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ASX Announcement
23 September 2021

FINAL SUBMISSIONS TO THE COAL POLICY COMMITTEE

KEY POINTS

- Delivery of Atrum's final submissions to the independent Coal Policy Committee (CPC), including a direct response to misleading assertions contained in select third party submissions. Recommendations of the CPC scheduled to be delivered to the Minister by 15 November 2021
- MOU executed with neighbouring project, Cabin Ridge, to work collaboratively to increase Indigenous project participation and promote socio-economic development and self-determination for communities
- Continued support for the Responsible Mining Initiative, presenting facts and science with respect to metallurgical coal mine development and operation.

Atrum Coal Limited (ASX: ATU) (**Atrum** or the **Company**) provides an update on recent events with respect to coal policy development in Alberta and the Company's aspirations to increase Indigenous project participation.

Final submissions to the independent Coal Policy Committee

The Company has made its final submissions to the independent Coal Policy Committee (**CPC**) as follows (which are included at the end of this document as Appendices 1 to 3):

- outline its recommendation for the design of a new coal development policy in Alberta ('ATRUM, Coal Policy Committee Submission.pdf');
- directly address misleading or inaccurate assertions in the submissions of select third parties to the CPC ('CPC – Atrum Coal Response to Misleading Assertions 210919.pdf'); and
- outline a vision (prepared with Cabin Ridge) to work with Indigenous communities in steelmaking (metallurgical) coal development ('Atrum Coal_Cabin Ridge_Indigenous Communities_Partners in Steelmaking Coal Development.pdf')

The first submission listed ('ATRUM, Coal Policy Committee Submission.pdf') is available at the Coal Policy Committee document library at https://your.alberta.ca/22184/widgets/91480/documents.

Building on its initial submission, Atrum's specific policy recommendations are summarised below.

Alberta has the opportunity and the responsibility to support both the environment and the economy. Science, technology, and strong legislative and regulatory framework have greatly surpassed the intent, purpose, and value of the coal Categories created in 1976.

A new coal policy should adopt a new land classification system that would continue to protect lands while enabling individual projects to be assessed on their own merits against existing and evolving regulatory frameworks:

<u>Non-Development Zone 1</u>: A resource ineligible zone where no resource development is allowed.

<u>Potential Development Zone 2</u>: A resource regulated zone where resource projects may be considered based on the merits of the individual project as permitted by regulators.

In consultation with existing leaseholders, Indigenous communities, and other stakeholders, these zones could be drawn to expand and protect additional lands while simultaneously allowing Alberta to build its economy.

Such a distinction would add clarity, provide certainty, reduce conflict, leverage science and technology, diminish red tape and increase the area of environmentally protected lands. This is achievable by applying world-leading environmental governance to the foothills and other terrain now subjectively assigned to Categories 2 to 4.

Recommendations by the committee are to be released by 15 November 2021.

Indigenous engagement and cooperation

Atrum has executed a Memorandum of Understanding (**MOU**) with neighbouring project proponent, Cabin Ridge. This MOU outlines a plan to work collaboratively in bringing an innovative approach to promote reconciliation, socio-economic development and self-determination for Indigenous communities. A model is proposed that enhances participation and benefits to Indigenous parties via their significant involvement in development, execution and post-closure activities, and commercial opportunities associated with, the respective Elan and Cabin Ridge projects.

Atrum continues to engage constructively with Indigenous communities regarding this vision for modern, responsible metallurgical coal development that focuses on environmental protection and long-term water and land stewardship.

Responsible Mining Initiative

Atrum continues to support the activities of the Responsible Mining Initiative (**RMI**). The RMI was launched earlier this year with the objective of presenting facts, science and key detail to Albertans with respect to modern mining, environmental protection and reclamation practice. It was introduced, in part, to counter misinformation being spread through the community with respect to various mine development practices.

The key content of the RMI can be found at www.responsiblemining.ca.

Atrum Managing Director and CEO, Andy Caruso, commented:

"Atrum has spent the last six months speaking with stakeholders about their thoughts on metallurgical coal development in southwestern Alberta. We wanted to ensure that we addressed not only the opportunities present in a future metallurgical coal industry in Alberta but also any concerns raised by Albertans.

"We put forward the position that a future policy should be balanced, embracing strong environmental regulations with an ability to promote responsible resource development.

"Steel continues to be in great demand globally, it is vital to our everyday lives and is a significant component in building green energy generation facilities including wind turbines and solar farms. A metallurgical coal industry in southwestern Alberta can bring economic benefits to the Crowsnest Pass region as well as to Canada, providing jobs, royalties, and tax revenues."

This ASX release was authorised on behalf of the Atrum Board by:

Andrew Caruso, Managing Director and CEO

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APPENDIX 1 – ‘ATRUM, Coal Policy Committee Submission.pdf’

COAL POLICY SUBMISSION

Submitted by Atrum Coal

Abstract

A new Coal Policy for Alberta is needed. Outlined are reasons to replace the original land Categories, suggestions that will simplify land categorization, and concepts which will increase the number of hectares of protected lands. Also summarized are approaches to modern mining that mitigate land reclamation worries, environmental concerns and water treatment.

Andy Caruso

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EXECUTIVE SUMMARY

The need for a new coal policy is certain.

The original 1976 Coal Development Policy is a planning document that recognized the importance of development and environmental protection. While it was a suitable planning document for the time, the policy itself did not evolve with a changing world. Factors such as enhanced legislation and regulation, and advances in science and technology need to be considered in a new coal policy.

We recognize this a coal policy review with the intention to acknowledge the science, but not to evaluate it. The determination and evaluation of the science and associated data sets should remain with the respective regulatory agencies, namely the Alberta Energy Regulator and the *Impact Assessment Agency* (Canada).

Our general policy recommendations can be summarized as follows:

- A new coal policy should reference environmental protections currently enabled by the Government of Alberta and Government of Canada and how those existing pieces of legislation and regulation ensure the ongoing protection of water and landscapes.
- A new coal policy should seek to inform Albertans and establish confidence that a robust regulatory construct, with strong oversight and enforcement, is in place to ensure environmentally responsible development.

Our specific policy recommendation for a new coal policy is to replace the current category system with a two-zone system:

- Non-Development Zone where resource projects may never be developed.
- Potential Development Zone where resource development may be permitted by regulators such as Alberta Environment, Alberta Energy, and the Government of Canada where applicable.

This approach removes generalizations from the 1976 Coal Development Policy that appear to be based strictly on geography and historical disturbance. Moreover, the provision of two distinct land classifications would support a path of clarity and one that would reduce the potential for conflict through misinterpretation of associated pieces of legislation.

We acknowledge a singular responsibility to protect the environment and welcome the opportunity to provide responsible economic opportunities for all Albertans. Developing a new coal policy that addresses key concerns and corrects common misconceptions can achieve these objectives.

1. Who is Atrum?

Atrum Coal Ltd (Atrum) is a public company listed on the Australian Securities Exchange (ASX), focused on metallurgical coal exploration and mining. In March 2018, Atrum acquired Elan Coal Limited (Elan), a private Alberta corporation which is now a wholly owned subsidiary of Atrum. In 2012, Elan had lodged coal lease applications in Alberta, including the Elan Hard Coking Coal Project (the Elan Project) located in the Crowsnest Pass area of southern Alberta.

Atrum is a responsible exploration and development company and in all our projects, we are committed to land stewardship and minimizing our environmental footprint.

At Atrum, incorporating community and Indigenous knowledge in all phases of the mining life cycle is central to our projects. Our approach is reinforced by sustained, open and transparent communication with communities and government to uphold the highest standards in the resources industry.

We are strongly committed to the wellbeing of employees, contractors, and communities in which we work. Safety is the first and foremost priority of Atrum. During our exploration phase, we have implemented practices and policies ensuring all activities at our work sites are consistently undertaken in the safest manner possible.

We are proud to be part of Alberta. Our employees live and raise families here. We work in the places where we live and play. We will never allow that work to put these places at risk.

2. History and Tenure

The Elan Project area (**Figure 1**) is located approximately 40 kilometers north of Coleman, Alberta and proposes a mine site based on the Isolation South coal deposit covering approximately 2,000 acres (800 hectares).

The Elan Project area is situated entirely on Crown land. The land is typically uninhabited forested areas and does not fall within any National or Provincial park boundaries. Forestry operations and oil and gas activities occur within and adjacent to the proposed project area.

The Elan Project land tenements are registered with Elan, our wholly owned subsidiary. The tenements, referred to as coal agreements (A13 agreement type), were issued by the Government of Alberta to Elan Coal Ltd between 2012 and 2013. The coal agreements, which initially were coal lease applications, provided the right to exclusively explore the land for a period of 15 years, with an option to extend at expiry. In 2020, the Government of Alberta converted those historical applications to leases. See Appendix A for a detailed listing of Elan's land Tenure.

Elan currently holds the exploration rights to approximately 45,380 hectares (~113,450 acres), with approximately 800 hectares (~2,000 acres) being considered for an initial viable development opportunity to mine the Isolation South coal deposit.

Clearly, coal leases do not necessarily mean coal mines will be developed. As with oil and gas, exploration and subsequent feasibility studies are required to determine whether the resources owned by Alberta can be responsibly and economically developed.

3. Elan Project

The Elan Project comprises two main areas, the Isolation South coal deposit which is being considered for initial development and the Elan South coal deposit.

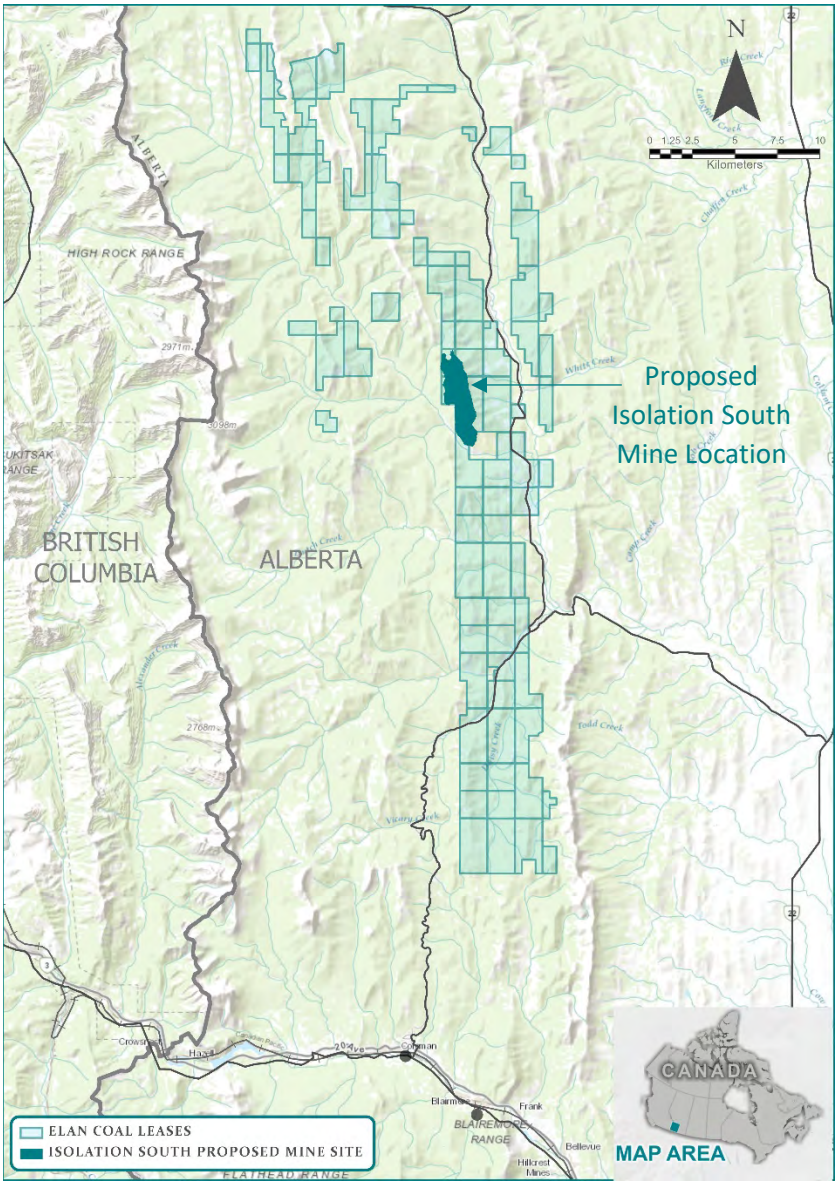


Figure 1: Elan Project area map – Southern Alberta

Since the acquisition of Elan three years ago, Atrum has invested approximately $40 million in exploration and preliminary engineering activities for the Elan Project. A Scoping Study was completed in April 2020 and an updated Scoping Study was completed in December 2020. As a result of the significant exploration and field work that we have done over the last three years, Atrum has established that the Elan Project is home to an estimated 486 million tonnes (Mt) of metallurgical coal (7 Mt of which is classified as "Measured" in accordance with JORC (Joint Ore Reserves Committee – the Australian resources reporting standard), 228 Mt of which is classified as "Indicated" and 252 Mt of which is classified as "Inferred").

Comprehensive quality testing, combined with review of substantial historical test-work data for the broader Elan Project, has confirmed Tier 1 Hard Coking Coal (HCC) quality. Ultimately, through this extensive body of work, Atrum has validated the resource and infrastructure components for a world class project with a Net Present Value in the order of C$1 billion.

Of importance are the high level direct economic benefits that will accrue to the people of Alberta. The estimated annual expenditures will be in the order of C$400 million with a large proportion being contributed locally through royalties, taxes, wages, sub-contracting, equipment, and operational consumables, that will yield specific support to Albertan businesses and communities over a currently estimated ~20-year life of mine for the initial Elan Project. During operations approximately 350-400 people will be directly employed, mostly drawn from local municipalities and Indigenous communities, with further indirect job creation in the order of 3 times that number.

The Elan Project is only mineable as a surface mine. Underground mining is not economically feasible for most metallurgical coal deposits in Alberta due to the complex nature of the folded coal seams. It is in most cases, the folded nature of the seams that makes them viable as it thickens the coal which enables safe and economic extraction.

Atrum have completed detailed coal quality testing as part of our development initiatives. This detailed testing provides confirmation that the Elan South and Isolation South project areas host a high-quality metallurgical resource, commonly associated with the western Canadian Mist Mountain formation.

Atrum's coal quality testing was conducted using core samples from over 35 exploration holes, providing confidence that the resource can deliver a mid to low volatility coal that has historically received a premium valuation compared to other, globally sourced coals.

Alberta maintains some of the most comprehensive environmental protections in the world and as a company, we welcome this rigorous regulatory control. The successful rehabilitation of mines in the Hinton area of Alberta demonstrates the efficacy of this regime and confirms that, with the right combination of regulation and modern mining methods, environmentally responsible coal mining operations can be conducted. We have embraced Alberta's comprehensive environmental regime and have planned to execute the Elan Project in accordance with the requirements of the relevant Provincial and Federal agencies. Environmental impact assessments and their associated review processes will ensure that the Elan Project, if approved, will mitigate the potential impacts of surface mining, and that the site is properly rehabilitated as early as possible in accordance with the plan approved by the relevant authorities.

Furthermore:

- Total disturbance planned for our Elan project represents an insignificant percentage of total Category 2 lands, while restoring the site to comparable topography;
- We aim to minimize the Elan Project footprint and cumulative impact where possible, including investigating the sharing of existing and new infrastructure with other entities; and
- The Elan Project aims to offset its carbon footprint over the lifetime of the project. We are currently working on a number of solutions to minimize our carbon footprint, including the use of lower carbon fuels, renewable electricity and electrification of our mobile mining fleet.

4. Metallurgical Coal vs Thermal Coal

There are two different types of coal, each with a distinct purpose. The Elan resource is metallurgical (or steelmaking) coal.

Metallurgical coal or steelmaking coal is used in the oxygen furnace process for the manufacture of steel. Steel is essential to modern life and global socio-economic development. It is used to build homes, schools, offices, factories, ships, trucks, cars, buses, bridges, railways, medical equipment, food processing facilities, household appliances, and many more items. Steel is also critical in building renewable energy infrastructure projects such as wind turbines and solar panel frames, as well as the manufacture of electric and low emission vehicles. It is a critical ingredient in the world's push towards a greener economy and a carbon neutral future.

The ethical sourcing of metallurgical (steel making) coal (and therefore steel) is also a key consideration. Alberta metallurgical coal is of the highest quality and as a result, is more efficient to use and requires less coal per unit of steel produced which leads to lower global CO_2 emissions. Suppliers competing to provide metallurgical coal include Russia, China and smaller producing nations which do not have stringent environmental protections or requirements to protect the rights and interests of Indigenous communities and will produce lower quality coal than Alberta. Without Alberta metallurgical coal, these alternative suppliers will meet the growing market demand.

Thermal coal or steaming coal is burned to create steam to drive turbines that generate electricity and/or heat.

5. Existing Coal Policy

A Coal Development Policy for Alberta (the 'Coal Policy') was originally published in 1976. While some legislation was enacted prior to that time, many additional pieces of legislation and regulation were introduced afterwards (see **Figure 12**). The scope of the Policy was wide-ranging and included, among other items, a land use classification system. The Coal Policy divided the province into 4 Categories which guided where and how coal leasing, exploration and development could occur. The four Categories, as taken from the Coal Policy are:

- Category 1, in which no exploration and development will be permitted. This Category includes National Parks, present or proposed Provincial Parks, Wilderness Areas, Designated Recreation Areas, Wildlife Sanctuaries, etc.

- Category 2, in which limited exploration is desirable and may be permitted under strict control but in which commercial development will not be considered *at the present time* (emphasis added). This Category includes lands in the Rocky Mountains and foothills *for which the preferred land use remains to be determined* (emphasis added).

- Category 3, in which exploration is desirable and may be permitted under appropriate control. This Category includes northern forested region and eastern portions of the Eastern Slopes.

- Category 4, in which exploration may be permitted under appropriate control. This Category includes all areas of the province not covered by the other 3 Categories.

The Coal Policy was rescinded, effective June 1, 2020, in order to align coal development and permitting activities, including tenure, with the rigorous oversight and regulatory processes in

place for other resource commodities. The Government of Alberta fully reinstated the Policy on February 8, 2021.

The Coal Policy did not, and does not, preclude the development of surface mines in Alberta. As recently as May 2016, NDP Energy Minister Margaret McCuaig-Boyd provided direction to the Alberta Energy Regulator, supporting surface mining on Category 2 lands. "The coal Category 2 designation does not preclude surface mine development. The Coal Policy states that surface mining of coal 'would not normally be considered' because, in 1976, the land use had yet to be determined, infrastructure was lacking or absent, and/or there are local areas of environmental sensitivity."[1]

At the time, Ram River Coal Corporation was seeking clarity about coal development on Category 2 land. Minister McCuaig-Boyd, in her direction to the Alberta Energy Regulator, further recognized the subsequent implementation of regional and subregional planning documents, and how those modern planning tools further define how resource development can occur. She closed her direction letter to the AER with, "While we will continue to work on regional and subregional planning for this and other areas, these processes are not intended to prevent developments that make sense."[1]

Examples of such regional and subregional planning can be found in the South Saskatchewan Regional Plan (SSRP), administered by the Alberta Government, to guide human development on public land. Through regional planning, as well as other initiatives, Alberta is shifting to a more effective and efficient management system that considers the cumulative effects of all activities and improves integration across the economic, environmental, and social pillars.

The Livingstone-Porcupine Hills Land Footprint Management Plan is also contained within the SSRP. Albertans clearly identified a priority of the Livingstone area and the Porcupine Hills as having high values for components such as headwaters, west slope cutthroat trout, fescue grasslands, and recreation opportunities. Opportunities for the responsible development of natural resources, tourism, and recreational activities are maintained as outlined in the objectives and strategies in the SSRP.

6. 1976 Coal Policy Categories vs. Metallurgical Coal Resources

The bituminous (or metallurgical) coal trend in Alberta parallels the Rocky Mountains as shown on **Figure 2**. Coal to the west the bituminous trend is metallurgical, coal to the east is thermal.[2]

[1] Letter written by Energy Minister Margaret McCuaig-Boyd dated May 24, 2016.
[2] AER Report ST-31.

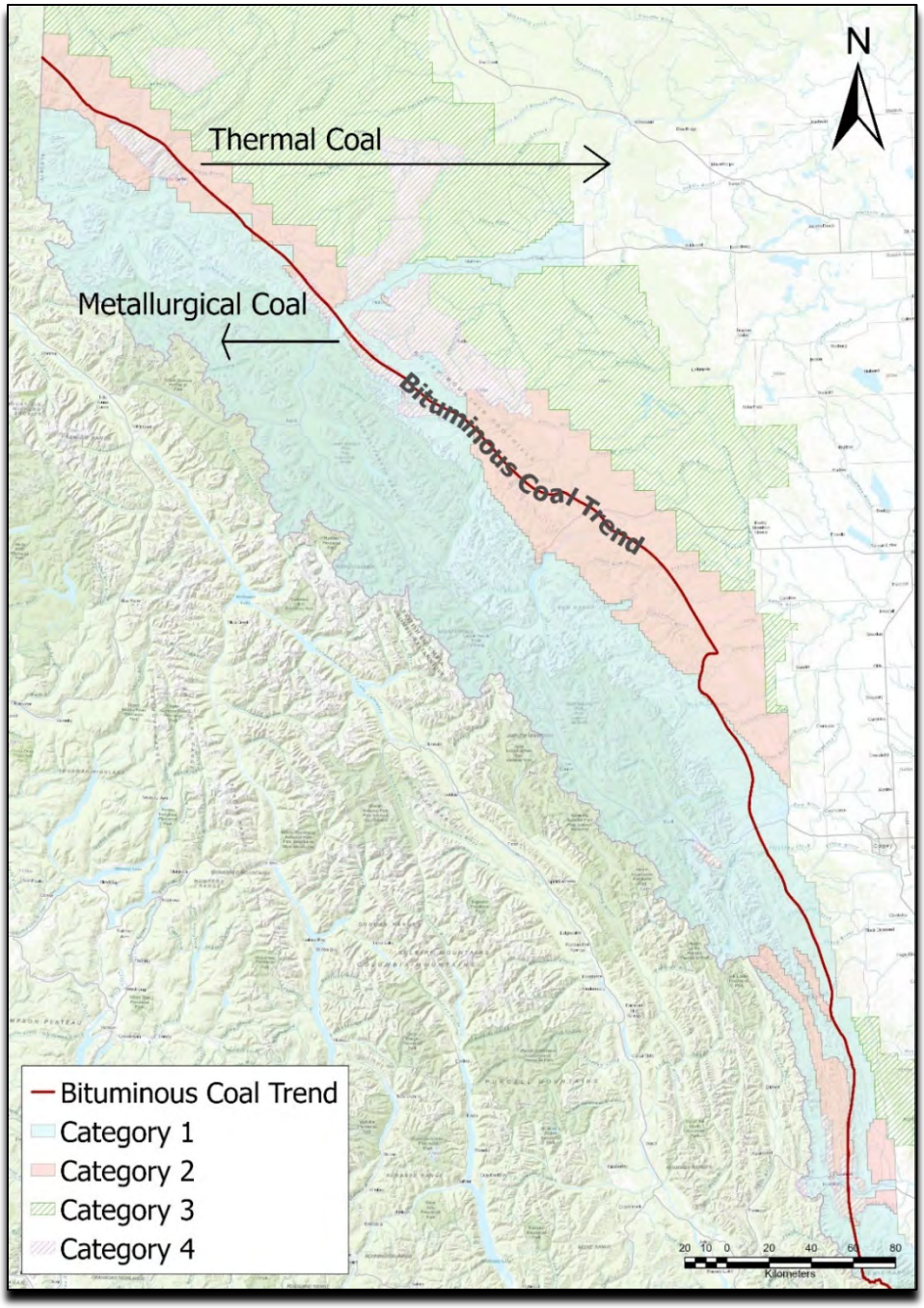


Figure 2: Metallurgical Coals vs. Thermal Coals[2]

As shown in **Figure 3**, known metallurgical coal deposits that have been catalogued by the Alberta Government occupy a small subset of the Categories 1, 2 and 4, with no metallurgical coal potential within Category 3.[2]

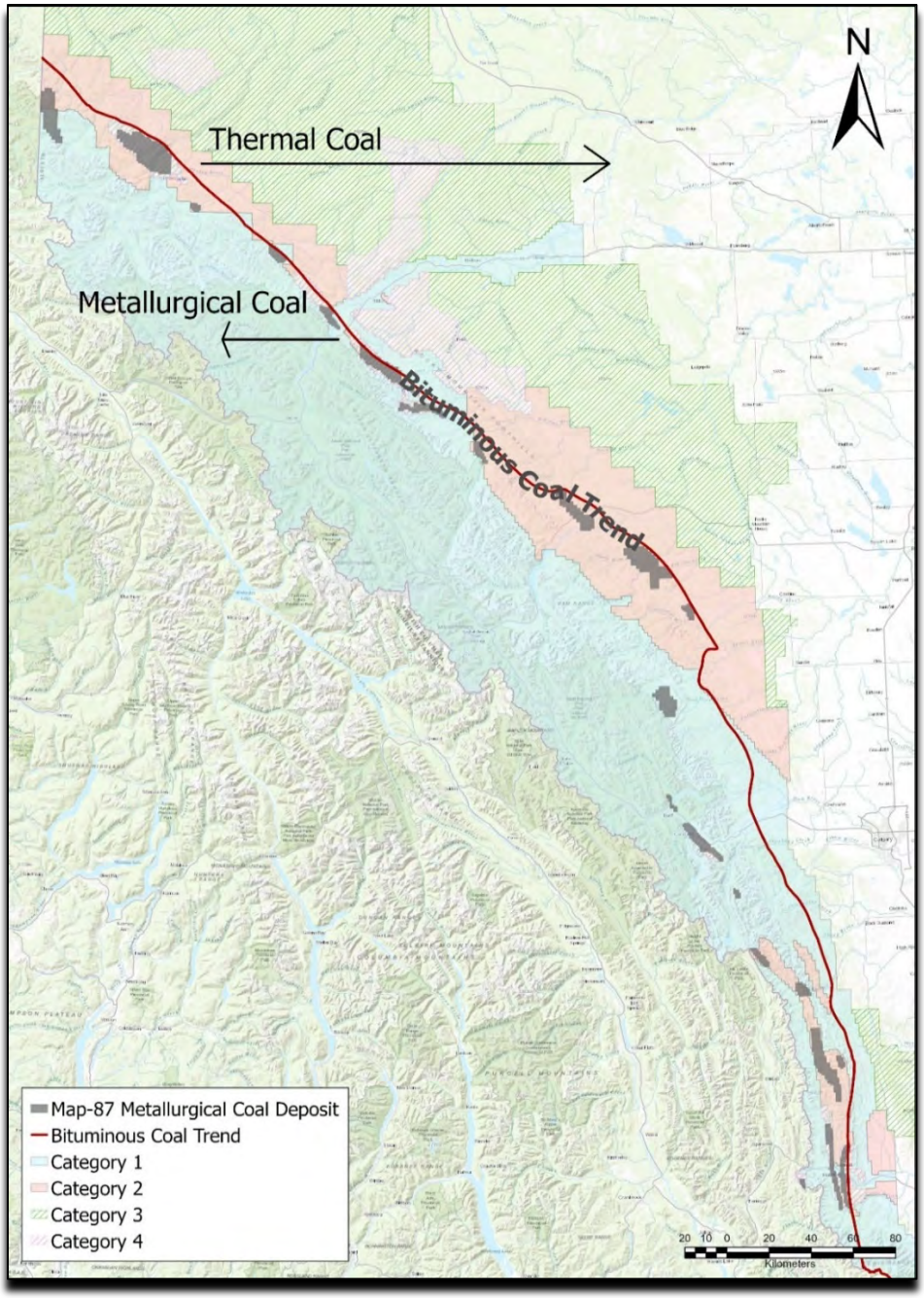


Figure 3: Metallurgical Coal Deposits vs. Categories[2]

Category 1 currently comprises some 4.15 million hectares of protected land that expressly prohibits coal exploration and development. This Category includes the environmentally sensitive and snow-capped peaks that are symbolic of Alberta. Identified metallurgical coal deposits within Category 1, as catalogued by the Alberta Government, encompass some 35,310 hectares which is less than 1% of Category 1 lands. Given the environmental sensitivity, these resources will likely never be developed.[2]

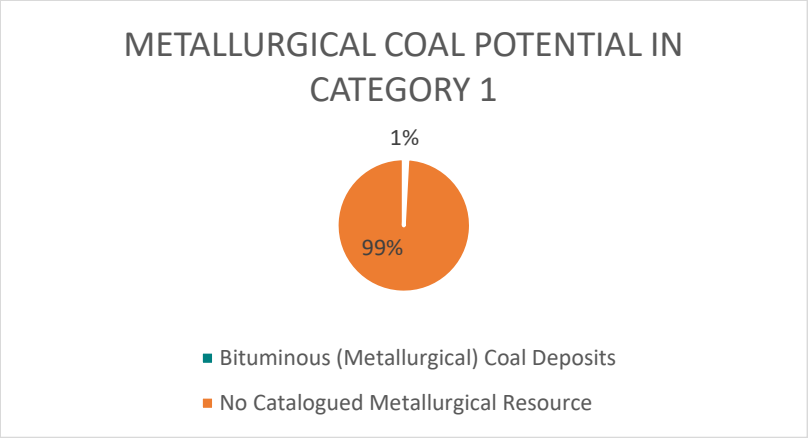


Figure 4: Category 1 Coal Deposits[2]

Category 2 currently comprises some 1.5 million hectares of land. Identified metallurgical coal deposits within Category 2, as catalogued by the Alberta Government, encompass some 75,321 hectares (or 5% of Category 2 lands).[2]

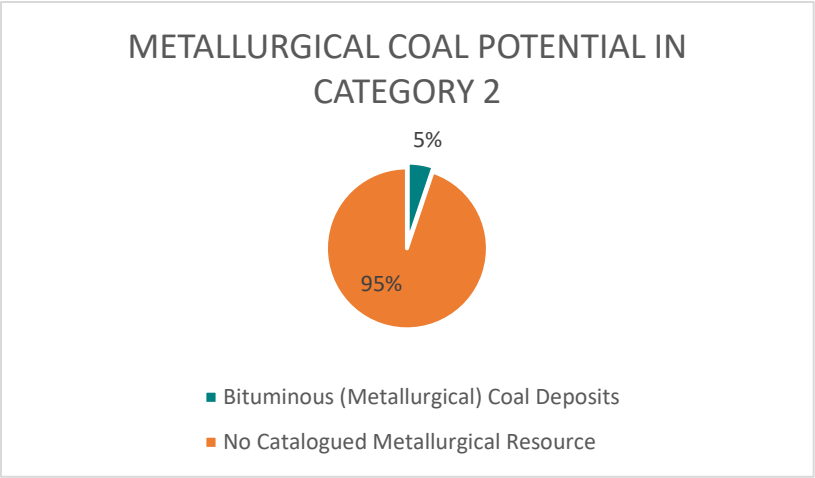


Figure 5: Category 2 Coal Deposits[2]

Category 3 currently comprises some 3.3 million hectares of land. There are no known metallurgical coal deposits within Category 3, as catalogued by the Alberta Government.[2]

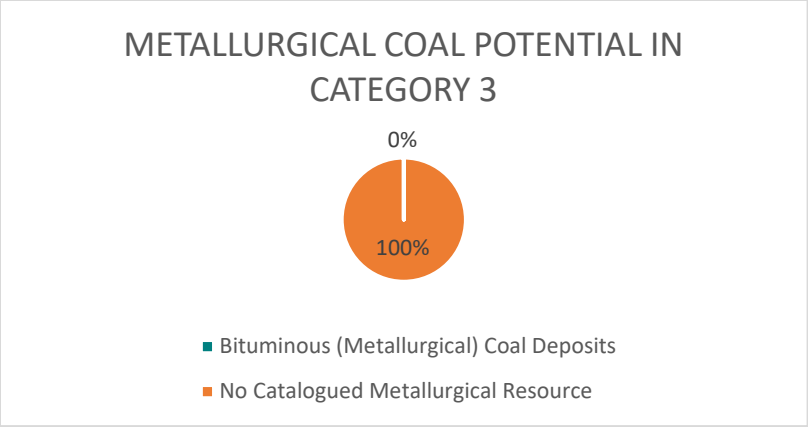


Figure 6: Category 3 Coal Deposits[2]

Category 4 currently comprises some 533,300 hectares of land. Identified metallurgical coal deposits within Category 2, as catalogued by the Alberta Government, encompass some 66,409 hectares (or 12% of Category 4 lands).[2]

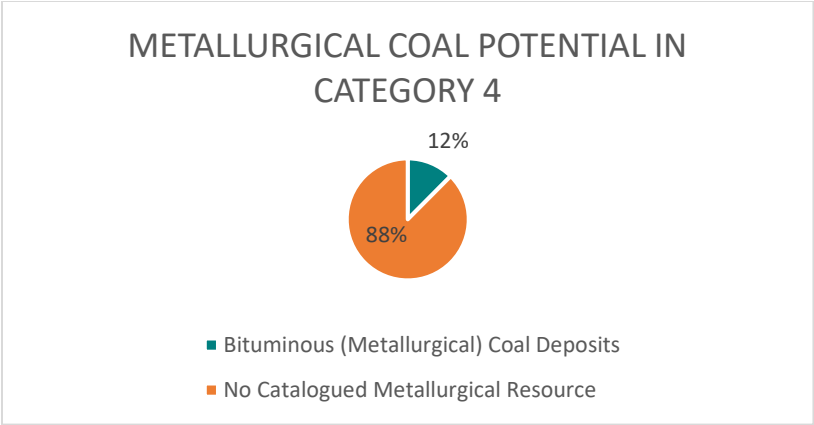


Figure 7: Category 4 Coal Deposits[2]

The Alberta Government has previously recognized the value of metallurgical coal to Albertans and has granted exemptions approving leases and licences since the 1976 Coal Development Policy was enacted.

In November 2009, the Alberta Government authorized the Energy Resources Conservation Board (ERCB) to grant an amended permit to Grand Cache Coal Corporation to develop the No. 8 surface mine site. In July 2011, Grand Cache Coal was again granted an amended mine permit and a new mine licence by the ERCB to commence development of its new No. 12 South B2 operation. The locations of both development sites, No. 8 and No. 12 South B2 are located on Category 2 land.

In 2016, Ram River Coal was allowed to permit a surface mining project on Category 2 land in west-central Alberta, with clear direction from the Alberta Government that the 1976 Coal Policy did not preclude development of surface mines on Category 2 lands.

7. Shortcomings of the Existing Category System

i) No recognition of environmental similarity between Category 2 and Category 4 lands.

There is no material difference between Category 2 and Category 4 lands from an environmental perspective. As further described below, both Categories have similar environmental considerations, topographies, and species at risk concerns, yet Category 4 development is not subject to the same restrictions as Category 2 development.

Maintaining the notion that Category 2 and Category 4 lands are somehow environmentally different does not facilitate the orderly and responsible assessment, permitting and development of resource projects.

It appears that Category 4 was created to capture what would have been Category 2 lands if there had not been historical activity on the land.

Table 1 compares the area covered by environmentally sensitive and species at risk by Category of land:

Table 1: Environmental Considerations for Category 2 and Category 4 Lands[3]

	Grizzly Bear Range	Critical Habitat of Aquatic Species at Risk	Key Wildlife and Biodiversity Zones	Mountain Goat and Sheep Areas
Category 2	95%	2%	21%	14%
Category 4	93%	1%	16%	10%

The following aerial images further highlight the similarities between Category 2 and Category 4 lands.

[3] Government of Alberta shapefiles: Key Wildlife Layers and Critical Habitat of Aquatic Species at Risk.

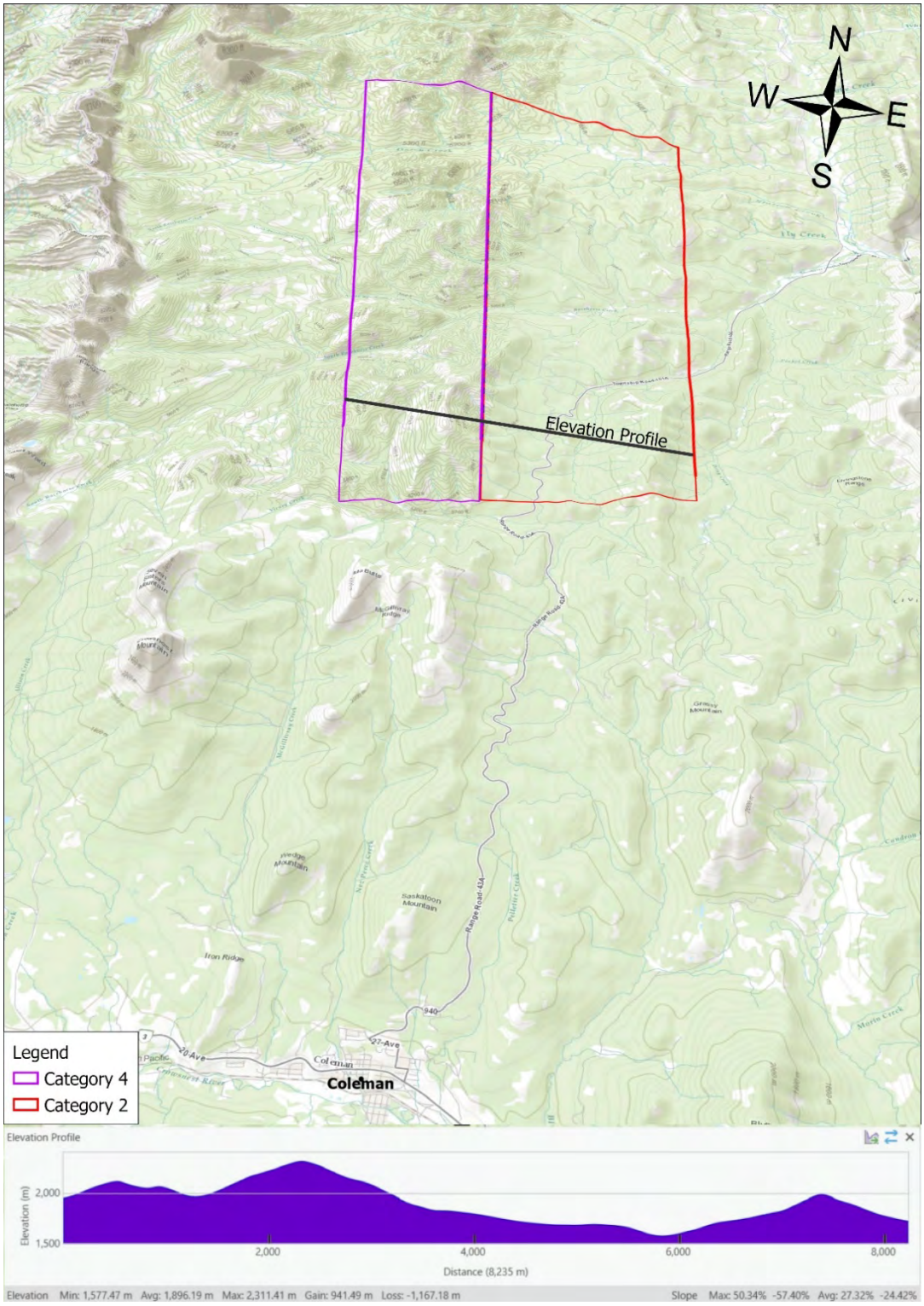


Figure 8: Southern Alberta Category 2 vs. Category 4

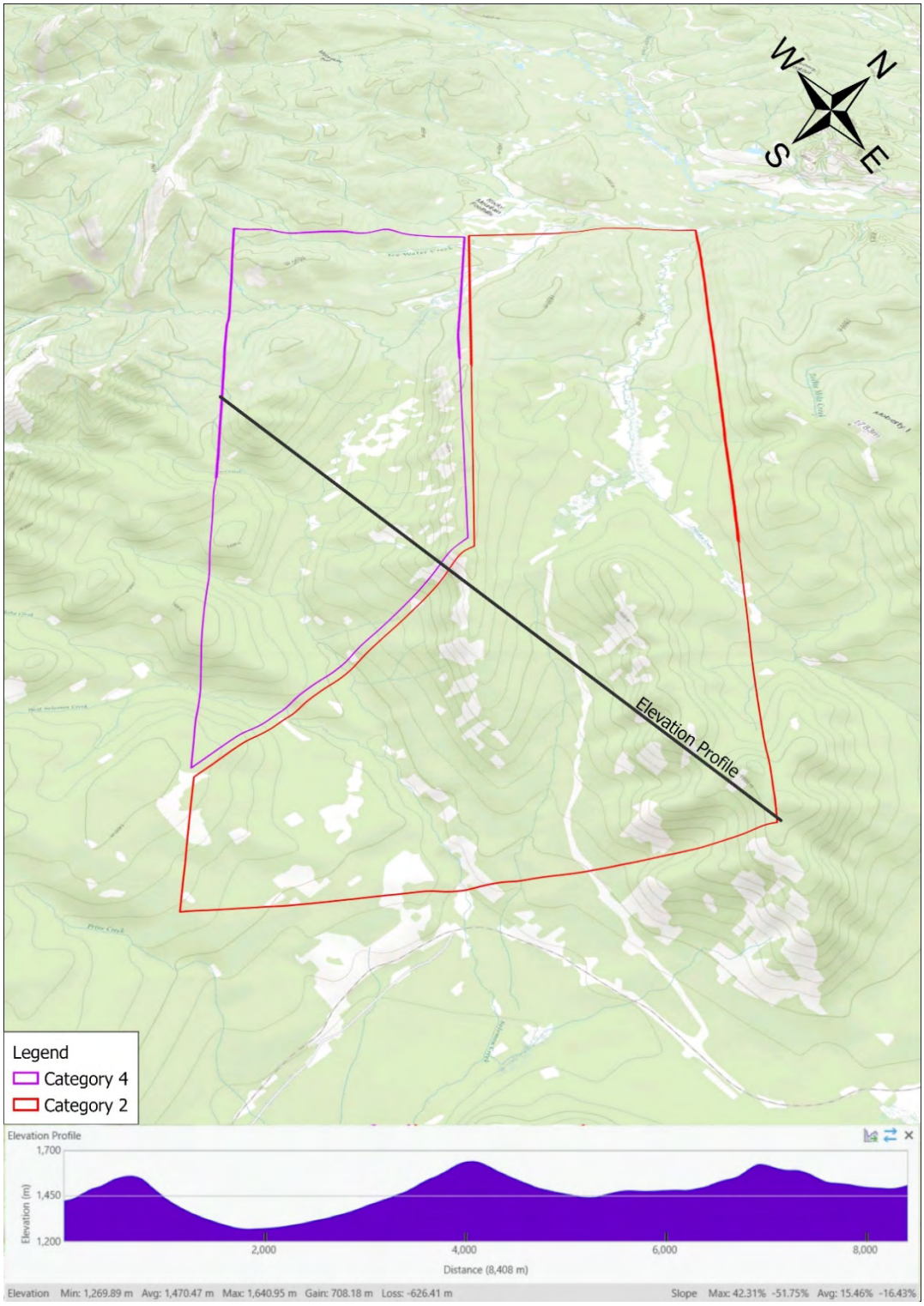


Figure 9: Central Alberta Category 2 vs. Category 4

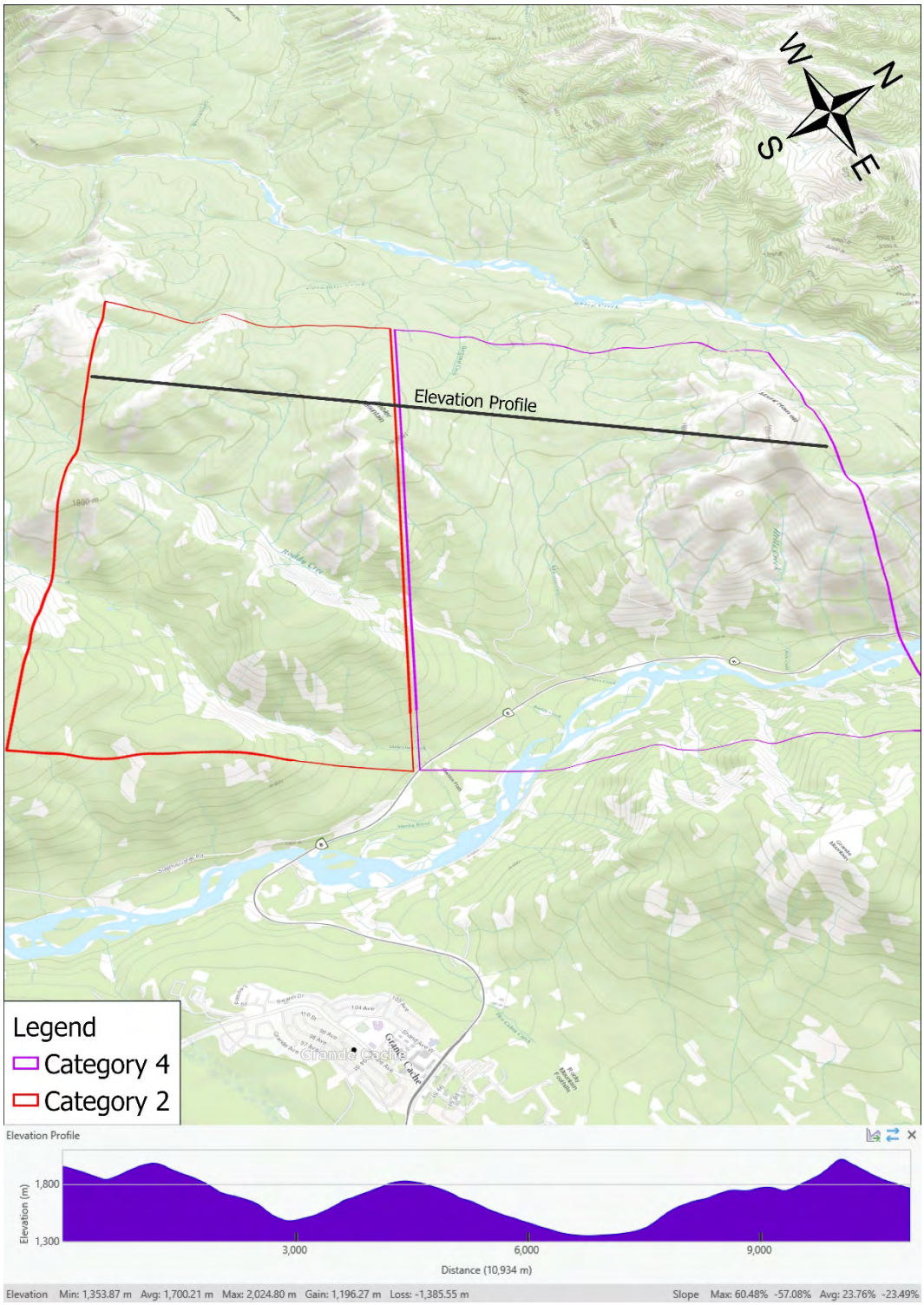


Figure 10: Northern Alberta Category 2 vs. Category 4

ii) No recognition of individual project impacts, mitigation, management, and approach. Each project possesses unique development opportunities requiring individual consideration of its potential benefits and challenges.

For example, the existing Category system does not differentiate between a project on Category 2 lands that may have lower cumulative environmental effects than a project on Category 4 lands.

Each project should be viewed on its own merit and not based on an artificial land Category determination that does not gauge the strengths and weaknesses of proposals to develop land which holds metallurgical coal potential. Alberta's exceedingly high regulatory bar should be rigorously applied to project proposals. Artificial land categorizations do not benefit the environment or the economy – or Albertans who are the owners of these resources.

iii) No recognition for modern responsible mining practices that include use of shared infrastructure (reduced footprint), progressive rehabilitation (reclaiming as mining advances), post-mining land use planning, development, and enforcement (that protect future multi-generational land use), and water treatment (selenium capture and sequestration).

The mining industry has evolved greatly since the original Coal Policy was introduced. Advances in process monitoring, controls, and technology, along with responsible development and strong environmental protection measures should factor into every decision related to development of resources.

Consistent with the requirements of the *Environmental Protection and Enhancement Act*, a closure plan must be developed to detail the transition of the site from mining to its post-mine productive land use. Progressive rehabilitation is applied during resource development; meaning when one phase of mining is completed, reclamation begins immediately.

The goal of rehabilitation and reclamation is to return the land to a state that fits local surroundings. This includes ensuring the range of vegetation (including forage and rare plant species), and a range of forestations (including sensitive species) are put in place in an optimum way, which can be achieved with the input of local communities and Indigenous bands. Modern reclamation plans also provide for multi-generational use of reforested and range lands, where ungulates, birds, bats, and other wildlife will thrive.

Modern mining has also established state-of-the-art methods for water treatment that includes the capture and sequestration of selenium and nitrates. Each step in the site water management process is designed to properly isolate and treat water that comes into contact with mining activities. Technology ensures that any water released to the environment meets the stringent surface water quality guidelines established by provincial and federal regulators.

In addition, the potential for the use of shared infrastructure between projects could result in a reduced overall land disturbance and reduced overall cumulative effects. Shared infrastructure could be applicable to many stages in the mining process including common waste rock storage, common processing, common transportation infrastructure, and common utilities infrastructure.

iv) No recognition of modern, post-1976 Coal Policy regulations that protect the environment while ensuring responsible development.

In 1976, when the Coal Policy was written, the authors understood that any number of advances could support responsible development of this resource. Specifically, the authors of the Coal Policy considered '… technology which has yet to be developed.' Modern mining has evolved, along with much more stringent regulations ensuring responsible resource developments. With an eye to future use and development, the existing Coal Policy further states, 'An energy source of his magnitude cannot be ignored or remain undeveloped indefinitely.'[4]

In addition, the original Policy provides no consideration for the current enhanced legislation and regulations, and the specific enforcements provided therein. The Coal Policy contains some wording with respect to land use, rights, etc., however the more recent individual pieces of legislation with their associated regulations provide stronger oversight. *There are over twenty (20) distinct pieces of legislation and/or regulation directly applicable to mining with each providing clear guidance for the protection of the environment.* For a partial listing of the specific legislation applicable to mining, please refer to Section 11 of this submission.

v) No recognition of the limited metallurgical coal occurrences on Category lands.

Metallurgical coal is not widespread across all of Alberta. The resource is only present in limited areas with specific geological conditions. For high-quality metallurgical coal to exist, there must be a more structured geological setting along with temperature and pressure enabling the creation of such deposits. These specific events have only occurred within a small subset of Category lands in the province.

8. General Policy Recommendations - What Should the Coal Policy Include and Why?

The 1976 Coal Development Policy contains outdated guidelines that do not reflect updated legislation, recent land use planning, advances in science and technology and the environmentally responsible mining methods used today.

Alberta's rigorous legislative and regulatory framework ensuring responsible and sustainable resource development should be applied to all projects regardless of land Category.

- A new coal policy must reference and work alongside updated regulations and land use planning while acknowledging technological advancements that support the protection of the environment.
- A new coal policy must ensure existing Category 1 lands remain protected.
- A new coal policy must facilitate the responsible development of metallurgical coal resources on remaining lands without any historical bias.
- A new coal policy must address visual concerns by ensuring the rehabilitated landform does not look out of place in the surrounding landscape.

[4] A Coal Development Policy for Alberta, June 15, 1976

- A new coal policy must address long-term water quality concerns by ensuring water monitoring activities and water treatment facilities operate beyond the life of a proposed mine.
- A new coal policy must acknowledge the existence and importance of modern water treatment practices, while deferring the technical assessment of these practices to the applicable regulators.
- A new coal policy must acknowledge industry advancements that support protection of the environment.
- A new coal policy must provide meaningful opportunities for Indigenous communities, local municipalities and directly effected stakeholders to provide input on the development, operation and ultimately rehabilitation of coal projects.
- A new coal policy can be used to protect existing lands where no metallurgical coal resources exist. This additional protection could encompass approximately 95% of existing Category 2, 3 and 4 lands.

Water quantity for downstream users is already protected by the *Water Act* (Alberta), which supports the existing 'first in time, first in right' priority system. The water priority system in Alberta ensures that existing water users such as municipalities, ranchers, and farmers will maintain the priority of their licenses and always have access to their water allocation ahead of any new development.

9. Specific Policy Recommendations

Alberta has the opportunity and the responsibility to support both the environment and the economy. Science, technology, and strong legislative and regulatory framework have greatly surpassed the intent, purpose, and value of the coal Categories created in 1976.

We respectfully propose that a new coal policy should adopt a new land classification system that would continue to protect lands while enabling individual projects to be assessed on their own merits against existing and evolving regulatory frameworks.

- Non-Development Zone 1: a **resource ineligible zone** where no resource development is allowed.
- Potential Development Zone 2: a **resource regulated zone** where resource projects may be considered based on the merits of the individual project as permitted by regulators.

In consultation with existing leaseholders, Indigenous communities, and other stakeholders, these zones could be drawn to expand and protect additional lands while simultaneously allowing Alberta to build its economy.

Such a distinction would add clarity, provide certainty, reduce conflict, leverage science and technology, diminish red tape and increase the area of environmentally protected lands. This is achievable by applying world-leading environmental governance to the foothills and other terrain now subjectively assigned to Categories 2 to 4.

10. How Do These Recommendations Improve Upon the 1976 Coal Policy?

The recommendations outlined in Section 9 of this submission remove generalizations from the 1976 Coal Development Policy that appear to be based strictly on geography and historical disturbance.

Exemptions have been previously granted on Category 2 lands to facilitate the development of resources. Our recommendations, if adopted, would provide greater clarity and consistency to the environmental characterization of lands hosting metallurgical coal deposits, while allowing projects to be assessed on their individual merits.

Moreover, the provision of two distinct land classifications, a potential development zone with eligible resources and a non-development resource ineligible zone, will remove what can be considered loopholes in the current Category system. Requests for "grandfathering" future development on certain lands is one example of such a loophole.

The suggestions we have provided in Section 9 would:

- Facilitate an increase in protected areas compared to existing Category 1 lands
- ensure long-term protection of our iconic mountain landscape;
- ensure long-term protection of water for downstream users; and
- ensure responsible development of this resource for all Albertans.

A resource ineligible zone comprising the current Category 1 lands will continue to protect Alberta's mountain landscape while sterilizing less than 1% of the coal potential across approximately 4.2 million hectares of land.

By comparison, identified metallurgical coal deposits within Category 2, 3, and 4 as catalogued by the Alberta Government, encompass some 141,730 hectares, or 3% of what is proposed as resource eligible lands.[2]

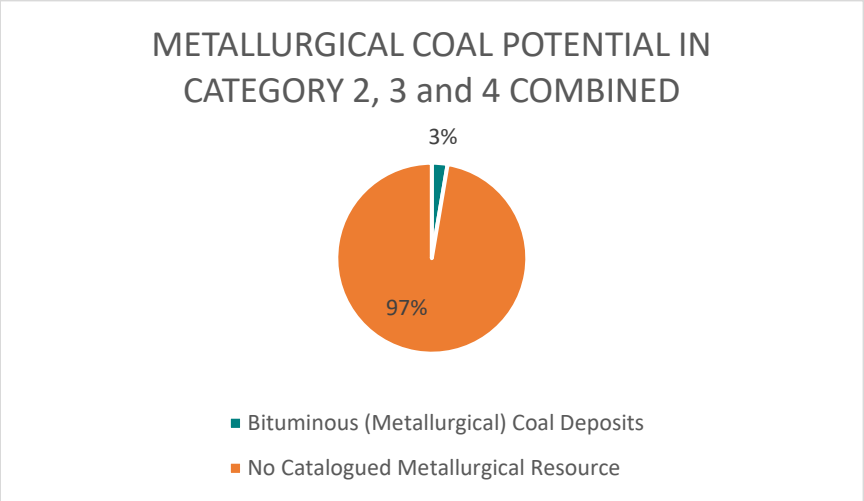


Figure 11: Overall Metallurgical Coal Potential compared to Category 2-4 Lands[2]

Clearly, the distribution of metallurgical coal potential in Alberta is small compared to the overall land base. Our recommendations, if accepted, would ensure these limited resources can be assessed on a project specific basis. If approved, these high-quality steel-making coal

deposits can be responsibly developed as a source of ethically extracted metallurgical coal for the benefit of all Albertans.

11. Existing Environmental Legislation and Regulation

The development of coal resources in Alberta is subject to a robust regulatory process that begins before a mine is built and continues long after mining is complete.

Alberta and Canada's stringent environmental legislation delivers leading protections and sustainable land use practices. Many of the applicable pieces of legislation were enacted *after* the 1976 Coal Policy. In fact, of the 21 examples listed below, 17 were enacted after 1976, enabling stronger protections than before the 1976 Coal Policy.

Illustrating the relevant legislation and regulations applicable to mining, **Figure 12** highlights the progressive legislative approvals post 1976 to present, while **Figure 13** details the approvals of specific acts and regulations.

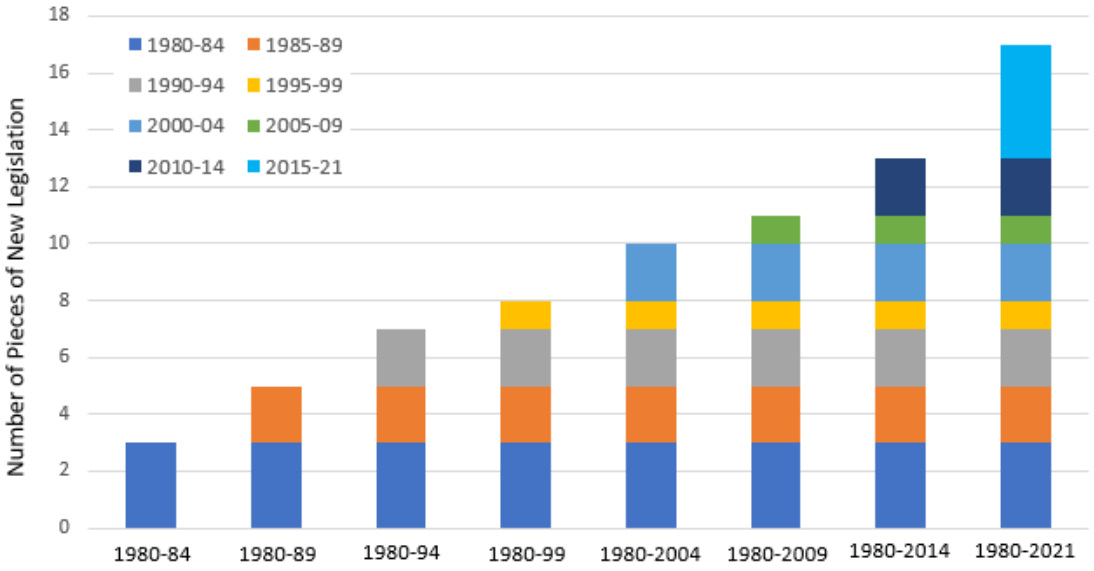


Figure 12: Progressive Legislation since 1980

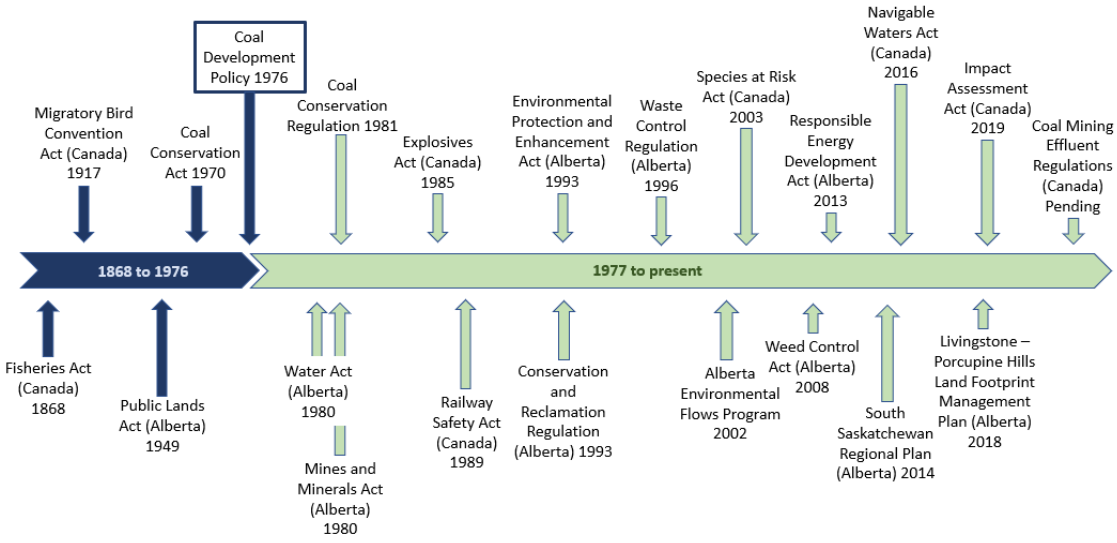


Figure 13: Timeline for Legislation, Regulation, and Land Use Plans

The following is a partial listing of some of the existing protections:

i) **Environmental Protection and Enhancement Act (Alberta)** – the primary Act in Alberta that regulates the requirements for air, water, land, and biodiversity. The Act supports and promotes the protection and enhancement of the environment by designating proposed activities which require approval or registration. This now 168-page Act was written in 1993 with the most recent update in December 2019. Strong, definable enforcements are outlined within each section applicable to land, water, etc. This Act contains strong guidance regarding reclamation and responsibilities of the operator to conserve and restore the land. EPEA also contains protection of water, prohibiting the release of harm-causing substances into any part of a waterworks system.

ii) **Responsible Energy Development Act (Alberta)** – Provides for the safe, efficient, and environmentally responsible development of energy resources in Alberta. This was enacted in June 2013 and updated as recently as June 2020. This Act will be applied in conjunction with the Environmental Protection and Enhancement Act for activities applicable to energy resources ensuring alignment of enforcement measures. In this Act's commitment to responsible development of energy, it created a registry for landowners to ensure companies comply with commitments set out in agreements. There are also enforcement and penalties contained within.

iii) **Coal Conservation Act and Regulations (Alberta)** – Administered by the AER, to control pollution and ensure environmental conservation in the development of coal resources in Alberta. The Act was written in 1970, prior to the 1976 Coal Development Policy. The regulations were separately written in 1981 but intended to operate together. The Act governs the development of coal resources and related facilities while the regulations provide requirements for applications for coal exploration, mining, processing plants, etc.

iv) **Mines and Minerals Act (Alberta)**– Governs the management and disposition in Crown-owned mines and minerals; includes the levying and collecting of rents, royalties, and bonuses. Originally written in 1980, this Act has been revised many times over the years, further refining context and requirements. Its most recent update was July 2020.

v) **Public Lands Act (Alberta)** – Establishes the role of the Alberta Government in managing public lands and sets out the mechanisms how public land can be transferred by lease or sale. One of the earlier Acts, this original legislation was written in 1949. A clause in the Act states 'regulations may be made retrospective as well as prospective where a disposition was made,' providing enforcement over past and future activities. The most recent update was December 2020.

vi) **Water Act (Alberta)** – Originally written in 1980, this Act promotes the conservation and management of water through the allocation of water in Alberta. The Act enshrines Albertan's rights to divert water, and the priorities of water rights among users as well as the decision making and enforcement powers to ensure the objectives of the Act are met. Many updates have been made over the years with the most recent in December 2017.

vii) **Conservation and Reclamation Regulation (Alberta)** – The objective of this regulation is to ensure the conservation and reclamation of specified land to an equivalent land capability, and sets standards, guidelines, and directives for such activities. Originally written in 1993 with its most recent update in January 2021. This regulation also addresses requirements for reclamation certification, post-certification liability, and security requirements for approved mines and approved pits.

viii) **Alberta Environmental Flows Program (Alberta)** – Defines environmental or "in-stream" flows describing the quantity, timing and quality required to sustain freshwater ecosystems and the human livelihoods that depend on these ecosystems. Originally outlined in June 2002, this program has expanded to include additional water flow projects; the latest addition was included in March 2019. The program covers Alberta, provincewide with specific framework and studies directly applicable to six other water systems.

ix) **South Saskatchewan Regional Plan (Alberta)** – identifies the parameters for robust growth, vibrant communities, and healthy environment through long-term planning for the region over the next 50 years. The SSRP sets the economic, environmental, and social outcomes for the region. Approved in September 2014, the Government of Alberta approved the SSRP which was subsequently amended in May 2018 to incorporate newly established parks and subregional plans. With a long-term horizon in mind, the SSRP identifies directions for the region over the next 10 years. The regional plan will be assessed and, if necessary, updated every five years to maintain its effectiveness while maintaining certainty, stability, and commitment to regulatory intent. Any subsequent revisions to the plan require consultation with Albertans.

x) **Livingstone – Porcupine Hills Land Footprint Management Plan (Alberta)** – A subregional plan that provides direction for the long-term cumulative effects on public lands within the region. This more recent plan was developed in May 2018 demonstrating continued assessment of environmental issues and accepted measures for its protection. This plan falls under the SSRP as above and is administered in the same manner, with consultations and regular assessment timelines.

xi) **Coal Mining Effluent Regulations (Canada)** – Proposed regulations to set national baseline effluent quality standards for all coal mines, including environmental effect monitoring provisions. Applies to the national coal mining sector. This regulation is in the proposal stage with anticipated compliance in late 2021 or early 2022.

xii) **Impact Assessment Act (Canada)** – Establishes public processes to examine the environmental effects of a proposed project. This Act came into force in August 2019 along

with a new set of five regulations. While relatively new, the Canadian Environmental Assessment Act (1992) was the original precedent providing strong and clear regulations.

xiii) **Species at Risk Act (Canada)** – the purpose of the Act is to prevent wildlife species in Canada from disappearing and provides for the recovery of species that are endangered, threatened or extirpated as a result of human activity. This Act was proclaimed in June 2003 and gives six departments, committees, and councils the responsibility for carrying out activities under the Act. Responsibilities range from overall coordination to protection and recovery.

xiv) **Navigable Waters Act (Canada)** – Requires approval for any works that may affect navigation on navigable waters in Canada. Legislative changes made in 2012 reduced protections for Canada's navigable waters. In 2016, the Federal Government launched a review to restore those lost protections enabling Canadians to travel the networks of rivers, lakes, and canals for years to come.

xv) **Fisheries Act (Canada)** – This is the main federal law governing fisheries in Canada. It has protected fish and fish habitat and regulated seacoast and inland fisheries since 1868. Amendments have been made over the years, including habitat protection in the late 1970s. The last amendment was made in August 2019.

xvi) **Migratory Bird Convention Act (Canada)** – Administered by Environment and Climate Change Canada, this Act seeks to ensure the protection of migratory birds, their eggs, and their nests. The MBCA was passed in 1917 and updated in 1994 and 2005.

xvii) **Waste Control Regulation (Alberta)** - Defines Alberta's requirements for proper management of waste. This regulation came into force in September 1996, with the last update in December 2019. The regulation devotes a full section to properties of hazardous waste controls in addition to an exhaustive list of hazardous compounds.

xviii) **Weed Control Act (Alberta)** - Defines Alberta's requirements for the prevention, control, and destruction of weeds that present significant economic, social, or ecological risks. Enacted in 2008 with the last update in December 2017.

xix) **Railway Safety Act (Canada)** - Promotes and provides for the safety of the public, and the protection of property and the environment, in the operation of railways. This Act was implemented in 1989. Since that time, the rail industry has become increasingly complex resulting in many amendments with the last one added May 2013.

xx) **Explosives Act (Canada)** - An Act respecting the acquisition, possession, storage, and transportation of explosives and the use of fireworks. This was enacted in 1985 with the last update made in 2004.

12. Managing and Enforcing the Regulatory Framework

The legislative and regulatory framework to oversee metallurgical coal projects in Alberta is comprehensive, addressing all elements of environment, health, and safety across the entire mining life cycle.

The human capacity and other resources employed by provincial and federal departments, regulators, and agencies in undertaking the activities of this framework are world class and continuously improving.

All concerned parties benefit from a strongly managed and enforced regulatory system. Ensuring the necessary regulatory resources are in place is an ongoing process involving budgets, human resources, technology and coordination of roles and responsibilities.

Atrum acknowledges and appreciates the significant work undertaken everyday by provincial and federal departments, regulators, and agencies. We urge continued diligence and priority to maintaining and amplifying as needed the strong capacity of Alberta and Canada to operate the regulatory framework that oversees our industry.

13. Expert Opinion – Selenium and Nitrate Removal

Water quality and safety is of the upmost importance to Atrum.

We have retained the services of an accomplished mine water treatment scientist, with direct hands-on Canadian experience in removal of selenium and nitrates from water influenced by mining activity.

The management of water throughout the entire life cycle of the Elan Mine will be guided by science to ensure full compliance with the regulatory framework.

We are happy to make this resource available to the Coal Policy Committee, should the committee be interested in hearing directly about these insights and experiences.

14. Supporting Documentation

The following supporting documentation is included as Appendix B and Appendix C.

I. Atrum final landform concept renderings (Appendix B)

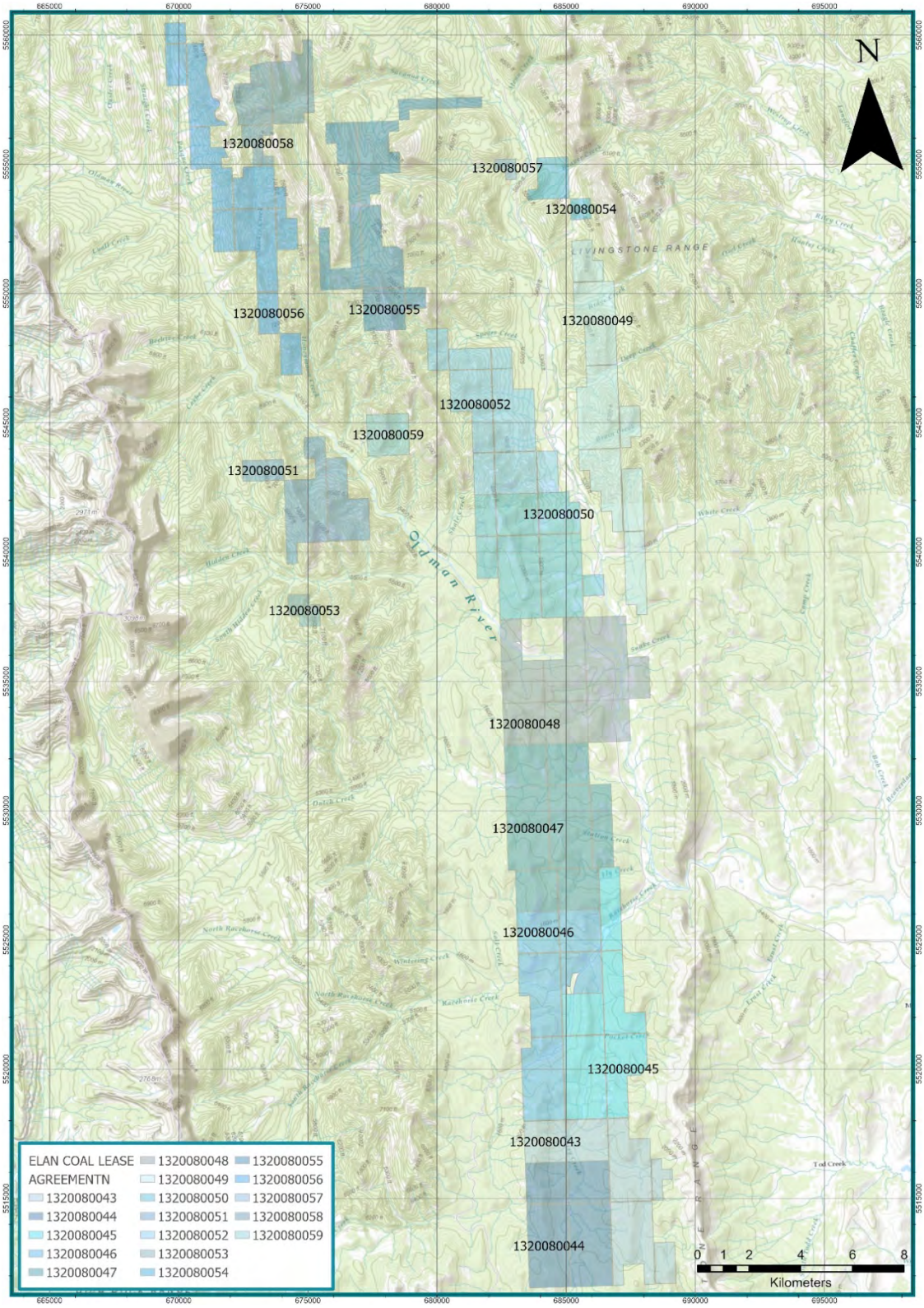
II. Atrum water management infographics (Appendix C)

15. Contact Information

Please direct any comments or questions you may have to:

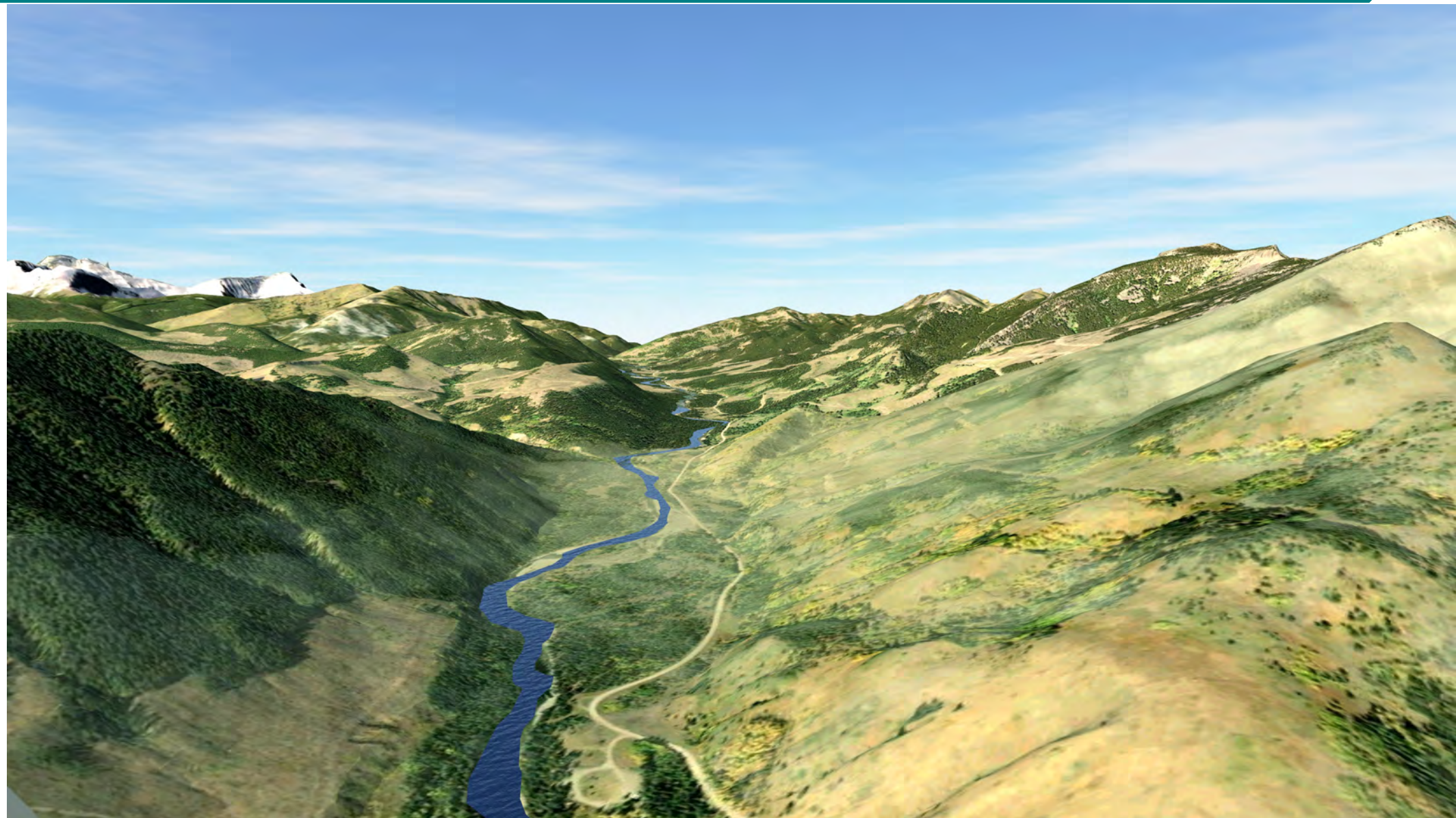
Andy Caruso
Managing Director and CEO
Atrum Coal Ltd.
andy_caruso_CEO@atrumcoal.com

Appendix A – 2020 Elan Coal Tenure



Appendix B
Atrum Final Landform Concept Renderings

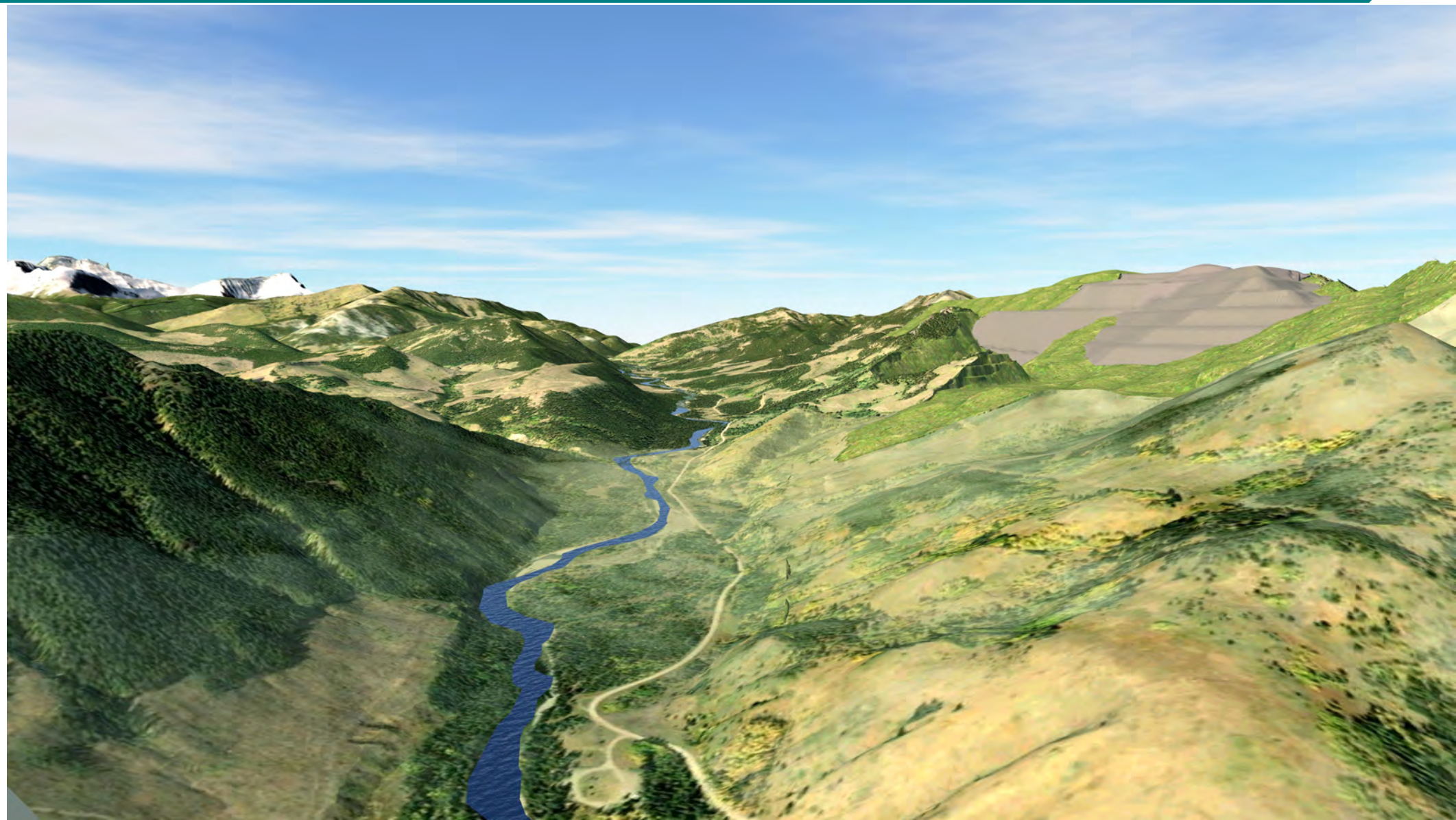
Before



Atrum Coal
COAL FOR STEEL

Appendix B
Atrum Final Landform Concept Renderings

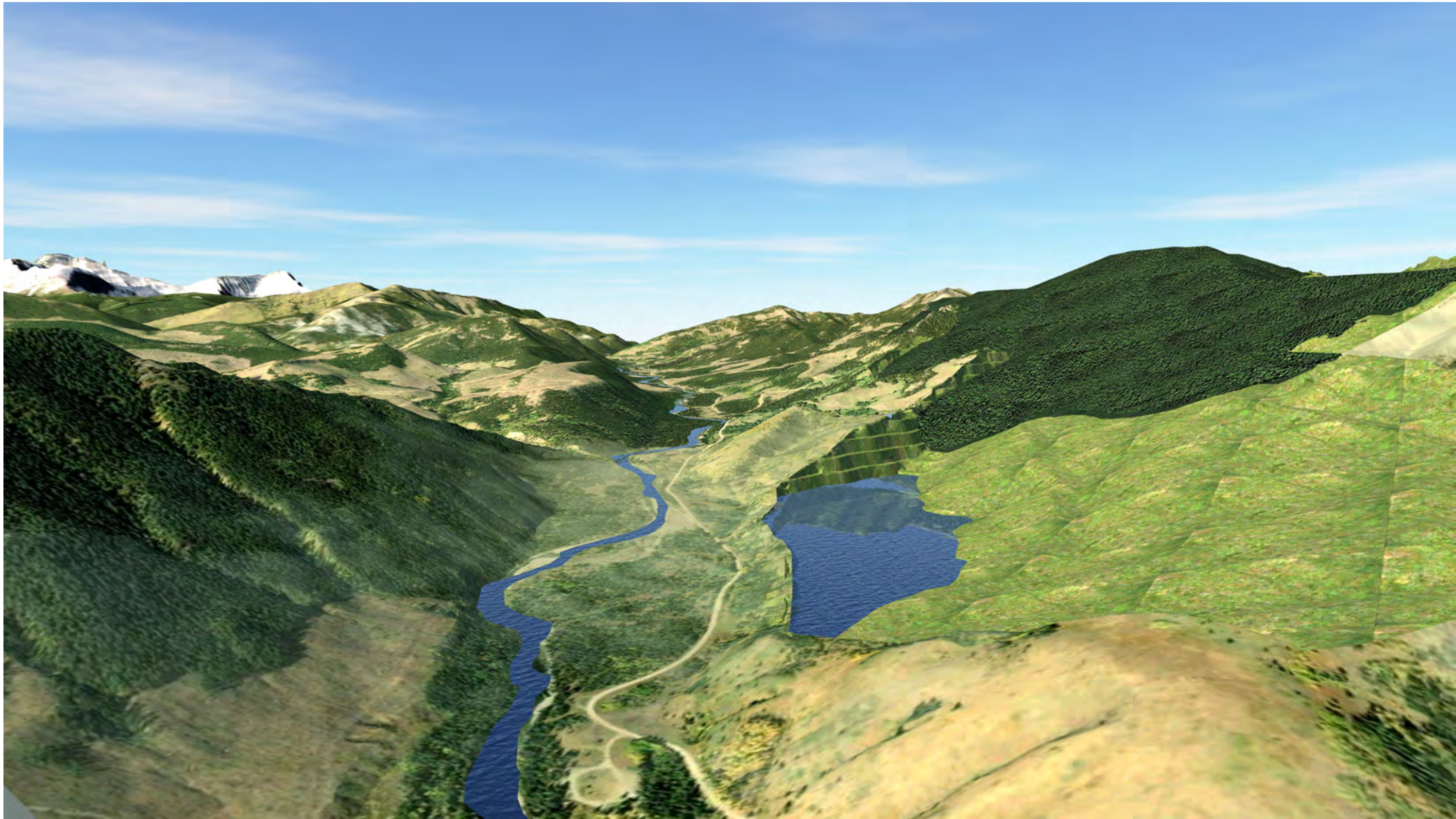
Mid Project



Atrum Coal
COAL FOR STEEL

Appendix B
Atrum Final Landform Concept Renderings

Post Closure



Atrum Coal
COAL FOR STEEL

Appendix C – Atrum Water Infographics

WATER

WATER DIVERSION

Alberta Environment and Parks has been clear that water allocations within the Oldman River have not changed nor will any new allocations be granted to mining projects. Any water that may be sourced by a proposed mine under an existing allocation will continue to be subject to Alberta's priority system for water use, meaning such a diversion would receive a lower priority than existing users.

The priority system ensures existing water users such as municipalities, ranchers and farmers will maintain the priority of their licenses and always have access to their water allocation.

> (1) Licensees and traditional agriculture users have priority among themselves according to the priority number that has been assigned to the license or registration.
>
> (2) A licensee or traditional agriculture user diverting water pursuant to a licence or registration that has a numerically lower priority number is entitled to divert the whole allocation of water specified under the licence or registration before a licensee or traditional agriculture user has any right to divert water pursuant to RSA 2000 Section 31 Chapter W-3 WATER ACT 32 a licence or registration that has a numerically higher priority number.
>
> Water Act (Alberta), Chapter 30

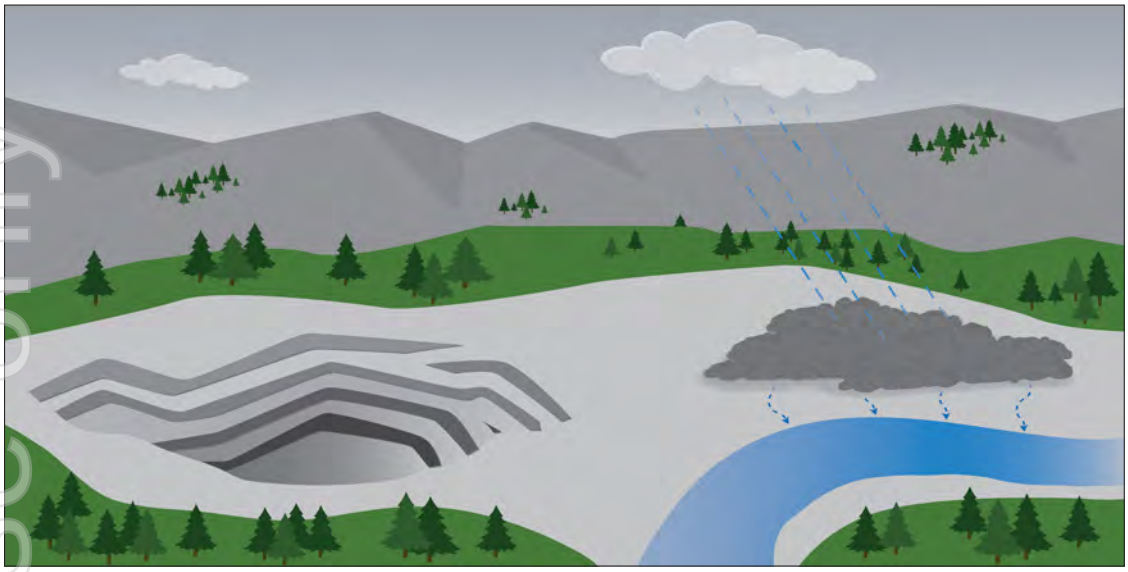
WHAT ABOUT SELENIUM?

Selenium is often referred to when discussing water quality. Selenium is a naturally occurring, non-metallic mineral that is found in rocks, soils and water. It is naturally released into watercourses when rocks and soils containing selenium are exposed to runoff and/or precipitation. If this water is not treated, higher concentrations of selenium can be experienced. Lack of capture and treatment of selenium enriched waters is what has created the issues that have been observed with older mining practices.

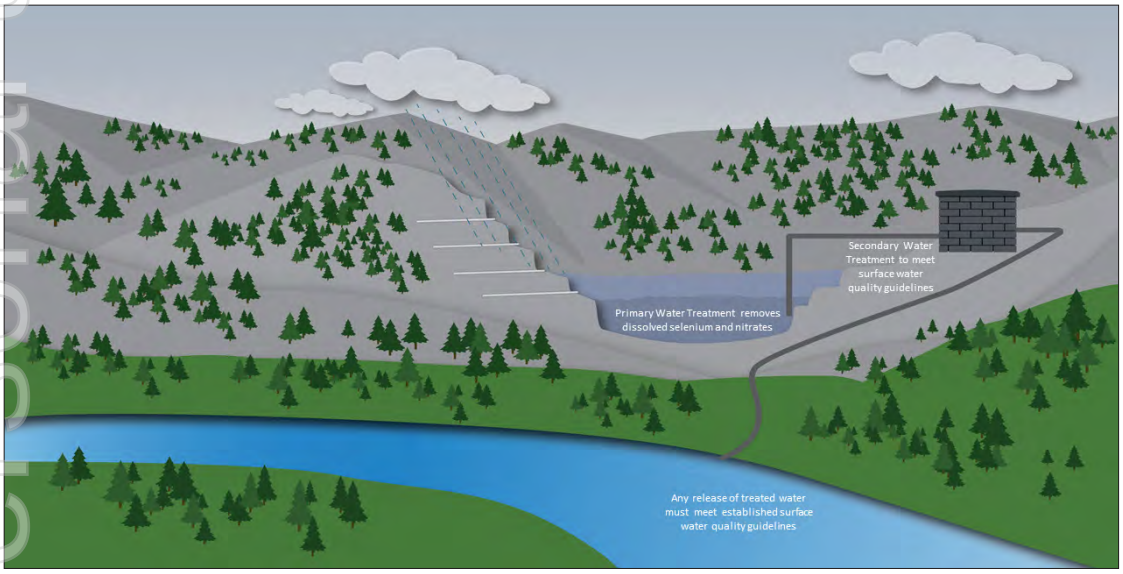
We take the conservation of water very seriously. Our project will maintain selenium and nitrates at their natural levels in watercourses and we will not release untreated water. Through the life of our proposed project, we will work closely with regulators to ensure that any discharge of treated water meets the stringent parameters established by both provincial and federal authorities.

Atrum Coal

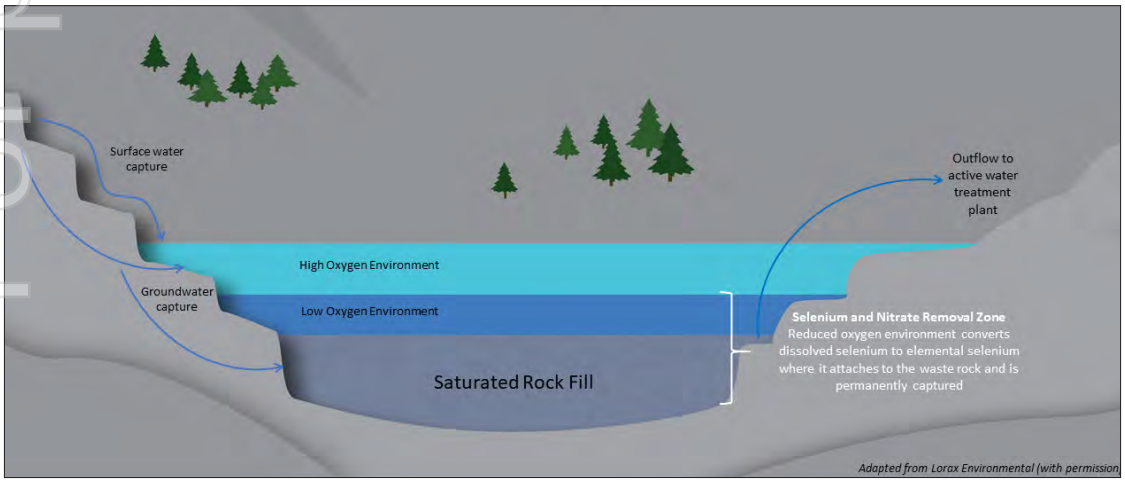
WATER MANAGEMENT



Historical Mining Practices allowed water affected by mining to be released directly into the environment (this is no longer permitted by regulators)



Modern Mining Practices capture and treat water affected by mining



Primary Water Treatment – Saturated Rock Fill

Mine planning plays a key role in meeting water quality objectives. This means that overburden (rock) with a higher potential to release selenium is strategically segregated where possible to minimize contact with precipitation.

Passive, in-situ treatment processes create environments that convert dissolved selenium into its solid mineral form where it attaches to the waste rock and remains buried indefinitely in the final rehabilitated landform.

Active treatment involves established water treatment processes to ensure any residual selenium is below legislated water quality guidelines prior to release.

Existing environmental legislation prohibits the release of substances that would impact the environment, including possible impacts to wildlife.

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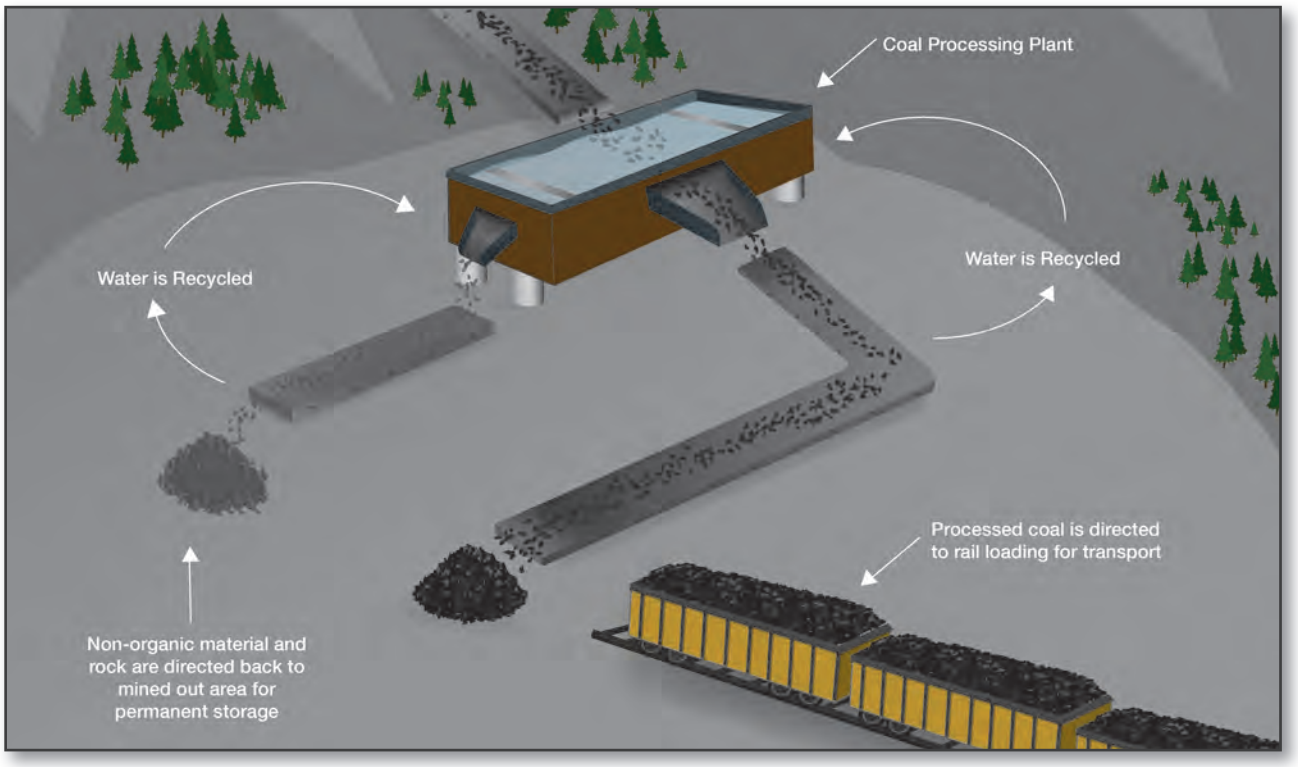
WATER USE IN THE COAL INDUSTRY

When coal is mined, the raw coal contains non-organic material and rock. These must be removed prior to transportation to end use markets. Water is used to process the raw coal. In simple terms, coal "floats" and all other material "sinks".

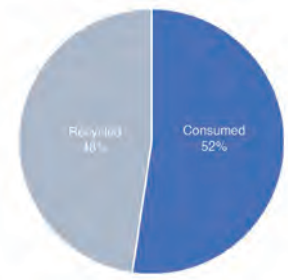


WATER RECYCLING IN THE COAL INDUSTRY

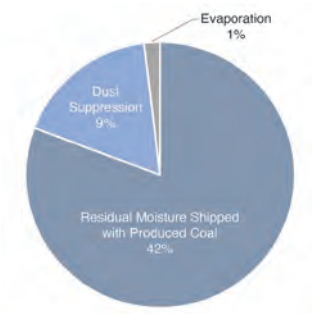
The mining industry takes its commitment to water conservation very seriously, and recycles the water used for processing. A typical and modern coal processing operation will recycle approximately half of its overall water requirements. Water that is not recycled is consumed in the following ways:

- Residual moisture shipped with the processed coal.
- Dust suppression.
- Evaporation

Recycling vs. Consumption
Based on Total Annual Water Requirements



Use of Water
that is not Recycled



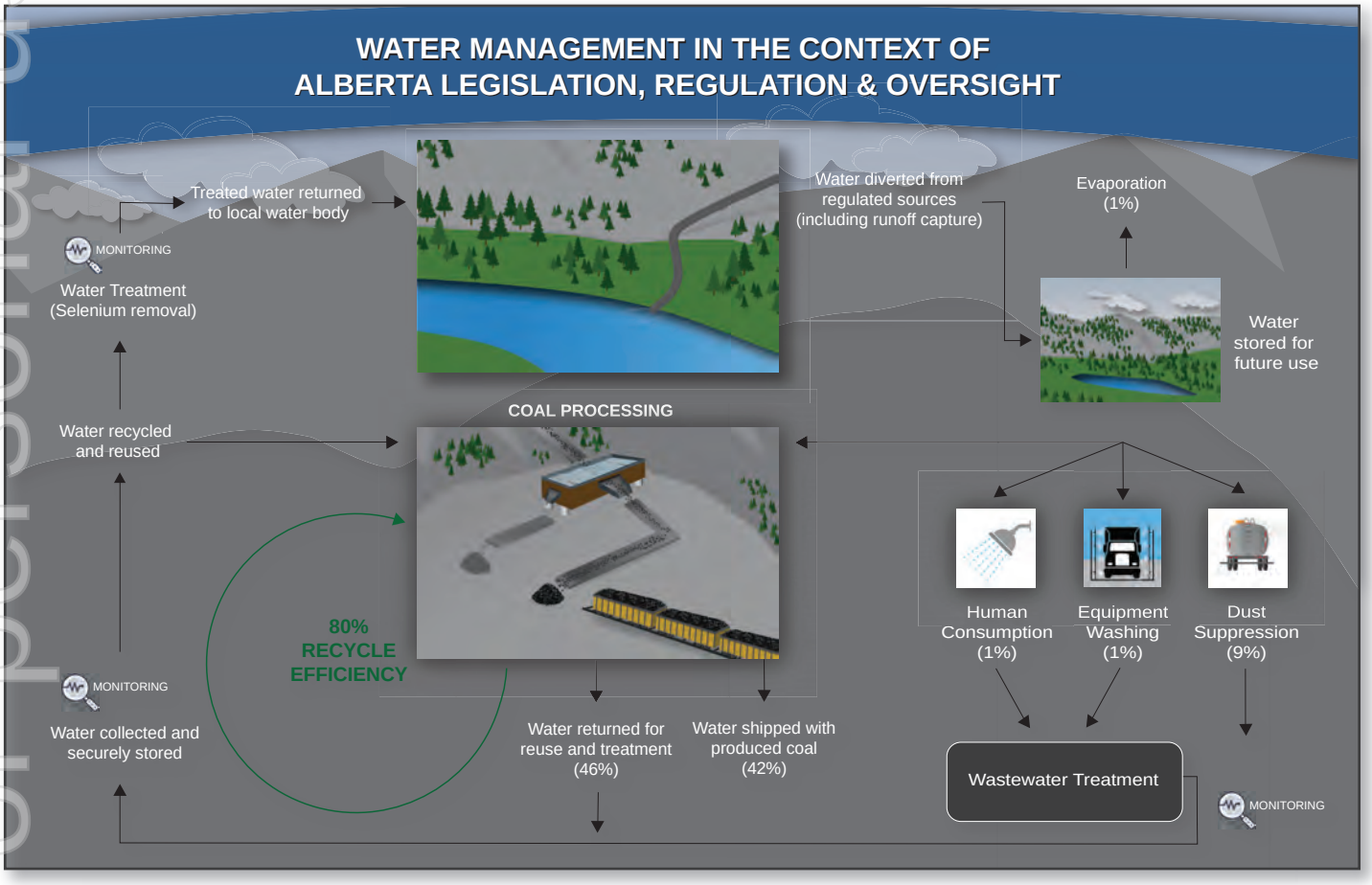
WATER MANAGEMENT

Water allocations and use of water is strictly and aggressively managed by Alberta's regulators.

Alberta's water priority system ensures availability for downstream users. The licenses of municipalities, ranchers, and farmers always have priority and ensure existing users will always have access to their water allocation.

Water used in mining is commonly diverted from licenced sources to an onsite storage pond. Licenced sources could include a local water body or treated groundwater released by mining operations. The use of storage ponds allows water to be collected during periods of higher water flows and used during periods of lower flows. This is important in managing water supplies during the four distinct seasons of the year in Alberta.

Recycling of water used in coal processing further reduces overall requirements, while ensuring that any water that comes into contact with mining operations is properly captured and treated prior to reuse or release.



Atrum Coal

APPENDIX 2 – ‘CPC – Atrum Coal Response to Misleading Assertions 210919.pdf’

RESPONSE TO MISLEADING ASSERTIONS

Submitted by Atrum Coal

Andy Caruso
andy_caruso_CEO@atrumcoal.com

Table of Contents

Appendices

Executive Summary

Atrum Coal would like to take the opportunity to address several key misrepresentations put forward in some of the submissions made to the Coal Policy Committee.

In reviewing submissions made to the CPC, some parties have made representations that should only be the purview of subject matter experts in a regulatory proceeding, while others have made unfounded allegations that are contrary to publicly available facts.

The intent of this paper is to highlight some of the major misrepresentations and again lay out the facts.

We appreciate the opportunity to correct some of the common misinformation presented to you as the Committee formulates its recommendations for Alberta's approach to coal development.

Selenium Treatment

Suggestions that there is no known treatment for selenium are incorrect.

A paper published by the North American Metals Council provides an extensive overview of selenium treatment and verifies numerous effective treatment methods do exist.

The White paper outlines no fewer than 15 strategies specifically applicable to the mitigation and treatment of selenium in mine-influenced water. The paper notes the list of 15 strategies is not exhaustive but are presented as examples of mitigation and source control methods. Also provided are seven separate case studies which utilize different methods to achieve successful results in treating selenium. The full 233-page paper can be found online (https://www.namc.org/docs/00180231.pdf).

Factual evidence is available that confirms modern, responsible mines further reduce potential selenium release through treatment technologies including active Moving Bed Bioreactors or Fluidized Bed Reactors, semi-passive saturated rock fills (SRF) and passive biochemical reactors (BCR) that remove as much as 99% of selenium from mine-affected water.

In addition, Teck Resources, by virtue of its legacy selenium challenges and current operations in British Columbia, has become a leader in the hands-on management of selenium. Atrum recommends the Committee meet with Teck to gain a fulsome understanding of its selenium treatment program, ongoing research and plans for the future.

Water Quantity

The suggestion that metallurgical coal mines would reduce the availability of water for existing users is incorrect.

Water quantity for downstream users is strongly protected by the *Water Act* (Alberta), which supports the existing 'first in time, first in right' priority system.

Coal Quality

The suggestion that the quality of southwestern Alberta metallurgical coal is low is incorrect.

The Crowsnest Coalfield of southwestern Alberta and southeastern British Columbia contains well-established metallurgical coal resources. Coal seams in this region of Alberta - including those contained in Atrum's Elan coal project - occur within the Mist Mountain Formation of the Kootenay Group, the same coal-bearing formation being actively mined in the Elk Valley of British Columbia.

We are aware of the submission by Cabin Ridge Project Limited (Follow-up Submission to the Coal Policy Committee, dated August 31, 2021) regarding coal quality and fully support the conclusions offered in that submission. These conclusions apply with equal accuracy to Atrum's Elan project.

Moreover, Atrum is publicly company traded on the Australian Stock Exchange and therefore must follow the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (internationally known as 'the JORC Code'). JORC is a professional code of practice that sets minimum standards for Public Reporting of Mineral Exploration Results, Mineral Resources and Ore Reserves.

All exploration results that support Atrum's assertions for coal resource and quality for the Elan project were validated by an independent third party who has no direct or indirect financial interest with Atrum. The independent third party used geological professionals for resource estimation who are members of the Australasian Institute of Mining and Metallurgy (AusIMM) which requires individuals to have sufficient experience relevant to the style of mineralisation and type of deposits at the Elan project to qualify as a Competent Person to sign off on a JORC Resource Report.

Furthermore, publicly listed companies such as Atrum (ASX:ATU) have a legal and a fiduciary obligation to provide factual disclosure in order to comply with ASX (Australian Securities Exchange) listing rules and ASIC (Australian Securities and Investment Commission) requirements. In the context of coal quality, this disclosure must be based on internationally accepted testing requirements.

Atrum has used five (5) independent international testing laboratories to ensure testing integrity to underpin independently verified assertions that the Elan project can support a multi-product portfolio of high quality Hard Coking Coal products for use in high productivity Blast Furnace operations into the future.

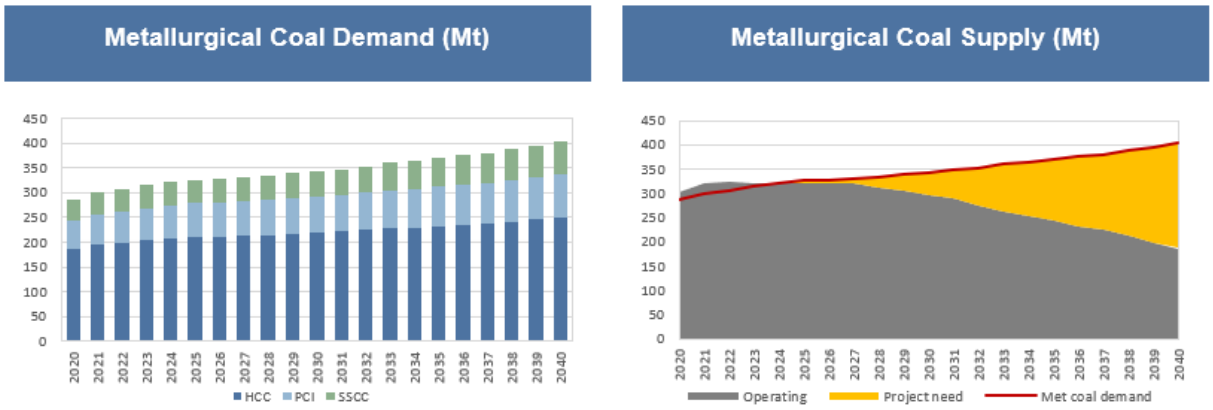
A copy of Atrum Coal's recent disclosure regarding coal quality is provided in Appendix A for reference.

Climate Change Ideology and the Demand for Metallurgical Coal

The suggestion that the proposed metallurgical coal mines will add to global CO_2 emissions is a misrepresentation.

Metallurgical coal production is a function of the demand for steel. If the demand for steel exists, metallurgical coal will be sourced, *regardless of where it is sourced from*. Alberta's metallurgical coal produces less CO_2 than coal from other jurisdictions when used to make steel. Using Alberta coal lowers global CO_2 emissions compared to using coal from other jurisdictions.

The demand for steel is not declining. As billions of people seek to improve their quality of life, metallurgical coal will continue to be sourced and consumed, as clearly depicted in the charts below sourced from Wood Mackenzie an independent, market forecaster in 2021.



Source: Wood Mackenzie.

Views that seek to advance climate change ideology in the context of metallurgical coal effectively obstruct access to a commodity that would help maintain and improve quality of life across the globe.

While these views have a right to be heard, any deliberation on a new coal policy that includes climate change must not be biased against the benefits of metallurgical coal to society. This includes the use of metals that originate from the use of metallurgical coal to build wind turbines, solar power arrays and a host of other carbon reducing technologies.

We believe the more appropriate climate change consideration for the Coal Policy Committee is how a high-quality resource, such as those found in Alberta and British Columbia, can support reductions in overall CO_2 emissions compared to lower quality coals that would otherwise be sourced to meet global demand. Plainly stated, the use of a lesser quality coal will result in increased emissions. Natural Resources Canada supports this statement with the following:[1]

> *'As coke is the most important raw material fed into a blast furnace, we work to improve the behaviour of coals during carbonization in order to provide high quality coke while ensuring efficient industrial operations. Introduction of high-quality coke to a blast furnace results in lower coke rates, higher productivity, lower hot metal costs and reduced greenhouse gas emissions. A good quality metallurgical coke is generally made from the carbonization of several good quality coking coals so we also develop methods to enhance coal blend properties for carbonization.'*

[1] Industrial Energy Systems | Metallurgical Fuels (nrcan.gc.ca)

Investment Fundamentals

The suggestion that the investment fundamentals of southwestern Alberta metallurgical coal are low is incorrect.

Investment fundamentals for metallurgical coal are strong, with limited near and medium-term substitutes for metallurgical coal, an attractive supply / demand balance given limited new supply, and a robust demand profile. Long-term growth in global metallurgical coal demand is anticipated to push seaborne trade up from 293 Mt in 2021 to 446 Mt in 2050[2].

Given an expected supply shortage of high-quality metallurgical coals from 2030 onwards (particularly from stable, low sovereign risk nations like Australia, Canada and the US), robust pricing levels are predicted over the next 3 decades. Atrum has reviewed the Coal Association of Canada's submission to the Coal Policy Committee entitled "Seaborne Metallurgical Supply & Demand Outlook" and we support the conclusions offered in that submission, including Wood Mackenzie's forecast for the benchmark for Australian Hard Coking Coal to be in excess of US$150 per tonne from 2031 to 2045.

This compares to a 10-year average seaborne free on board (FOB) price of ~US$170 per tonne or ~US$180/t on an inflation-adjusted basis[3] as of May 2021.

A combination of both strong global steel demand and tight supply has driven prices higher with the premium metallurgical coal free on board (FOB) index prices in Australia and the U.S. both in excess of US$350 per tonne[4] currently (September 2021).

An increasing focus on decarbonisation has raised questions about the future of steel production via the traditional blast furnace route and therefore demand for metallurgical coal. The concept of green steel and potential impacts to the global metallurgical coal trade has been considered by global independent experts Wood Mackenzie[5]:

> *'Green steel technologies are maturing. However, a seismic shift away from the traditional blast furnace/basic oxygen furnace combo as the dominant method of steel production is still decades away'*

They[5] also note the impacts to global metallurgical coal markets from green steel and hydrogen will be limited to specific country-level projects through 2040 and that solutions need to be found for the following in relation to the production of green steel:

- safe storage and transportation of large quantities of hydrogen;
- highly variable production cost; and

[2] Coronado Global Resources Inc Half Year Results and Investor Presentation reference to 'Wood Mackenzie July 2021 Coal Market Service metallurgical trade 2021 outlook to 2050' – 10 August 2021
[3] Teck Resources Limited – Bank of America Securities, Global Metals, Mining & Steel Conference – 18 May 2021
[4] IHS Markit – September 17, 2021
[5] Wood Mackenzie – 11 May 2020

- lack of electrolyser scale and the need for reliable, low-cost carbon-free electricity to produce green hydrogen

Based on expert advice, Atrum asserts that green steel will not see widespread use at commercial scale around the globe before 2050 at the earliest, as:

- Most importantly, green steel produced before at least 2050 will cause global carbon emissions to be higher than they'd otherwise be;
- Enormous quantities of additional renewable power will be required;
- There remain major technical barriers and safety risks;
- Green steel has prohibitively high operating costs;
- Trillions of US dollars of capital investment are required, but do not deliver an economic benefit.

The scale and impact of these impediments are so significant that, industry efforts are focussed on initiatives to reduce the carbon intensity of steelmaking by other means. The most practical – that is immediately actionable and affordable - way to significantly reduce steelmaking emissions is by replacing low quality metallurgical coal with high quality hard coking coal.

A high-level position paper detailing the development and challenges associated with green steel technologies is included for reference in Appendix B.

Economic benefits to Albertans

The suggestion that the economic benefits of metallurgical coal mining to Albertans is low is incorrect.

Atrum has made a preliminary assessment of the resource and infrastructure components for the world class Elan project via its early scoping studies – a Net Present Value in the order of C$1 billion is estimated at a projected long term hard coking coal price of US$150 per tonne FOB.

Of importance are the high level direct economic benefits that will accrue to the people of Alberta. The estimated annual expenditures (operating costs and sustaining capital costs) will be in the order of C$400 million with a large proportion being contributed locally through sub-contracting, equipment, and operational consumables, that will yield specific support to Albertan businesses and communities over a currently estimated ~20-year life of mine for the initial Elan Project.

Furthermore, the Elan project will be subject to federal and provincial taxes. Embedded in these annual expenditures are 350-400 direct jobs, with further indirect job creation.

In addition to the direct benefits outlined above are royalties payable to the Province of Alberta. Coal royalties, structured the same as for the oil sands, will provide a significant contribution to the Province of Alberta. Contrary to misinformation represented publicly that metallurgical coal producers would only pay 1% of gross revenues, 1993 Coal Revenue Guidelines[6] confirm the following:

[6] https://www.alberta.ca/coal-royalties-and-reporting.aspx

"The royalty rate for Crown-owned Bituminous (Mountain/Foothills) coal, which is based on a revenue minus costs royalty regime, is:

- *Before mine payout: 1% of mine mouth revenue*
- *After mine payout: 1% of mine mouth revenue plus 13% of net revenue"*

As a result, Atrum's preliminary estimates indicate that, at a projected long term hard coking coal price of US$150 per tonne FOB, royalties and taxes paid over the life of the project will be in excess of C$1.6 billion.

Mining versus Ranching and Recreation

The suggestion that mining and ranching cannot co-exist is a misrepresentation.

During mining operations, livestock access will be restricted, however, mining companies regularly execute commercial agreements with grazing lease holders to mitigate impacts related to the loss of grazing land during operations. Such agreements are in place in Canada, Australia, and other leading mining jurisdictions. Ranchers and mining companies have worked together for years to their mutual benefit through private agreements. While we cannot disclose the specifics of such agreements, we can confirm they are in place in Southern Alberta in areas where grazing leases overlap metallurgical coal exploration activities.

Moreover, progressive reclamation in consultation with grazing lease holders can actually create *more* grazing area than existed prior to commencement of mining.

Moreover, coal mines temporarily occupy relatively small areas of land, leaving vast areas of the foothills available for tourism and recreation.

One of the world's most prolific thermal coal producing regions is the Hunter Valley in NSW, Australia, which feeds the world's largest export coal port in Newcastle. For decades, a great many large scale coal mines have successfully coexisted immediately alongside a thriving tourism industry, complemented by horse breeding, farming and countless internationally renowned wineries. Modern coal mining focusses on suppressing dust and noise, and progressive rehabilitation to reduce the surface area disturbed at any given time. The nearby towns like Singleton, Cessnock, Maitland and Muswellbrook thrive, underpinned by a local workforce earning very high wages from coal mining and local businesses servicing the coal mines. Rehabilitated coal mines throughout the region are often indistinguishable from the surrounding natural landscape.

Recent polling

To suggest that Albertans oppose new, responsible natural resource development projects is false.

The Livingstone Landowners Group has fielded survey questions most notable for incomplete information, absent context and "zero-sum" choices. Not surprisingly, these questions have yielded results "showing" that Albertans are opposed to the development of new met coal mining projects.

Many years of polling has, however, told a different story. Canadians – and Albertans in particular – continue to support the development of natural resource projects.

For example, in April 2021, Ipsos (https://www.ipsos.com/en-ca/canadians-support-natural-resource-development) reported the results of a survey with 2,000 Canadians that showed:

- 81% agreed natural resource development (oil, gas, renewable energy, forestry, mining, agriculture and fishing) is good for Canada.
- 83% believe Canada's natural resource sector is an important contributor to the Canadian economy today.
- 73% agree investment in Canada's natural resource sector will help Canada's post COVID-19 economic recovery with only 15% disagreeing.

Similarly, an Environics poll (https://www.environics.ca/news/the-majority-of-indigenous-people-in-rural-areas-and-on-reserve-support-resource-development-according-to-recent-survey/) conducted with Indigenous respondents across Canada in March and April 2021 showed majority support for resource development:

- 65% said they supported natural resource development, while only 23% indicated they were opposed.
- 54% supported new projects proposed near their own community, while only 26% said they were opposed.
- 49% say resource development can occur in a way that respects the land and environment, while only 11% believe this is not possible.

Albertans have high expectations of natural resource companies and government. Fielding misleading questions that fail to address the opportunities and challenges of resource development does a disservice to Canadians. Particularly when sponsored by an interest group with an undeclared agenda of its own, a skeptical eye to the conclusions of this "research" is well advised.

Conclusion

We recognize the work of the Committee is not to reconcile opposing views on the efficacy of modern, responsible mining practices, but rather to arrive at a coal policy recommendation that reflects the facts and concerns of all Alberta stakeholders. The goal of this paper is to provide additional information to assist with that task. Thank you for your consideration.

Appendix A – Disclosure on Atrum's Coal Quality

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ASX Announcement

25 November 2020

ISOLATION SOUTH RESOURCE UPDATE

Atrum Coal Limited (ASX: ATU) (**Atrum** or the **Company**) is pleased to advise of an interim update to the resource estimate for the Isolation South deposit at its 100%-owned Elan Hard Coking Coal Project (**Elan Project**) in southern Alberta, Canada.

HIGHLIGHTS

- **Resource update following 2020 Elan Project drilling program at Isolation South**
- **Isolation South Measured + Indicated (M+I) resource increased 93 Mt to 175 Mt (+113%)**
- **Total Isolation South resource increased 32 Mt to 262 Mt (+14%)**
- **Total Elan Project resource now 486 Mt (7 Mt Measured, 228 Mt Indicated and 252 Mt Inferred)**
- **Dual infill and extensional objectives satisfied: (1) substantial upgrade to resource classification; and (2) further expansion of the Isolation South resource base**
- **Successful upgrade of large portions of previously Inferred resources at Isolation South has delivered substantial expected upside to the life-of-mine production target and forecast base case economics presented in the Elan Project Scoping Study results (April 2020)[1]**
- **Updated Scoping Study outcomes expected to be released in December 2020**
- **Final Isolation South resource expected in 1Q 2021 following receipt of residual coal quality results; further resource classification upgrades expected**
- **Final Isolation South resource to underpin Elan Project PFS expected by mid-2021**

Commenting on the interim Isolation South resource update, Atrum Managing Director and CEO, Andy Caruso, said:

"The initial resource outcomes from the 2020 Elan drilling program are excellent. Over two thirds of the total Isolation South resource is now in the higher confidence Measured and Indicated categories. The team has also managed to deliver a further 14% increase to the large existing Isolation South resource base. Importantly, the magnitude of the classification upgrades with this interim resource allow us to enlarge, and further enhance, the mine schedule from the Elan Project Scoping Study – with these outcomes to be presented in an Updated Scoping Study targeted for release next month. The upgrades also deliver us the opportunity to declare a substantial Coal Reserve with the Elan Project PFS next year."

[1] At Isolation South, 108Mt of Inferred resource within the optimised pit shell was excluded from the mine schedule and production target in the Elan Project Scoping Study (which totaled 126Mt), in accordance with the current ASX/ASIC regulatory framework (see Atrum ASX release dated 16 April 2020, *Elan Project Scoping Study*). Upgrade of these Inferred Resource portions of Isolation South into Indicated and/or Measured Resource categories has now delivered the strong potential for inclusion in the mine schedule for the Elan Project PFS and subsequent conversion to Coal Reserves. Other than the content of this release, Atrum confirms that all material assumptions underpinning the production target and forecast financial information within the Scoping Study continue to apply and have not materially changed.

2020 drilling program

The 2020 drilling program at the Elan Project focused solely on Isolation South. The program comprised 125 rotary air blast (**RAB**) holes, 35 large diameter core (**LDC**) holes and 6 HQ geotechnical and hydrogeological holes. The RAB holes were completed across a typical spacing of 100 to 200 metres. The LDC drilling was designed to reduce the spacing between coal quality data points to around 250 metres; it achieved this along with excellent core recoveries. The program had both an infill and extensional focus, aimed at significantly upgrading resource classification and potentially also expanding the Isolation South resource base.

Isolation South interim resource update

Northern Area

The Isolation South (Northern Area) resource estimate has increased to 240 Mt (7 Mt Measured, 168 Mt Indicated and 66 Mt Inferred). Measured and Indicated resources now total 175 Mt (or 73% of the total Northern Area resource), as summarised in Table 1. The thick Seam 3 package comprises 146 Mt (or 61%) of the total Northern Area resource.

Table 1 Isolation South (Northern Area) Resources (November 2020)

Seam Group	MEASURED (Mt)	INDICATED (Mt)	MEASURED and INDICATED (Mt)	INFERRED (Mt)	TOTAL (Mt)
SEAM 1	4.6	18	22	9	31
SEAM 2	2.3	13	16	10	25
SEAM 3	-	119	119	28	146
SEAM 4	-	18	18	20	37
TOTAL	**6.9**	**168**	**175**	**66**	**240**

The strong conversion of previously Inferred resources to Measured and Indicated classification has demonstrated that the previously lesser explored northern areas at Isolation South are broadly consistent with the southern Indicated resource areas within the pit shell defined during the Scoping Study.

Southern Area

No exploration was carried out in the southern area (south of the Oldman River) in 2020 and therefore no adjustment to the Isolation South (Southern Area) resource estimate has been made (Table 2).

Total Isolation South

Total Isolation South resources have increased 32 Mt (+14%) to 262 Mt (7 Mt Measured, 168 Mt Indicated and 88 Mt Inferred).

Table 2 Total Isolation South Resources (November 2020)

AREA	MEASURED (Mt)	INDICATED (Mt)	MEASURED and INDICATED (Mt)	INFERRED (Mt)	TOTAL (Mt)
NORTHERN AREA	6.9	168	175	66	240
SOUTHERN AREA	-	-	-	22	22
TOTAL	**6.9**	**168**	**175**	**88**	**262**

Critically, the interim resource update has delivered a total of 175 Mt resources classified as either Measured or Indicated (a 113% increase in M+I quantity).

A comparison with the previous Isolation South resource estimate is provided in Table 3 below.

Table 3 Changes in total Isolation South Resources (November 2020)

UPDATE DATE	MEASURED (Mt)	INDICATED (Mt)	INFERRED (Mt)	TOTAL (Mt)
Starting base (Feb 2020)	0	82	148	230
Interim resource (Nov 2020)	**6.9**	**168**	**88**	**262**
2020 Program Increase (Mt)	6.9	86	-60	32
2020 Program Increase (%)	**-**	**105%**	**-41%**	**14%**

For details of the previous Isolation South resource estimate, see Atrum ASX release dated 10 February 2020.

Global Elan Project resource estimate

Total Elan Project resources now stand at 486 Mt (7 Mt Measured, 228 Mt Indicated and 252 Mt Inferred) – a 32 Mt increase.

Following the substantial classification upgrade to the Isolation South resource, higher confidence Measured and Indicated resources now comprise almost 50% of the total Elan Project resource base per Table 4 below.

Table 4 Total Elan Project Resources (November 2020)

PROJECT	PROJECT AREA	MEASURED (Mt)	INDICATED (Mt)	MEASURED + INDICATED (Mt)	INFERRED (Mt)	TOTAL (Mt)	DATE REPORTED
ELAN NORTHERN TENEMENTS	ISOLATION SOUTH	7	168	175	88	262	25-Nov-20
	ISOLATION	-	-	-	51	51	22-Jan-19
	SAVANNA	-	-	-	30	30	22-Jan-19
ELAN SOUTH	SOUTH EAST CORNER	-	16	16	22	38	10-Feb-20
	FISH HOOK	-	15	15	11	26	10-Feb-20
	OIL PAD RIDGE	-	29	29	50	80	10-Feb-20
TOTAL		**7**	**228**	**235**	**252**	**486**	

Tier 1 HCC quality

Coal quality testwork is continuing at several laboratories. The comprehensive coring program in 2020 (35 LDC and 6 hydrogeology / geotechnical holes) resulted in over 400 seam composites being sampled, prepared and submitted for testing, with the seam composites combined from discreet ply samples.

The interim Isolation South resource estimate has been prepared based on the raw and clean coal quality data that was available as at November 2020, with a minimum requirement of at least the raw quality test results completed for a valid coal quality point of observation.

Of the 35 LDC holes completed in 2020, 21 have been completed to at least raw quality testwork, while 12 have been completed through to testing of clean coal composites. Coal quality data used in the geological model is also incorporated from two hydrogeology / geotechnical holes and 15 cored holes drilled historically by Scurry Oil.

Coal quality attributes for the coal resources reported are summarised in Table 5 below, as determined from individual grid models for each quality variable on an individual ply basis. Coal quality attributes are reported on an air-dried basis and weighted by resource tonnes.

Table 5 Isolation South (Northern Area) Resources with raw quality attributes (November 2020)

SEAM GROUP	RESOURCE (Mt)	Total Thickness (m)	RD (ad)	IM % (ad)	Ash % (ad)	VM % (ad)	FC % (ad)	CSN	TS %
SEAM 1	31	6.6	1.49	0.8	24.4	24.0	50.8	5	0.76
SEAM 2	25	5.6	1.45	0.9	20.5	23.1	55.7	4	0.56
SEAM 3	146	18.5	1.49	1.0	22.7	21.6	54.6	3	0.38
SEAM 4	37	5.2	1.56	0.8	30.3	20.6	48.4	4	0.63
Grand Total	**240**								

Coal core samples from the LDC program were submitted to GWIL Birtley in Calgary for detailed coal quality, washability and clean coal laboratory testwork. Additional clean coal analysis is being completed by COALTECH Petrographic Associates, USA (for clean coal characterisation tests). Blended products are designed by Atrum and prepared by Birtley for delivery to coal carbonisation laboratories in Europe; DMT Coal Coke Group (Germany) and INCAR (Spain)[2].

Indicative clean coal quality attributes are presented on a seam group basis in Table 6 below, providing further confidence in the ability of Isolation South to deliver premium mid to low volatile hard coking products.

Table 6 Weight averaged clean coal attributes by seam group

Seam Group	Composites Tested	Ash % (ad)	VM % (ad)	FC % (ad)	TS %	Phos %	Max. Fluidity ddpm	CSN	Reactive Macerals %	Mean Max Reflectance %
Seam 1	22	7.7	26.7	64.6	0.83	0.054	791	8	76.1	1.11
Seam 2	10	8.0	24.5	66.7	0.68	0.039	231	7	67.5	1.16
Seam 3	12	8.3	23.5	67.2	0.47	0.023	95	5	64.7	1.20
Seam 4	16	8.8	24.6	65.9	0.65	0.008	1,442	6.5	66.9	1.15

[2] For further details of the clean coal and coke characterisation testwork completed, see Atrum ASX release dated 7 October 2020, *Isolation South Tier 1 HCC*

The data acquired from the coal quality testwork has been used to generate raw and clean coal quality grid models, and the data will feed into the Coal Handling and Preparation Plant (CHPP) design, and determination of practical processing yield and product specification within the current PFS.

Next steps

The core objectives of the 2020 exploration program at Isolation South were to demonstrate structural and coal quality continuity of the four seam groups over the pit shell extent identified in the Scoping Study, upgrade resource classification and to acquire the necessary data to underpin key Elan Project Pre-Feasibility Study (**PFS**) workstreams (including mine planning, plant design and product strategy to market). These aims have all been achieved.

The significant increase in Measured and Indicated resources at Isolation South provides the potential for declaration of a substantial maiden Coal Reserve in accordance with JORC (2012) following the targeted completion of a successful PFS by mid-2021.

More immediately, the magnitude of the classification upgrades delivered with the interim Isolation South resource now allow us to enlarge and enhance the production target from the Elan Project Scoping Study (April 2020). These outcomes are set to be presented in an Updated Scoping Study targeted for release next month.

The context to this is that approximately 108Mt of Inferred resource within the Isolation South optimised pit shell was excluded from the mine schedule and production target in the Scoping Study (which totaled 126Mt), in accordance with the current ASX/ASIC regulatory framework (see Atrum ASX release dated 16 April 2020, *Elan Project Scoping Study*). The now successful upgrade of large portions of previously Inferred resources within that optimised pit shell to Measured and Indicated status has delivered substantial expected upside to the life-of-mine production target and forecast base case economics presented in the Scoping Study results.

A further update to the Isolation South resource is also expected in 1Q 2021, following receipt of residual coal quality testwork results. Further resource classification upgrades are expected with this final resource update from the 2020 exploration program.

This ASX release was authorised on behalf of the Atrum Coal Board by:

Andrew Caruso, Managing Director and CEO

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About Atrum Coal

Atrum Coal (ASX: ATU) is a metallurgical coal developer. The Company's flagship asset is the 100%-owned Elan Hard Coking Coal Project in southern Alberta, Canada. Elan hosts large-scale, shallow, thick, hard coking coal (HCC) deposits with a current resource estimate of 486Mt (7Mt Measured, 228Mt Indicated and 252Mt Inferred). Comprehensive coal quality testing from the 2018, 2019 and 2020 exploration programs, combined with review of substantial historical testwork data for the broader Elan Project, has confirmed Tier 1 HCC quality.

Elan's southern boundary is located approximately 13 km from an existing rail line with significant excess capacity, providing direct rail access to export terminals in Vancouver and Prince Rupert. It shares its southern boundary with Riversdale Resources' Grassy Mountain Project, which is in the final permitting stage for a 4.5Mtpa (saleable) open-cut HCC operation. Around 30km to the west, Teck Resources operates four mines (the Elk Valley complex) producing approximately 25Mtpa of premium HCC for the seaborne market.

Atrum completed a Scoping Study in April 2020 which demonstrated the strong technical and economic viability of development of the Elan Project. For full Scoping Study and resource details refer to Atrum ASX release dated 16 April 2020, *Elan Project Scoping Study*. Atrum confirms that all material assumptions underpinning the production target and forecast financial information within the Scoping Study, and the resource estimate outlined above, continue to apply and have not materially changed.

APPENDIX A: Further information relating to Isolation South resources

Isolation South exploration

The 2020 exploration campaign was successfully completed in October 2020 with rotary air blast (**RAB**) and cored drilling and 2D seismic survey undertaken at the northern (Cabin Ridge) area at Isolation South. The overall aim of this year's exploration program was to demonstrate structural and coal quality continuity of the four seam groups over the pit shell extent identified in the Scoping Study, upgrade resource classification and to acquire the necessary data to underpin the Pre-Feasibility Study (**PFS**).

During the 2020 field program, 125 RAB holes, 35 150 mm large diameter cored (**LDC**) and six HQ cored holes (for hydrogeology and geotechnical analysis) were completed, along with five 2D seismic lines. This complements the program of 49 RAB holes that were completed in 2019 in the northern Cabin Ridge area at Isolation South.

Exploration completed at Isolation South in 2019 and 2020 (northern area)

YEAR	RAB Holes	LD Cored Holes	HQ Hydrogeology / Geotechnical Holes	2D Seismic Lines
2020	125	35	6	5
2019	49	-	-	-
TOTAL	**174**	**35**	**6**	**5**

The RAB drilling program was successfully completed in September 2020 with 125 RAB holes drilled (for 21,500 total metres), 117 of which were located within the Scoping Study pit shell area. The resultant RAB hole spacing typically ranges from less than 100 metres up to 200 metres between holes and provides significant confidence in geological interpretation and modelling.

The LDC coring program was successfully completed with a total of 35 LDC holes completed at Isolation South. The quantity and distribution of LDC holes was planned to delineate spatial variability in coal quality and washability attributes and to support improved resource classification, with the spacing between coal quality data points typically 300 metres or less within the Scoping Study pit shell area.

Six multi-purpose hydrogeological / geotechnical holes were also completed in the 2020 program. These boreholes are fully cored (HQ size) and have been used for the assessment and monitoring of groundwater aquifers, geotechnical logging and sampling, and coal quality testwork. The 2020 coring program is also complemented by 18 historical fully cored holes drilled in the 1970's by Scurry Oil.

All holes were completed with downhole geophysical logging incorporating gamma, density, caliper, deviation, dipmeter and sonic wireline logging undertaken.

Elan Project resource estimate

This update to coal resource estimates for Isolation South is prepared and reported in accordance with the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) 2012 Edition.

Resources for the Isolation South pit shell area are classified according to depth of cover increments in the table below. This demonstrates high potential for open cut mining at favourable strip ratios, with greater than 47% of the total resource occurring at a depth of cover of less than 100 metres, and 40% less than 200 metres.

Isolation South (Northern Area) Resources subset by depth increments

Depth Subset (m)	MEASURED (Mt)	INDICATED (Mt)	MEASURED and INDICATED (Mt)	INFERRED (Mt)	TOTAL (Mt)
0 - 100	6.1	80	87	26	113
100 - 200	0.8	79	79	17	96
200 - 300	-	7	7	12	18
300 - 400	-	2	2	11	13
Total	**6.9**	**168**	**175**	**66**	**240**

Geological interpretation and modelling

The 2020 exploration program was planned and managed by Atrum following industry protocols and best practice. This includes use of independent third-party specialty contractors for drilling, geophysical logging and laboratory testing. Lithological logs, geophysical LAS curves and coal quality data are used to undertake detailed correlation of the coal plies. 3D geological models have been constructed using Dassault Systems Geovia Minex modelling software by Palaris in collaboration with Atrum.

The coordinate system used for geological modelling and GIS systems is the NAD1983 Universal Transverse Mercator (UTM), Zone 11N. A Light Detection and Ranging (LiDAR) survey was flown in July 2020 and the resultant high-resolution topography surface has been incorporated into the geological model.

The structural model was created using the borehole collar data and seam intersections compiled in the Minex borehole database, based on the geological data acquired by Atrum. The collaborative approach between Atrum and Palaris provides significant confidence in the development of the geological models. With the current tight borehole spacing (< 50 to 200m) at Isolation South and depth of boreholes drilled sufficiently deep to encounter the full section of coal, the model provides good representation in three dimensions.

Structure and coal quality grids are based on 25 m mesh (grid cell) size with a scan distance of 5,000 metres. The use of dummy boreholes or trend surfaces has not been used in structural modelling. At this stage, modelling of any overthrust coal seams in faulted areas has not been incorporated into the geological model. After receival of the results of the seismic program, 3D faulting will be incorporated into the updated geological model and next resource estimate (expected 1Q 2020).

Density values modelled are air-dried, true relative density values which are based on crushed samples and take into account density variations resulting from pore spaces in the coal. Density values used for resource estimation are on an air-dried basis and have not been adjusted to in-situ moisture (further work is required to determine a reasonable estimate of in-situ moisture).

Resource classification and limits

Coal resources are generally defined in areas of elevated topography and are generally distanced from rivers and streams, although a 100-metre exclusion buffer is applied adjacent to the Oldman River on the southern extent of the Northern Area resource estimate. Coal seam outcrops define the eastern and northern limits of the resource, while the tenement boundary limits the western down-dip extent of the resource.

A coal ply thickness of 0.3 metres has been applied as the minimum coal thickness for inclusion in the resource estimate. The upper limit of the resource is the limit of weathering surface based on the LiDAR topographical surface minus three metres. The lower limit of the resource is at a maximum depth of 400m below the topographical surface (pit optimisation has not identified any coal that is beyond an economic strip ratio, noting there are limited coal resources below 200 metres depth).

Points of observation used in the classification and estimation of resources are identified as either:

1. Points of observation for coal quality and structure (cored hole with geophysical logging and coal quality data); or
2. Points of observation for structure (RAB open holes with geophysical logging).

Cored holes have been drilled in locations that twin existing RAB holes with the coring intervals targeting the main seam intervals based on depths in the pilot hole. Resource polygons were created around points of observation for both structure and quality as defined in the table below, and subsequently rationalised based on the quantity and location of coal quality data points, isolated data points and variability shown in continuity and grade. Extrapolation distances beyond drill holes in any direction are usually very limited due to tenure, depth of cover and seam subcrop limits, with most Inferred resources located in the north-western area adjacent the tenement boundary and in the southern area near Oldman River.

Isolation South resource classification limits

Classification	Valid Cored Holes with Coal Quality Data	RAB Holes with Geophysical Logs
Measured	Points of observation normally < 400m apart (200m radii), Seam 1 and 2 only	Typically < 150m between holes, Seam 1 and 2 only
Indicated	Points of observation normally < 600 to 800m apart (300-400m radii)	Typically <200m between holes
Inferred	Points of observation normally > 600m apart or lacking valid coal quality data points	Sufficient distribution with maximum 500m extrapolation distance

Geology of the Isolation South area

Isolation South is located approximately 20 km north of the Elan South area within the Elan Project. Historically referred to as the Oldman River Prospect, the main target area at Isolation South occurs on Cabin Ridge, on the McConnell Thrust fault and bounded to the west by the Twin Ridge Thrust. The Oldman River flows south-east through the Isolation South area and dissects the project into northern and southern areas with the majority of the resources in the area north of the river (Cabin Ridge).

The coal seams at Isolation South dip to the west at relatively moderate angles (around 20 degrees). Over most of the project area, the dip angle of the coal seams mimics the topographical surface and represents a dip slope on the western side of the ridge. The coal seams outcrop near the surface expression of the McConnell Thrust fault and in a crescent shaped cropline due to a topographical feature associated with Manystick Creek located midway along Cabin Ridge.

Isolation South contains four main seam groups that have been correlated with high confidence into the plies of Seam 1, Seam 2, Seam 3 and Seam 4 groups. Where intersected, the full sequence of coal seams can present more than 40m of cumulative coal thickness (apparent) without any structural thickening evident, and exceeding 100 metres where thrust faulting and / or structural thickening are prevalent.

Competent Persons Statement

Exploration Results

The information in this document that relates to reporting of Mineral (Coal) Resources for the Isolation South project is based on, and fairly represents, information and supporting documentation prepared by Mr Brad Willis, who is a Member of the Australasian Institute of Mining and Metallurgy (#205328) and is a full-time employee of Palaris Australia Pty Ltd.

Mr Willis has read and understands the requirements of the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Exploration Targets, Mineral Resources and Ore Reserves (JORC Code, 2012 Edition). Mr. Willis is a Competent Person as defined by the JORC Code, 2012 Edition, having twenty years' experience that is relevant to the style of mineralisation and type of deposit described in this document.

Neither Mr. Willis nor Palaris Australia Pty Ltd has any material interest or entitlement, direct or indirect, in the securities of Atrum or any companies associated with Atrum. Fees for the preparation of this report are on a time and materials basis. Mr. Willis has visited the Elan project site with Atrum coal personnel during the exploration programs in 2018 and 2019.

The JORC Code (2012)

Table 1 - Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	▪ *Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.* ▪ *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* ▪ *Aspects of the determination of mineralisation that are Material to the Public Report.*	▪ In total, 35 cored drillholes have been completed in 2020 at Isolation South for the collection of large diameter (LD) samples which are logged and sampled for coal quality and washability testwork ▪ Sampling has been undertaken on LD (150mm or 6" diameter) cored holes, as well as HQ core samples from six hydrogeology / geotechnical holes and 18 historical holes ▪ Samples are taken on ply intervals and are manually composited in the laboratory after results for raw light transmittance (LT) ash, ARD and IM are received from sub-samples ▪ Atrum Coal provides the instructions to the laboratory for manually compositing individual ply samples ▪ In order to ensure representivity, coal seams sampled with <80% linear core recovery are not tested at the laboratory ▪ From the 125 RAB holes completed to date in the 2020 program, drill cuttings have been collected at 1m depth intervals. These samples are not intended to be used for coal quality testwork
Drilling techniques	▪ *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).*	▪ 35 LDC holes were completed between February and October 2020 (150mm or 6" diameter core) ▪ The LD cored holes are drilled with PDC or tungsten bits and use double tube core barrels (triple tube core barrels with LD core are uncommon in Canada) ▪ The LD holes were geophysically logged to total depth in the open hole, with seam and sample intervals adjusted to the geophysical log depths (where necessary) ▪ The 125 RAB completed in 2020 are percussion (rotary air blast) boreholes with a 4 1/2" diameter hammer drill bit ▪ All of the boreholes completed in 2020 were geophysically logged to total depth in the open hole, or through HQ drill pipe in the event of severe hole instability
Drill sample recovery	▪ *Method of recording and assessing core and chip sample recoveries and results assessed.* ▪ *Measures taken to maximise sample recovery and ensure representative nature of the samples.* ▪ *Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.*	▪ The LD cored boreholes were geophysically logged and cored seam intervals are calibrated to the geophysical log data ▪ Achieving consistently high core recoveries can be difficult due to the fractured and friable nature of the coal seams, however the 2020 LDC program was very successful ▪ The large diameter (6" core size) coring programs at Elan have generally achieved better core recoveries than PQ or HQ cores, and appears to be a more suitable coring technique for this type of coal

Criteria	JORC Code explanation	Commentary
		▪ Core recoveries were recorded and cumulative tallies kept. Any samples from seams with less than 80% linear recovery (relative to geophysical log depths) are not tested by the laboratory ▪ Cored boreholes were geophysically logged to calculate linear recovery, and ensure recovered core lengths are representative of the full seam
Logging	▪ *Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* ▪ *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* ▪ *The total length and percentage of the relevant intersections logged.*	▪ Core samples were logged in detail including lithology, brightness, sedimentary features and defects ▪ Boreholes were geophysically logged with downhole tools including long and short spaced density, caliper and gamma, sonic, deviation and dipmeter ▪ The seam intervals in RAB holes have been determined from the geophysical log signatures ▪ Six HQ core holes have been geotechnically logged to assist with geotechnical aspects of the PFS mine design
Sub-sampling techniques and sample preparation	▪ *If core, whether cut or sawn and whether quarter, half or all core taken.* ▪ *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* ▪ *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* ▪ *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* ▪ *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* ▪ *Whether sample sizes are appropriate to the grain size of the material being sampled.*	▪ All core sampled is sent to the testing lab (no slabbing or splitting of core is undertaken) ▪ The LD cores are subject to drop shatter testing, sizing analysis and subjected to float sink testing by size fraction (50mm x 4mm, 4mm x 1mm, 1.0mm x 0.25mm and -0.25mm), with raw coal analysis being undertaken after completion of the initial drop shatter and dry sizing. ▪ Clean coal composites are typically prepared at selected cut-points for each size fraction as directed by Atrum Coal, for detailed coal quality and carbonisation testing. ▪ Carbonisation samples are generally seam blend composites, with varying proportions of each seam group, as directed by Atrum Coal ▪ The LD core provides a much better representation of size fractions relative to smaller diameter core samples and is preferred for coal preparation design
Quality of assay data and laboratory tests	▪ *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* ▪ *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* ▪ *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	▪ Analytical testwork (raw, washability and initial clean coal testing) undertaken by nationally accredited laboratory GWIL Birtley of Calgary, generally to ASTM standards. The lab participates in International Canadian Coal Laboratories Round Robin series (CANSPEX) and test results are consistently ranked in preferred groupings. ▪ The Competent Person undertook a site visit and tour of the GWIL Birtley laboratory in 2018 ▪ Drop shatter, sizing analysis and float sink testing is undertaken on LD samples according to testing protocols designed by Atrum Coal ▪ Clean coal composites are prepared by Birtley and forwarded to COALTECH Petrographic Associates, USA (for clean coal characterisation tests) ▪ Blended products are designed by Atrum and prepared by Birtley for delivery to two world-class coal carbonisation laboratories in Europe; DMT Coal Coke Group (Germany) and INCAR (Spain)
Verification of sampling and assaying	▪ *The verification of significant intersections by either independent or alternative company personnel.* ▪ *The use of twinned holes.* ▪ *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* ▪ *Discuss any adjustment to assay data.*	▪ Geological data is collected in line with Atrum Coal's exploration procedures and guidelines ▪ Sample interval depths are as measured by the field geologist (drillers depths), and adjusted to align with geophysical log depths, while measured sample interval thicknesses are retained ▪ GWIL Birtley undertakes preliminary checks of assay data using regression analysis, and the data is checked by Atrum Coal and Palaris geologists ▪ All data has been encoded, collated and cross checked by Atrum Coal, and later by Palaris ▪ Twinning of existing rotary air blast (RAB) holes is used for targeted coring of coal seams in the LD cored holes. The twinned cored holes are also geophysically logged

Criteria	JORC Code explanation	Commentary
		▪ Coal quality data (raw, washability and clean coal) is checked and validated by metallurgical consultants A&B Mylec ▪ Reported results in this announcement have not been adjusted in any way, shape or form
Location of data points	▪ *Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* ▪ *Specification of the grid system used.* ▪ *Quality and adequacy of topographic control.*	▪ The collar locations of the LD boreholes have been surveyed using Trimble surveying technology ▪ The co-ordinate system is UTM projected grid NAD83 Zone 11N ▪ The topographical surface is sourced from a LiDAR survey and has a reasonable correlation with borehole collars (in 2020 a new LiDAR survey has been flown and incorporated into the geological model) ▪ RAB and LDC hole collars and associated borehole details are provided in Appendix A of this announcement
Data spacing and distribution	▪ *Data spacing for reporting of Exploration Results.* ▪ *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* ▪ *Whether sample compositing has been applied.*	▪ RAB hole density has been increased to a typical spacing of <100 – 200 metres between holes within the pit shell extent defined during the Scoping Study ▪ The 35 LDC holes drilled are located within the Scoping Study pit shell area of Isolation South and are typically spaced at approximately 200 to 400m apart ▪ The data spacing of RAB and cored coal quality holes provides sufficient confidence in geological and grade continuity for the respective proportions of Measured, Indicated and Inferred resources, and to underpin the PFS mine design. No reserves have been stated for the Elan project. ▪ Resource classification and estimation will be revisited at completion of the laboratory testing program and seismic survey (Q1 2021) ▪ Sample compositing (into seam intervals) is generally manually undertaken in the laboratory after instructions are provided by Atrum Coal. ▪ Additional compositing is undertaken in Minex software and requires 80% linear recovery as specified in the Minex BHDB settings, while composite values are mass weighted using both thickness and true RD as weighting variables
Orientation of data in relation to geological structure	▪ *Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* ▪ *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	▪ The 35 LD holes completed in 2020 have been drilled vertically, twinning existing vertical RAB holes with targeted coring intervals ▪ The RAB holes completed in 2020 are mostly vertical, with some inclined holes as shown in the borehole collar table in Appendix 1 ▪ Electronic deviation data from each hole is imported into the Minex borehole database. The geological modelling software captures the downhole inclination and deviation, and structural modelling assists in correcting the apparent seam thicknesses to true thicknesses in model grids ▪ 3D representation is relatively good with the 2020 infill drilling completed, and will improve further with ongoing infill drilling ▪ A seismic survey was also undertaken in 2020, and the results will be incorporated into the next model update
Sample security	▪ *The measures taken to ensure sample security.*	▪ The LD core is photographed, sampled, labelled and bagged before being submitted to the testing laboratories ▪ Samples have a unique sample number that is provided on tags in the bag, outside the bag and in separate digital and hard copy sample advice. Each item of advice lists project name, borehole, top and base of sample and sample number ▪ The laboratory records provided include sample identification numbers and weighed sample mass

Criteria	JORC Code explanation	Commentary
		▪ All measures are taken to ensure sample security represents best practice by industry standards
Audits or reviews	▪ *The results of any audits or reviews of sampling techniques and data.*	▪ Palaris representatives visited the site in 2018 and 2019 to oversee the drilling program, and ensure a high standard of geological data is provided by Atrum Coal's geologists ▪ Processing consultants Sedgman have reviewed and provided input into the sizing and washability components of the testing program ▪ Coal quality data (raw, washability and clean coal) is checked and validated by metallurgical consultants A&B Mylec, requesting the testing laboratories to check and retest any anomalies identified

Table 1 – Reporting of Exploration Results

Criteria	JORC Code explanation	Commentary
Mineral tenement and land tenure status	▪ *Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* ▪ *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	▪ The Isolation South coal agreements were granted to Elan Coal Ltd in 2012/13, Elan Coal was acquired by Atrum Coal in March 2018. Coal Lease agreements provide the right to exclusively explore the land within the boundaries of the lease and are granted for a term of 15 years (with an option to extend at expiry) ▪ The Property falls within the Rocky Mountain Forest Reserve, which is managed by the Alberta Government ▪ Exploration Permits for Isolation South were granted to Atrum Coal by the Alberta Energy Regulator (AER) covering exploration activities undertaken in 2020
Exploration by other parties	▪ *Acknowledgment and appraisal of exploration by other parties.*	▪ Scurry-Rainbow Oil Limited (Scurry) undertook exploration of the Isolation South area in the 1970s, then referred to as the Oldman River prospect. ▪ Exploration activities included bulldozer assisted trenching, establishment of access roads, numerous adits and 19 HQ size fully cored holes for a total of 3,286m of coring. ▪ The cored holes were accompanied by geophysical logging and seam intervals interpreted from geophysical log depths
Geology	▪ *Deposit type, geological setting and style of mineralisation.*	▪ Atrum Coal's Elan project is located in the province of Alberta, in the Crowsnest Pass area of the Crowsnest Coalfield, on the Front Ranges of the Canadian Rocky Mountains ▪ Coal-bearing sedimentary sequences occur within the Mist Mountain Formation of the Late Jurassic to Early Cretaceous aged Kootenay Group, which was strongly deformed during the Late Cretaceous Laramide Orogeny. This resulted in the development of north to northwest-trending folds and steeply dipping reverse faults. The project is located within the Rocky Mountain Thrust Belt, west of the Livingstone Thrust fault and the project extent encompasses the McConnell thrust sheet ▪ Major folds regionally trend in a northerly direction. Secondary local thrusts typically occur within the area, generally determining the distribution and outcrop of coal seams along the thrust fault zones. In many areas of the Crowsnest Coalfield, structure is principally the controlling factor in resource development.
Drill hole Information	▪ *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:* o *easting and northing of the drill hole collar* o *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar* o *dip and azimuth of the hole* o *down hole length and interception depth*	▪ This information is provided for all RAB and LDC holes completed in 2020 at Isolation South, in Appendix 1 of this ASX announcement

Criteria	JORC Code explanation	Commentary
	○ *hole length.*	
Data aggregation methods	▪ *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.* ▪ *Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* ▪ *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	▪ No cut-off grades were applied to the exploration results in this announcement ▪ Composite or seam coal quality values are calculated by mass weighting the quality parameters by thickness and RD ▪ Stated coal quality accompanying the resource estimates is determined through grid models that account for spatial variability, and weighted by resource tonnes
Relationship between mineralisation widths and intercept lengths	▪ *These relationships are particularly important in the reporting of Exploration Results.* ▪ *If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported.* ▪ *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').*	▪ The results tabulated in this announcement are apparent thicknesses as recorded in vertical drill holes and may be different to the true thickness of the seams ▪ Seam dips are generally moderate (20 to 25 degrees) to the west at Isolation South ▪ True seam thickness is determined through use of borehole deviation survey data, seismic survey, and updated structural interpretation / fault modelling
Diagrams	▪ *Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	▪ Previous ASX announcements have provided progressive updates on Exploration Results and Coal Resources at Isolation South ▪ Borehole locations plans are provided along with drill hole locations from the 2020 program
Balanced reporting	▪ *Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	▪ To ensure balance reporting of Exploration Results in previous ASX announcements, the total coal thicknesses stated are summarised along with the hole location for all holes drilled in 2020 ▪ Coal quality variables are weighted by resource tonnes, although coal quality statistics have been provided to show minimum and maximum values for each seam ▪ To ensure balance reporting of Exploration Results, Appendix 1 includes the results for all RAB holes drilled at Isolation South in 2020
Other substantive exploration data	▪ *Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	▪ A 2D seismic of five lines and totalling 5 line km was completed in September 2020, with the data currently being processed ▪ Previous ASX announcements have provided progressive updates on Exploration Results and Coal Resources at Isolation South ▪ Metallurgical testing and studies are ongoing and will be incorporated into the PFS coal processing design ▪ Atrum Coal geologists have undertaken a significant surface mapping program in 2019, collecting data points from outcrops of the Cadomin Formation and coal seams of the Mist Mountain Formation
Further work	▪ *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* ▪ *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	▪ While drilling activities are complete for 2020, the GWIL Birtley Calgary continues to process the large quantity of coal core samples that require sample preparation, raw quality testwork, attrition and float sink testing, and clean coal testwork that will continue into Q1 2021. ▪ Incorporate further laboratory testing data as it is received into updated raw and clean coal quality grid models ▪ The data acquired in the 2020 program will support geotechnical, coal quality and washability requirements to support the PFS work that has commenced and is ongoing ▪ As part of the PFS, a review of any data gaps and determination of required infill and coal quality drilling in 2021 will be undertaken (where possible to upgrade Measured or Indicated resources, minimizing any residual Inferred based on the PFS pit design and

Criteria	JORC Code explanation	Commentary
		production target) ▪ Incorporation of the results of the seismic survey into fault interpretation and updated geological model ▪ Palaris continues with the interpretation of data and updating 3D geological models of Isolation South, with an update to the resource estimate planned for Q1 2021 incorporating updated fault modelling and coal quality data.

Table 1 - Estimation and Reporting of Mineral Resources

Criteria	JORC Code explanation	Commentary
Database integrity	▪ *Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* ▪ *Data validation procedures used.*	▪ Geological data was acquired and collated by Atrum Coal, who undertake validation checks on each hole before the geological logs are finalised ▪ Geological data has been cross checked and re-interpreted by Palaris and used in the construction of geological models ▪ Structure and coal quality grids and data points are checked for outliers and addressed, or potential anomalies are omitted ▪ Data is currently stored in the Minex borehole database system, and has compatibility with formats used by Atrum Coal ▪ Coal quality data (raw, washability and clean coal) is checked and validated by metallurgical consultants A&B Mylec, requesting the testing laboratories to check and retest any anomalies identified ▪ Some historical data is relied upon and assumes that the original acquisition and management of data is sound ▪ Borehole seam profiles with lithology, seam intervals and coal quality results are produced to check validity of data
Site visits	▪ *Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* ▪ *If no site visits have been undertaken indicate why this is the case.*	▪ The Competent Person has undertaken a site visit to the Elan project in 2018 and 2019 to inspect the site and drilling progress at Elan South and Isolation South, and to ensure alignment between Atrum Coal's geological data and Palaris' modelling and resource estimation processes ▪ The visits have been in relation to exploration assistance, geological modelling, and assisting with data QA/QC for model updates, and JORC resource estimates
Geological interpretation	▪ *Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* ▪ *Nature of the data used and of any assumptions made.* ▪ *The effect, if any, of alternative interpretations on Mineral Resource estimation.* ▪ *The use of geology in guiding and controlling Mineral Resource estimation.* ▪ *The factors affecting continuity both of grade and geology.*	▪ Confidence in the geological data is considered to be sound, based on the level of structural complexity at Isolation South. ▪ Correlations have been established in detail and in most cases the seam correlations are straightforward ▪ Correlations can sometimes be difficult where seams are fault thickened or affected. Seam correlation has been a joint exercise between Atrum Coal and Palaris ▪ Coal seam correlations have been cross checked by geophysical logging and identifying characteristic signatures, which decreases the chance of miscorrelation. ▪ The only remaining area which may have some impact on resource tonnes is a zone of thrust faulting. While the zone has been well delineated by drilling, the results need to be aligned with the recent seismic survey to allow discreet modelling of the overthrust coal zones.
Dimensions	▪ *The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	▪ The size and extent of the resource can be visualised in the resource classification plans and cross sections in the appendices. The area defined by the resource estimate is ~6km along strike and up to 1.8km across strike ▪ The resource extents are limited by tenure boundaries in the west, 100m offset to the river in the south, and by seam outcrops in the east and north. ▪ In all areas, the bedding strikes roughly north – south along well defined ridgelines, and controlled by westerly dipping thrust faults, synclines and anticlines.

Criteria	JORC Code explanation	Commentary
		▪ The coal seams of the Mist Mountain Formation dip towards the west with dips ranging from 20 - 25 degrees on the western limb, and are brought to the surface through on the McConnell Thrust ▪ The upper limit of the resource is the limit of weathering surface which is the LiDAR topographical surface minus 3 metres ▪ The lower limit of the resource is at a maximum depth of 400m below topography.
Estimation and modelling techniques	▪ *The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* ▪ *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* ▪ *The assumptions made regarding recovery of by-products.* ▪ *Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).* ▪ *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* ▪ *Any assumptions behind modelling of selective mining units.* ▪ *Any assumptions about correlation between variables.* ▪ *Description of how the geological interpretation was used to control the resource estimates.* ▪ *Discussion of basis for using or not using grade cutting or capping.* ▪ *The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.*	▪ Geovia Minex software was used to create structural and coal quality grids, which are based on 25 m mesh (grid cell) size with a scan distance of 5,000 metres. ▪ Resource classification was undertaken using the methodology as outlined in the Appendix of this announcement ▪ There are some areas of extrapolated resources beyond the furthest boreholes located in the western down-dip areas ▪ Comparisons between previous estimates are provided in this announcement ▪ Grade cut-offs were not applied globally as all coal seams would be washed and blended into various products, consistent with Teck's mines in the Elk Valley, BC ▪ RD values used in resource estimation are based on air-dried true RD values from the laboratory. For historical holes where RD was unavailable, a regression between raw ash (ad) and laboratory tested true RD (air-dried) has been used to estimate RD from raw ash. ▪ The estimate has been internally audited and deemed reproducible. Resource classification has also been reviewed in detail by Atrum Coal geologists.
Moisture	▪ *Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	▪ RD values used in resource estimation are based on air-dried true RD values from the laboratory. No adjustment to in-situ moisture has been attempted at this stage until a reliable estimate of in-situ moisture can be provided. ▪ All quality parameters are reported on an air-dried basis unless stated otherwise
Cut-off parameters	▪ *The basis of the adopted cut-off grade(s) or quality parameters applied.*	▪ Grade cut-offs were not applied globally as blending and / or coal processing would be used to manage product quality attributes ▪ There are no seams included in the resource estimate that have poor coal quality attributes that may warrant coal quality cut-offs being applied
Mining factors or assumptions	▪ *Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be*	▪ The potential mining method and the PFS mine plan is based on open cut mining due to the low stripping ratios ▪ Open cut resources are limited by a minimum 0.3m seam thickness, between the base of weathering and maximum 400 m depth, although the seams only reach greater depths adjacent to the western tenement boundary ▪ Open cut resources have not been limited by stripping ratios as pit optimisation has not identified coal that is beyond economic limits ▪ With the exception of the Oldman River at Isolation South, no

Criteria	JORC Code explanation	Commentary
	rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	surface constraints have been identified or used to limit or constrain the extent of the resource estimate ▪ Mining losses and dilution has not been factored in to the resource estimate
Metallurgical factors or assumptions	▪ *The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	▪ Testing of clean coal quality and potential product types is ongoing and will continue to be reported to the market. ▪ Clean coal and carbonisation testing has been completed and demonstrates high potential for hard coking coal with CSR range of 69 to 74 %, for further details please see ASX announcement *Isolation South Tier 1 HCC* dated 7 October 2020 ▪ The primary products are expected to be premium low to mid volatile hard coking coals suitable for the export market, with a marketing strategy being developed as part of the ongoing PFS ▪ Some minor volumes of secondary thermal or PCI product may also be produced for the export market, with further work required during the PFS to quantify ▪ Detailed sizing, washability and clean coal composite testing is continuing with samples from Isolation South being tested.
Environmental factors or assumptions	▪ *Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	▪ An assessment of initial out of pit dump spaces is currently conducted as part of the PFS and is being led by SRK Consulting ▪ The PFS is currently progressing, and will include a detailed review of environmental factors for the Isolation South project area ▪ Environmentally sensitive areas are being considered during the current mine planning and PFS being undertaken ▪ Any coal mine development would need to go through the process of preparing an Environmental Impact Assessment (EIA) and submission of an application to the Alberta Energy Regulator (AER) under the Environmental Protection and Enhancement Act (EPEA) and Canadian Environmental Assessment Act 2012 (CEAA).
Bulk density	▪ *Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* ▪ *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.* ▪ *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	▪ All coal quality parameters are reported on an air-dried basis unless otherwise stated ▪ True relative density values (air-dried) basis are used in the geological modelling and resource estimation, and are based on a crushed sample that accounts for void spaces in the coal ▪ For historical samples, regression between raw ash (ad) and laboratory tested RD (air-dried) has been used to calculate RD from raw ash. ▪ Bulk density assumptions have not been made
Classification	▪ *The basis for the classification of the Mineral Resources into varying confidence categories.* ▪ *Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* ▪ *Whether the result appropriately reflects the Competent Person's view of the deposit.*	▪ Resource polygons were rationalised according to the distribution and variability in coal quality data points, and the classification downgraded if coal quality data was sparse or highly variable. ▪ Seams 3 and 4 are currently limited to maximum Indicated classification pending updated structural interpretation and modelling of faults which impact those seam groups. ▪ Any extrapolated coal typically exists down-dip of existing data points, and is limited as much as possible ▪ The factors used in the rationalisation and determination of final resource classification polygons included: age and reliability of the data, consideration of 3D representivity and removal of isolated points of observation, quantity and location of coal quality data points, variability shown in continuity and grade, and likelihood of the coal seams being

Criteria	JORC Code explanation	Commentary
		mined ▪ In the view of the Competent Person, the resource classification reflects the level of geological confidence achieved through the 2020 and 2019 drilling programs
Audits or reviews	▪ *The results of any audits or reviews of Mineral Resource estimates.*	▪ Resource estimates were undertaken in three passes to ensure repeatability, with previous versions saved for reference ▪ The resource estimate has been internally peer reviewed, with a review of geological models and resource classification polygons undertaken by Atrum Coal geologists in December 2019 to January 2020.
Discussion of relative accuracy/ confidence	▪ *Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.* ▪ *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.* ▪ *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	▪ The drill spacing is relatively tight at Isolation South. The spacing of structure holes is generally <200m which allows for good structural definition, with vastly improved distribution of coal quality data points (generally 200 – 400m apart) ▪ In the view of the Competent Person, the resource classification reflects the level of geological confidence achieved through the 2020 and 2019 drilling programs ▪ The level of confidence in the exploration and data acquisition is high based on the level of structural complexity and success in achieving high core recoveries ▪ Geostatistical analysis would be difficult due to the structural complexity and inclined nature of boreholes. It is recognised that Western Canadian coal deposits are often structurally complex (relative to Australian coal projects) and requires a much tighter borehole spacing to achieve the same level of geological confidence. This is reflected in the borehole spacing achieved and also the resource classification methodology. ▪ Atrum Coal and the Competent Person aim to apply some conservatism to the borehole spacing and resource classification in light of the complexity.

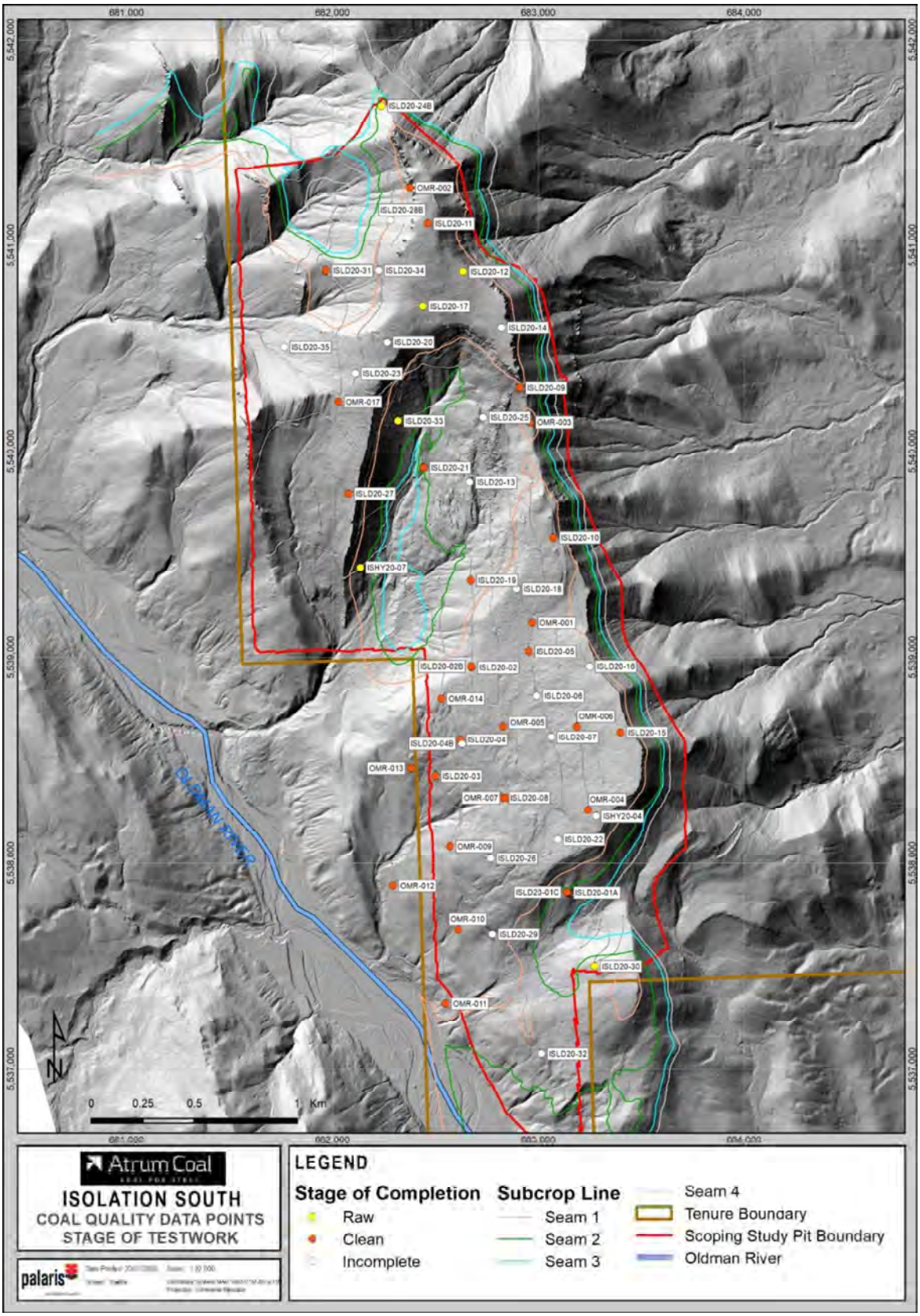

Figure 1: Isolation South LDC drilling location plan

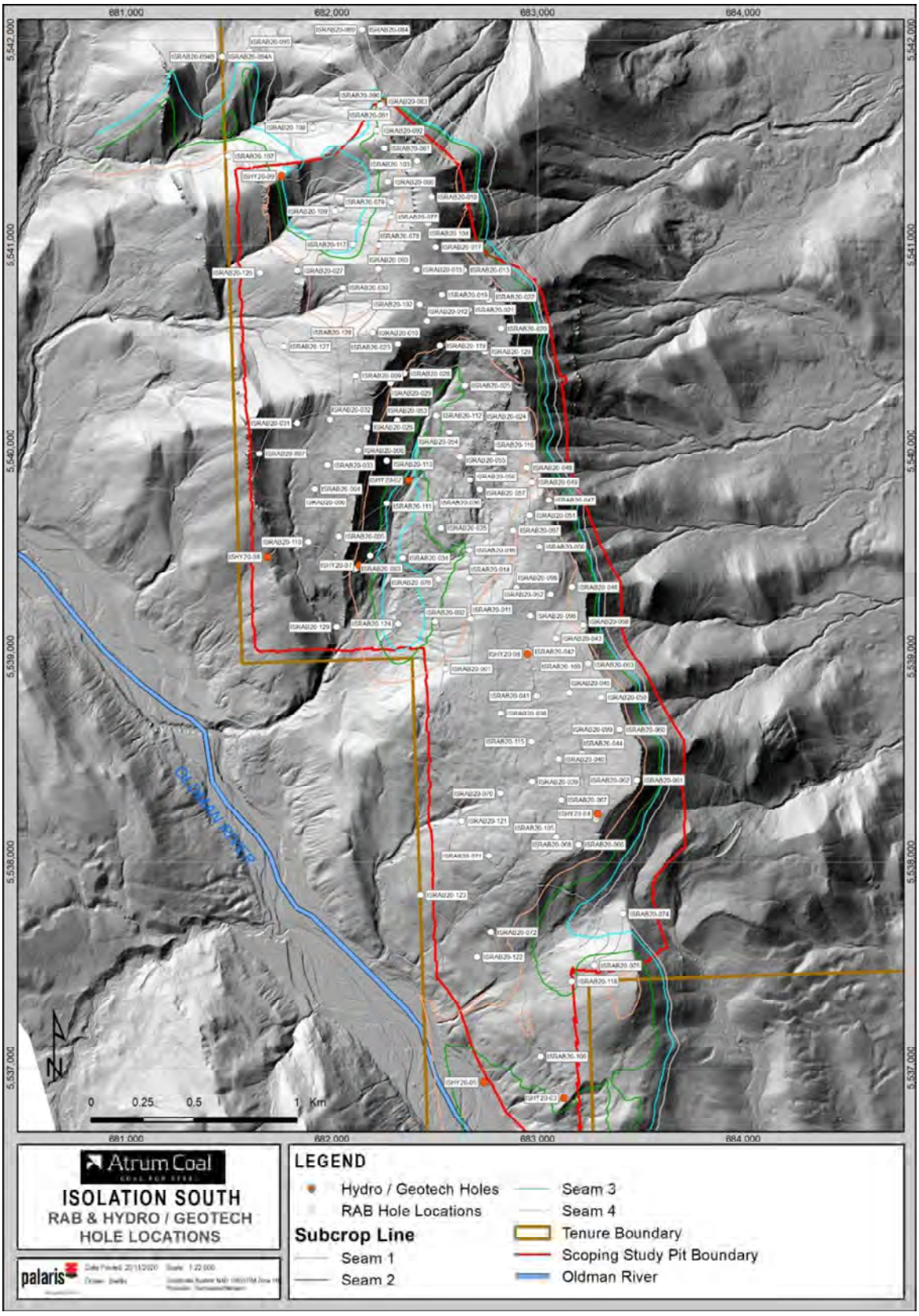

Figure 2: Isolation South RAB and hydro/geotechnical drilling location plan

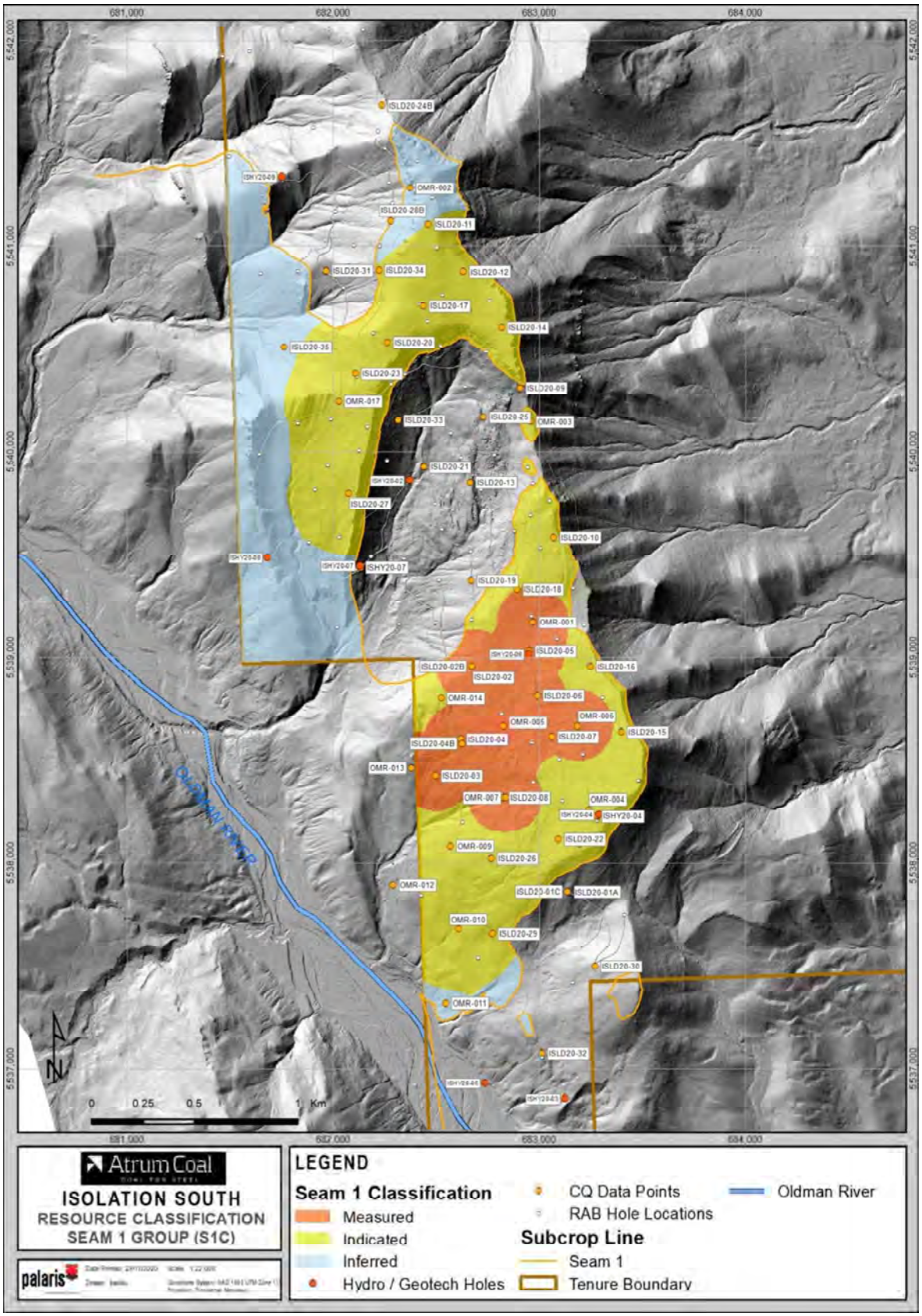

Figure 3: Seam 1 resource classification polygons

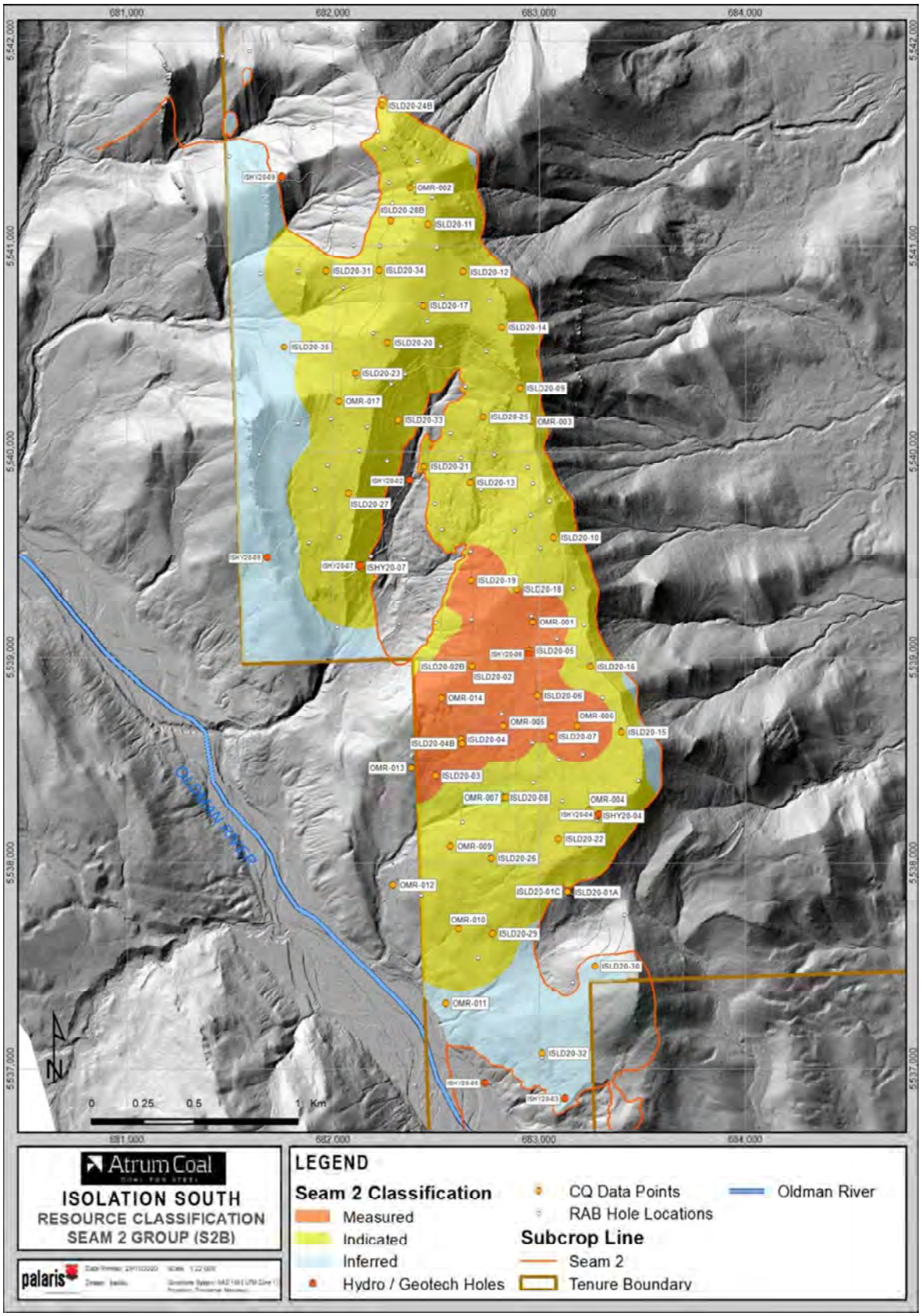

Figure 4: Seam 2 resource classification polygons

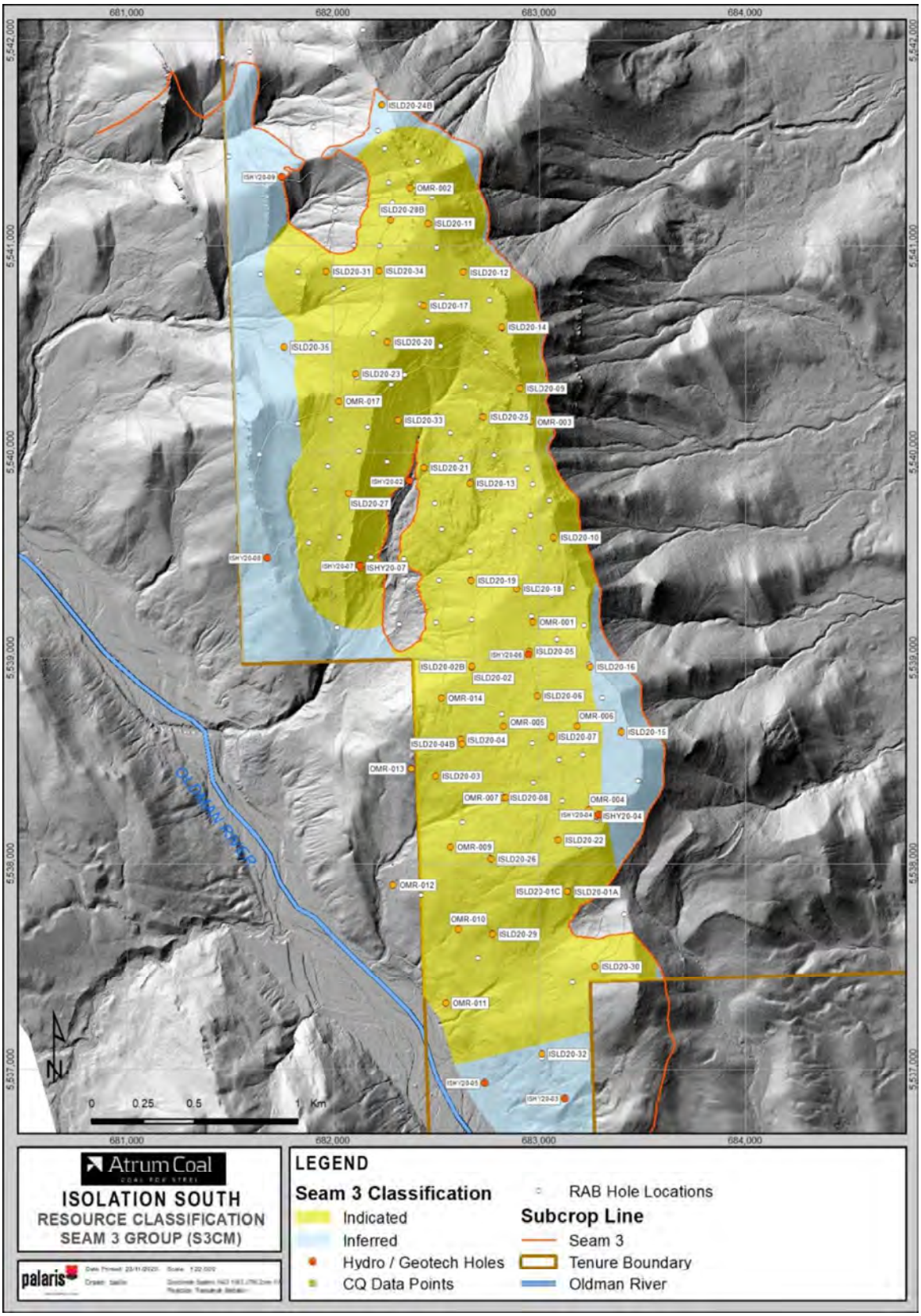

Figure 5: Seam 3 resource classification polygons

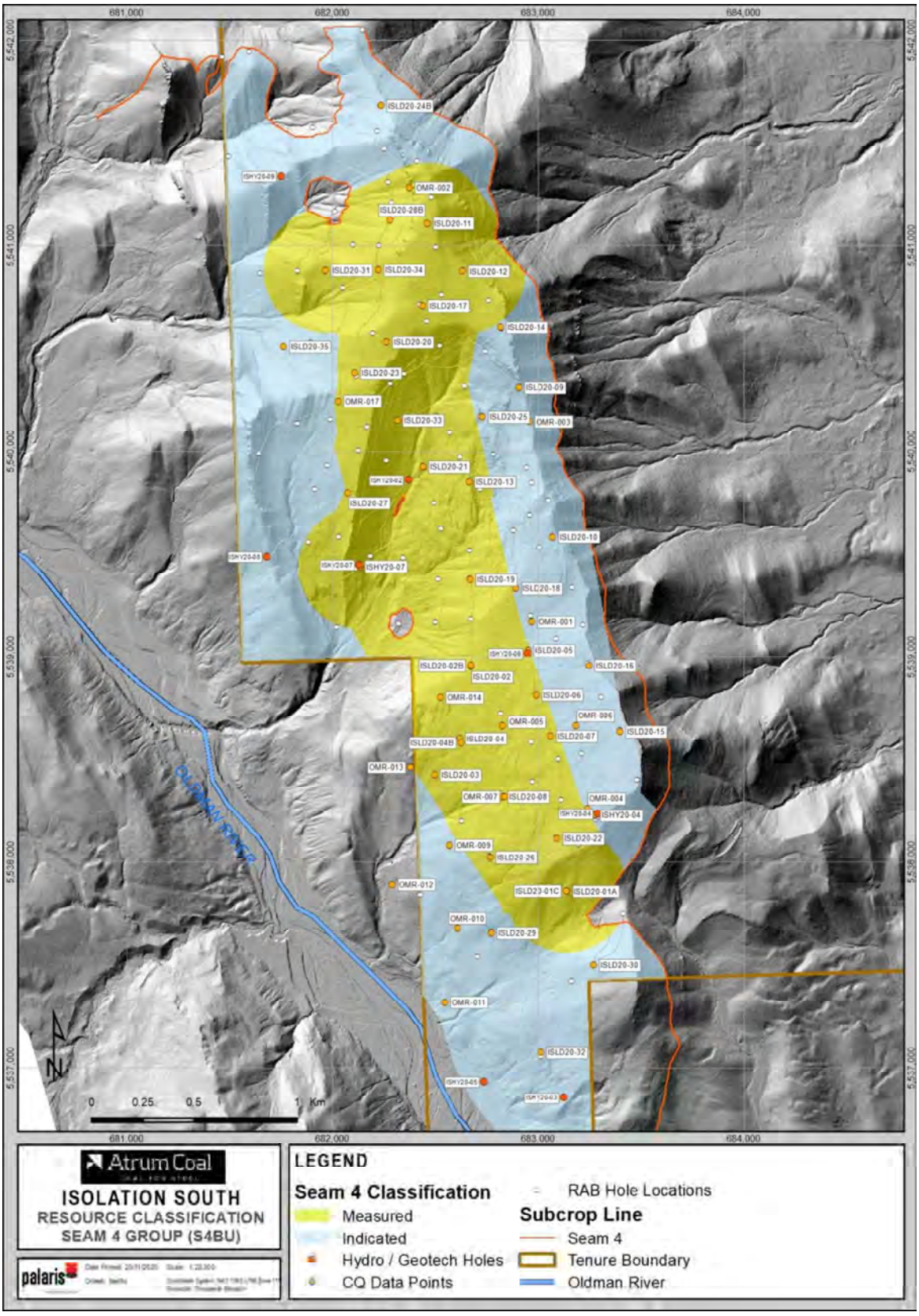

Figure 6: Seam 4 resource classification polygons

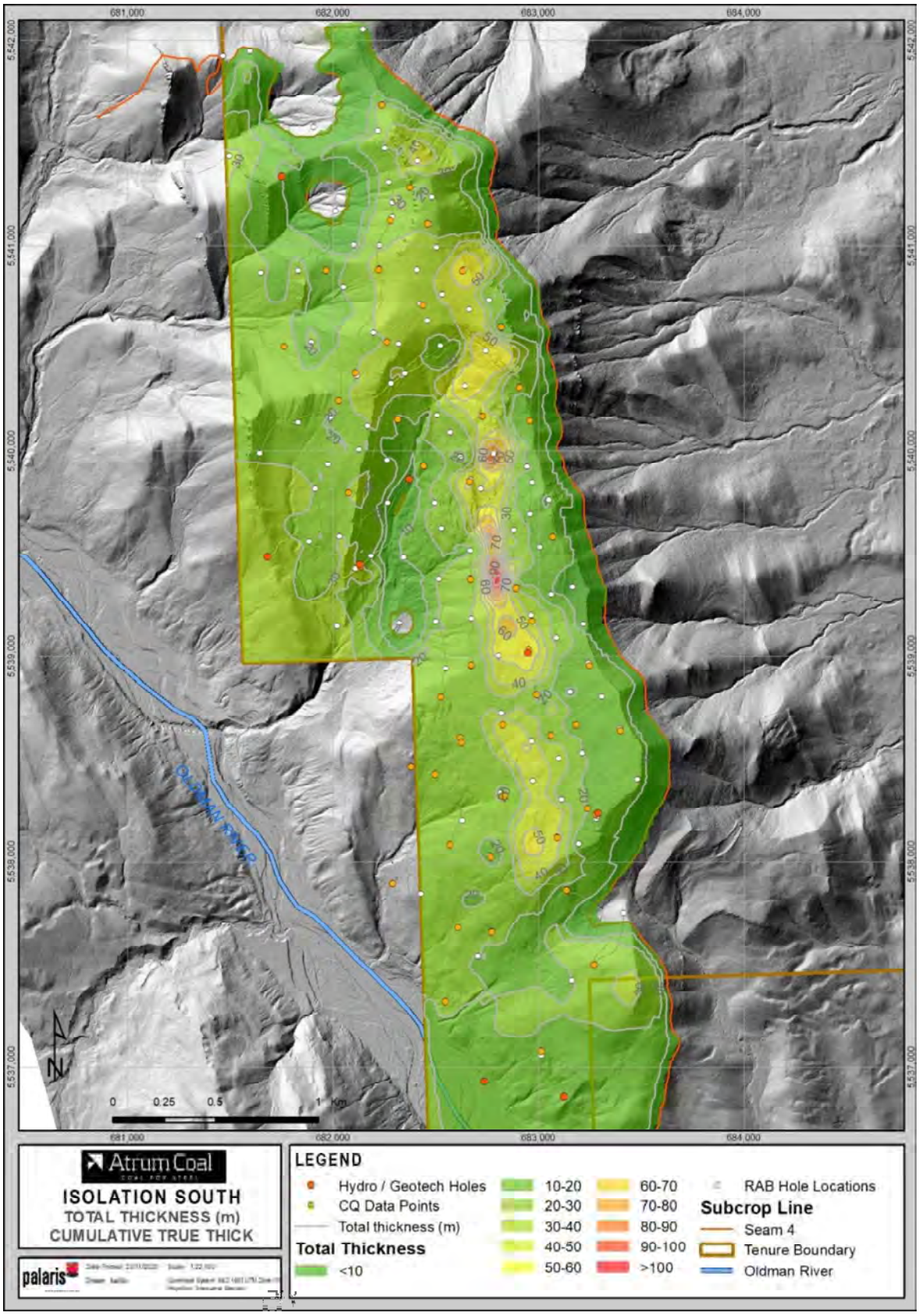

Figure 7: Total cumulative coal thickness (true thickness)

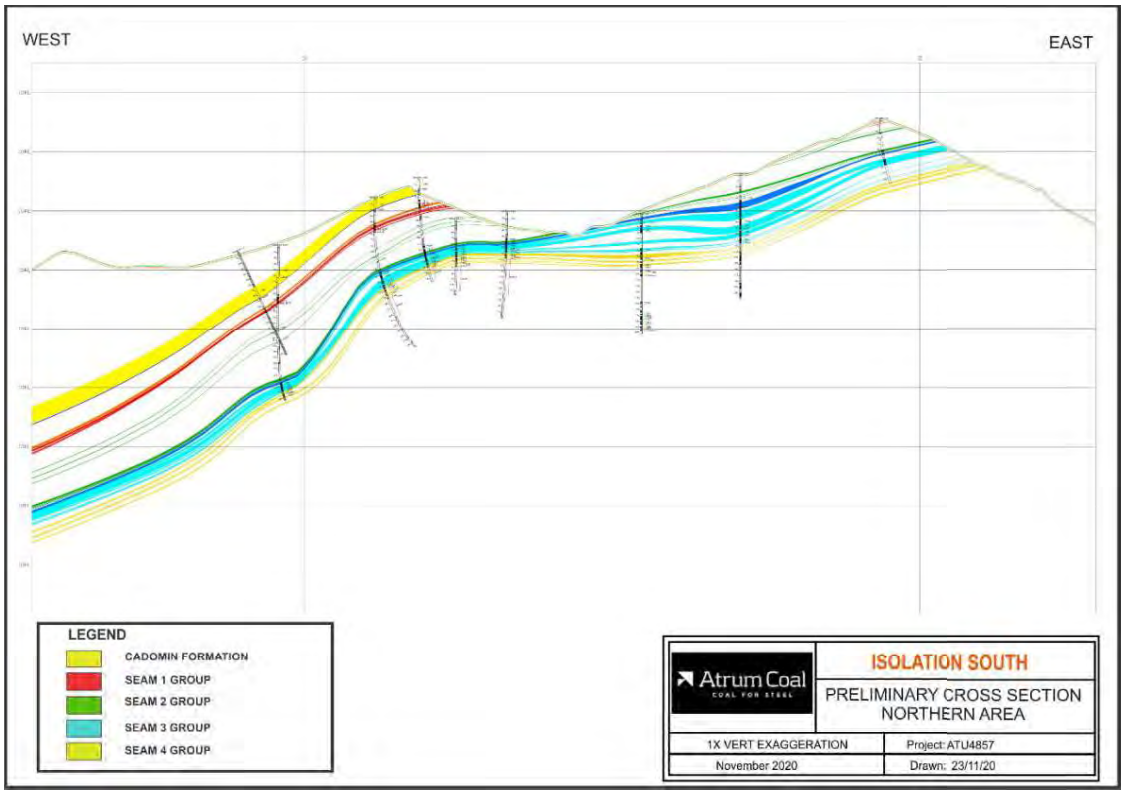

Figure 8: West-east model cross section – Northern Area

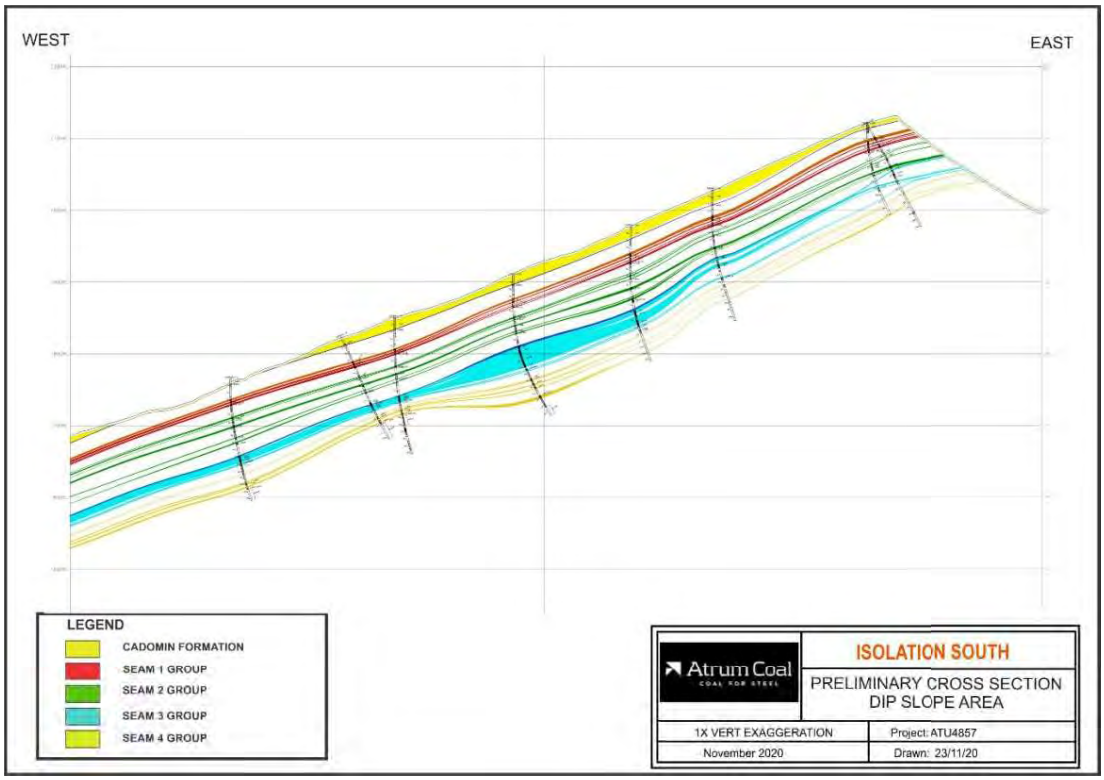

Figure 9: West-east model cross section – Southern Area

Coal Resources by Ply with Coal Quality Attributes (raw)

SEAM	Resource (Mt)	Thick (m)	RD (ad)	IM % (ad)	Ash % (ad)	VM % (ad)	FC % (ad)	CSN	TS %
S1C	13	2.82	1.42	0.9	15.4	26.1	57.8	5	0.86
S1CL	5	0.52	1.53	0.9	30.2	22.7	46.2	5	0.80
S1B	2	0.97	1.58	0.9	35.1	21.0	43.5	4.5	0.69
S1BL	5	0.52	1.47	0.8	23.6	24.5	51.0	6	0.88
S1AU	5	0.89	1.56	0.7	31.7	22.9	44.6	5.5	0.58
S1AL	1	0.88	1.52	0.8	29.5	22.2	46.4	6	0.70
S2CU	1	0.62	1.45	1.0					
S2C	5	0.83	1.45	0.6	20.6	25.0	54.1	5	0.50
S2CL	3	0.59	1.44	0.8	21.6	23.6	54.1	6	0.86
S2B	16	2.26	1.46	0.9	19.5	22.2	57.5	3	0.45
S2A	1	0.56	1.45	1.0	27.7	25.2	46.6	5	1.54
S2AL	1	0.78	1.45	1.0	32.7	23.7	43.0	4	1.59
S3D	20	2.63	1.51	0.8	25.5	21.0	52.6	2.5	0.36
S3CU	36	4.50	1.50	1.3	23.6	21.5	53.1	2	0.35
S3CM	56	7.02	1.45	0.9	19.0	22.1	57.9	2.5	0.34
S3CL	20	2.48	1.48	0.8	22.3	21.8	55.2	3.5	0.44
S3B	9	1.10	1.57	0.8	32.0	20.4	46.9	5	0.61
S3A	5	0.78	1.57	0.7	32.1	20.1	47.0	4	0.56
S4CU	8	1.46	1.56	0.9	30.3	20.0	48.9	4	0.57
S4CL	5	0.81	1.59	0.9	31.6	20.0	47.5	4	0.45
S4BU	8	1.03	1.53	0.7	27.3	22.2	50.0	5.5	0.63
S4BL	6	0.71	1.69	0.7	39.8	17.5	42.1	1.5	0.52
S4AU	5	0.61	1.50	0.7	25.5	22.1	51.9	4	0.74
S4AL	5	0.61	1.51	0.7	26.8	22.2	50.4	4	0.94
TOTAL	**240**								

Coal Resources by Ply with Coal Quality Attributes (clean)

SEAM	Resource (Mt)	IM % (ad)	ASH % (ad)	VM % (ad)	FC % (ad)	TS %	CSN	FLUIDITY ddpm
S1C	13	1.3	7.5	26.5	64.7	0.75	6	90
S1CL	5	0.9	7.5	27.7	63.9	0.90	7.5	618
S1B	2	1.0	7.6	27.1	64.2	0.89	8	1058
S1BL	5	0.9	8.0	27.5	63.7	0.81	7.5	1893
S1AU	5	1.6	8.6	27.5	62.3	0.89	8	759
S1AL	1	1.6	8.6	26.8	63.1	0.86	8	691
S2CU	1	-	-	-	-	-	-	-
S2C	5	-	-	-	-	-	-	-
S2CL	3	0.9	7.9	26.9	64.4	1.07	8	1251
S2B	16	1.1	8.0	23.9	67.0	0.59	5	22
S2A	1	-	-	-	-	-	-	-
S2AL	1	-	-	-	-	-	-	-
S3D	20	1.0	9.8	24.8	64.5	0.58	6	194
S3CU	36	1.2	9.2	23.6	66.0	0.41	4.5	6
S3CM	56	1.3	8.8	23.0	67.0	0.37	3	4
S3CL	20	0.9	8.7	23.5	66.9	0.54	6	127
S3B	9	0.8	7.5	26.2	65.5	0.95	8	545
S3A	5	1.0	8.0	24.3	66.7	0.75	7.5	386
S4CU	8	1.0	8.9	23.2	66.9	0.56	6	253
S4CL	5	1.0	8.8	23.5	66.8	0.41	6.5	9
S4BU	8	0.9	9.0	24.6	65.5	0.63	7	455
S4BL	6	0.9	7.9	22.6	68.6	0.74	5.0	10
S4AU	5	0.7	9.2	24.9	65.1	0.63	7	1618
S4AL	5	0.8	10.1	26.5	62.6	0.76	7.5	3971
TOTAL	**240**							

Modelled Borehole Locations, TD, Inclination/Azimuth and Type

BOREID	X	Y	Z	TD	AZI	DIP	TYPE	BOREID	X	Y	Z	TD	AZI	DIP	TYPE
ISHY20-03	683127	5536856	1648	177	360	-90	HY	ISRAB20-025	682644	5540319	2062	167	0	-90	RAB
ISHY20-04	683280	5538229	2018	146	0	-90	HY	ISRAB20-026	682169	5540120	2053	175	0	-90	RAB
ISHY20-06	682953	5539030	1989	223	0	-90	HY	ISRAB20-027	681830	5540878	2006	160	0	-90	RAB
ISHY20-07	682135	5539437	1803	155	360	-90	HY	ISRAB20-028	682351	5540378	2092	183	360	-90	RAB
ISHY20-08	681690	5539492	1817	428	75	-60	HY	ISRAB20-029	682284	5540332	2090	62	360	-90	RAB
ISHY20-09	681752	5541325	2055	194	360	-90	HY	ISRAB20-030	682051	5540796	2056	92	360	-90	RAB
ISLD20-01A	683141	5537859	1821	85	0	-90	LDC	ISRAB20-031	681830	5540139	1968	297	63	-60	RAB
ISLD20-01C	683139	5537861	1822	60	0	-90	LDC	ISRAB20-032	681989	5540156	1997	229	0	-90	RAB
ISLD20-02	682676	5538951	1899	117	0	-90	LDC	ISRAB20-033	681977	5539933	1939	265	360	-90	RAB
ISLD20-02B	682674	5538957	1898	160	0	-90	LDC	ISRAB20-034	682343	5539480	1807	181	0	-90	RAB
ISLD20-03	682498	5538425	1782	114	0	-90	LDC	ISRAB20-035	682530	5539624	1897	88	0	-90	RAB
ISLD20-04	682620	5538602	1848	152	360	-90	LDC	ISRAB20-035B	682525	5539633	1897	166	0	-90	RAB
ISLD20-04B	682628	5538582	1847	155	360	-90	LDC	ISRAB20-036	682495	5539750	1900	205	228	-88	RAB
ISLD20-05	682953	5539030	1989	163	360	-90	LDC	ISRAB20-037	682446	5539921	1910	133	0	-90	RAB
ISLD20-06	682993	5538814	1979	132	0	-90	LDC	ISRAB20-038	682820	5538727	1913	229	360	-90	RAB
ISLD20-07	683062	5538615	1977	147	0	-90	LDC	ISRAB20-039	682972	5538394	1909	207	271	-90	RAB
ISLD20-08	682828	5538319	1851	176	0	-90	LDC	ISRAB20-040	683101	5538504	1977	191	327	-86	RAB
ISLD20-09	682909	5540311	2159	102	0	-90	LDC	ISRAB20-041	682995	5538811	1979	160	196	-89	RAB
ISLD20-10	683072	5539583	2116	122	0	-90	LDC	ISRAB20-042	682953	5539026	1988	182	304	-89	RAB
ISLD20-11	682462	5541109	2294	261	0	-90	LDC	ISRAB20-043	683089	5539091	2044	170	318	-88	RAB
ISLD20-12	682634	5540874	2253	217	360	-90	LDC	ISRAB20-044	683215	5538532	2028	186	314	-89	RAB
ISLD20-13	682666	5539851	1979	62	0	-90	LDC	ISRAB20-045	683154	5538826	2042	151	0	-90	RAB
ISLD20-14	682820	5540605	2238	182	360	-90	LDC	ISRAB20-046	683167	5539339	2083	124	0	-90	RAB
ISLD20-15	683400	5538637	2120	88	360	-90	LDC	ISRAB20-047	683052	5539763	2133	134	0	-90	RAB
ISLD20-16	683249	5538957	2088	116	0	-90	LDC	ISRAB20-048	682946	5539922	2094	123	360	-90	RAB
ISLD20-17	682439	5540709	2223	184	360	-90	LDC	ISRAB20-049	682971	5539848	2103	154	360	-90	RAB
ISLD20-18	682893	5539334	2024	165	360	-90	LDC	ISRAB20-050	683006	5539535	2093	175	360	-90	RAB
ISLD20-19	682672	5539375	1909	75	0	-90	LDC	ISRAB20-051	682961	5539689	2102	156	360	-90	RAB
ISLD20-20	682264	5540532	2172	168	0	-90	LDC	ISRAB20-052	683063	5539305	2062	175	360	-90	RAB
ISLD20-21	682442	5539925	1911	25	0	-90	LDC	ISRAB20-053	682315	5540152	1996	179	360	-90	RAB
ISLD20-22	683094	5538115	1912	159	0	-90	LDC	ISRAB20-054	682570	5540094	1992	201	0	-90	RAB
ISLD20-23	682110	5540380	2085	182	360	-90	LDC	ISRAB20-055	682621	5539973	1989	255	0	-90	RAB
ISLD20-24	682239	5541683	2209	32	0	-90	LDC	ISRAB20-056	682669	5539861	1980	200	0	-90	RAB
ISLD20-24B	682237	5541682	2208	30	0	-90	LDC	ISRAB20-057	682718	5539815	1972	175	0	-90	RAB
ISLD20-24C	682236	5541680	2208	32	0	-90	LDC	ISRAB20-058	683220	5539156	2076	122	183	-90	RAB
ISLD20-24D	682239	5541678	2210	34	0	-90	LDC	ISRAB20-059	683308	5538804	2102	95	0	-90	RAB
ISLD20-25	682732	5540169	2060	157	0	-90	LDC	ISRAB20-060	683398	5538646	2119	160	75	-60	RAB
ISLD20-26	682768	5538023	1801	144	0	-90	LDC	ISRAB20-061	683484	5538402	2127	152	360	-90	RAB
ISLD20-27	682077	5539797	1940	224	0	-90	LDC	ISRAB20-062	683481	5538401	2126	134	180	-60	RAB
ISLD20-28	682285	5541130	2202	200	0	-90	LDC	ISRAB20-063	683245	5538962	2088	130	75	-60	RAB
ISLD20-28B	682281	5541124	2200	104	0	-90	LDC	ISRAB20-064	683285	5538210	2016	152	192	-58	RAB
ISLD20-29	682775	5537656	1695	122	0	-90	LDC	ISRAB20-065	683286	5538222	2019	137	0	-90	RAB
ISLD20-30	683273	5537500	1830	91	0	-90	LDC	ISRAB20-066	683197	5538086	1951	243	0	-90	RAB
ISLD20-31	681967	5540879	2049	93	0	-90	LDC	ISRAB20-067	683114	5538304	1951	238	360	-90	RAB
ISLD20-32	683015	5537075	1664	151	0	-90	LDC	ISRAB20-068	683198	5538086	1951	198	83	-70	RAB
ISLD20-33	682317	5540152	1995	80	0	-90	LDC	ISRAB20-070	682818	5538335	1850	192	360	-90	RAB
ISLD20-34	682224	5540880	2168	120	0	-90	LDC	ISRAB20-071	682763	5538031	1801	240	0	-90	RAB
ISLD20-35	681764	5540509	1916	283	360	-90	LDC	ISRAB20-072	682771	5537661	1695	209	0	-90	RAB
ISRAB19-01	682621	5537342	1587	179	75	-60	RAB	ISRAB20-074	683415	5537750	1853	160	0	-90	RAB
ISRAB19-02	683386	5535315	1632	146	75	-65	RAB	ISRAB20-075	683275	5537499	1830	204	75	-60	RAB
ISRAB19-03	683450	5534836	1708	208	75	-60	RAB	ISRAB20-076	682516	5539378	1831	210	360	-90	RAB
ISRAB19-04	683620	5534692	1779	206	75	-60	RAB	ISRAB20-077	682288	5541140	2202	216	360	-90	RAB
ISRAB19-05	683128	5536853	1648	168	75	-65	RAB	ISRAB20-078	682227	5541002	2177	123	360	-90	RAB
ISRAB19-06	683627	5535106	1781	170	75	-65	RAB	ISRAB20-079	682289	5541211	2197	123	360	-90	RAB
ISRAB19-07	683675	5534563	1801	151	75	-65	RAB	ISRAB20-080	682271	5541312	2200	99	360	-90	RAB
ISRAB19-08	682929	5537278	1677	108	70	-65	RAB	ISRAB20-081	682253	5541474	2240	150	360	-90	RAB
ISRAB19-09	683727	5534923	1831	101	75	-65	RAB	ISRAB20-083	682240	5541686	2209	96	0	-90	RAB
ISRAB19-10	683795	5534676	1862	69	75	-65	RAB	ISRAB20-084	682147	5542052	2147	107	0	-90	RAB
ISRAB19-11	683622	5534339	1804	178	70	-60	RAB	ISRAB20-085	682072	5542398	2112	91	0	-90	RAB
ISRAB19-12	682842	5537474	1663	212	75	-65	RAB	ISRAB20-086	681790	5542771	2031	25	0	-90	RAB
ISRAB19-13	682608	5537937	1729	187	75	-65	RAB	ISRAB20-087	681790	5542773	2032	87	65	-60	RAB
ISRAB19-14	682701	5538397	1828	162	75	-65	RAB	ISRAB20-088	682006	5542746	2072	30	75	-60	RAB

BOREID	X	Y	Z	TD	AZI	DIP	TYPE	BOREID	X	Y	Z	TD	AZI	DIP	TYPE
ISRAB19-15	682913	5538066	1852	184	75	-65	RAB	ISRAB20-089	682146	5542052	2147	134	245	-60	RAB
ISRAB19-16	683207	5537591	1775	98	75	-65	RAB	ISRAB20-090	682241	5541686	2210	115	65	-65	RAB
ISRAB19-17	682902	5538564	1911	188	69	-65	RAB	ISRAB20-091	682233	5541684	2205	118	245	-60	RAB
ISRAB19-18	682556	5538836	1866	186	75	-65	RAB	ISRAB20-092	682218	5541561	2225	147	0	-90	RAB
ISRAB19-19	682801	5539125	1962	198	75	-65	RAB	ISRAB20-093	682225	5540887	2169	113	360	-90	RAB
ISRAB19-20	683025	5538741	1980	135	67	-65	RAB	ISRAB20-094A	681481	5541927	2017	90	75	-65	RAB
ISRAB19-21	683320	5538397	2057	135	83	-65	RAB	ISRAB20-094B	681479	5541927	2017	111	75	-65	RAB
ISRAB19-22	683106	5538955	2038	134	82	-65	RAB	ISRAB20-095	681552	5541937	2017	67	75	-65	RAB
ISRAB19-23	682937	5540282	2153	107	360	-90	RAB	ISRAB20-096	682964	5539201	2016	244	0	-90	RAB
ISRAB19-24	682887	5539349	2024	200	69	-65	RAB	ISRAB20-097	682880	5539614	2040	213	360	-90	RAB
ISRAB19-25	682770	5539660	1970	190	75	-65	RAB	ISRAB20-098	682896	5539336	2025	216	360	-90	RAB
ISRAB19-26	682371	5539860	1876	36	75	-65	RAB	ISRAB20-099	683398	5538648	2119	130	0	-90	RAB
ISRAB19-27	682011	5539500	1832	199	68	-65	RAB	ISRAB20-100	683244	5538970	2089	140	0	-90	RAB
ISRAB19-28	681613	5539868	1927	178	0	-90	RAB	ISRAB20-102	682426	5540716	2223	243	0	-90	RAB
ISRAB19-29	681612	5539870	1927	193	75	-75	RAB	ISRAB20-103	682413	5541415	2314	271	360	-90	RAB
ISRAB19-30	682039	5540248	2038	176	75	-65	RAB	ISRAB20-104	682467	5541108	2295	270	75	-65	RAB
ISRAB19-31	682035	5540597	2059	185	75	-65	RAB	ISRAB20-105	683091	5538121	1911	233	360	-90	RAB
ISRAB19-32	681973	5540890	2053	161	360	-90	RAB	ISRAB20-106	683014	5537077	1664	185	0	-90	RAB
ISRAB19-33	681883	5540011	1930	193	75	-65	RAB	ISRAB20-107	681494	5541436	1929	135	68	-55	RAB
ISRAB19-34	682461	5539250	1799	46	75	-65	RAB	ISRAB20-108	681906	5541576	2021	33	60	-60	RAB
ISRAB19-35	683079	5539574	2116	134	360	-90	RAB	ISRAB20-109	682012	5541170	2049	29	70	-60	RAB
ISRAB19-36	682996	5539946	2121	140	0	-90	RAB	ISRAB20-110	681884	5539561	1817	238	65	-60	RAB
ISRAB19-37	682878	5539496	2019	137	360	-90	RAB	ISRAB20-111	682247	5539752	1869	126	0	-90	RAB
ISRAB19-38	682975	5538947	1986	187	360	-90	RAB	ISRAB20-112	682504	5540180	1985	213	360	-90	RAB
ISRAB19-39	682787	5539354	1962	202	0	-90	RAB	ISRAB20-113	682259	5540036	1983	126	360	-90	RAB
ISRAB19-40	682817	5538904	1932	201	360	-90	RAB	ISRAB20-114	682808	5539024	1950	247	360	-90	RAB
ISRAB19-41	683029	5538226	1904	192	75	-65	RAB	ISRAB20-115	682969	5538587	1940	215	360	-90	RAB
ISRAB19-42	682770	5539586	1969	10	0	-90	RAB	ISRAB20-116	682784	5539986	2038	209	0	-90	RAB
ISRAB19-43	682769	5539586	1968	200	360	-90	RAB	ISRAB20-117	682102	5541004	2101	57	0	-90	RAB
ISRAB19-44	682781	5539447	1964	204	360	-90	RAB	ISRAB20-118	683165	5537422	1762	111	360	-90	RAB
ISRAB19-45	682672	5538801	1888	202	360	-90	RAB	ISRAB20-119	682525	5540514	2139	105	0	-90	RAB
ISRAB19-46	682663	5539095	1897	159	360	-90	RAB	ISRAB20-120	682743	5540486	2162	119	0	-90	RAB
ISRAB19-47	682678	5538941	1899	154	360	-90	RAB	ISRAB20-121	682629	5538201	1765	173	360	-90	RAB
ISRAB19-48	682620	5538602	1848	184	360	-90	RAB	ISRAB20-122	682705	5537541	1651	191	0	-90	RAB
ISRAB19-49	683146	5537859	1821	110	360	-90	RAB	ISRAB20-123	682429	5537842	1660	116	0	-90	RAB
ISRAB19-50	682499	5538433	1782	173	360	-90	RAB	ISRAB20-124	682322	5539161	1756	67	0	-90	RAB
ISRAB19-51	682681	5537815	1714	146	0	-90	RAB	ISRAB20-125	682185	5539490	1804	118	0	-90	RAB
ISRAB20-001	682550	5538942	1847	164	156	-87	RAB	ISRAB20-126	681648	5540867	1919	228	0	-90	RAB
ISRAB20-002	682500	5539171	1812	89	59	-90	RAB	ISRAB20-127	681764	5540509	1916	258	0	-90	RAB
ISRAB20-002B	682502	5539167	1813	103	360	-90	RAB	ISRAB20-128	681896	5540532	1979	244	360	-90	RAB
ISRAB20-003	682111	5539429	1808	176	148	-90	RAB	ISRAB20-129	682022	5539146	1708	215	75	-70	RAB
ISRAB20-004	681915	5539817	1896	236	36	-89	RAB	OMR-001	682970	5539170	2010	247	0	-90	DDH
ISRAB20-005	682033	5539586	1869	294	360	-90	RAB	OMR-002	682376	5541284	2266	153	0	-90	DDH
ISRAB20-006	682126	5540006	2020	267	299	-89	RAB	OMR-003	682959	5540145	2130	124	0	-90	DDH
ISRAB20-007	681644	5539989	1941	335	360	-90	RAB	OMR-004	683242	5538260	2004	168	0	-90	DDH
ISRAB20-008	682073	5539797	1940	197	181	-88	RAB	OMR-005	682828	5538666	1906	182	0	-90	DDH
ISRAB20-009	682115	5540368	2085	177	150	-89	RAB	OMR-006	683187	5538665	2037	160	0	-90	DDH
ISRAB20-010	682195	5540578	2162	196	0	-90	RAB	OMR-007	682840	5538318	1856	200	0	-90	DDH
ISRAB20-011	682673	5539184	1915	135	312	-87	RAB	OMR-008	682944	5537861	1815	51	0	-90	DDH
ISRAB20-012	682460	5540635	2208	174	0	-90	RAB	OMR-009	682571	5538082	1744	180	0	-90	DDH
ISRAB20-013	682639	5540881	2252	205	166	-89	RAB	OMR-010	682610	5537678	1661	185	0	-90	DDH
ISRAB20-014	682666	5539380	1908	144	360	-90	RAB	OMR-011	682549	5537319	1567	201	0	-90	DDH
ISRAB20-015	682410	5540882	2264	186	204	-89	RAB	OMR-012	682293	5537892	1626	179	0	-90	DDH
ISRAB20-016	682668	5539518	1908	138	18	-88	RAB	OMR-013	682380	5538462	1775	170	0	-90	DDH
ISRAB20-017	682504	5540992	2282	213	206	-89	RAB	OMR-014	682527	5538801	1862	182	0	-90	DDH
ISRAB20-018	682482	5541236	2315	295	314	-89	RAB	OMR-015	681972	5539624	1866	81	0	-90	DDH
ISRAB20-019	682533	5540762	2244	213	33	-89	RAB	OMR-015A	681972	5539624	1866	232	90	-55	DDH
ISRAB20-020	682823	5540598	2238	219	331	-89	RAB	OMR-016	681968	5539929	1935	63	90	-55	DDH
ISRAB20-021	682663	5540689	2228	211	251	-88	RAB	OMR-017	682029	5540245	2036	173	90	-55	DDH
ISRAB20-022	682762	5540736	2243	216	357	-90	RAB	OMR-018	683415	5535185	1662	218	90	-55	DDH
ISRAB20-023	682319	5540522	2176	213	322	-90	RAB	OMR-019	683619	5534758	1775	147	90	-55	DDH

Appendix B – Position Paper on Green Steel Technologies

POSITION PAPER ON GREEN STEEL TECHNOLOGIES

Submitted by Atrum Coal

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Green Steel Technologies – Development and Viability

This paper:

1. Outlines why green steel would increase global emissions;
2. Identifies that if commercial scale green steel one day becomes widespread, this will not happen until 2050 at the earliest;
3. Summarises some of the major challenges to green steel production; and
4. Provides references for the summaries contained herein.

What do the experts assert?

Respected global independent experts Wood Mackenzie concluded[1] last year:

> *"Green steel technologies are maturing. However, a seismic shift away from the traditional blast furnace/basic oxygen furnace combo as the dominant method of steel production is still decades away."*

Industry leader BHP notes:[2]

> *"the energy system modellers producing Paris-aligned technical pathways are positioned almost universally on the cautious side of the green hydrogen debate."*

Green steel would increase global emissions[3]

Every tonne of Green Steel produced before at least 2050 will cause global carbon emissions to be materially higher than they could have been.

Producing Green Steel is an extremely inefficient use of scarce renewable power. There are large efficiency losses:

- Through the electrolyser in producing green hydrogen; and
- In liquefying and transporting the green hydrogen.

The production of Green Steel requires the use of renewable energy to produce green Hydrogen using an electrolyser, which only averages about 70% efficiency. This means that, on average, 30% of the renewable energy used in the electrolyser process is lost in the production of green Hydrogen.

From 1MW renewable power used to produce exported green hydrogen, over 50% of the energy is wasted by the time it's used to make green steel by DRI so as to displace coking coal. While

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[1] Wood Mackenzie, 11 May 2020. Available online at https://www.woodmac.com/news/opinion/is-green-hydrogen-metallurgical-coals-kryptonite/?utm_source=newsletter&utm_medium=email&utm_term=Metals-and-Mining&utm_content=ed202070iss72&utm_campaign=inside-track

[2] BHP, Available online at https://www.bhp.com/news/prospects/2021/04/pathways-to-decarbonisation-episode-4-the-promise-and-challenges-of-green-hydrogen.

[3] This logic is also articulated by BHP here: https://www.bhp.com/news/prospects/2021/04/pathways-to-decarbonisation-episode-4-the-promise-and-challenges-of-green-hydrogen "And from an efficiency standpoint, let's not forget that only 8% of power generation worldwide came from wind and solar in 2019. The most efficient use of this rapidly growing but as of now scarce green energy is to progressively decarbonise the grid by displacing fossil power, as we argued in the first episode of this series . Diverting this resource towards low efficiency uses while it is still scarce would be a poor one: and the models don't make that mistake."

electrolyser efficiency may improve incrementally, we are not aware of credible claims that efficiency (post both losses above) is likely to be improved by more than 10% in the foreseeable future.

It is essential that the world continue to accelerate the rollout of renewable power. However, no credible organisations project that thermal coal can be eliminated from the global power grid, and all cars converted from combustion engines to electric vehicles before 2050. Therefore, it is essential to allocate scarce renewable power to end uses that maximise emissions reductions and there is a clear order of priority in which this must be done.

Once thermal coal has been displaced from the global power grid and all cars have been converted to EVs, a range of green hydrogen applications become more impactful on emissions. However green steel will then be competing for renewable power alongside other green hydrogen applications such as fuel cell heavy vehicles, ammonia for shipping, aviation etc.

In summary, **each tonne of green steel produced before 2050 causes global emissions to be substantially higher** than if the scarce renewable power in those jurisdictions was instead directed towards decarbonising the power grid.

This conclusion cannot be altered by a far higher carbon tax. The higher a carbon tax, the greater the incentive to direct scarce renewable power to applications that maximise emissions reductions, which is certainly not green steel. The constraint is not money, the constraint is the relative scarcity of renewable power compared to the vast, growing need to decarbonise. Even if renewable power is accelerated, it must still be allocated first to the end uses that maximise emissions reductions. Today and for some decades into the future, **green steel is a poor use of scarce renewable power**.

Governments (mainly in Europe) will continue to subsidise pilot scale green steel, and it's important that work continue to improve the technology. However widespread commercial scale rollout will still require vast quantities of renewable power to be redirected away from applications that achieve double the emissions reductions.

Challenges and Timeframe for Commercial Scale Green Steel

Moreover, while renewable power generation capacity is growing, the scale of renewable power generation needs to accelerate dramatically to support the journey of displacing non-renewable energy from the power supply mix.

The need to develop significant renewable power generation capacity around the world further amplifies the challenge associated with green steel. As noted by BHP[4]:

> *"To put the size of the challenge in perspective, a single 2 Mt per annum green hydrogen based DRI plant requires roughly 3 GW of renewable power and electrolyser capacity. How much land would be used by a solar array powering that 3 GW electrolyser? 95 square kilometres (sqkm) – or just under two Manhattans. If the power comes from onshore wind, the land requirement increases by a factor of 5. All this for a single plant producing roughly one-thousandth of global supply in 2050.*
>
> *How much [zero carbon] power would it take to turn over 100% of the EU's 2019 steel production of 157Mt to this route? Over 600 TWh – or about half the total power generation*

[4] BHP, Available online at https://www.bhp.com/news/prospects/2021/04/pathways-to-decarbonisation-episode-4-the-promise-and-challenges-of-green-hydrogen.

of Japan: an industrial powerhouse whose economy is $1 trillion larger than Germany's. And the EU represents just 8% of global steel production."

As noted by JP Morgan[5]:

> *"Scaling up H2 production to levels envisaged by BNEF in 2050 (700Mt/y) would represent a massive increase in electricity demand and an even more massive increase in renewables installed capacity, given wind RE has load factors of ~40% and Solar PV RE has load factors of ~25%.*
>
> *Assuming that Electrolysers use 53kwh of electricity to produce 1kg of H2, producing 700Mt of green hydrogen, as envisaged by BNEF 2050 [strong policy] scenario, it would require 37100 TWh of power, i.e.* ***1.7x the worldwide energy consumption of 2018. This is equivalent to 4.2 TWh used only for Hydrogen, every hour****. Using an average load factor of 32.5% for renewable power (i.e. the arithmetic average of the Wind and Solar Load factors: wind RE has load factors of ~40% and Solar PV RE has load factors of ~25%),* ***the required power capacity in installed renewable power would be 13.03 TW of additional renewables capacity****." [Emphasis added]*

Additional challenges associated with green steel include:

- Hydrogen transportation and storage:
  - Hydrogen's low density makes liquefying or conversion to ammonia necessary, which introduces substantial additional energy losses at both ends (as well as materially heightening safety concerns).
  - Similarly, the lower density of Hydrogen requires a lower liquefaction temperature (compared to natural gas), thereby increasing the energy requirements, but also introducing safety related concerns for the type of storage required to handle the volume require to support commercial scale hydrogen usage.
- Firming intermittent renewable power
  - With common capacity factors for renewable energy being 45% for wind and 25% for solar, a significant overbuild of generating and transmission capacity, along with battery storage, will need to be development to drive electrolysers for a 24-hour production cycle.
- Iron ore quality.
  - Green steel uses the Direct Reduced Iron ("**DRI**") route which requires higher grade iron ore of at least 65% Fe (and typically uses 67-68% pellets), whereas the vast majority of the global iron ore supply is typically lower (~62% Fe) that what is required for this process.
- Operating costs
  - For green hydrogen to be competitive, BHP[6] notes that:
    - Renewable electricity prices would also need to fall radically to ~$10/MWh – not *some* renewable power, but all future renewable power. The most favourable sites are generally being developed first, at full lifecycle costs that are currently multiples of this. This figure already assumes large reductions in the costs of

[5] JP Morgan, 23 February 2021. Available online at https://buyhydrogen.com.au/wp-content/uploads/2021/04/J.P.Morgan-CAZENOVE-EMEA-Hydrogen.pdf

[6] BHP, Available online at https://www.bhp.com/news/prospects/2021/04/pathways-to-decarbonisation-episode-4-the-promise-and-challenges-of-green-hydrogen.

electrolysers to the point where the cost of the electrolyser is of limited significance.
    - For hydrogen DRI (direct reduction iron) to be cost-competitive, green hydrogen costs would need to fall to $1-2/kg on a delivered basis (compared to ~$5-13 today), as well as a carbon price well over US$100/t.
- Similarly, JP Morgan[7] concludes that "at US$150/t hard coking coal, hydrogen would need to be ~US$1/kg". For context, BHP estimate that the cost of transporting green hydrogen from Australia to Japan is likely to eventually reduce to US$1.80 - $3/kg; that is merely the cost of transportation excluding the cost of production and renewable power needed.

[7] JP Morgan March 2021 "Green Steel: Technically Possible, Economically Challenging, Significant Supply Not a Short Term Reality" (herein cited as JP Morgan Green Steel).

APPENDIX 3 – ‘Atrum Coal Cabin Ridge Indigenous Communities Partners in Steelmaking Coal Development.pdf’

INDIGENOUS COMMUNITIES - PARTNERS IN STEELMAKING COAL DEVELOPMENT: OWNERSHIP & OVERSIGHT OPPORTUNITIES

VISION

This Framework seeks to establish Indigenous parties as co-proponents of responsible and modern ethically sourced metallurgical coal in southwest Alberta for steelmaking projects. This can be achieved through a long-term collaboration model that receives guidance from members and incorporates Indigenous participation in all stages of project development.

This Framework will outline a collaborative approach that goes beyond relying on previous approaches to development with Indigenous communities. Its implementation will further enable all engaged parties to contribute meaningful insight and expertise to critical development decisions. These contributions seek to ensure that projects are carried out to the highest standards while providing a solid foundation for the long-term, post-closure stewardship of land and water resources.

Atrum and Cabin Ridge support Canada's Truth and Reconciliation Commission's Calls to Action Recommendation #92 for Business and Reconciliation. We are together putting forth a regional approach to steelmaking coal development in southwest Alberta that includes meaningful Indigenous project participation before, during, and after mine completion.

This approach includes:

- Membership in a Regional Collective Steering Committee that has oversight and input into areas of specific importance to Indigenous communities including water and land.
- Potential for Indigenous equity participation and BOD representation in the individual project(s).
- Potential for equity participation and BOD representation in any successor entities established from the Framework.
- Training, education, and employment opportunities.
- Potential for establishment of ventures that support mine development including post-closure land and water stewardship.

PURPOSE - OWNERSHIP & ECONOMIC DEVELOPMENT

The purpose of the equity participation, BOD representation and economic development outline is to:

- Fulfill the stated principles of Atrum and Cabin Ridge that support reconciliation with Indigenous communities and contributing positively to communities.
- Work within the principles of the Framework and work collectively and in good faith to maximize available expertise, ensuring the responsible development of regional metallurgical coal projects.

Key elements involve:

- Equity investment and commercial opportunities
- BOD representation
- Indigenous participation in economic development through individual First Nations or a consortium

The Regional Collective Steering Committee will be fully funded by the participating metallurgical coal companies. Equity participation and BOD representation in individual projects or any entities established under the guidance of the Framework is not mandatory for any member of the Framework.

[1]Recommendation #92 asks the corporate sector and their leadership to adopt the United Nations Declaration on the Rights of Indigenous People. The commission calls for meaningful consultation and long-term, sustainable opportunities from economic development projects, as well as education and training for managers on the history of Indigenous people, inter-cultural competency, human rights and anti-racism. https://indigenousworks.ca/en/partnership/what-does-intersection-mean/trc-call-action

PURPOSE - OVERSIGHT

The purpose of the Regional Collective Steering Committee (the "Steering Committee") is to:

- Be a fully funded, multi-party stewardship entity to provide oversight before, during and after mining activities.
- Work within the principles of the Framework and uphold a commitment to work collectively and in good faith to maximize available expertise to ensure the responsible development of regional metallurgical coal projects.

Key activities involve providing guidance on:

- environmental data collection;
- cultural data collection;
- mine planning (including post-mining closure planning);
- environmental assessments; and
- long-term stewardship and legacy infrastructure/ developments.

The Steering Committee will be comprised of leadership representatives from the industry and participating Indigenous communities. Decisions of the Steering Committee will be made by consensus in a cooperative manner.

The Steering Committee is expected to receive guidance and recommendations from 3 Project Working Groups:

- Land Working Group
- Water Working Group
- Mine Planning Working Group

The Terms of Reference and participation for the Project Working Groups will be determined by the Steering Committee.

In association with: Atrum Coal CABINRIDGE