Full Value Realisation of Metallurgical Coal Tailings

A Value Proposition

Bowen Basin Circularity

Coreo

Queensland Government

Resources Centre of Excellence

Acknowledgement

We acknowledge the first and continuing custodians of the countries and the grounds upon which we collectively work, create, live, and dream.

We pay respect to Aboriginal and Torres Strait Islander cultures, and to Elders past and present. We recognise the unique and enduring relationship that exists between Indigenous Peoples and their traditional territories, and welcome their deep knowledge and participation in the circular economy. An understanding of interconnectedness and continual regeneration has long informed Indigenous cultures, and the opportunity exists for all organisations to benefit from an Indigenous understanding of living systems, the passing down of knowledge through communities, and the key elements of circular economy practice.

Each year, Queensland's Bowen Basin produces over 137 million tonnes of saleable metallurgical coal.

In doing so, it generates an estimated 11.7 to 23.5 million tonnes of tailings[1].

If recovered, these resources could generate between $1.7 and $3.4 billion in annual value, based on conservative yield assumptions and market-aligned pricing.[2]

This Value Proposition outlines:

- The scale of the tailings resource in the Bowen Basin
- The market value of materials contained within them
- The near-term commercial opportunity from legacy dams
- A staged, practical pathway for recovery at scale

[1] Based on industry data showing coal preparation plants typically discharge 60–120 kg of dry tailings per tonne of ROM coal processed.

[2] Value range derived from estimated tailings volumes (11.7–23.5 Mt/year) and indicative market prices for recoverable materials including carbon, clays, quartz, titanium, sulphides, and REEs. Calculations and assumptions were developed in consultation with subject-matter expert Ross Garling.

What if the biggest untapped resource wasn't underground, but hidden in the materials we leave behind?

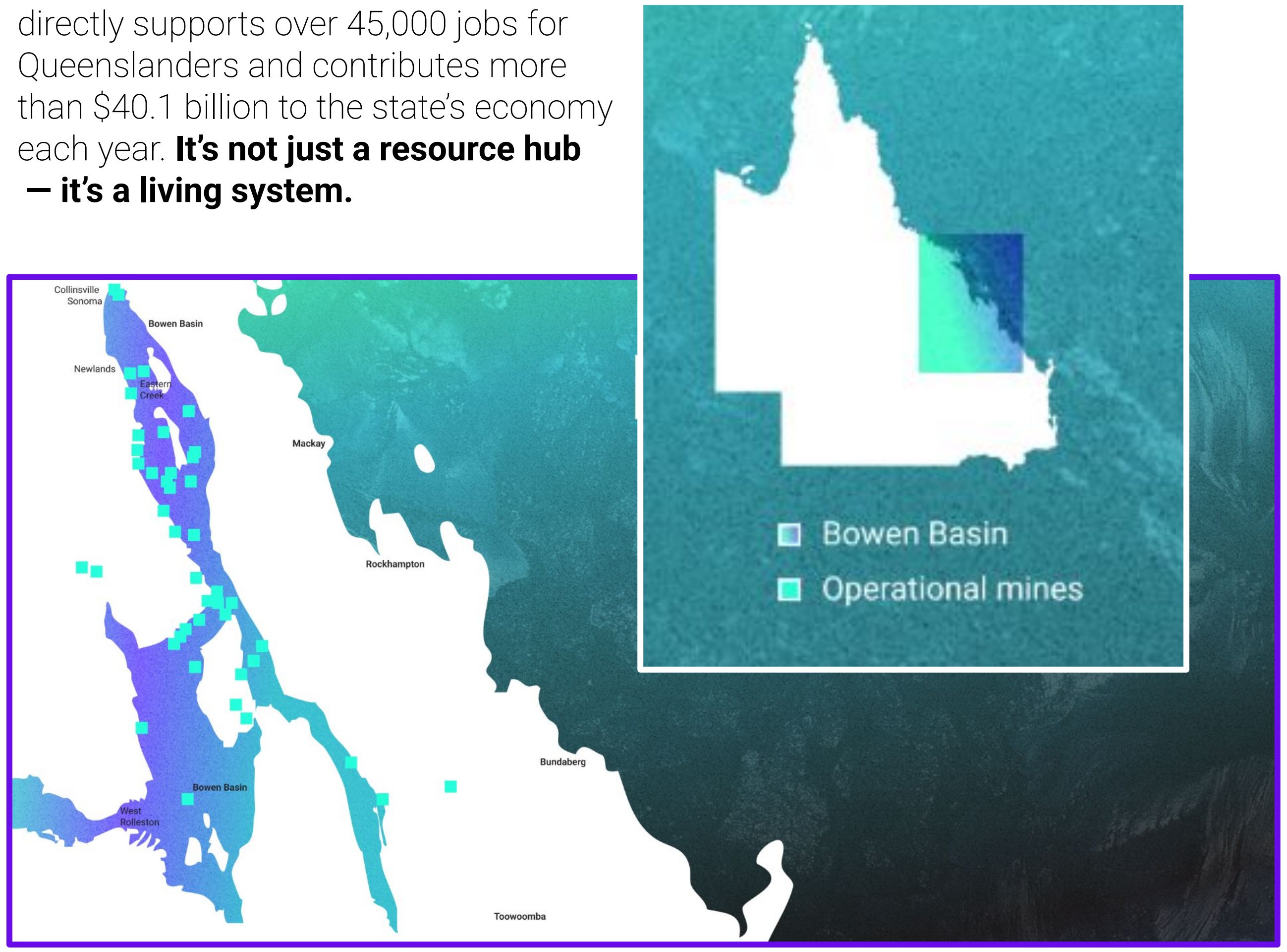
In mining, success is too often measured by the volume we extract, not the value we create.

Yet for every tonne of metallurgical coal sold, between 60 and 120 kilograms of valuable co-products in the tailings and fines remain.[3]

These tailings are not leftovers, they are the raw material of new opportunities.

Nowhere is this opportunity more pronounced than in Queensland's Bowen Basin, a region spanning 60,000 square kilometres, equivalent to around 8.5 million football fields. It is the heart of Australia's metallurgical coal production, supplying coal critical for global steelmaking.

With 58 active mines, the Basin directly supports over 45,000 jobs for Queenslanders and contributes more than $40.1 billion to the state's economy each year. **It's not just a resource hub — it's a living system.**



And yet, despite mining the same material, in the same ways, on the same ground, most operations still work in isolation.

[1] Based on industry data showing coal preparation plants typically discharge 75–120 kg of dry tailings per tonne of coal. Additional context from ACARP project C29057 (Katwal et al., 2020–2022) supports this range for Australian coal operations.

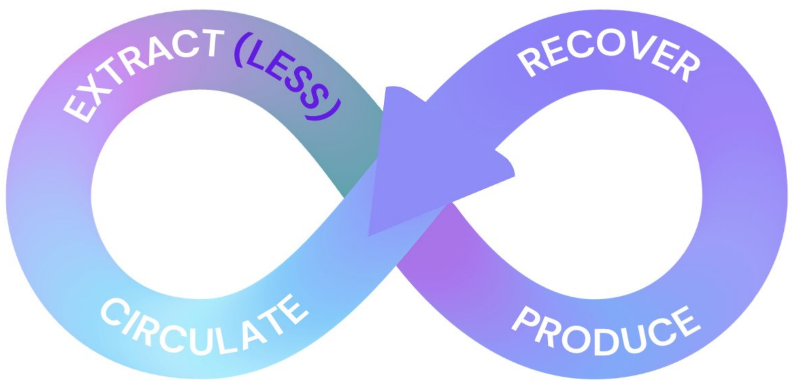
What if we stopped just mining the seam, and started mining the system?

The Bowen Basin is not just a collection of individual mines, but an integrated system, one capable of circulating resources, retaining value, and regenerating opportunity.

As global demand for steel continues to rise, the focus must shift from simply producing more to extracting more value from what we already produce. Circular principles offer a pathway to do just that.

Circularity is about rethinking the system, shifting from a traditional linear model:

to a circular model that prioritises value retention:



These ideas shaped the Bowen Basin Circularity Project — a pioneering collaboration between Coreo, the Queensland Government Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development, and the Resources Centre of Excellence (RCOE).

Our Mission

Unlock the true potential of Queensland's resources through collaborative circular practices that transform mindsets, foster environmental regeneration, enhance social prosperity, and build resilient regional economies.

Our Approach

We started with the system.

We built on our previous Pit to Port project, where we tracked material and energy flows for a BHP Mitsubishi Alliance (BMA) met coal mine in the Bowen Basin to their port.

This time, we scaled the analysis, mapping the full life cycle of inputs and outputs across the Basin to better understand the size of the opportunity for circularity.

In parallel, and with the support of the RCOE, we mapped the wider stakeholder ecosystem. This work involved identifying the region's skills, capabilities, infrastructure, and synergistic material flows, as well as the organisations and communities connected to them.

By combining material flow analysis with ecosystem mapping, we could frame clear and targeted questions to guide our search for circular opportunities – practical, grounded interventions with both commercial and environmental value.

Before we dig deeper into these questions, let's get our heads around the tails!

The questions we asked were simple but powerful:

1. What volumes of tailings are in the Bowen Basin?
2. What valuable resources are in the tailings?
3. How can we recover and maximise the tailings' full potential?

What are coal tailings?

Coal tailings are the fine-grained materials left behind after saleable coal is extracted during processing (see Figure 1 for a high level process flow). Typically composed of water, coal fines, clays, and other mineral residues, tailings are a by-product of the coal washing process – a step used to improve the quality and consistency of the final coal product. In this process, impurities are separated from the raw coal and removed as tailings, which are then stored in engineered impoundments or tailings ponds. It's important to note that not all coal mines generate tailings. Some thermal coal mines bypass washing entirely and produce no tailings or coarse rejects. Others co-dispose tailings with coarse rejects in shared facilities. However, for metallurgical coal, which must meet strict quality standards, washing is essential. As a result, nearly all Queensland metallurgical coal operations generate significant volumes of tailings.

What is Metallurgical Coal, and why does it matter?

Coal, including metallurgical coal, was formed millions of years ago from ancient trees and plants.

Over time, heat and pressure transformed this organic material into a dense, carbon-rich rock.

Metallurgical coal, or *met* coal, is a special grade of coal used to make steel. Unlike *thermal* coal, which is burned for electricity, met coal is valued for its unique properties that allow it to be converted into coke, a solid carbon material essential to steelmaking.

When heated in a blast furnace, coke plays two key roles:

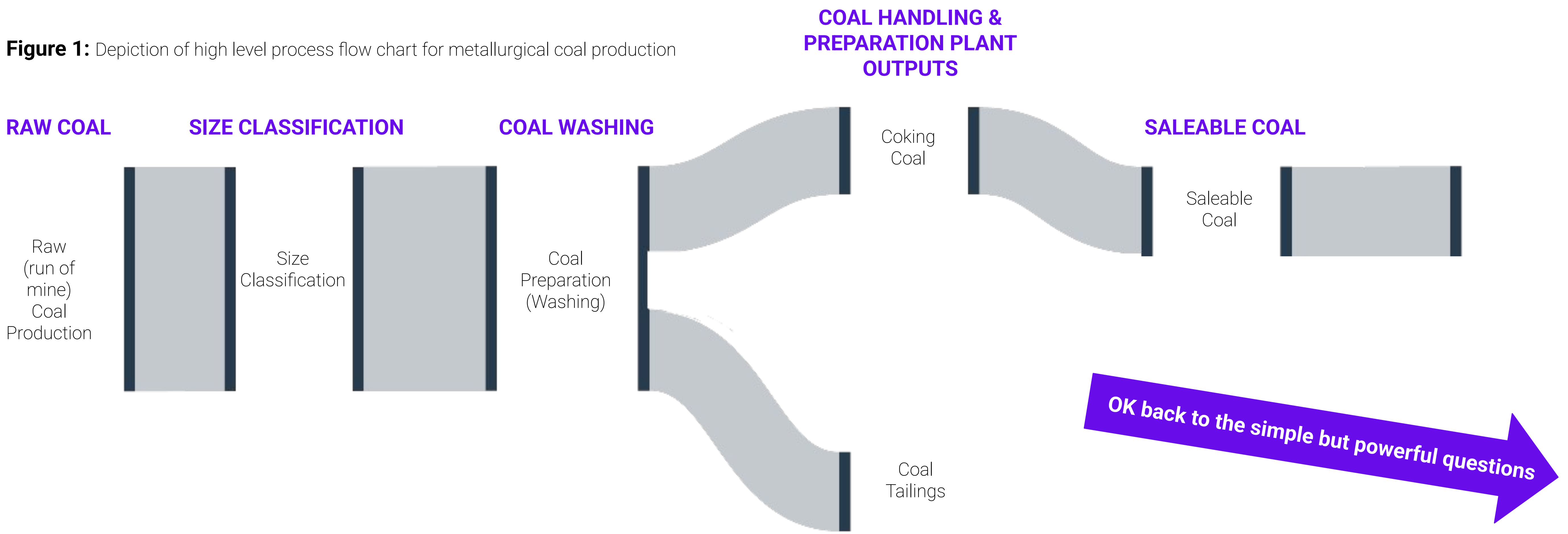
1. It provides the intense heat needed to smelt iron ore.
2. It supplies the carbon required to remove oxygen from the ore, turning it into molten iron.

This makes coal critical to the modern world. Steel is the backbone of infrastructure, transport, construction, and clean energy systems. Without met coal, large-scale steel production as we know it wouldn't be possible.

While emerging "green steel" technologies are advancing, around 70% of the world's steel is still made using traditional blast furnaces that rely on met coal.

Australia plays a pivotal role. We are the world's largest exporter of metallurgical coal, and Queensland's Bowen Basin is home to some of the highest-grade reserves on the planet, making it a key player in both the global steel industry and the transition to a low-carbon economy.

Figure 1: Depiction of high level process flow chart for metallurgical coal production



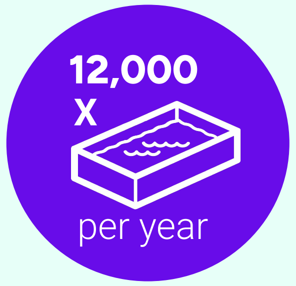
First question. . .

What volumes of tailings are in the Bowen Basin?

Mining in Queensland's Bowen Basin began in the early 1960s and has grown steadily ever since.

Today, with 58 operating mines, the region produces around 137 million tonnes of saleable metallurgical coal each year. At typical processing rates, this volume generates an estimated **11.7 to 23.5 million tonnes of tailings annually.**

Enough tailings to fill up to 12,000 Olympic-sized swimming pools every year.



In addition to this, vast quantities of legacy tailings are already stored in Tailings Storage Facilities and co-disposal dumps across the region. Many of these materials are recoverable, dramatically increasing the total potential tonnage.

But in a basin as large and geologically diverse as the Bowen, tailings aren't uniform. Their composition varies by site, shaped by geology, processing methods, and operational history.

Despite the Basin's scale and strategic importance, there is little publicly available data on the composition of coal tailings in Queensland. While individual operators have conducted site-specific analysis, no consolidated dataset has previously offered a basin-wide view of what value these materials might hold.

To help close this gap, we worked with researchers from the University of Queensland Sustainable Minerals Institute (SMI) and directly with mine operators.

Thanks to their collaboration and willingness to share physical samples and operational data, we've assembled the largest dataset of its kind for Bowen Basin coal tailings. To protect commercial sensitivities, the individual site data and companies involved will not be disclosed. All data has been anonymised and aggregated.

The dataset is not yet fully comprehensive, and many before us have rightly avoided over-extrapolating limited data across such a vast and varied region. But this nonetheless is the strongest starting point in decades and, more importantly, a platform to move the conversation forward.

We don't need to have all the answers to begin. What we need is the willingness to ask better questions, to test assumptions, and to be brave enough to try something different. Because unless we do, this opportunity will remain buried - literally and figuratively.

Second question. . .

What's Inside?

Our dataset revealed more commonality than difference in the materials present in tailings. What varied most were the concentrations, not the types of materials themselves.

We believe it's time to challenge the assumption that all tailings are either low-value or too variable to work with. In fact, many tailings streams may share more in common than is often assumed, presenting a more strategic, scalable opportunity for operators and government alike.

Yes, the Bowen Basin is geologically complex. Its formation spans over 100 million years of tectonic extension, marine transgression, and foreland loading, creating a stratigraphy rich in coal, clastics, volcanics, and marine sediments. This diversity explains some of the local variation in tailings, but importantly, large bands of similar geology are also being mined across the basin, producing tailings with recurring material profiles.

Understanding both the differences and the consistencies is key to unlocking value at scale.

To understand the potential at scale, we modelled average composition values against estimated annual tailings output from the Bowen Basin between 11.7 and 23.5 million tonnes.

The calculation was simple:

Tailings mass × Average composition (%) = Estimated annual material mass (tonnes)

Across the Bowen Basin, a consistent set of valuable materials is emerging including high-grade residual carbon, aluminosilicates, rare earths, quartz, sulphides, and other oxides. These materials point to clear pathways for recovery and reuse, if we design the right systems to unlock them.

As Tony Knight, Queensland's Chief Government Geologist, puts it:

> **Each of these materials points to pathways for recovery and reuse - if we design the right solutions. In a circular economy, tailings aren't waste; they're misclassified resources. They're the building blocks of entirely new industries.**

Table 1: Materials identified in Bowen Basin met coal tailings and their potential uses

Material Category	Examples / Notes	Possible Uses
Aluminosilicates	Kaolinite, Illite, various clays	Can be calcined to produce supplementary cementitious materials (SCMs), replacing Portland cement in concrete. Also used in clay-based products such as pavers.
Quartz	SiO_2 dominant; often co-occurs with clays	Used in construction materials, ceramics, glass manufacturing, and as a feedstock for silicon production.
Residual Carbon	High fixed carbon content (~40–47%); often higher vitrinite than ROM coal	Can be upgraded to prime coking coal for steelmaking.
Sulphide Minerals	Pyrite (FeS_2) and other minor sulphides	Source of sulphuric acid, which is in increasing demand across mining and industrial sectors.
Rare Earth Elements (REEs)	Cerium (Ce), Lanthanum (La), Neodymium (Nd), Praseodymium (Pr), others	Critical in green technologies - used in magnets, high-performance motors, electronics, and batteries.
Heavy Metals (Trace)	Chromium (Cr), Vanadium (V), Zinc (Zn), Strontium (Sr)	Inputs to steel alloys, galvanising, ceramics, electronics, and catalysts.
Titanium-bearing Minerals	TiO_2 detected in ash fractions	Used in white pigments, UV-blocking agents, and advanced coatings.
Phosphorus (P)	Detected as P_2O_5 in minor concentrations	Essential for fertilisers, animal feed supplements, and industrial chemicals.
Sulphur	Total sulphur content up to ~0.5%	Feedstock for sulphuric acid, widely used in fertilisers, mining, and chemical processing.
Other Oxides	Fe_2O_3 (iron oxide), Al_2O_3 (alumina), CaO (lime), MgO (magnesia)	Raw materials for cement, refractory products, steelmaking, and chemical industries.

Scaling up: the Opportunity

To understand the full potential of Bowen Basin met coal tailings, we scaled our average composition data against estimated annual tailings volumes, ranging from 11.7 to 23.5 million tonnes.

The results demonstrate a significant, multi-material resource base. The table below outlines indicative yield ranges, market-aligned unit values, and potential annual revenue estimates for key material categories. While not exhaustive, this modelling highlights the scale of opportunity available if recovery pathways are developed at industrial scale. Some materials, such as REEs, pyrite, sulphur, and phosphorus are present at sub-economic grades and are unlikely to be commercially viable with current technology; values are indicative only to reflect potential resource diversity.

Table 2: Annual revenue potential from recovered met coal tailings materials

Product	Average Yield%	Ave. Tails Yield	Estimated Annual Mass		Est. Ave. Au$/t	Estimated Annual Revenue	
			MIN	MAX		MIN	MAX
Prime Coking Coal	50%	50%	5,850,000	11,750,000	$181	$1,058,850,000	$2,126,750,000
Potential Co-Products	50%	-	5,850,000	11,750,000	-	-	-
Aluminosilicates (clays)	40%	20%	1,170,000	2,350,000	$100	$117,000,000	$235,000,000
Quartz (SiO_2) Dust	25%	13%	731,000	1,469,000	$55	$40,205,000	$80,795,000
Residual Carbon	12.50%	6.25%	366,000	734,000	$181	$66,246,000	$132,854,000
Sulphide Minerals (Pyrite)	1.50%	0.75%	44,000	88,000	$95	$4,180,000	$8,360,000
Rare Earth Elements (REEs)	0.03%	0.02%	1,000	2,000	$10,000	$10,000,000	$20,000,000
Heavy Metals (Cr, V, Zn, Sr)	0.01%	0.01%	300	1,000	$10,000	$3,000,000	$10,000,000
Titanium-bearing Minerals	1.50%	0.75%	44,000	88,000	$8,500	$374,000,000	$748,000,000
Phosphorus (P_2O_5)	0.05%	0.03%	1,000	3,000	$6,000	$6,000,000	$18,000,000
Sulphur	0.50%	0.25%	15,000	29,000	$95	$1,425,000	$2,755,000
Other Oxides (Fe_2O_3, Al_2O_3, etc.)	10%	5%	293,000	588,000	$100	$29,300,000	$58,800,000
Total if All Sold	-	96%	8,515,300	17,102,600	$201	$1,710,206,000	$3,441,314,000

Last question...

How can we maximise the full value from the full volume of tailings?

With a clearer understanding of the materials contained in tailings, we overlaid our insights with a system-wide view of the Bowen Basin, developed through ecosystem mapping.

This combination gave us a unique vantage point: not just to identify what could be recovered, but to rethink how and where recovery could be achieved sustainably and at scale.

Instead of focusing on small, high-value fractions like rare earths (which often occur at low concentrations and remain commercially marginal), we adopted a whole-system approach. Our aim: to recover the full value from the full volume of metallurgical coal tailings, wherever technically and commercially viable.

Our work revealed three interconnected recovery pathways:

1. In-situ Value Extraction

Unlocking value onsite. This includes identifying near-term opportunities for site-based recovery using modular, shareable technologies. These could include mobile fine flotation units or acid leach circuits positioned close to source, reducing transport and processing emissions for mines facing early dam closure or legacy liabilities.

2. Post-Removal Value Extraction

Here we discovered the greatest short-term potential. Once tailings are removed and processed (e.g. via FlexiLAB detailed below), a commercial-grade coal product can be recovered, proven through flotation testwork at multiple sites. At one site alone, this could unlock 9.5 Mtpa of saleable coal, worth ~AU$1.7 billion/year before costs.

Beyond coal, the residual stream contains multiple by-products:

- Supplementary Cementitious Materials (SCMs) from calcined clays
- Clay products for bricks and tiles
- Sulphuric acid from sulphur-rich compounds (concentrations too low at present)
- Rare earths, heavy metals, and titanium minerals
- Phosphates and other oxides
- Soil media with high NPK values — valuable in regions with topsoil deficits

3. Residual Utilisation

Even after recovery, material remains. But this “residue” still holds value:

- Soil conditioners for mine rehabilitation and agriculture
- Void fill for mine site stabilisation
- Dam closure strategies that align with regulatory trends (e.g. Canada's legislative push to remove legacy dams)

Importantly, each site presents different constraints, from geochemical conditions to logistics and market access. So recovery must be tailored.

A core principle holds: value is rarely singular, so all recovery should be staged, cascading, and system-optimised.

Deep Dive

Post-removal value extraction - the near-term opportunity

Of the three recovery pathways identified, post-removal extraction presents the most immediate commercial potential. In the Bowen Basin, historical mining operations often excluded fine particle flotation from their flowsheets. As a result, significant volumes of coal-rich tailings were deposited in storage facilities, many of which remain accessible and viable for reprocessing today.

The high quality of coal historically mined in the region further strengthens the case. Legacy tailings across multiple sites show strong potential for reprocessing using modern technologies. Once the coal fraction is recovered, the remaining residue stream presents a range of downstream uses, from supplementary cementitious materials to sulphuric acid production and soil media for land rehabilitation.

Testwork Summary

Commercial-grade recovery from legacy dams

Extensive flotation testwork has been conducted on samples from two representative sites within the region.

Results confirm that a commercially viable coal product can be recovered using conventional flotation technologies, with further upside expected using newer equipment designed for fine particles.

Site A

Particle size: 7% of material was coarser than 0.5 mm, 25% was between 0.25 and 0.5 mm, and 40% was very fine (under 38 microns).

(This means nearly half the material is in the fine fraction typically targeted by flotation.)

Ash content: The recovered coal had ash levels between 5–7.5%,

(A lower ash content means higher quality coal, this range is well within commercial specifications.)

Yield: 35–54%

(This indicates that more than one-third, and up to half, of the tailings can be turned into usable coal.)

Oxidation: No significant oxidation observed. Some surface oxidation is likely, but not extensive.

(Oxidation can reduce coal recovery — low levels are a good sign.)

Site B
(Dam 1 and Dam 2)

Particle size: Similar to Site A, with a slightly higher proportion of very fine particles.

At 7% ash:
Dam 1: Two-thirds of samples achieved yields between 75–85%, with the full range spanning 10–85%
Dam 2: Yields ranged from 60–85%
Oxidation: Surface oxidation expected, though depth is not yet confirmed.

These results show that high-quality coal can be recovered from legacy tailings. The finer the particles, the more important it is to use advanced flotation systems. Technologies like Jameson cells are designed specifically for this task and are expected to outperform the standard equipment used in the tests.

What could this mean in practice?

Based on testwork conducted on two representative tailings sites in the Bowen Basin, there is clear evidence that high-quality coal can be commercially recovered from legacy storage facilities.

Site A showed flotation yields of 35–54% at ash levels between 5–7.5%

Site B demonstrated even stronger performance, with yields of 60–85% at consistent 7% ash quality

If we assume indicative tailings volumes of 9 million tonnes at Site A and 6 million tonnes at Site B, conservative estimates based on dam size and production history and apply the observed recovery ranges, **the potential annual recovery could be:**

Table 3: Potential annual recovery on two representative tailings sites

Site	Tailings Volume (t)	Conservative Yield (%)	Recovered Coal (t)
Site A	9,000,000	35–54%	3.15–4.86 million
Site B	6,000,000	60–85%	3.6–5.1 million
Combined	**15,000,000**	**–**	**6.75–9.96 million**

This means nearly 10 million tonnes of saleable coal could be recovered from just two legacy tailings sites, using existing flotation methods and with product quality that meets or exceeds market specifications.

Importantly, this estimate reflects only the coal recovery potential. It does not include the additional value streams identified in the residual material, such as supplementary cementitious materials, sulphuric acid, or soil conditioners.

In short, even limited deployment of tailings reprocessing focused on high-yield sites could unlock significant economic and environmental returns.

To bridge the gap between laboratory testwork and commercial deployment, the RCOE Flexi-Lab is being developed as a pilot-scale minerals processing facility in Mackay, Queensland.

The pilot facility is funded by the Queensland Government and Mackay Regional Council, and delivered in partnership with the RCOE, Core Resources, the University of Queensland's Sustainable Minerals Institute, and DGH Engineering.

The initiative aims to incubate new industries by focusing on critical minerals such as vanadium, reprocessing coal tailings and other metals. The initial design will accommodate tailings retreatment, with provisions for future expansion to handle vanadium and other hard rock applications. True to its "Flexi-Lab" label, the pilot plant intends to be versatile enough to process a wide range of materials by integrating various equipment items, supporting a broad spectrum of beneficiation processing options. The facility will also provide opportunities for operator and metallurgist training, research and development and the trialling of new process equipment and technologies.

Pilot Plant Design

The design for the tailings beneficiation pilot plant consists of the following major equipment items:

- Tailings reslurry tank
- Deslime cyclones
- Thickener and associated pumps
- Rougher and scavenger Jameson flotation cell units – particularly suited to fine particle coal & base metal flotation
- Variety of mechanical flotation cells in 40 L, 20 L and 12 L sizes with feed conditioning tanks
- Pressure filter for product dewatering
- Reagent mixing, storage and distribution
- Water storage and distribution system
- Air compressor

The Jameson cells are self-contained units including feed pumps and can be used at any point in the flowsheet as required. The mechanical flotation cells are skid-mounted such that they can be relocated and reconfigured for a particular flowsheet. Piping is flexible hose type, allowing units to be moved around the facility or bypassed as required. The flotation circuit is designed to process up to 77 kg/hr of solids. The pilot plant can be operated continuously, either on day shift (at ~800 kg/day) or 24 hrs per day (at ~1.8 t/day).

Pilot Plant Flowsheet

The tailings flowsheet is shown below.

L = Liquid stream only
S = Solid + Liquid stream

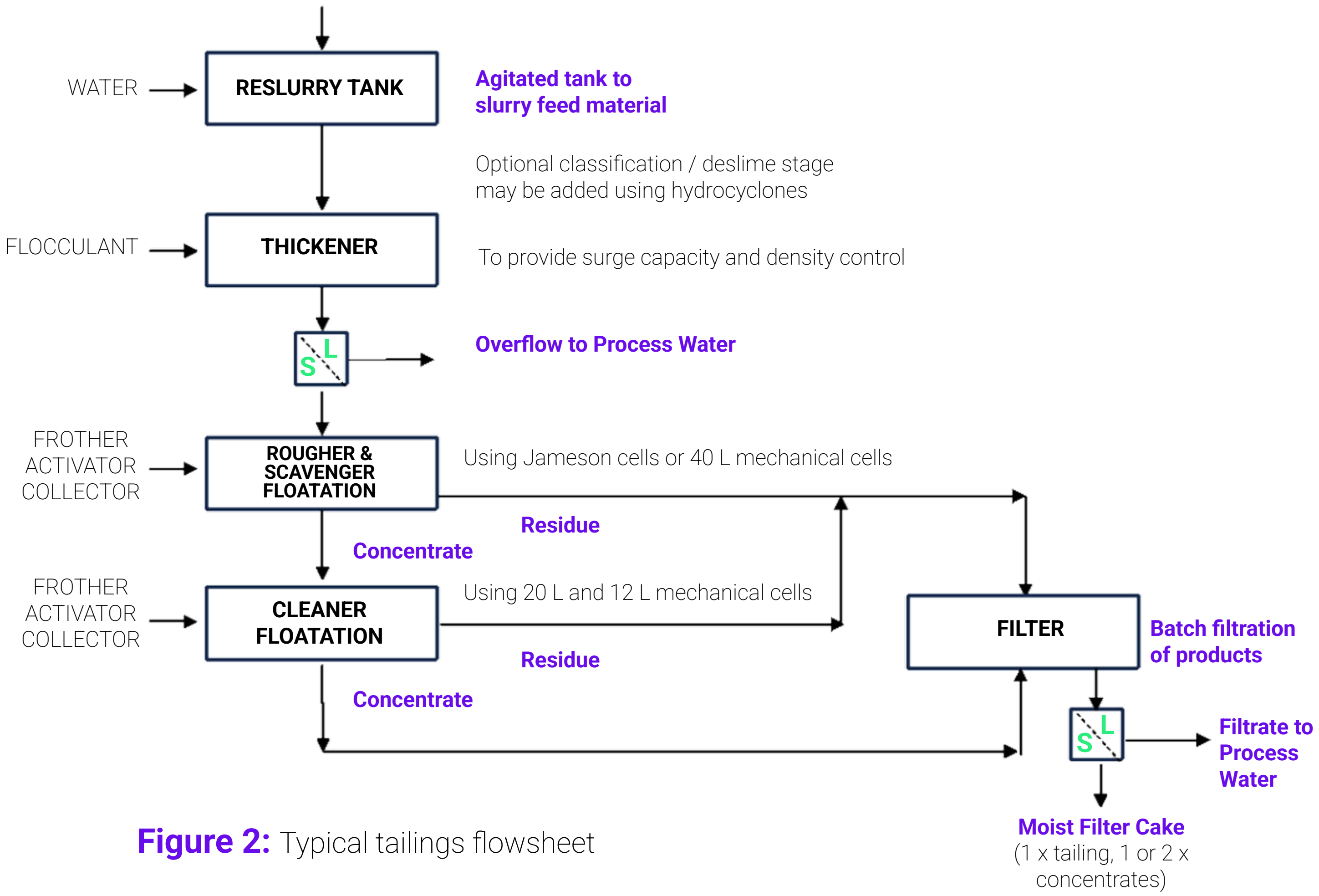


Figure 2: Typical tailings flowsheet

The plant feed is first re-slurried in a feed tank and made up to the target % solids. The feed slurry can either be directed to a two-stage cyclone system for classification and desliming, or sent directly to the flotation feed conditioning tank, depending on requirements. The flotation circuit consists of two Jameson pilot rigs in series, and mechanical cleaner and re-cleaner cells, with flexibility to reconfigure the flotation banks as required depending on circuit requirements. The flotation tailings and deslime cyclone waste is sent to a thickener, prior to filtration. The thickened tailings, as well as the flotation products, are sent to storage tanks, prior to a batch filtration process.

Flexi-Lab Pilot Facility

The Flexi-Lab pilot facility is well suited to process fine-grained coal tailings from legacy storage sites across the Bowen Basin. However, based on material characteristics observed during testwork, additional equipment may be required upstream of the flotation circuit to optimise performance.

Specifically:

- **Upfront screening** of material greater than 0.5 mm will be needed to remove coarse particles prior to flotation. While the flotation cells can technically process this fraction, coarse material may cause blockages elsewhere in the circuit, particularly in the pipework.
- **A scrubber** or mill may also be required post-screening to clean coal surfaces and remove surface oxidation prior to flotation. This unit would not be used for size reduction, but to improve flotation response through surface preparation.

The Flexi-Lab has been designed with sufficient space to accommodate this additional equipment, allowing for flexible configuration depending on the feed material.

Operating model

The Flexi-Lab offers flexible service arrangements to suit different project needs. Under a full-service model, the facility and all required operations are managed by the RCOE and its delivery partners. This includes qualified operators, analytical support, technical evaluation, and reporting.

Alternatively, appropriately qualified organisations may opt to use the facility with their own personnel under an agreed operating framework. In all cases, projects can be conducted under confidentiality agreements, and intellectual property generated through testwork remains with the client unless agreed otherwise.

The Flexi-Lab provides a low-risk, technically robust environment to validate site-specific recovery strategies, improve yield performance, and de-risk future capital investment.

> **For Bowen Basin operators looking to unlock value from tailings, the Flexi-Lab is the critical link between opportunity and action.**
> **Steven Boxall**
> CEO RCOE

Conceptual Way Forward

To unlock the full value of coal tailings and associated by-products, a staged, and evidence-based pathway is recommended.

This approach ensures that technical viability, regulatory compliance, and commercial potential are all considered early.

Recommended steps include:
and as shown in Figure 3 overleaf

1. **Site assessment and sampling**
   A qualified *Competent Person should undertake a site visit to assess project constraints, site access, and rehabilitation obligations. Fresh, representative large-diameter samples (minimum six per site) should be collected and preserved to minimise oxidation prior to transport.

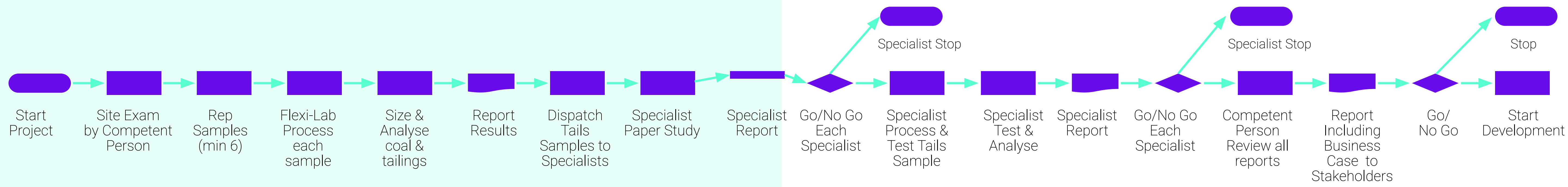
2. **Pilot-scale testing at Flexi-Lab**
   Samples should be delivered to the Flexi-Lab for pilot-scale reprocessing. This will:
   - Identify the optimal coal product through flotation
   - Conduct full compositional analysis of feed, product, and residuals (including particle size distribution)
   - Determine if high-purity silica or other value streams are present

3. **Residual characterisation and coproduct screening**
   Once flotation is complete, Flexi-Lab will generate barren tailings samples for downstream testing by recognised specialist laboratories. These samples should be evaluated for coproduct potential across the following categories:
   - Calcined clays and concrete additives
   - Clay-based products (e.g. bricks, tiles)
   - Sulphur, sulphides, and sulphuric acid production
   - Rare earth elements and critical minerals
   - Titanium and other heavy minerals
   - Phosphates and other oxides
   - Soil conditioners and amendments

4. **Competent Person review and business case development**
   All technical results should be consolidated and assessed by a Competent Person in line with JORC Code and ASIC definitions. This expert will provide a recommendation on the most commercially and technically viable pathway forward and prepare an indicative business case for investment or progression.

*A Competent Person must be a Member or Fellow of The AusIMM, AIG, or a recognised equivalent organisation, with at least five years' experience relevant to both the deposit type and activity under consideration.

Figure 3: Conceptual roadmap for tailings reprocessing and co-product recovery



Once the pilot phase has defined the optimal coal and tailings characteristics, representative residuals should be sent to specialist labs for further evaluation. Recommended categories and expert institutions include:

Potential coproduct	Suggested specialist organisations
Calcination and concrete products	Nagrom (WA), Brisbane Met Lab, James Hutton Institute (UK)
Clay-based products	Prof. Chris Sorrell (UNSW), Murray Lines (Stratum Resource)
Fine silica and high-purity silica	Ginn Minerals (USA), Stratum Resource
Sulphur and sulphide minerals	Core Resources
Rare earth and critical minerals	CSIRO, UQ SMI
Titanium and heavy minerals	Core Resources
Phosphorus and other oxides	Core Resources
Soil conditioners	Sydney Environmental Soil Laboratories

This is not just a technical opportunity — it's a chance to begin again.

Unless someone like you cares a whole awful lot, nothing is going to get better. It's not.

The Lorax
Dr Seuss

Coreo

Bowen Basin Circularity

Queensland Government

RESOURCES CENTRE of EXCELLENCE