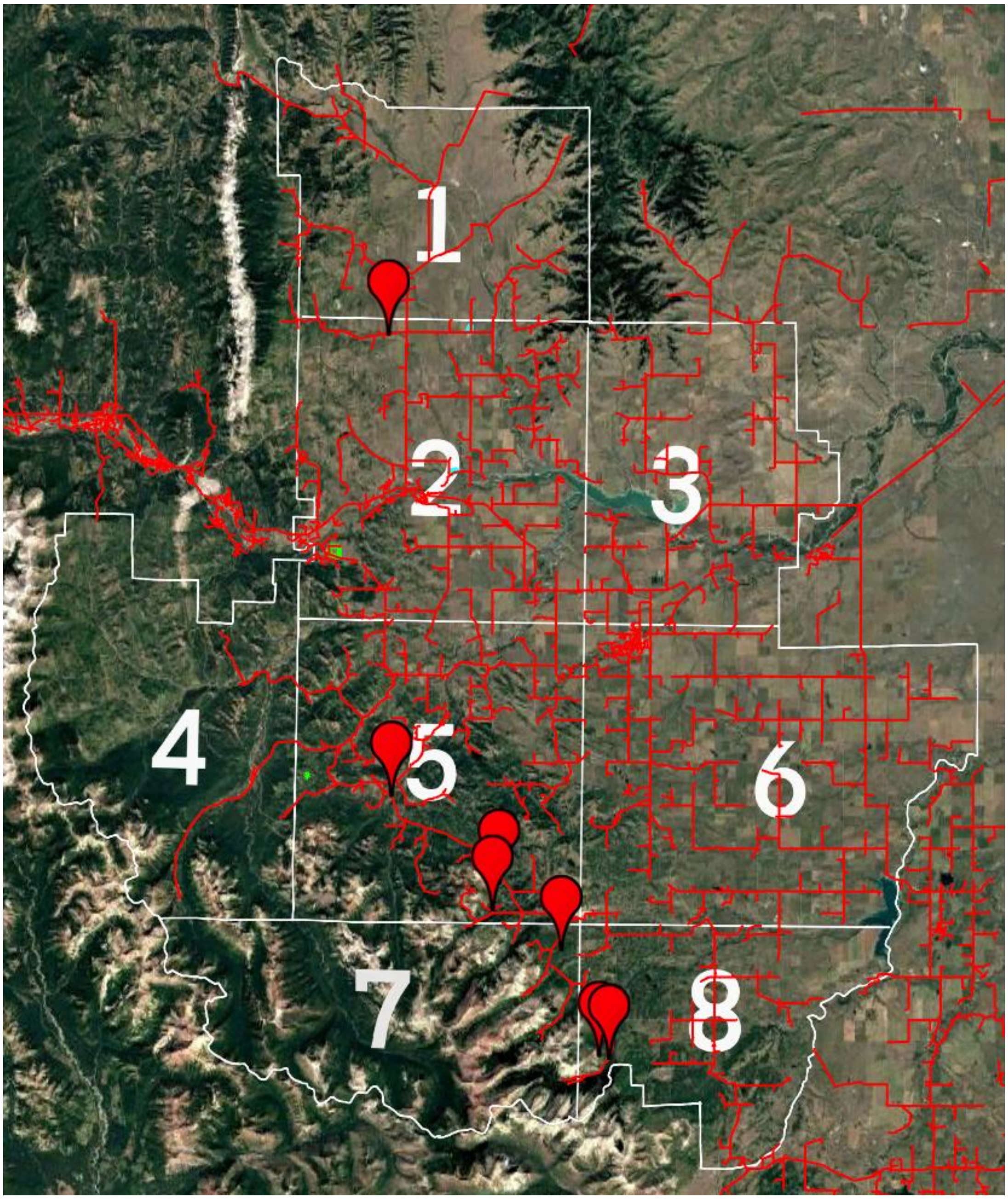


Figure 11. The distribution of the brownfield sites with the highest carrying capacities within the MD

The sites listed in Table 6 have nearby powerlines with a carrying capacity greater than 150 kW.

Table 6. Summary of the sites with highest carrying capacity

Site Name	Distance to Powerline (m)	Carrying Capacity (kW)	Site Area (hectares)	Estimated size (kW)	Estimated Generation (MWh)
Well 0013351	0	1,876	0.9	429	647
Well 0015899	411	4,356	2.6	1,293	1,951
Well 0026825	37	2,753	0.2	93	140
Well 0017681	680	2,774	1.7	828	1,249
Well 0016720	746	532	2.5	1,221	1,843
Orphan Well 6	0	582	13	6,372	9,616
Well 0123333	76	532	1.0	509	768

Preferred sites for the largest brownfield area

The brownfields are recorded and sorted for the largest disturbed area shown in Table 7 below. Larger areas are preferred as they allow for more efficient solar array layouts and the potential to maximize energy generation capacity.

Table 7. Summary of top 5 sites with the largest area

Site Name	Site Area (hectares)	Distance to Powerline (m)	Powerline Capacity (kW)	Estimated Size (MW)	Estimated Generation (MWh)	Distance to High Capacity Powerline (km)	Carrying Capacity (kW)
AW 0186449	58	150	150	29	43,416	1.1 *(2.3)*	1183 *(5498)*
Olson GP	12	0	150	6	8,936	2.3	500
Orphan Well 6	13	0	150	6	9,616	-	-
Scotton GP	10	0	150	5	7,339	4.8	592
AW 0091782	5	1,154	150	3	3,904	5.8	1823

Of the top five sites, four are located in Section 1 and 2 of the MD, with one site located in Section 5. The top five largest sites are depicted below in Figure 12.

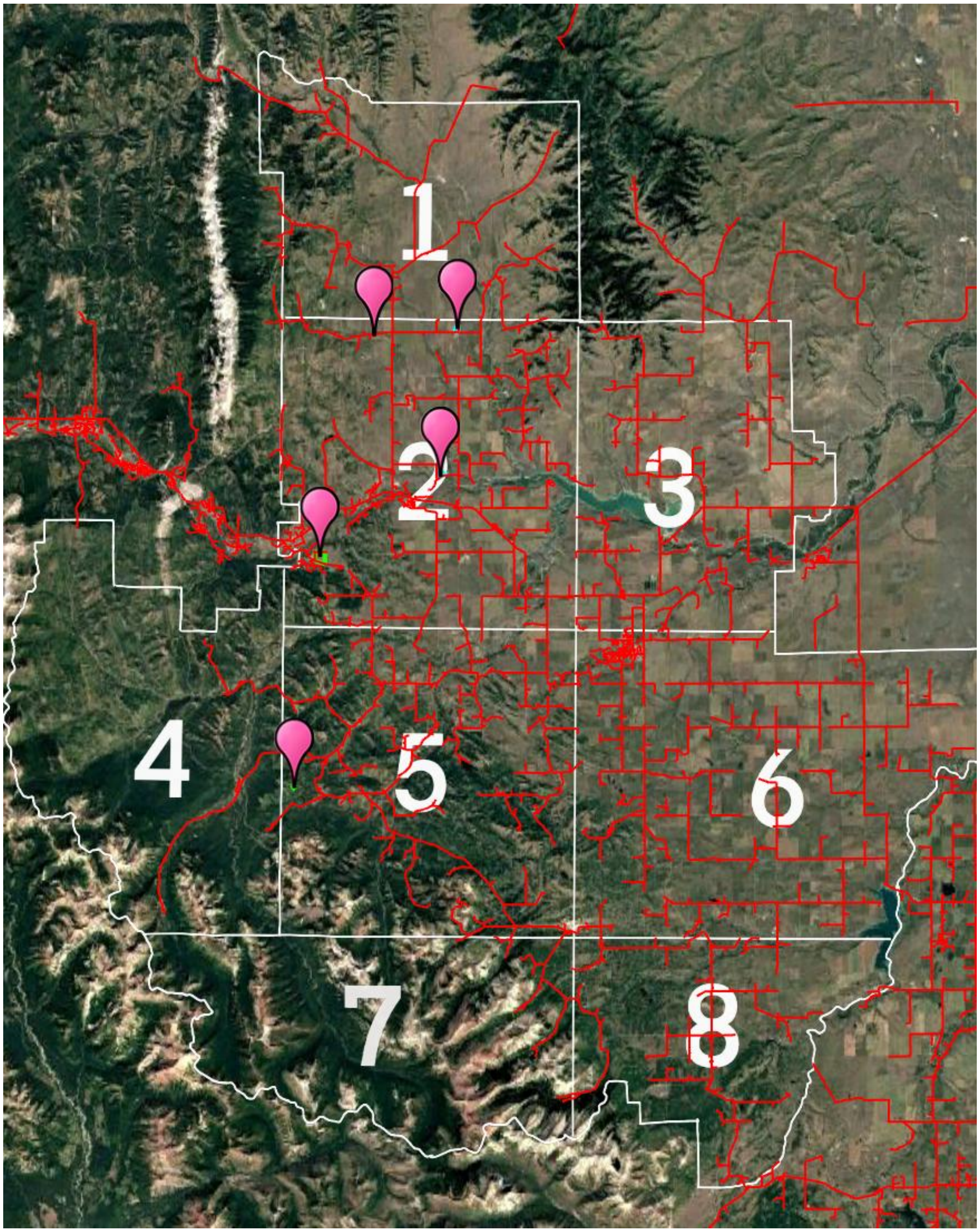


Figure 12. Map of the top 5 largest brownfield sites within the MD

Preferred Sites for Solar Development

The top 15 sites are identified using a ranking system that considers the area of the site, the distance from the nearest powerline, the carrying capacity of the nearest powerline, and whether the site is in a no-go zone or not. Abandoned Wells are indicated by AW, Gravel pits by GP, and Orphan wells by OW. Area and distance to powerlines are considered the most important factors. The top 15 sites are mapped below in Figure 13.

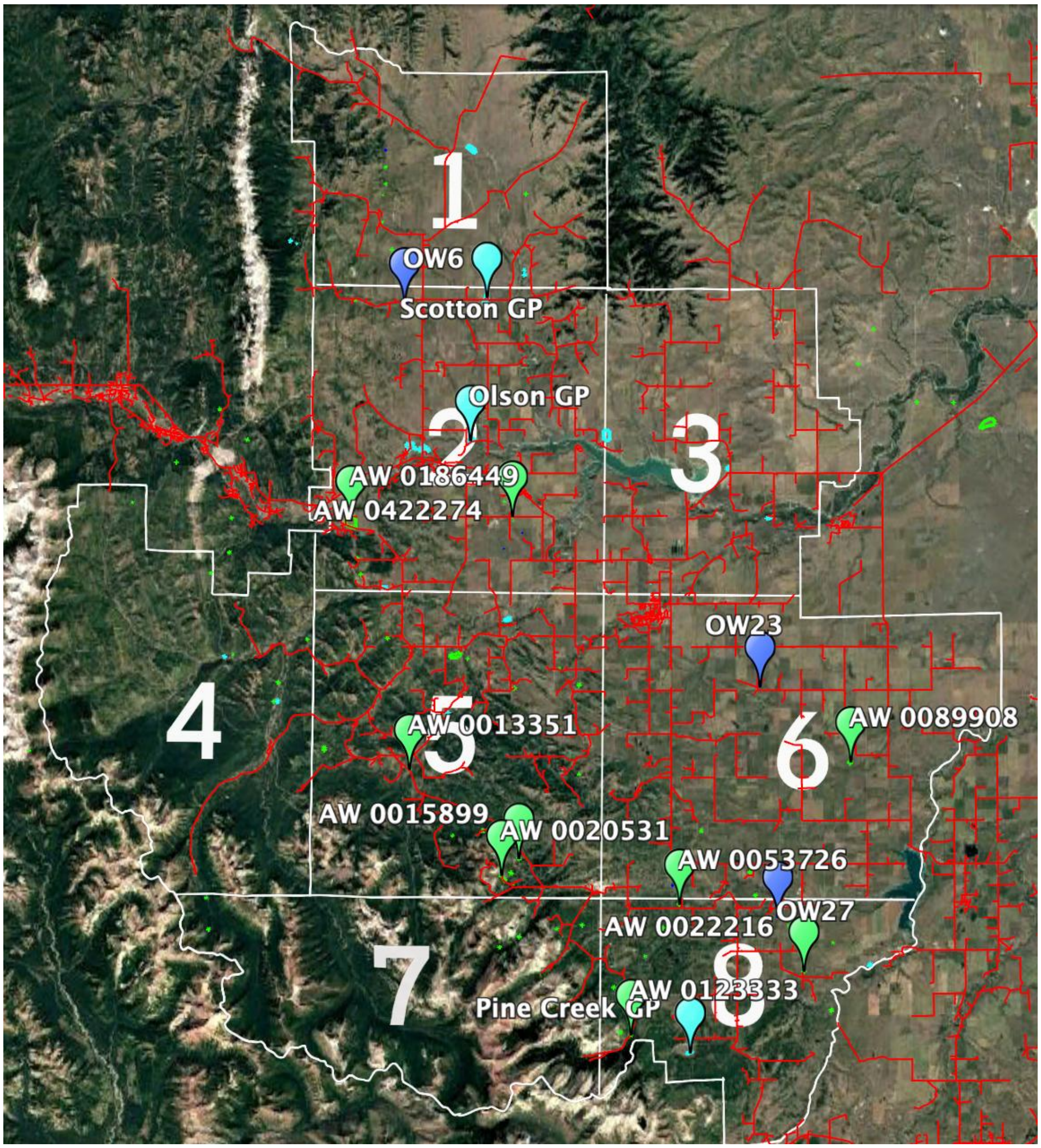


Figure 13. Map of the top 15 brownfield sites within the MD of Pincher Creek

The top-scoring sites are listed in below Table 8 with size, estimated annual generation, distance and carrying capacity, and secondary capacity for areas in proximity to two sets of lines. The top 15 sites have a total area of 110 hectares with an estimated size of 60 MW. This will allow for an annual generation potential of 90 GWh. The largest site is AW 0186449 with an area of 58 hectares and an estimated annual generation of 43 GWh.

Table 8. Summary of the top 15 brownfield sites, with area, estimated size, annual generation, distance to powerline, and carrying capacity

Site Name	Status	Area (hectares)	Estimated Size (MW)	Estimated Annual Generation (MWh)	Distance to Powerline (m)	Capacity (kW)	Distance to High Capacity Powerline (km)	Capacity (kW)
AW 0186449	Abandoned	58	28.77	43,358	0	150	1.1 *(2.3)*	1183 *(5498)*
Olson GP	Inactive	12	5.92	8,924	0	150	2.3	514
AW 0020531	Abandoned	3	1.53	2,308	102	150	0.7 *(2.4)*	636 *(5506)*
AW 0053726	Recertified	3	1.62	2,445	267	150	7 (7.2)	5523 *(2774)*
AW 0089908	RecCertified	1	2.20	3,323	76	532	-	-
OW 6	Closed	13	6.37	9,603	0	582	-	-
AW 0022216	Abandoned	2	1.02	1,542	0	150	-	-
AW 0422274	Abandoned	1	0.68	1,024	0	150	3.6	1226
OW 23	Reclamation	2	0.86	1,295	154	150	7.4	1093
AW 0123333	RecExempt	2	0.51	767	163	150	-	-
Pine Creek GP	Empty	4	2.22	3,347	1,017	150	-	-
OW 27	Reclamation	3	1.50	2,264	574	150	-	-
AW 0015899	RecCertified	3	1.29	1,948	411	4356	1.23	5505
AW 0013351	Abandoned	0.9	0.43	646	0	1876	-	-
Scotton GP	Inactive	2	4.86	7,329	1,010	150	4.8	592
Total	-	**109.9**	**59.78**	**90,123**	-	-	-	-

The table below outlines a summary of the estimated cost of each site, where the cost of installation is assumed to be $2/W. Annual income is estimated to be $75/MWh, and emissions saved are estimated using a local grid emission factor of 0.57 kg CO_2e/MWh. The top 15 sites result in $120 MM of installation costs and an annual income of $6.8 MM/year. Emissions can be reduced by approximately 51,000 tonnes CO_2e/year. AW 0186449 showed the highest emissions reduction at 25,000 tonnes CO_2/year and an annual income of $3 MM.

Table 9. Summary of installation cost, income, payback period, and GHG emissions reduction for the top 15 sites

Site Name	Estimated Size (MW)	Cost of Installation (MM $CAD)	Annual Income ($CAD)	Emissions saved/year (Tonnes)
AW 0186449	28.77	$57,542,503	$3,251,871	24,714
Olson GP	5.92	$11,843,255	$669,292	5,087
AW 0020531	1.53	$3,062,998	$173,098	1,316
AW 0053726	1.62	$3,245,284	$183,399	1,394
AW 0089908	2.20	$4,409,543	$249,194	1,894
OW 6	6.37	$12,744,805	$720,241	5,474
AW 0022216	1.02	$2,046,543	$115,655	879
AW 0422274	0.68	$1,359,488	$76,828	584
OW 23	0.86	$1,719,219	$97,157	738
AW 0123333	0.51	$1,017,344	$57,493	437
Pine Creek GP	2.22	$4,442,344	$251,048	1,908
OW 27	1.50	$3,004,310	$169,781	1,290
AW 0015899	1.29	$2,585,300	$146,102	1,110
AW 0013351	0.43	$857,090	$48,436	368
Scotton GP	4.86	$9,726,662	$549,678	4,178
Total	**59.78**	**$119,606,688**	**$6,759,273**	**51,371**

Abandoned Well 0186449 is located east of Burmis along highway 507, in section 2 of the MD. The total size of the wellsite is approximately 58 hectares and is located 1.1 km away from a high capacity powerline of 1,183 kW and 2.3 km from a high capacity powerline of 5,498 kW. The estimated size of this project is 29 MW, generating a total of 42,000 MWh per year. This project will produce an estimated annual income of $2.99 MM, and a reduction of 24,000 tonnes of CO_2e/year. The status of this well is Abandoned. A map of Abandoned Well 0186449 is included in Figure 14.

Abandoned Well 0186449

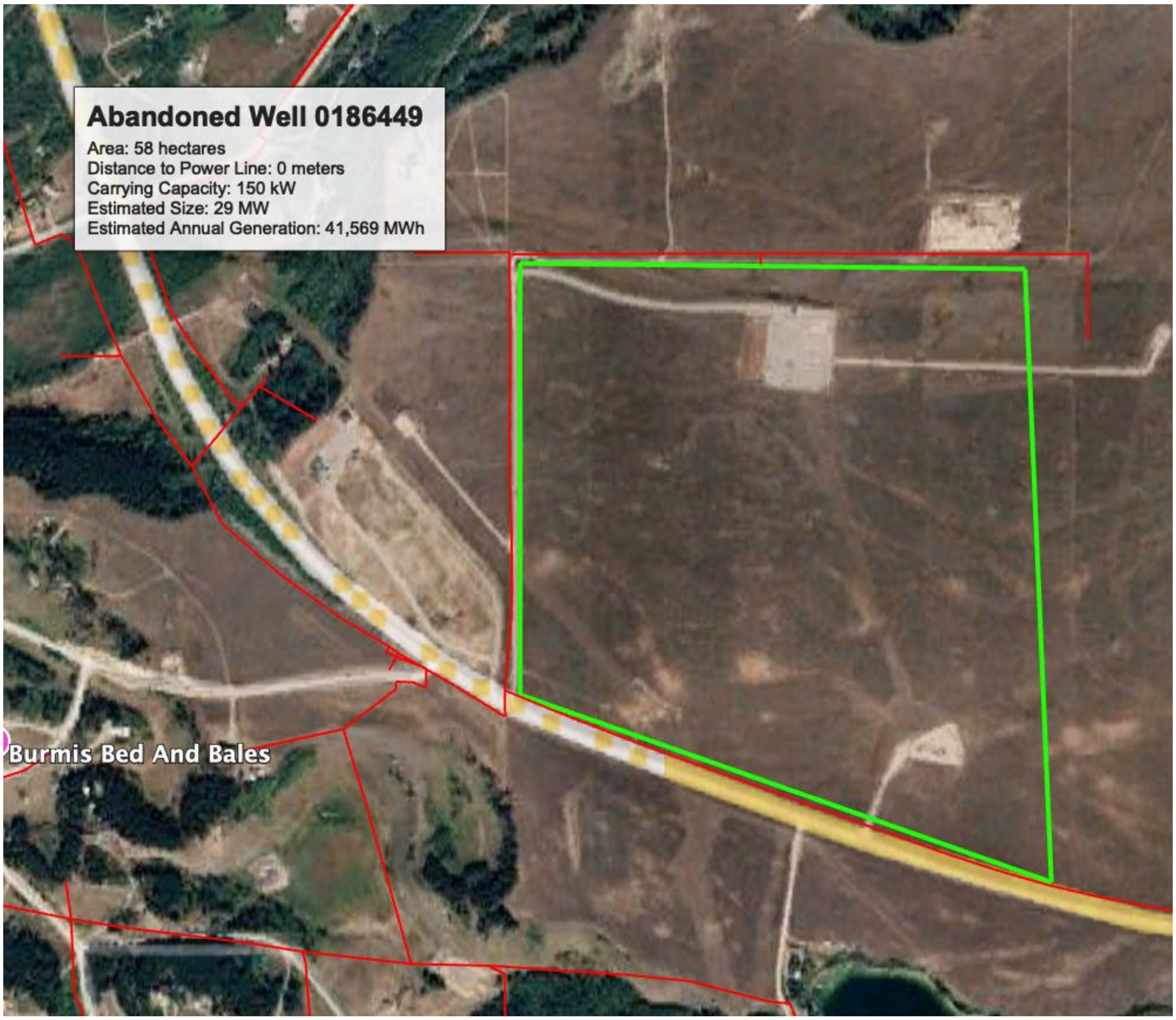


Figure 14. Map of Abandoned Well 0186449

The Oslon Gravel Pit is located northeast of Lundbreck in section 2 of the MD. The total size of the site is approximately 12 hectares and is located 2.3 km away from a high-capacity powerline of 500 kW. The estimated size of this project is 6 MW, generating a total of 9,000 MWh per year. This project will produce an estimated annual income of $2 MM, and a reduction of 18,000 tonnes of CO_2e/year. A map of the Olson Gravel Pit is included in Figure 15.

Olson Gravel Pit

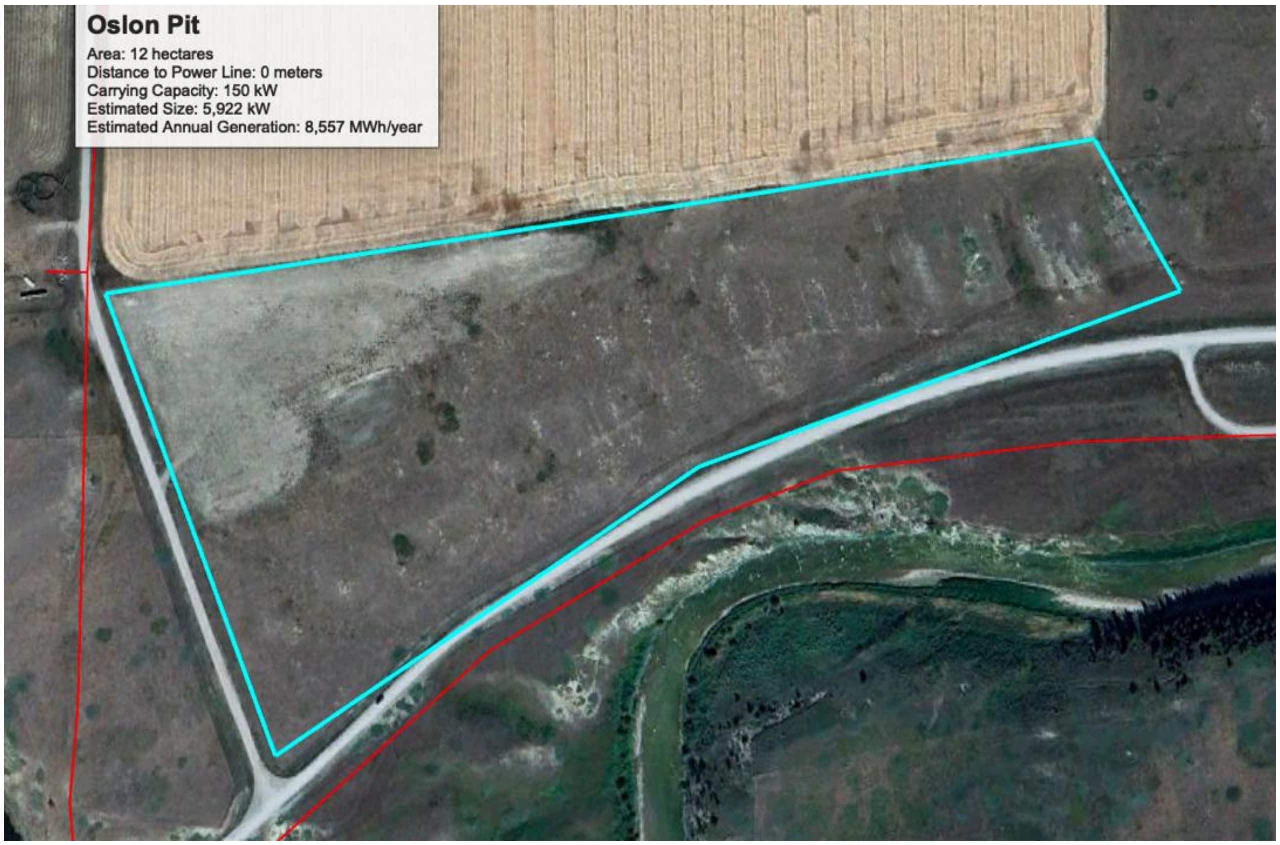


Figure 15. Map of the Olson Gravel Pit

Abandoned Well 0020531 is located west of Pecten in section 5 of the MD. The total size of the well is approximately 3 hectares and is located 0.7 km away from a high capacity powerline of 636 kW and 2.4 km away from a high capacity powerline of 5,506 kW. The estimated size of this project is 1.5 MW, generating a total of 9,000 MWh per year. This project will produce an estimated annual income of $160,000, and a reduction of 1,200 tonnes of CO_2e/year. The status of well is Abandoned. A map of Abandoned Well 0020531 is shown in Figure 16.

Abandoned Well 0020531

Figure 16. Map of Abandoned Well 0020531

Abandoned Well 0053726 is located southeast of Pecten and northwest of Twin Butte in section 8 of the MD. The total size of the well is approximately 3 hectares and is located 7 km away from a high capacity powerline of 5523 kW. The estimated size of this project is 1.6 MW, generating a total of 2,300 MWh per year. This project will produce an estimated annual income of $170,000, and a reduction of 1,300 tonnes of CO_2e/year. The status of this well is Reclamtion Certified. A map of Abandoned Well 0053726 is shown in Figure 17.

Abandoned Well 0053726

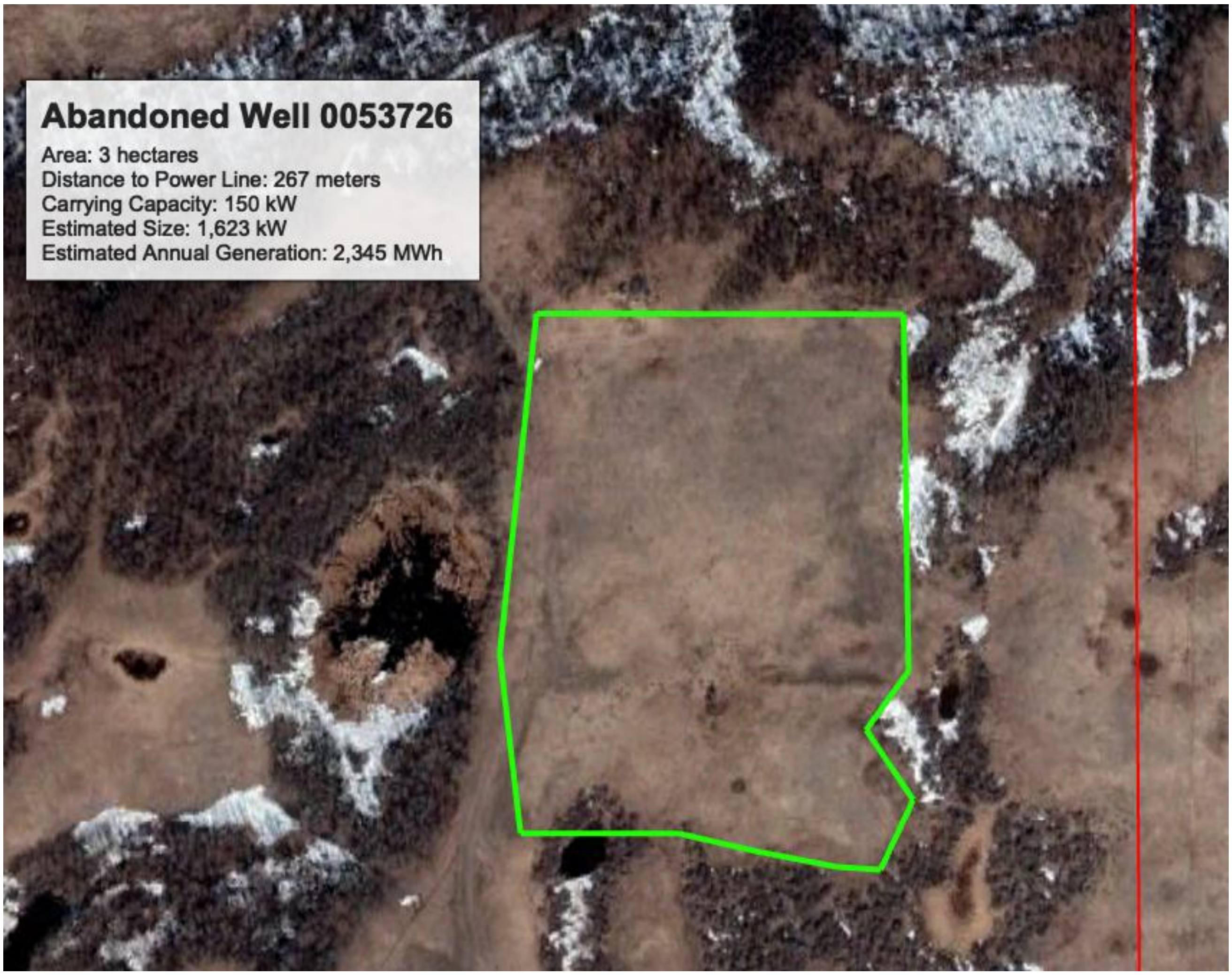


Figure 17. Map of Abandoned Well 0053726

Abandoned Well 0089908 is located northeast of Drywood and northwest of Hartleyville in section 6 of the MD. The total size of the well is approximately 4 hectares and is not located near any high capacity powerlines. The estimated size of this project is 2 MW, generating a total of 3,200 MWh per year. This project will produce an estimated annual income of $230,000, and a reduction of 1,800 tonnes of CO_2e/year. The status of this well is Reclamation Exempt. A map of Abandoned Well 0089909 is shown in Figure 18.

Abandoned Well 0089908

Figure 18. Map of Abandoned Well 0089908

Orphan Well 6 is located north of Lundbreck along Highway 22 in section 2 of the MD. The total size of the well is approximately 4 hectares. The estimated size of this project is 5 MW, generating a total of 9,200 MWh per year. This project will produce an estimated annual income of $660,000, and a reduction of 5,000 tonnes of CO_2e/year. The status of this well is closed. A map of Orphan Well 6 is shown in Figure 19.

Orphan Well 6

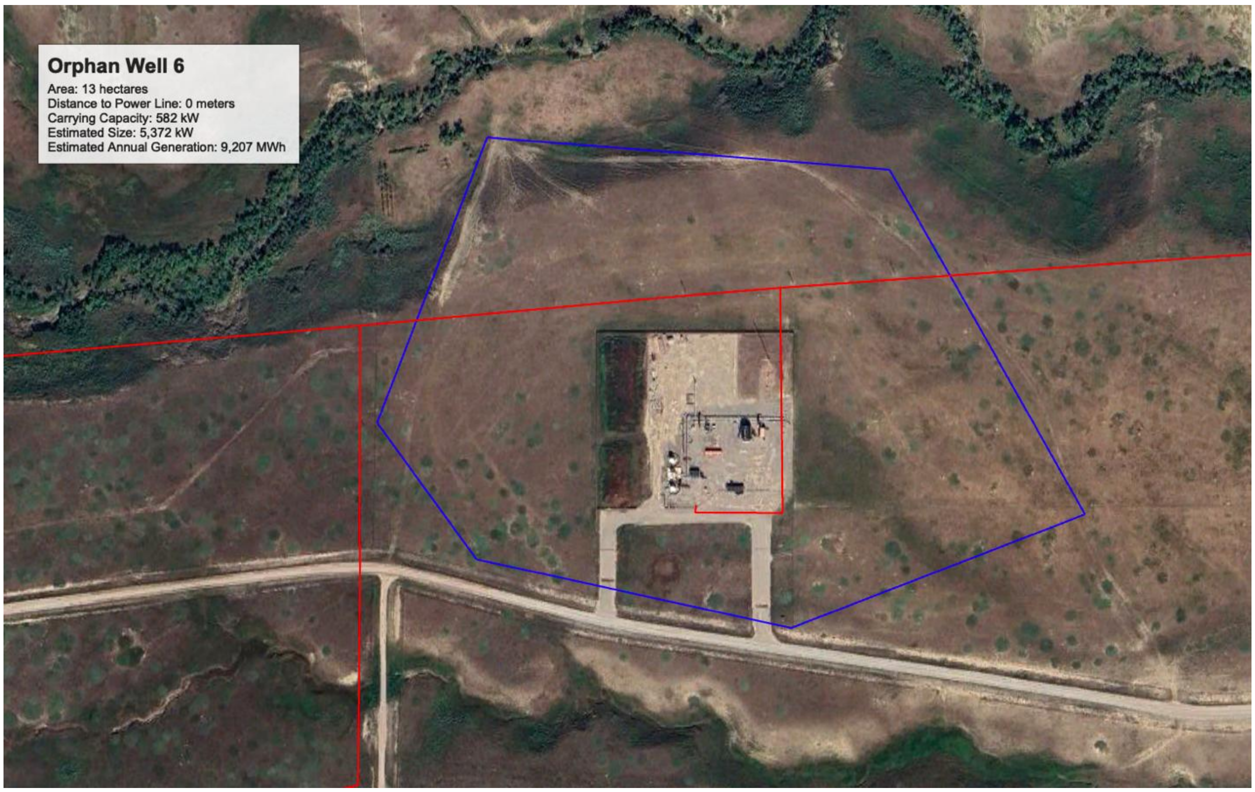


Figure 19. Map of Orphan Well 6

Abandoned Well 0022216 is located approximately 18 km southeast of Pincher Creek in section 8 of the MD. The total size of the well is approximately 2 hectares and is not located near any high capacity powerlines. The estimated size of this project is 1 MW, generating a total of 1,500 MWh per year. This project will produce an estimated annual income of $110,000, and a reduction of 800 tonnes of CO_2e/year. The status of this well is Abandoned. A map of Abandoned Well 0022216 is shown in Figure 20

Abandoned Well 0022216

Figure 20. Map of Abandoned Well 0022216

Abandoned Well 0422274 is located approximately 2 km southwest of Cowley in section 2 of the MD. The total size of the well is approximately 1 hectare and is located 3.6 km from a high capacity powerline of 1,226 kW. The estimated size of this project is 0.7 MW, generating a total of 983 MWh per year. This project will produce an estimated annual income of $71,000, and a reduction of 600 tonnes of CO_2e/year. The status of this well is Abandoned. A map of Abandoned Well 0422274 is shown in Figure 21.

Abandoned Well 0422274

Figure 21. Map of Abandoned Well 0422274

Orphan Well 23 is located approximately 9 km southeast of Pincher Creek in section 6 of the MD. The total size of the well is approximately 2 hectares and is located 7.4 km from a high capacity powerline of 1,093 kW. The estimated size of this project is 0.9 MW, generating a total of 1,200 MWh per year. This project will produce an estimated annual income of $90,000, and a reduction of 700 tonnes of CO_2e/year. The status of this well is undergoing Reclamation. A map of Orphan Well 23 is shown in Figure 22.

Orphan Well 23

Figure 22. Map of Orphaned Well 22

Abandoned Well 0123333 is located in the southern region of section 8 of the MD, along the foothills of the Rocky Mountains. The total size of the well is approximately 1 hectare and is located to a powerline with a carrying capacity of 532 kW. The estimated size of this project is 0.5 MW, generating a total of 800 MWh per year. This project will produce an estimated annual income of $53,000, and a reduction of 400 tonnes of CO_2/year. The status of this well is Reclamation Exempt. A map of Abandoned Well 0123333 is shown in Figure 23.

Abandoned Well 0123333

Figure 23. Map of Abandoned Well 0123333

The Pine Creek Gravel Pit is located in the southeast region in section 8 of the MD. The total size of the well is approximately 4 hectares and is not located near any high capacity powerlines. The estimated size of this project is 2 MW, generating a total of 3,200 MWh per year. This project will produce an estimated annual income of $231,000, and a reduction of 1,800 tonnes of CO_2e/year. The status of this gravel pit is empty. A map of the Pine Creek Gravel Pit is shown in Figure 24.

Pine Creek Gravel Pit

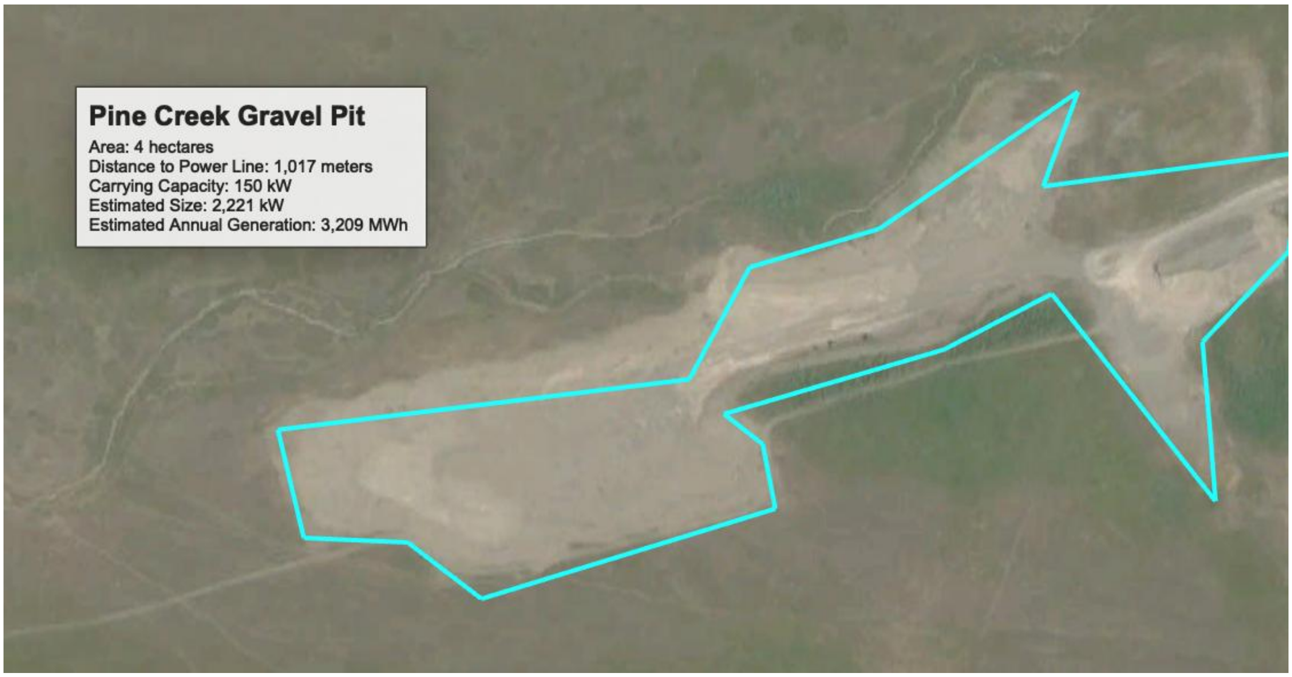


Figure 24. Map of the Pine Creek Gravel Pit

Orphan Well 27 is located in 4 km northeast of Twin Butte in section 8 of the MD. The total size of the well is approximately 3 hectares and is not located near any high capacity powerlines. The estimated size of this project is 1.5 MW, generating a total of 2,200 MWh per year. This project will produce an estimated annual income of $170,000, and a reduction of 1,200 tonnes of CO_2e/year. The status of this orphan well is undergoing reclamation. A map of Orphan Well 27 is shown in Figure 25.

Orphan Well 27

Figure 25. Map of Orphaned Well 27

Abandoned Well 0015899 is located 20 km southwest of Pincher Creek in section 5 of the MD. The total size of the well is approximately 3 hectares and is located 411 meters from a high capacity powerline of 4,256 kW. The estimated size of this project is 1.2 MW, generating a total of 1,900 MWh per year. This project will produce an estimated annual income of $130,000, and a reduction of 1,000 tonnes of CO_2e/year. The status of this well is Reclamation Certified. A map of Abandoned Well 0015899 is shown in Figure 26.

Abandoned Well 0015899

Figure 26. Map of Abandoned Well 0015899

Abandoned Well 0013351 is located south of the Beaver Mines Hamlet in section 5 of the MD. The total size of the well is approximately 1 hectare and is located next to a high capacity powerline of 1876 kW. The estimated size of this project is 0.43 MW, generating a total of 650 MWh per year. This project will produce an estimated annual income of $45,000, and a reduction of 400 tonnes of CO_2e/year. The status of this well is Abandoned. A map of Abandoned Well 0013351is shown in Figure 27.

Abandoned Well 0013351

Figure 27. Map of Abandoned Well 013351

The Scotton Gravel Pit is located north of Lundbreck, along Highway 22, in section 2 of the MD. The total size of the well is approximately 10 hectares and 4.8 km from a high capacity powerline of 592 kW. The estimated size of this project is 5 MW, generating a total of 7,000 MWh per year. This project will produce an estimated annual income of $500,000, and a reduction of 4,000 tonnes of CO_2e/year. The status of this gravel pit is Inactive. A map of the Scotton Gravel Pit is shown in Figure 28.

Scotton Gravel Pit

Figure 28. Map of the Scotton Gravel Pit

Conclusion

The MD of Pincher Creek contracted Massif Energy to conduct a study on existing brownfield sites to explore potential land suitable for developing renewable energy conversion systems. Based on the Renewable Energy Conversion System Land Use Bylaw survey conducted in October 2024, there is support and interest from residents towards development of renewable energy on brownfield sites to reduce the use of agricultural land. Of 88 responses, 58% of respondents indicated support towards developments on brownfields.

In total, 180 brownfield sites are reviewed in this report. Of the 180 sites, 127 of these sites are abandoned wells, 26 are gravel pits, and 27 are orphaned wells. Of all sites, 38 did not have a visibly disturbed area and were not mapped leaving 142 which are further investigated. This study resulted in the mapping of over 3.76 million square meters of brownfield sites, and provides key insights into suitable areas for development within the MD. In total there are 335 hectares of brownfield land in the MD, capable of hosting 165 MW of solar energy generation equipment and generating 250 GWh of electricity. This is enough to electricity to power 35,000 homes.

The top 15 sites, shown in Table 7, are ranked based on area, generation capacity, distance from closest powerlines, and proximity to the no-go zones identified in the MLUST report. The sites include abandoned wells (AW), orphaned wells (OW), and gravel pits (GP). AW 0186449 stands out as the largest, covering over 582,000 m² and capable of producing 43,000 MWh annually at max capacity, while the smallest, AW 0123333, could generate 768 MWh annually. Installation costs range from $1.4M to $57.5M, with annual income scaling proportionally—large sites, like AW 0186449 earn millions yearly, while smaller sites like AW 0422274 earn under $100,000. In terms of emissions saved, the largest sites reduce tens of thousands of tonnes of CO_2e annually, while smaller ones save a few hundred. Gravel pits tend to be larger and more impactful than the wells, but even the smaller sites offer meaningful benefits.

The analysis of these sites is high level in nature due to the number of sites within the MD. Further evaluation is important to identify if the selected sites can be increased in size to generate more energy and leverage economies of scale to reduce installation costs. While the majority of the brownfields are small individually, by aggregating them together the total project size can become significant. The benefits of using these brownfield sites for solar generation include alignment of agricultural values by not using quality farmland, reduction in need for new powerline infrastructure to be installed, and support for remediation of the sites by supporting top soil regeneration.

Next Steps

The next steps for advancing these renewable energy projects is outlined below. They involve further analysis, engaging with landowners, potential energy offtakers, funders, and other ey regional stakeholders.

1. Detailed analysis of selected sites to determine total area available, line capacity, project potential, and business case
2. Engage with landowners to determine willingness to have solar photovoltaic equipment installed.
3. Engage with Grassland restoration groups, Indigenous Nations, and conservation entities to determine how best to integrate reclamation of these sites.
4. Engage with Fortis and share selected sites to determine interconnection eligibility
5. Engage with Provincial, Federal, and alternative funders to identify project cost support
6. Engage with large energy users to identify potential offtakes
7. Submit interconnection study request
8. Develop detailed design

These steps can be undertaking and adjusted at the discretion of the MD and local stakeholders.

Appendix A

License Number	Status	Area (m^2)	closest powerline	Distance (m)	carrying capacity (kW)	size potential (MW)
X0000398	RecExempt	8224	502S-425LS	1718	150	0.41
X0000376	RecExempt	6134	396S-41LE	634	<150	0.30
X0000189	RecExempt	1075	799S-181LE	175	<150	0.05
X0000188	RecExempt	1362	799S-181LE	137	<150	0.07
X0000080	RecExempt	5816	502S-425LS	1944	<150	0.29
Waterton Stockpile	Gravel Pit	34393	229S-42LN	959	<150	1.70
Vantol Pit	Gravel Pit	26988	396S-41LE	185	<150	1.33
Tapay Pit	Gravel Pit	37256	396S-41LE	0	<150	1.84
Summerview Pit	Gravel Pit	34455	396S-41LE	0	<150	1.70
Smith Pit	Gravel Pit	61386	799S-181LE	1217		3.03
Scotton Pit	Gravel Pit	98448	799S-181LE	0	150	4.86
Sapeta Pit	Gravel Pit	193870	799S-181LE	0	<150	9.58
Sandshed Stockpile	Gravel Pit	1958	396S-117TS	80	150	0.10
Pine Creek	Gravel Pit	44963	502S-425LS	1017	<150	2.22
Olson Pit	Gravel Pit	119871	799S-181LE	0	150	5.92
O6	Closed	128996	799S-181LE	0	582	6.37
O27	Environmental Reclamation	30408	396S-41LE	574	<150	1.50
O26	Environmental Reclamation	14446	396S-41LE	757	<150	0.71
O23	Environmental Reclamation	17401	396S-41LE	154	<150	0.86
O20	Decommisioning	2924	396S-41LE	810	<150	0.14
O19	Decommisioning	6439				0.32
O15	Decommisioning	7422	396S-41LE	238	<150	0.37
O13	Decommisioning	10969	396S-41LE	0	<150	0.54
O1	Environmental Reclamation	11839	799S-181LE	1900		0.58
McRae Pit	Gravel Pit	78422	396S-41LE	295	<150	3.87

Mcculloch Pit	Gravel Pit	211750	799S-181LE	0	<150	10.46
Mcculloch Pit	Gravel Pit	136863	799S-181LE	260	1217	6.76
Mcculloch Pit	Gravel Pit	28737	799S-181LE	300	<150	1.42
Livingstone Stockpile	Gravel Pit	98444	799S-181LE	252	<150	4.86
Hucik Pit	Gravel Pit	20369	799S-181LE	1374		1.01
Drain Pit	Gravel Pit	24107	799S-181LE	50	150	1.19
DAM #4 Heritage Acres Stockpile	Gravel Pit	48931	396S-41LE	174	<150	2.42
DAM #3A HIWAY 510 Stockpile	Gravel Pit	355967	799S-181LE	477	<150	17.58
Carbondale Pit	Gravel Pit	18145	396S-41LE	2189	<150	0.90
Burles Pit	Gravel Pit	25173	799S-181LE	457	<150	1.24
Burder Pit	Gravel Pit	12542	396S-41LE	0	<150	0.62
B0001168	RecExempt	6860	799S-181LE	181	<150	0.34
A0000206	RecExempt	3452	396S-41LE	94		0.17
A0000052	RecExempt	123	799S-181LE	2815	<150	0.01
0422274	Abandoned	13760	396S-41LE	0	<150	0.68
0358668	RecCertified	14725	799S-181LE	1200	<150	0.73
0354924	Abandoned	767	396S-41LE	156	<150	0.04
0333275	Abandoned	4798	799S-181LE	1200	<150	0.24
0332815	Abandoned	1839	396S-41LE	331	<150	0.09
0329845	Abandoned	617	799S-181LE	1205	<150	0.03
0315756	Abandoned	12948	799S-181LE	1183	<150	0.64
0272551	RecCertified	10466	396S-41LE	0	<150	0.52
0253086	Abandoned	20885	396S-41LE	0	<150	1.03
0208761	Abandoned	26719	396S-41LE	1100	150	1.32
0206236	Abandoned	16981	396S-41LE	0	150	0.84
0202545	RecCertified	2442	799S-181LE	95	<150	0.12
0200092	Abandoned	9779		0		0.48
0186449	Abandoned	582414	799S-181LE	0	<150	28.77
0140522	RecCertified	24321	229S-42LN	1010		1.20

0123333	RecCertified	10297	502S-425LS	76	532	0.51
0115908	RecCertified	9185	396S-41LE	695		0.45
0099824	RecCertified	27653	396S-41LE	526	150	1.37
0098432	RecCertified	17431	396S-41LE	3666	150	0.86
0091782	RecCertified	52366	502S-425LS	1154		2.59
0089908	RecCertified	44631	396S-41LE	667	<150	2.20
0087583	Abandoned	18895	396S-41LE	2176	150	0.93
0086279	Abandoned	12495	502S-425LS	0	150	0.62
0075282	Abandoned	25985	502S-425LS	632	150	1.28
0055503	RecExempt	18017	502S-425LS	4238	<150	0.89
0053726	RecCertified	32847	502S-425LS	267	150	1.62
0052408	Abandoned	206	799S-181LE	1864	<150	0.01
0036814	RecExempt	5175	502S-425LS	13370	<150	0.26
0030213	RecCertified	18122	502S-425LS	1726	150	0.90
0026825	RecCertified	1873	502S-425LS	37	2753	0.09
0025093	RecCertified	22601	502S-425LS	1457	150	1.12
0022216	Abandoned	20714	502S-425LS	0	<150 kW	1.02
0021309	RecExempt	7237	502S-425LS	2353	<150 kW	0.36
0021146	RecExempt	10211	396S-41LE	706	150	0.50
0020715	RecExempt	5290	396S-41LE	1579	150	0.26
0020550	Abandoned	12253	502S-425LS	339	150	0.61
0020531	Abandoned	31002	502S-425LS	102	150	1.53
0020361	RecExempt	15916	502S-425LS	0	150	0.79
0019264	Abandoned	12553	502S-425LS	3377	150	0.62
0017681	RecCertified	16761	502S-425LS	680	2774	0.83
0016720	RecExempt	24723	502S-425LS	746	532	1.22
0015899	RecCertified	26167	502S-425LS	411	4356	1.29
0015296	RecExempt	17620	396S-41LE	163	150	0.87

0015028	Abandoned	19832	502S-425LS	993	150	0.98
0014970	RecCertified	22899	502S-425LS	797	150	1.13
0013351	Abandoned	8675	502S-425LS	0	1876	0.43
0010748	Abandoned	20442	396S-41LE	929	<150 kW	1.01
0009434	RecExempt	19122		670	<150 kW	0.94
0004465	Abandoned	25502	396S-41LE	270	<150 kW	1.26

References

[1] "How are wells abandoned? | Alberta Energy Regulator." Accessed: Dec. 29, 2024. [Online]. Available: https://www.aer.ca/understanding-resource-development/project-life-cycle/suspension-and-abandonment/how-are-wells-abandoned

[2] "Orphan Well Association | Home." Accessed: Dec. 29, 2024. [Online]. Available: https://www.orphanwell.ca/

[3] "Fixed tilt vs Single axis solar racking mounting." Accessed: Dec. 29, 2024. [Online]. Available: https://www.polarracking.com/blog/fixed-tilt-vs-single-axis-solar-racking-mounting/

[4] "PVWatts Calculator." Accessed: Dec. 29, 2024. [Online]. Available: https://pvwatts.nrel.gov/index.php

[5] "Well Status | Alberta Energy Regulator." Accessed: Dec. 30, 2024. [Online]. Available: https://www.aer.ca/data-and-performance-reports/data-hub/well-status

[6] "AER Abandoned Well Map Viewer." Accessed: Dec. 30, 2024. [Online]. Available: https://extmapviewer.aer.ca/AERAbandonedWells/Index.html

[7] "Site-specific Inventory | Orphan Well Association." Accessed: Dec. 29, 2024. [Online]. Available: https://www.orphanwell.ca/inventory/site-specific-inventory

[8] "Inventory Across Alberta | Orphan Well Association." Accessed: Dec. 30, 2024. [Online]. Available: https://www.orphanwell.ca/inventory/inventory-across-alberta

[9] "Hosting Capacity Map." Accessed: Dec. 29, 2024. [Online]. Available: https://www.fortisalberta.com/customer-service/get-connected/generation/hosting-capacity-map