



D2.1 Inventory of global best practice scenarios for mine-closure and related social strategies and civic inclusion and related potentials and challenges

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Summary

The aim of this report is to illustrate *global best practice scenarios for mine-closure and related social strategies and challenges*. The ultimate goal is to provide an *inventory of best practice mine closure* as a basis for deducting *future social benefit potential*. Furthermore, this will serve as the groundwork for the creation of a *challenge map* specifically related to the RIS countries selected in this project and the development of *preliminary social indicators*. All of this information will be the basis for reconciliation of work of WP3 after the completion of WP2.

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1 INTRODUCTION

The aim of this report is to illustrate *global best practice scenarios for mine-closure and related social strategies and challenges*. The ultimate goal is to provide an *inventory of best practice mine closure* as a basis for deducting *future social benefit potential*. Furthermore, this will serve as the groundwork for the creation of a *challenge map* specifically related to the RIS countries selected in this project and the development of *preliminary social indicators*. All of this information will be the basis for reconciliation of work of WP3 after the completion of WP2.

2 WHAT IS GOOD AND BAD MINE CLOSURE PRACTICE?

It is certain that when a mine reaches its end and is not properly closed with the result of possible environmental damage and job losses for the community this is worse than when a mine site is remediated and harm to humans and environment is reduced. If, additionally, social aspects such as for example post mining job creation are considered this can even be of benefit for communities. It is important to take a closer look at this, however, because there are many different factors which interact when it comes to effective mine closure and finally lead to the overall mine closure case. Sometimes for example it may be a “point-of-view” that is decisive because not always is a tourist orientated theme park also the best re-use-option for the local/indigenous people. So, the knotty idea of “best practice” must be always set in comparison to the locality-based circumstances (demography).

It should be considered that mining by its nature does not cause much joy in local communities. However, it can be noticed that when residents are taken by the hand, a well-placed communication base is ensured and the future opportunities of “their” mine site are shown to them, mine closure becomes an integrative process among all stakeholders. This is indeed one of the main points that crystallized across all the literature that was consulted: effective communication from the very beginning is essential in community inclusion and reduces the associated social challenges in mine closure activities. In combination with respect for law, regulations and human rights it thus results in more effective mine closure socially.

In this context ICMC developed two guidelines for dealing with stakeholders, especially local communities (Community Development Toolkit) and indigenous people (Indigenous peoples and mining: A good practice guide)

3 INVENTORY OF BEST SOCIAL STANDARDS IN MINE CLOSURE AROUND THE WORLD

The main social parameters, which are found across the “mine-closure-cases-literature” are primarily the following:

- Employment: Changes in (un)employment rate, sectoral share of employment, labor mobility,...
- Economic development: Impacts on growth, income and poverty level, export level, economy structure, ...
- Community & Social Structures: Changes in patterns of social relations, community cohesion, stability, ...
- Political: Political struggle, distribution of power, political representation and electoral behavior, changes in public institutional arrangements and interactions, ...
- Urban/Land planning: Changes in urban and land use/planning policy, ...
- Behaviour of the mining company: site reuse vision, social investment for closure, stakeholder engagement, industry peers, community consultation, social programs, ...

With these parameters in mind we can go on a round-the-world-trip and have a closer look at some individual good practice mine closure cases:

3.1 Good practice scenarios for mine-closure¹

Mine Case	Related social strategies and civic inclusion	Related potentials and challenges
<p>Sullivan lead and zinc mine² (Teck Resources Ltd.) Kimberley, British Columbia, Canada</p> <p>1909-2001</p>	<p>During operation:</p> <ul style="list-style-type: none"> About ten years before the expected closure planning became more deliberate: the company submitted a mine closure and reclamation plan to the Ministry of Mines of British Columbia, which led to the creation of the Sullivan Mine Public Liaison Committee (SMPLC) as a means of <u>engaging the public in the review of the plan</u>. The community identified two main areas of focus: <ul style="list-style-type: none"> The <u>economic and financial sustainability</u> of the municipality of Kimberley Managing the <u>environmental legacy</u> of the Sullivan Mine open and collaborative attitude from the company (Teck) <p>During closure:</p> <ul style="list-style-type: none"> To <u>promote economic development and facilitate the transformation of Kimberley from a mining town into a resort community</u>, the town established a non-profit development corporation (Kimberley Community Development Society) to plan, develop, promote and operate some of the city’s economic assets. development of a strong collaborative partnership between the City of Kimberley and Teck, that <u>created a unified voice and a shared vision for the long-term sustainability of the region</u> <p>Post closure:</p> <ul style="list-style-type: none"> The ownership and management of a ski hill, the commissioning and construction of several golf courses, the operation of a campsite and the eventual packaging and sale of the ski resort and golf courses to a developer <u>provided the city of Kimberley with valuable revenues, a stronger and more predictable tax base and a competitive advantage in attracting people looking for a new place to live or retire</u> 	<p>Challenges:</p> <ul style="list-style-type: none"> Kimberley has made a successful transition from a company town whose livelihood was dependent on the extraction and processing of minerals to a self-reliant four-season resort community with a growing knowledge-based economy that serves the region. The process that led to the development of a mine closure plan and an economic development strategy for Kimberley required the active and sustained participation of leaders from the city, the mine and the community <p>Potentials:</p> <ul style="list-style-type: none"> strong municipal leadership Local leaders can play an instrumental role in creating an environment that is conducive to the building of trust and confidence, and fostering an openness to approaching issues and challenges as partners rather than as adversaries creating a four-season resort built around golf and skiing Project “SunMine”: a one-megawatt solar power plant on the site of the former Sullivan Mine concentrator The Sullivan Mine closure has received international recognition for its proactive reclamation and mine closure work—both on the environmental side and in helping the community rebrand itself

¹ Short summary of each case in the appendix

² Government of Canada (2017)

<p>Beenup titanium minerals project³ (BHP Titanium Minerals) Western Australia</p> <p>1997-1999</p>	<p>During operation:</p> <ul style="list-style-type: none"> • Establishment of the “Beenup Consultative Group (BCG)”, with well-defined roles and objectives: independent, chaired by a representative from the Local Shire Council and included representation from BHP (all unpaid volunteers) • <u>well understood and documented database of statutory requirements and stakeholder commitments</u> • <u>final land use goals</u> had been subject to a public assessment process • <u>Transparency and opportunities for input</u>: BHP had made <u>all data</u> from its statutory monitoring requirements <u>available to the public</u>, demonstrating BHP’s commitment to open and honest dialogue • Workshops were held which gave all parties a <u>chance to discuss</u> and understand the factors limiting rehabilitation options, together with the opportunities, and created a sense of ownership • Involving the regulators: Representatives from the then Departments of Water, Environment, Conservation and the Department of Mines and Petroleum attended early BCG meetings and workshops about closure planning. <p>During closure:</p> <ul style="list-style-type: none"> • Retained: Selected employees that <u>understand the new objectives and priorities</u> for rehabilitation, provide innovative solutions to rehabilitation challenges and see the project through. • <u>At the commencement of the closure process new company representatives were nominated for the BCG</u>: people who had been the public face of BHP during the operating phase could find it difficult to continue given the circumstance and reframing required for closure – the new representatives however were still BHP employees, sufficiently senior and in relevant company roles to be able to engage effectively 	<p>Challenges:</p> <p>“Unplanned” closure, only 2 years after commencement:</p> <ul style="list-style-type: none"> • How to effectively engage with stakeholders • The desire and expectation to commence with immediate rehabilitation of the site and therefore a short time frame for closure planning, consultation and approvals • Human resources management (retain a smaller team of people with the ability and mindset to move rapidly from an operations mode to decommissioning and rehabilitation) • At the start of the implementation phase, stakeholder confidence in BHP was low • Keep in mind: The pathway to the point of closure sign-off can take much longer than anticipated, may require addressing perceptions as well as facts and can involve a time delay between ‘technical demonstration’ and stakeholder acceptance • The challenges for all parties include: <ul style="list-style-type: none"> ○ navigating an uncharted regulatory pathway ○ accepting and responding to reasonable changes to the goal posts ○ challenging unreasonable changes ○ maintaining assessment impetus for a closed project without production/development imperatives ○ overcoming the final hurdle of accepting the risk associated with sign-off • stakeholder (particularly community) confidence • The rehabilitation completion criteria need to be achievable! • A clear defined “Method of Assessment” is important • Avoid absolutes in the wording of the criteria, there needs to be room for small under-achieving areas • Ensure that the data being collected are being correctly analyzed and interpreted • The completion criteria need to be embedded in a project statutory document • Regular reporting and communication: clear and accessible documentation
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³ Norrish, R. (2019)

	<ul style="list-style-type: none"> • Project lead: a manager who had been with the project during the operations phase (providing reflection of BHP’s “ownership of the situation” & empathy) • Dedication of the community: the BCG are a group of individuals who bring different expertise and knowledge to the table: ensure adequate community input and oversight of the closure process • The intensity of stakeholder engagement did not cease <u>after approval of the rehabilitation plan</u>: regular meetings, site visits and workshops also attended by consultants and government agency representatives <p>Post closure:</p> <ul style="list-style-type: none"> • Independent audit one year after closure: BHP would fund the audit but selection of the auditor and the process was to be planned and managed by the BCG - <u>The resultant report was made widely available to the community</u> • BHP commitment: It was essential to effective stakeholder relations that <u>BHP did what it said it was going to do</u> <i>“I think a key to the success of the consultative process is the resourcing. If you don’t have solid resourcing of that process, it would fail. We were lucky that [BHP] knew that.” Terry Adams Former BCG Member (2003)</i> 	<p>Potentials:</p> <ul style="list-style-type: none"> • Targets can vary across the site • Allow for targets to be varied if this is justified • The completion end point may be a combination of divestment, relinquishment, ongoing management and/or using the site for an alternative purpose
<p>Cerro San Pedro gold mine⁴ (New Gold Inc.) Mexico</p> <p>2007-2018</p>	<p>During operation:</p> <ul style="list-style-type: none"> • Important for good “social closure” is the engagement of employees and communities to <u>build together a feasible sustainability path forward</u> • close relationship with the residents of the Municipality of Cerro de San Pedro • The mine/company has, from its inception, provided broad benefits to the local communities, becoming the main economic activity of the region: increased access to medical services, support for the local educational system with contributions for improving school’s facilities, building new classrooms, providing educational software 	<p>Challenges:</p> <ul style="list-style-type: none"> • reaching consensus among different communities of interest, enabling participation and ownership of a shared disposition that addresses social impacts of mine closure • main challenges: lack of social capital, “crisis of social organisation” in the communities around the mine, attributable to changes in land ownership, lack of leadership, emigration, and social and economic inequality, ... • design a well-structured engagement process: <ul style="list-style-type: none"> ○ implementation of participatory workshops with local communities and technical experts ○ consider partnerships and co-investment opportunities

⁴ Costa, S. (2015)

	<p>and Internet connectivity, transportation to schools, contributed to the preservation of local heritage and culture, and has provided financial support for the restoration of heritage buildings</p> <ul style="list-style-type: none"> • Since it has become clear that the mine life was about to end, management has carried out a strategic review of community investments and has been working to <u>ensure that long term and sustainable benefits from community investments were achieved</u>. • Founding of a Closure Committee, which <u>includes all key departments</u>: The autonomous civil society organisation <i>Centro de Colaboración Cívica (CCC)</i> was charged with coordination of the engagement process (in 2014): <ul style="list-style-type: none"> ○ autonomous, transparent, inclusive at all stages ○ introduction & collaborative process design ○ identification and development of livelihood alternatives ○ feedback to the community • Employees were able to share their concerns, their vision for their own future and to articulate how the company could support their transition to a productive life post mine closure <p>During closure:</p> <ul style="list-style-type: none"> • strengthen economic activities alternative to mining such as agriculture, tourism, and small business development; in addition to identifying potential partners • Cerro San Pedro's Integrated Closure Strategy: support employees to have a successful <u>employment transition</u>, by strengthening their employability in the mining industry, in other industries, or through individual entrepreneurship identify and promote <u>local economic development</u> • Cerro San Pedro has offered <u>skills certification and training programs</u>, for both its employees and for the residents of neighbouring communities <p>Post closure:</p> <ul style="list-style-type: none"> • Key goals of the Integrated Closure Strategy: <ul style="list-style-type: none"> ○ employability of the workforce ○ focus on sustainable economic development of local communities 	<ul style="list-style-type: none"> • Water is the greater challenge for agriculture in the region • Agricultural projects must include consistent technical support for at least three years and should be well planned and based on a solid understanding of the market • Regarding challenges of the engagement process it is important to find preliminary a reputable and trustworthy third party to carry the process out: balance needs to be found between jointly designing and overseeing the process while keeping its autonomy and independence from the mining company • The main challenges to strengthen economic activities alternative to mining were: <ul style="list-style-type: none"> ○ water scarcity ○ gaps in infrastructure ○ transportation ○ gaps in local capacity and in social capital <p>Potentials:</p> <ul style="list-style-type: none"> • raising awareness and responsibility of mine closure, both environmental and social impacts • building a common vision of the future without the mine • Key goals of the Integrated Closure Strategy: <ul style="list-style-type: none"> ○ employability of the workforce ○ focus on sustainable economic development of local communities • San Pedro has, besides the mining industry, an economy based on agricultural and tourist activities • The main opportunities to strengthen economic activities alternative to mining identified were: <ul style="list-style-type: none"> ○ the proximity to a large industrial city ○ highways and an international airport ○ cultural and historical richness of the area ○ a recognised tourism potential
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<p>Mina Velha gold mine⁵ (Saint John Del Rey Mining Company, Anglo American Corporation, AngloGold Ashanti) Brazil</p> <p>1830-2003</p>	<p>During operation:</p> <ul style="list-style-type: none"> An extensive communications program has been undertaken <u>with the local residents</u> (some 40 families - approximately 160 people) The cost of about U\$4 million was estimated for this rehabilitation program <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> In 2004, the <u>Federal Mining Department (DNPM)</u>, following a technical visit, issued a partial closure certificate for surface infrastructure and the mining operation at Mina Velha, and final decommissioning is underway. 	<p>Challenges:</p> <ul style="list-style-type: none"> A mining <u>company may play a catalytic role</u> by reconciling the interests of different constituencies that could benefit from heritage conservation initiatives. In addition, heritage restoration and conservation go a long way to show that mining played an important historical role in the settlement and development of many regions, thus reinforcing its economic and social role from both a historical and contemporary perspective. <p>Potentials:</p> <ul style="list-style-type: none"> The project for future use includes urbanization of an area of approximately 20 ha that encompasses the former underground mines and the old ore processing facilities The real estate plan is expected to include residential, commercial and leisure areas. A jewelry production center was considered, as it would establish a link with the gold mining past In 1994, AngloGold Ashanti opened the <i>Centro de Memória Morro Velho</i>: An impressive Mine Museum, also designed as part of the future use project, that would help preserve the history of the mining operation along with the preservation of heritage buildings and which became a popular tourist attraction. the old hydroelectric plants dating back to the early 20th century: one of them was transformed into an environmental education center
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⁵ Castro, M. (2011) & Sánchez, L.E. (2014)

<p>Dawangshan Limestone pit⁶ Ice World & Water Park (IWWP) project (China</p> <p>1973-2013</p>	<p>During operation: <i>no information available</i></p> <p>During closure:</p> <ul style="list-style-type: none"> The reuse of abandoned pit is a comprehensive and complicated task which cannot be managed without the support of government. <p>Post closure: <i>no information available</i></p>	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> By taking advantage of the heat insulation effect of subsiding quarry, the Dawangshan Pit was renovated into a theme park which features indoor ice, snow and water. It is not only the largest indoor snow park in the world, but also the sole ice-snow recreational facility built over a deep pit. The Ice World & Water Park (IWWP) project, which involves green construction, environment protection and high technology application, is beneficial to people's livelihood and thus has gained wide social compliment.
<p>Kidston mine⁷ (Barrick Gold, Genex Energy) Queensland, Australia</p> <p>1907-2002</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> The Kidston-project now is creating work and opportunities for many local people, delivering green, clean energy to thousands of Queensland homes 	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> The former tailings dam was transformed into the first integrated solar and pumped hydro project worldwide (like a battery) The solar farm is providing 100% of the renewable energy to power the pump storage hydro scheme. That's enough electricity to power about 280,000 homes
<p>Vagonetto⁸ (S&B Industrial Minerals S.A.) Greece</p> <p>1967-1972</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p>	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> Vagonetto Mining Park is an underground Theme Park built in a former bauxite mine site after closure.

⁶ Tan, F. (2019)

⁷ Kidston (2020) & Queensland (2015)

⁸ Greece (2019) & Vagonetto (2020)

	<p>Post closure:</p> <ul style="list-style-type: none"> The idea for this project came from the people who worked in the mines and wanted to preserve and share their memories of the place – now inextricably linked with the bauxite mining process. 	<ul style="list-style-type: none"> More than 35,000 visitors have already visited the Park. The purpose of the Fokis Mining Park is not only to present the different phases of operations in the mine, but also to inform and educate.
<p>Zloty Stok Gold Mine⁹ (Poland 15th century - 1961</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> 1991, a group of local residents decided to open some of the workings and adapt them for tourist purposes (officially opened in 1996) 	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> The Zloty Stok gold mine offers a number of attractions to tourists, primarily the underground route. Since its opening, the Museum of Mining and Metallurgy in Zloty Stok has been enjoying a growing interest, mainly due to investments in new objects and infrastructure at the mining site. Except having the tourist and museum functions, the old mine is also a site of scientific research in mining, geology, geodesy, and biology.
<p>La Tortilla Mines⁹ (Spanish Lead Company, Ltd) Spain Middle 19th century - 1991</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> 2007, a design team was made up to plan and prepare a project for the revitalization of the mining installations: It was formed by architects, mining engineers, technicians from the Town Council of Linares, an exhibition specialize company, and the mining company. the role of the civil society, represented by the “Colectivo Proyecto Arrayanes” was to <u>suggest ideas to protect and recover the mining heritage</u>, to design projects to implement those ideas and to watch that the actions were coherent and preserve the values and the 	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> The plan consisted of the creation of an Interpretation Centre, reusing the mining buildings of La Tortilla Mines, now of public property, with the aim to show the mining works

⁹ Kaźmierczak, U. (2019)

	integrity of the inherited remains, thus acting as intermediary between the heritage, the society, and the authorities.	
<p>St Barbara Mine¹⁰ (Croatia 1481-1950</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> • The brain behind the mine renovation and the project application was Prof. Dr. Boris Šinkovec (the geologist) in charge of the exploratory mining works in Rude during the 1950s) • 2002 he came back to Rude with the <u>proposal of opening a mining museum</u> and the members of KUD Oštrc recognized the potential of the idea and started its realization. 	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> • tourism
<p>Eden Project¹¹ (Cornwall, Great Britain 1835-1995</p>	<p>During operation:</p> <ul style="list-style-type: none"> • In 1995 the hole in the ground is a working china clay pit nearing the end of its economic life. The Eden project was back then just Tim Smit's vision <p>During closure:</p> <ul style="list-style-type: none"> • <u>development of local solutions to fit local circumstances</u> <ul style="list-style-type: none"> ○ leadership, vision and commitment ○ creative partnerships for funding: These partnerships involved developing shared interests, and community involvement and consultation at all stages to aid in developing shared responsibility and ownership. <p>Post closure:</p> <ul style="list-style-type: none"> • 1998 construction starts 	<p>Challenges:</p> <ul style="list-style-type: none"> • The large amount of tourism that is created by the Eden Project has huge effects on the local area: <ul style="list-style-type: none"> ○ As with any tourist attraction there are also negative impacts with damage to the environment, tensions between locals and the tourists due to factors such as increased traffic congestion ○ Due to the nature of the seasonality of tourism some of the jobs are only temporary for the holiday season, however, the Eden Project recognises this and try to combat it by increasing promotions during the winter time when local unemployment is high, to try to encourage more local and holiday visitors. <p>Potentials:</p> <ul style="list-style-type: none"> • The Eden Project is a charity and tourist attraction focused on education and sustainable development • Many social and education programs

¹⁰ Rudnik (2020)

¹¹ Eden (2020) & Cornwall (2011)

		<ul style="list-style-type: none"> The large amount of tourism that is created by the Eden Project has huge effects on the local area: <ul style="list-style-type: none"> Employment up to 700 people and support of 3,000 tourism related jobs locally As with any tourist attraction there are also negative impacts with damage to the environment, tensions between locals and the tourists due to factors such as increased traffic congestion Due to the nature of the seasonality of tourism some of the jobs are only temporary for the holiday season, however, the Eden Project recognises this and try to combat it by increasing promotions during the winter time when local unemployment is high, to try to encourage more local and holiday visitors.
<p>Brownstone Park¹² (Brainerd Quarry Company, Connecticut Brownstone Quarries) Portland, Connecticut, USA</p> <p>1783-1930</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> 2008: Originally, there was hope that opening the site as an adventure park for the public would raise awareness of the historic landmark and strengthen the local economy. <u>Residents of the town of Portland receive entry to the park for half price.</u> An estimated 50,000 visitors came in 2010, and even more in 2011 onward. The response to Brownstone Exploration and Discovery Park has been incredibly positive. 	<p>Challenges:</p> <ul style="list-style-type: none"> Monitoring of the area by park life guards and police officers has eliminated safety hazards posed by the quarry lake prior to redevelopment. The site has become a beloved activity site instead of an abandoned hazards and visitors range from locals to out-of-state tourists. <p>Potentials:</p> <ul style="list-style-type: none"> The quarry converted into an adventure park features a variety of outdoor activities, including cliff-jumping, rock climbing, swimming, kayaking, scuba diving, climbing and rappelling, wakeboarding, rope-swings, zip-lining, water slide, inflatable water toys, campground, educational programs at the site, including scuba diving and wakeboarding. Brownstone Park has successfully yielded high revenue for the city due to the increasing number of visitors that attend the park every year as well as a large number of employment opportunities.

¹² McCandless (2013)

<p>Quarry Falls¹³ () San Diego, California, USA</p> <p>1938-2008</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> This project has helped provide jobs to many of the construction workers who lost their jobs in the 2008 market crash, and stimulates the local economy by attracting tourists. 	<p>Challenges:</p> <ul style="list-style-type: none"> The large-scale plan was proposed and accepted in 2008, but due to the housing market crash, construction did not begin until 2010 Prior to Redevelopment: The site of the quarry was located in the center of San Diego and there were several surrounding neighborhoods that are subjected to the noise, air, and water pollution as a result of the operational quarry. Since the quarry was unsightly for nearby residents, property values in the area were low and complaints were high. The land had allegedly sunken 200 feet from its original level. <p>Potentials:</p> <ul style="list-style-type: none"> The first housing units went up for sale in early 2012 and have had a very positive response. While living spaces are costly to purchase or lease, the district has been granted many awards for its creation of a smart energy community. The project turns the area into a thriving center of residential, retail, office and business space.
<p>Bellwood Quarry¹⁴ () Atlanta, Georgia, USA</p> <p>1907-2007</p>	<p>During operation: <i>no information available</i></p> <p>During closure:</p> <ul style="list-style-type: none"> The public response has been incredibly positive towards the Atlanta Beltline Project and the transformation of the Bellwood Quarry into a reservoir. When <u>tours are given along the railroad</u> on which the project was being undertaken, visitors were astounded by the natural beauty of the quarry and the potential benefits and historic value it will provide for the city. <p>Post closure: <i>no information available</i></p>	<p>Challenges:</p> <ul style="list-style-type: none"> Prior to Redevelopment: The quarry was considered a huge nuisance by locals, who were subjected to noise from machinery and air pollution. The land was neglected and fenced off to prevent accidents. Atlanta has faced serious issues with water shortages and has considered building a new water storage system. <p>Potentials:</p> <ul style="list-style-type: none"> Since the city of Atlanta has faced such issues with water shortages, the reclamation of this quarry into a reservoir will contribute to the remediation of the water shortage. The crater already existed, so it was faster and cheaper to develop the site into a reservoir. Not only does the transformation provide a reduction in noise and air pollution, but it also

¹³ McCandless (2013)

¹⁴ McCandless (2013)

		resolves detrimental environmental issues involved in building a completely new reservoir for the city.
<p>Butchart Gardens¹⁵ (Robert Pim Butchart) near Victoria City of Canada</p> <p>1904-1909</p>	<p>During operation: <i>no information available</i></p> <p>During closure:</p> <ul style="list-style-type: none"> As R. Butchart, a pioneer in the thriving North American cement industry exhausted limestone deposits, his enterprising wife, Jennie, made <u>plans to create something of beauty in the gigantic exhausted pit.</u> <p>Post closure:</p> <ul style="list-style-type: none"> Little by little, the quarry blossomed into the spectacular Sunken Garden by 1921, the <u>ownership of which has been passed on for generations.</u> The public response is incredibly positive and the site creates lots of job opportunities for the region With the incredible amount of family activities and community engagement, this re-use of this derelict quarry has been widely successful and beloved. 	<p>Challenges: <i>no information available</i></p> <p>Potentials: <u>Tourism:</u></p> <ul style="list-style-type: none"> The Butchart Gardens features a series of beautiful gardens—each of which have a different cultural theme—outdoor symphony concerts, a yearly Christmas light display and ice skating, greenhouses, firework shows, a children’s carousel, a boat tour and family restaurants. The site even offers educational features, such as an ornamental bird collection for education and conservation. The gardens are dog friendly and feature a variety of reservation opportunities for weddings, birthdays, and other social events. The Butchart Gardens attracts over a million visitors each year and has been deemed a National Historic Site in Canada. The site attracts tourism for the region, creates job opportunities, re-uses resource-depleted land, and engages the community and provides family entertainment.
<p>Intercontinental Shanghai Wonderland Groundscraper Hotel¹⁶ () Shanghai, China</p> <p>1950-2000</p>	<p>During operation: <i>no information available</i></p> <p>During closure: <i>no information available</i></p> <p>Post closure:</p> <ul style="list-style-type: none"> the public response thus far has been very positive The transformation from a resource-depleted quarry into a luxury hotel generated a vast amount of job opportunities. 	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> The transformation from a resource-depleted quarry into a luxury hotel generated a vast amount of job opportunities. It also brings many tourists to the area, as the hotel is somewhat of a cross between a vacation spot and a theme park.

¹⁵ McCandless (2013) & Walls (2017)

¹⁶ McCandless (2013) & Zhou (2018)

		<ul style="list-style-type: none"> The most appealing aspect of the hotel is its use of green design and sustainable energy sources, as well as the illusion that the hotel is a part of nature.
<p>Flambeau Mine – Gold/Copper¹⁷ (Kennecott Minerals Company) Wisconsin, USA</p> <p>1970-1997 (intermittently)</p>	<p>During operation:</p> <ul style="list-style-type: none"> The initial plan (in the 1970’s) called for a mine life of 11 years with the rehabilitation plan calling for a recreational lake as the end use. The <u>local community</u>, however, <u>reacted unfavourably to the proposal</u> and the <u>company chose not to proceed</u> with that particular development. This placed Kennecott in a strong position within the local community, as they were seen as a company that was inclusive and would listen to the needs of the local community. Kennecott Mining Company began planning for the mine again during the mid 1980’s, but <u>changed the criteria for the site.</u> The mining company needed to take into account the Flambeau River in its planning criteria, as the <u>protection of the river was the cornerstone to gaining community approval and acceptance</u> for the new development. The ability to listen to and take local concerns into account assisted Kennecott in ultimately gaining local approval for the mine development. The mining project due to its profitability for the company also provided economic benefits in the form of the taxes paid by the mining company to the State of Wisconsin, which could then be redistributed back to the local communities. In addition to economic development, Kennecott assisted in the development of the community through various projects: a new library, playground equipment for the local primary school, a new visitor centre, fire truck and a scholarship program for the local High School In addition to this overall company objective, the Rio Tinto subsidiary Kennecott Mining Company developed its own Sustainable Development Framework that <u>“integrates the</u> 	<p>Challenges:</p> <ul style="list-style-type: none"> The Local Agreement gave guarantees to the local communities in a number of areas, some of which were: <ul style="list-style-type: none"> Hiring of local employees Visitor’s observation area Limited hours of operation Guarantee of private Off-Site wells Right of first refusal – The local governments have the right of first refusal based on the highest bid received on any property being sold by Flambeau Revenues to Local Government <p>Potentials:</p> <ul style="list-style-type: none"> The Kennecott Mining Company also entered into an agreement with the City of Ladysmith to establish a series of hiking trails on the mine site Kennecott mining developed an industrial park on part of the mining site in conjunction with the Ladysmith Community Industrial Development Corporation From a community engagement point of view when asked the question: <u>“If another ore deposit were found in the vicinity of your community, would you welcome Flambeau Mining Company back to mine it?”</u>, <u>75.2% of respondents replied that they would welcome them back</u> The idea of the Wisconsin State Government handing back some of the mining taxes to the local communities, for them to use in development projects, contains a lot of future “best practice mine closure” potential

¹⁷ Hunt (2013)

	<p><u>principles of economic activity with social responsibility, environmental integrity and effective governance systems”</u></p> <ul style="list-style-type: none"> • The company engaged the local community in the revised mining project from the outset, with a deliberate strategy to include the local community in the mine’s rehabilitation and closure outcomes • 1988: Local Agreement and the Conditional Land Use Permit that were <u>signed by the three local government areas and Kennecott Minerals</u> -> The local community had their needs addressed and were listened to in matters concerning the mine and its impact on the community -> the local community saw the mining experience in Flambeau as overwhelmingly positive and the <u>community views mining in a more positive light as a result</u> <p>During closure:</p> <ul style="list-style-type: none"> • The company also <u>turned former gravel pits that were located near the Flambeau River into Wetland</u> reserves as part of their community development program. <p>Post closure:</p> <ul style="list-style-type: none"> • Kennecott Mining Company continued to engage local communities after mining had ceased at the site and in 2004 formed the Flambeau Community Advisory Group whose purpose is to <u>develop a land use management plan for the hectare still owned by Kennecott</u> 	
<p>Elliot Lake – Uranium¹⁸ (Rio Algom Limited (now a subsidiary of BHP Billiton), Denison Mines) Ontario, Canada</p> <p>1955-1996</p>	<p>During operation:</p> <ul style="list-style-type: none"> • In terms of the actual closure process, in what was a unique event at the time, the Canadian government, under the <i>Atomic Energy Control Board</i> (now known as the Canadian Nuclear Safety Commission) established a Joint Review Group that <u>led a coordinated group</u> of what were normally separate departments to oversee the closure process. All of the departments maintained their regulatory authority, but it was processed <u>through just one main body</u>, the Atomic Energy Control Board. In other words, what would have normally been a bureaucratic approach to closure with 	<p>Challenges:</p> <ul style="list-style-type: none"> • The 50-year maintenance program that is required by the <i>Canadian Nuclear Safety Commission</i> at Elliot Lake is longer than the operating life of the mines in the region and demonstrates how companies that fail to adequately plan for, or miscalculate the costs associated with mine closure can find themselves in financial trouble, even if the mine were profitable during its operational phase. This of course then has inevitable negative consequences for communities and regulators faced with mine closures that are not adequately financed, such as a loss of jobs and therefore income in the local community, loss of royalties for governments, and the

¹⁸ Hunt (2013)

	<p>different bodies all separately involved became a streamlined process, with just <u>one main regulator</u>.</p> <ul style="list-style-type: none"> • The mining company, the Provincial Government and the local community, all worked in close consultation with one another several years prior to the mine closure, in order to help minimise its impact. Part of this process involved <u>developing the area as a retirement location and tourism destination</u> through the use of the former mine infrastructure (such as houses and buildings) as part of the development process. • The company prior to the closure process instigated a program that allowed employees to purchase company rental properties – to provide some financial independence to employees and also to prevent the company from being left with a large number of dwellings once mining had ceased. • Both mining companies engaged with the local community through a series of public meetings held over a two year period that were used to <u>refine the closure plans</u> for their Elliot Lake mine sites. The meetings were organised through the federal government's Environmental Assessment Agency with the aim of eliciting views from the community as to the final design and look of the rehabilitated site <p>During closure:</p> <ul style="list-style-type: none"> • Rio Algom was a strong supporter of community programs and encouraged employees to join voluntary organisations. They also established facilities such as ski areas, an equestrian centre, a golf club, and supported nature and conservation programs. • The company kept its employees closely informed of the closure details and elicited their involvement in the process. Rio Algom also <u>provided assistance to employees to help with the transition to other employment</u> by assisting with retraining the workers, paying relocation costs, and finding alternative employment for former employees, or through retirement incentives. • Due to community concerns (land loss, death of cancer, radium levels in fish, ...) a standing committee was formed (known as the Standing Environmental Committee), which consisted of two members each from the City of Elliot Lake, the Township of the North Shore and the Serpent River First Nation 	<p>potential costs of the government paying to rehabilitate the site if the mining company is unable to do so.</p> <ul style="list-style-type: none"> • The company was still active in supporting many of these ventures in 2006, claiming it recognises the need to keep strong cultural/social institutions, particularly after closure. This is not often a consideration in the closure process, but social institutions are just as important as economic considerations in maintaining the vitality of a community. • Even with employees purchasing former company owned houses, the company was still left with over 2,000 dwellings that would have to have been demolished. Instead, the company chose to advertise the dwellings as retirement homes for seniors. • The Standing Environmental Committee process has still been the subject of some criticism from the community, although the concerns raised are the responsibility of the mining company and regulators, rather than issues that can be addressed by the Committee. Some of the criticisms directed at the process include: <ul style="list-style-type: none"> ○ Loss of mining company personnel and their expertise ○ Changes in the areas focus towards retirement living, tourism and cottage industry development ○ Changes in land use to former mine sites for increased recreational activities such as camping, trail bike riding and hiking ○ The production of highly detailed and technical reports that are not easily understood by those without the technical expertise ○ Competition from other regions for limited resources to assist with economic diversification ○ High residential rate costs to compensate for falling tax base after mines closed ○ Infrastructure costs, as the city was built for a population twice the size ○ The burden of a retirement population on local health infrastructure <p>Potentials:</p> <ul style="list-style-type: none"> • The city developed an Economic Diversification Strategy to turn the area into a retirement centre and all-seasons tourism region. In addition to this, the town attracted a research centre from Laurentian University, a drug and alcohol treatment centre and developed 4,500 cottage housing lots from federal and provincial government grant funds.
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	<ul style="list-style-type: none"> • The City of Elliot Lake worked very close with the local community and the mining companies to facilitate the move away from mining and diversify the economic base of the region. <p>Post closure:</p> <ul style="list-style-type: none"> • All of the former mine sites are monitored on an ongoing basis by both Federal and Provincial government regulatory agencies, with annual inspections of the sites by geo-technical engineers (2001) • Rio Algom is still involved in an ongoing monitoring program of its mine sites at Elliot Lake and has a <u>full-time Reclamation Manager and closure team based in the town</u>. The team will be based at Elliot Lake until the Federal and Provincial governments allow the mine leases to be relinquished and the former mine sites handed back to the City. • <u>The city has managed to diversify its economic base away from a dependence on mining</u> and it has done this by working with the local community, mining companies and provincial and federal government agencies and in the process ensuring that <u>the town has not only survived, but has managed to halt a population slide that occurred post mining</u>. 	
<p>Golden Cross – Gold¹⁹ (Cyprus Gold, Couer D’Alene Mines Corporation & Viking Mining Ltd.) Waihi, New Zealand</p> <p>1895-1920 1991-1998</p>	<p>During operation:</p> <ul style="list-style-type: none"> • Upon its closure in 1998, Golden Cross mine became the first New Zealand mine to move into planned rehabilitation and closure. The rehabilitation and closure planning for the site began three years prior to the closure of the mine, with community involvement in the closure plans commencing during the planning phases of the mine. • Through the <i>Resources Management Act</i> (1991) Environment Waikato was responsible for monitoring the environment during all phases of the mine’s life. 	<p>Challenges:</p> <ul style="list-style-type: none"> • Underneath the tailings dam and mound was a slip surface that was slowly moving down the slope of the mountain, and hence the Joint Venture Company had to employ a landslide expert to monitor the problem and ensure it did not cause problems after closure. The company notified regulatory authorities and kept the local community up-to-date with regular meetings, informing them of how the issue was being resolved. • false representations about what was occurring at the site, by media outlets, which included reports that the site would be unsafe for recreational use when completed

¹⁹ Hunt (2013)

	<ul style="list-style-type: none"> • The <u>community did request that the site be open to the public as a recreational area</u> and the end-use of the site was designed to meet the community needs. • During the history of the Golden Cross mine, the Joint Venture Company developed a strong relationship with the local community through the establishment of two community based consultative groups, a <u>peer review panel</u> and a <u>Community Consultation Group – CCG (known as the Joint Task Force)</u>; allowed members of the local community to be kept fully informed of the closure process at every step • The joint venture operation established a “Joint Task Force” to <u>examine sustainable postmining land uses</u> for the site, with the process involving community engagement both prior to, and during closure. One of the major issues for the site was cyanide contamination; therefore, the rehabilitation required thorough planning and engagement with the local community. • The Joint Task Force that was established to participate in the closure process consisted of a number of members drawn from the wider community in order to assist with the closure of the mine. <u>Members of the Consultative Task Force included: Regional and District Councillors and Staff members, Professional peer reviewers, Environmental groups, Local residents of the Valley and Iwi (Maori) People</u> <p>During closure:</p> <ul style="list-style-type: none"> • It was not just the mining companies, but also the regulatory agencies that conducted monitoring, in order to <u>provide independent analysis of the data</u>. The water treatment plant was in operation until all the water at the site meets discharge criteria (under the Resources Management Act), and could be safely released into the Waitekauri River, without the use of any intervention mechanisms. • Underneath the tailings dam and mound was a slip surface that was slowly moving down the slope of the mountain, and hence the Joint Venture Company had to employ a landslide expert to monitor the problem and ensure it did not cause problems after closure. The company notified regulatory authorities and kept the local 	<ul style="list-style-type: none"> • Despite the successful initial plans for closure of the site, the final concept cost many millions more than had been allowed for in the original closure plan, which demonstrates the high costs sometimes associated with closure. The Joint Venture Company in this case, however, decided that it was wiser to bear the extra rehabilitation costs, rather than risk future environmental problems and the potential negative publicity associated with it. <p>Potentials:</p> <ul style="list-style-type: none"> • The final rehabilitation has seen the mine become a wetland and native habitat, as well as being used for grazing and recreational purposes, such as tramping (bushwalking), bike and horse riding, with facilities also being made available for picnics. • The consultation process involved a number of positive features that enabled the Joint Venture partners to make Golden Cross a success from a social perspective, as well as an environmental one. • The planning for rehabilitation and closure at Golden Cross began during the planning phase of the mine operation and continued during the operational phase of mining as part of a progressive rehabilitation program.
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	<p>community up-to-date with regular meetings, informing them of how the issue was being resolved.</p> <ul style="list-style-type: none"> As part of the consultation process, the Joint Venture Company produced an 18-minute video presentation explaining how the problem would be resolved. This process was also <u>undertaken</u> in order to counteract what the company saw as the false representations about what was occurring at the site, <u>by media outlets, which included reports that the site would be unsafe</u> for recreational use when completed and that the site would be more prone to landslips, particularly given the high levels of rainfall that the area experiences. In order to encourage interaction with the local community, Coeur Gold and Viking Mining <u>encouraged regular visits to the site by members of the Community Consultation Group and the local community</u> (this was open to anyone from the local community who wished to attend). <p>Post closure:</p> <ul style="list-style-type: none"> The rehabilitated mine site area now has walking trails, picnic facilities, footbridges and information panels along the walking trail that discuss the history of the Golden Cross Mine. 	
<p>Rother Valley Country Park - Coal Mining²⁰ (National Coal Board's Opencast Executive) Rotherham, United Kingdom</p> <p>1976-1982</p>	<p>During operation:</p> <ul style="list-style-type: none"> The Rotherham Borough Metropolitan Council and the Sheffield City Council actually began the process of planning the development of the park during the 1960's: The plans by the National Coal Board to mine the site provided the impetus for the project to proceed as the rehabilitation of the mine site would enable the development of the Country Park. The closure of Meadowbank mine had the potential to cause social and economic upheaval for the Borough of Rotherham but the well planned closure of the mine, along with the local councils and public involvement in the mine closure process <u>prevented the mine closure from causing social and economic dislocation for residents of the region</u>. This involvement ranged from the planning 	<p>Challenges: <i>no information available</i></p> <p>Potentials:</p> <ul style="list-style-type: none"> Rother Valley Park was planned long before mining actually commenced: The planning for a recreational area commenced nearly 20 years prior to mining at the site and the development of the site into a Country Park was actually assisted by the decision to commence mining at the site. The idea of the park had broad support through input from the community and had been canvassed by the local government areas through numerous public meetings during its planning stages. The decision by the National Coal Board to mine the site enabled the local councils to gain assistance from the National Coal Board to rehabilitate the site into a series of recreational lakes

²⁰ Hunt (2013)

	<p>and funding of the park (Local Councils), to the input from the local community in <u>determining the final design of the park</u>.</p> <ul style="list-style-type: none"> • The Joint Committee consisted of <u>National Coal Board executives, Council representatives from each of the five county councils involved in the development of the park and local residents</u> who met regularly to discuss what was occurring at the site and also review the planning for the rehabilitation and closure of the site, including regular site tours to examine the progressive rehabilitation process at the site • The <i>Joint Committee</i> throughout this period established a community consultation program: By 1978 the <u>Final Development Options Report</u> was published - <u>four years before the mine closed</u> - and formed the basis for the final design of the mine site • The local councils used council funds to help develop the park and incorporate the mine site into what was essentially became a public park. Local councils effectively became involved in the rehabilitation process, with the overall aim being a public park that incorporated the rehabilitated mine site into its design. <p>During closure:</p> <ul style="list-style-type: none"> • Especially environmental rehabilitation programs were successfully implemented <p>Post closure:</p> <ul style="list-style-type: none"> • The former open pit coalmine site has been turned into a successful recreational park that attracts over 800,000 visitors per year. • Since 1995 the Rotherham Metropolitan Borough Council is the sole entity responsible for the funding and maintenance of the park. • The development of the former mine site into a large recreational park was successful due the engagement and commitment by so many local government authorities to work with the local community and invite their input into the final design. • The community was able to take ownership of the former Meadowgate site and saw the <u>park as an asset for future generations and a positive new feature for the region</u>. 	<p>and wetlands, generally broadening the original layout of the park to encompass more recreational uses.</p> <ul style="list-style-type: none"> • The former open pit coalmine site has been turned into a successful recreational park that attracts over 800,000 visitors per year. • In addition to the lakes, the rehabilitation of the mine site included the construction of car parks, access roads and guided walks and nature trails. Other recreational facilities developed at the mine site included: “18 hole golf course, four soccer pitches, riding trail, Camping and caravan facility, education centre, a grass skiing slope, the visitor Information Centre at a 17th Century mill that was redeveloped as part of the mine rehabilitation
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<p>Landau Colliery²¹ (Anglo American) South Africa</p> <p>2011-2018 (?)</p>	<p>During operation:</p> <ul style="list-style-type: none"> the Anglo American Technical & Sustainability mine closure team worked with the site to establish a Project Initiation Document (PID): It was agreed that the social closure plan will address the needs and risks associated with four key groups of stakeholders: employees and dependents, interested parties, affected parties and regulators. <u>Understanding the needs and expectations of these stakeholders</u> is essential to improve the confidence of the overall mine closure plan. Conducting an issues and gap analysis workshop to <u>identify the current issues and gaps related to social closure</u> After identifying the social issues and gaps related to closure a set of <u>actions to address these issues and gaps for each stakeholder group were identified</u> <p>During closure: <i>no current information available</i></p> <p>Post closure: <i>no current information available</i></p>	<p>Challenges:</p> <p>Key social issues that must be taken into account in the social closure planning:</p> <ul style="list-style-type: none"> Mine workers and their dependents are financially reliant on the mine, which will impact upon their livelihoods at closure Civil and municipal services in the area are currently under pressure as a result of urban expansion and insufficient maintenance, hence end land uses must seek to be self-reliant where possible, so as not to place additional strain on existing service networks Ongoing expansion of informal townships along the edges of existing settlements onto surrounding open land may influence potential end land uses of the mine site, especially where illegal settlement occurs The mine and immediate surroundings currently have limited existing and future tourism development opportunities due to the lack of natural and cultural historic amenities, which must be taken into consideration when identifying potential end land uses of the mine site Economic development in the region will need to diversify into other sectors, as mining can be expected to contract in the future as reserves become depleted. End land uses and associated skills redevelopment and training must align with regional trends in this regard A large percentage of younger inhabitants in the region may benefit more from end land uses that offer a larger number of semi-/unskilled employment opportunities than development that relies on highly skilled or educated workers <p>Potentials: <i>no current information available</i></p>
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²¹ Heymann (2016)

4 CONCLUSION

This list could be continued page by page but also reversely on the side of bad practice mine closure. It is obvious that especially in the last decade people's awareness of the social aspects of mine closure and their importance to mining overall increased substantially. Abandoned mine sites can be reused in many ways, for example as agricultural application, resource storage, underground warehouses, tourism development, recreation areas, nature reserves etc. but whatever is planned for post-mining land use the crucial point for successful closure is always stakeholder engagement and communication.

Engaging employees and affected communities from the earliest phase of mining is the first step to successful mine closure. In this way employees are able to share their concerns, their vision for their own future and to articulate how they imagine their life post mine closure. In most of successful mine closure cases a third "regulative institution, closure committee, ..." was installed to guide the communication between all stakeholders (company, community, educational institutions, business incubation centres, international consultants, governmental agencies, ...). This regulating authority should draw its members from a wide range of backgrounds, including local community members (representatives of all social groups), (external technical) experts, etc. Companies will benefit from having employees involved who can see the project through and who have a good access to the local people. The collaboration between public, private and social actors is fundamental.

Furthermore, it is essential to set and meet realistic and achievable post closure goals by the company respectively the closure committee etc. to preserve trust and reliability. In combination with total transparency in all stages and all levels effective communication will be facilitated and will lead to a satisfying result for everyone.

It should be always kept in mind that the successful mine closure will take money and time to realise the full potential of the future post-mine site. Sometimes rehabilitated mines should be commercially successful for economic reasons and sometimes the aesthetic appeal of a well rehabilitated mine site can be just as important as any commercial appeal. Give a voice to affected people, listen to it and enter in a dialog. This will reveal many new opportunities: raising essential awareness and responsibility of mine closure, including both environmental and social aspects, building a common vision of the future without the mine, reaching consensus among different communities of interest, and enabling participation and ownership of a shared strategy that addresses social impacts of mine closure. All of these are key components for successful social mine closure.

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Annex 1 - Short summaries of good practice mine closure-cases

1. Sullivan lead and zinc mine

The strong partnership between the City of Kimberley and Teck was critical to the success of the project. A unified voice and a shared vision for the long-term sustainability of the region was formed. When closure was committed the *Sullivan Mine Public Liaison Committee (SMPLC)* was created to engage the public in the review of the mine closure plan.

The community identified two main areas of focus: a) The economic and financial sustainability of the municipality of Kimberley; and b) Managing the environmental legacy of the Sullivan Mine. To promote economic development and facilitate the transformation of Kimberley from a mining town into a resort community, the town established a non-profit development corporation (*Kimberley Community Development Society*) to plan, develop, promote and operate some of the city's economic assets.

Project SunMine: development of a one-megawatt solar power plant on the site of the former Sullivan Mine concentrator

Kimberley has made a successful transition from a company town whose livelihood was dependent on the extraction and processing of minerals to a self-reliant four-season resort community with a growing knowledge-based economy that serves the region.

2. Beenup titanium minerals project

The mine was closed prematurely in April 1999 after only two years of operation. The Stakeholder concerns for the rehabilitation of the site were high. The project was controversial when first raised with the community in 1989 due to its size and location in an area highly valued for its natural assets. Today the site comprises a network of wetlands, integrated with the local drainage system and surrounded by a diverse mix of native vegetation.

This closure case is a very good example of the great value of effective stakeholder engagement throughout the planning, implementation and assessment phases of a closure project.

Lessons learned: A community consultation program must be flexible enough to change as the project plans and potential impacts change and at the same time, the people managing community relations must recognize the need to change.

In 2018, 19 years after closure, rehabilitation of the former Beenup Titanium Minerals Project has achieved regulatory sign-off against the 21 Completion Criteria agreed with stakeholders.

3. Cerro San Pedro gold mine

The Cerro San Pedro Mine, wholly owned by New Gold Inc., is an open pit mine that produces doré, a mix of gold and silver, through heap leaching and a Merrill Crowe process plant.

Cerro San Pedro started production in 2007 and finished active mining in 2016 transitioning to residual leaching. In 2018 Cerro San Pedro transitioned to reclamation.

Cerro San Pedro has maintained a close relationship with the residents of the Municipality of Cerro de San Pedro, which comprises sixteen communities and three ejidos (communally-owned land holdings) within the mine's sphere of influence. The mine has, from its

inception, provided broad benefits to the local communities, becoming the main economic activity of the region. From pre-Hispanic times to the present, Cerro de San Pedro has experienced boom and bust times due to mining.

The history of the Municipality of Cerro de San Pedro has been closely linked to mining. Mining in this area gave rise to the founding of the city of San Luis Potosí: By 2012, Cerro San Pedro had created nearly 860 direct jobs and about 4300 indirect ones.

In order to establish a closure strategy which meets the needs of the local communities, the mine launched a participatory process to help define the company's social closure strategy: engagement with key communities of interest to understand the social impacts of closure and find feasible economic alternatives for a local and regional longer-term development.

4. Mina Velha gold mine

Morro Velho is a complex of gold mines (Minha Velha mine & Mina Grande mine).

The Morro Velho gold mine was in continuous operation for 170 years. Minha Velha mine discontinued operations in 2004. The mine was located in Nova Lima, a town adjacent to Belo Horizonte, an area which has been experiencing rapid population and urban growth. The town of Nova Lima, in the State of Minas Gerais, home of the old Morro Velho operations (now Anglo Gold Ashanti) has been a gold mining centre since 1830, when large-scale mining first began.

During the life of the mine: construction of a circa 10 kilometre tramway line between Nova Lima and Raposos, considered the first in South America

The Morro Velho mine was sold in 1975 to AngloGold Ashanti Ltd. of South Africa. Two decades later, in 1994, "AGA" opened an impressive mining museum, the Centro de Memória Morro Velho.

5. Dawangshan Limestone pit

The Dawangshan Pit was an opencast limestone quarry with over forty-year mining history. It covered an area of 130,000m². This pit has always been a potential risk to the urban environment and ecological safety as it covers a large area and stores much water near downtown.

The Changsha government has been recovering the landscape around the pit since 2014, and finally the project to construct a huge recreational building (the Ice World & Water Park, IWWP) in the pit was determined. Meanwhile, the recreational building will become a new landmark of Changsha.

The IWWP is a showcase project for China because the reuse ratio of abandoned mines in China is less than 10%.

6. Kidston mine

The Kidston town is located alongside the Copperfield River in Far North Queensland. The Township of Kidston was developed on the west bank of the Copperfield River after the discovery of gold in September 1907. Kidston gold mine was the biggest and richest gold mine in Australia.

The mine closed in 2002 and left a ghost town and a worthless mine behind.

In 2014 an innovative plan started to be developed by Genex Energy who bought the old mine from Barrick Gold: The old mine will undergo a dramatic change of use and become the third-largest hydroelectric energy storage project in Australia

7. Vagonetto

1967-1972 bauxite mining

In 1998 the company that promoted the area's bauxite deposits undertakes the project to convert, after 25-years, the obsolete gallery into a tourist and educational destination, in order to honor the old miners of Fokis and promote the history of bauxite. And so opened in 2003 the Vagonetto-Fokis Mining Park its doors to the public. A guided walk through the underground workings aided by sound, lightning and life-like figures of miners at their work posts, introduces the visitor to the mineral extraction process and the lives of those, who worked there.

8. Zloty Stok Gold Mine

First gold miners are believed to have worked in this area approximately 4000 years ago. In the fifteenth and sixteenth centuries, the mine produced 150 kg of gold a year, which was approximately 8% of gold production in whole Europe.

The abandoned mine remained almost completely forgotten for 35 years, before in 1991 a group of local residents decided to open some of the workings and adapt them for tourist purposes.

9. La Tortilla Mines

The mining activity in the Linares-La Carolina mining district has a 4000-year history. The industrial revolution came with the application of the steam technology brought by British mining companies established in the area since the middle nineteenth century, as well as French, Belgian, and German companies that made the relatively small district into the most important lead producer in 1867. The mining activity stopped in 1991.

10. St Barbara Mine

The St. Barbara Mine is located in Rude village in Croatia. Rude's rich mining tradition is evidenced by its very name, which changed a couple of times throughout the history. A widespread network of mining shafts used to run throughout the village, but nowadays about 350 meters of shafts are renovated and accessible to visitors. The project was co-financed from the PHARE Pre-accession Fund of the EU.

11. Eden Project

Established within a reclaimed kaolinite pit, the Eden Project is an excellent example of successful rehabilitation of an abandoned mine site.

The clay pit in which the project is situated was in use for over 160 years. By the mid-1990s the pit was all but exhausted. Project-construction started in 1998. In 2001 the Eden project finally opened its doors – only in the first 4 months more than one million people visited this so called “eighth wonder of the world”, a complex with two huge domes hosting thousands of plant species. Outside there's a botanical garden which is home to many native plants and wildlife but also has many plants with a prehistoric heritage.

12. Brownstone Park

Brownstone Exploration and Discovery Park is a privately-operated extreme adventure park built in a former quarry that opened in 2008. The limestone quarry was originally abandoned in the 1930's after flooding from the Connecticut River ended all operations. The quarry site

was neglected and filled with water, forming what is known as a quarry lake. In 1994, a new operator, Connecticut Brownstone Quarries, began a small-scale quarrying operation to provide stone for restoration of brownstone buildings. In 2000 the quarry was leased by the Town of Portland, which receives a portion of gate receipts and is relieved of much of the maintenance as well as policing of the quarries.

13. Quarry Falls

This quarry had served as the major stone and concrete source for construction projects in the region for the last 80 years, including the downtown baseball stadium of the San Diego Padres and airport runways.

As of 2008, when the quarry was depleted of its resources, developers proposed a plan to restore the site into a mixed-use housing district including multi-family housing units, retail shops and commercial office space, interchangeably referred to as Quarry Falls or Civita.

14. Bellwood Quarry

The Bellwood Quarry was purchased in 2006 by the city of Atlanta for the construction of a potential reservoir within the Atlanta Beltline Project, which is a large-scale redevelopment project, started in 1999, that seeks to combine greenspace, trails, transit, and new development along a 22-mile rail in Atlanta.

The Bellwood Quarry reservoir could hold 30-50 days' worth of water, an estimated 1.2 billion gallons of water.

15. Butchart Gardens

Butchart gardens used to be a limestone quarry and is now the most famous garden in North America. The Butchart Gardens are a group of floral display gardens made in an exhausted limestone quarry. Robert Butchart, a pioneer in the thriving North American cement industry, was attracted to Canada's West Coast by rich limestone deposits. In 1904, he developed a quarry and built a cement plant to satisfy the cement demand from San Francisco to Victoria, Canada.

The Butcharts established the family home close to the quarry. As Mr. Butchart exhausted limestone deposits, his enterprising wife, Jennie, made plans to create something of beauty in the gigantic exhausted pit. Little by little, the quarry blossomed into the spectacular Sunken Garden by 1921, the ownership of which has been passed on for generations.

16. Intercontinental Shanghai Wonderland Groundscaper Hotel

The intercontinental Shanghai Wonderland Groundscaper Hotel is the first five-star hotel which was built in an abandoned pit. The 100 meter deep crater was a source of industrial resources since the 1950s. The pit was initially abandoned in 2000, and the land was neglected, unsightly, and dangerous. After 12 years and some 5,000 architects, engineers, designers and construction workers the Shanghai Wonderland opened its doors in 2018.

The 18-storey Intercontinental Shanghai Wonderland includes two entire floors of underwater suites, bungee jumping and rock-climbing facilities as well as an artificial waterfall on the opposite side of the quarry.

17. Flambeau mine

The mine was located close to the Flambeau River and was unpopular with some in the local community due to its proximity to the river and the potential for environmental problems. The last mining operations commenced in 1991, with the last shipment going out in 1997. The site began to be rehabilitated during autumn of 1996, with the backfilling of the void, which was completed the following year. The site was then contoured back to its approximate original state, along with the construction of wetlands for a wildlife sanctuary. By the end of 1999, the last of the rehabilitation was completed.

18. Elliot Lake

Elliot Lake was a major uranium mine centre from 1955 until 1996 when the last mine ceased production. The area came into being due to high demand for uranium associated with the post World War II boom in nuclear energy production.

Elliot Lake saw the closure of not just one, but over a 45-year period the rehabilitation and closure of twelve mines in the region. Both Rio Algom and Denison Mines began commencing the plans for closure of their respective mine sites during the 1980's. Elliot Lake has managed to elude the negative images traditionally associated with uranium mining and has started to market itself as a retirement and vacation destination, moving away from its mining past.

19. Golden Cross

The history of Golden Cross dates back to the last part of the 19th Century. The mine closed in 1920 and the area reverted to farmland. Initial licensing and exploration for the current site began in 1977 with mining commencing in 1991 and ceasing production in 1997.

Gold Cross was a successful and profitable mine and an important employer in the town of Waihi, bringing substantial income into the region. The closure of the mine left the town with a skilled local workforce that was able to be absorbed into the larger Martha mine in town and left the town with a well-planned rehabilitated former mine area that has now become something of a tourist attraction. The town of Waihi proudly boasts of its mining heritage and is keen for visitors to see past mining activities of the town (Golden Cross) and its current mining operations (Martha mine).

20. Rother Valley Country Park

The mine was named Meadowgate with mining commencing at the site in 1976 and ceasing production by 1982, it was one of the largest mines in the United Kingdom. The region has traditionally been known for being a heavy manufacturing and coal mining centre, with a strong emphasis on the steel industry. The closure of the Meadowbank mine in Rotherham coincided with a number of issues that altered the face of coal mining in Britain, including the miners strikes during the mid 1980's and the closure of many mines leading to a large number of job losses.

The development of the Rotherham site was planned well in advance of the mine closure allowing time for extensive community involvement in the process and say in the design of the final form of the park.

The development of the Country Park only proceeded once the public had been able to comment and suggest changes on the proposed park. This was a unique feature of the mine

rehabilitation and closure process at the time, particularly given the long-term nature of the proposed development and the decision to turn the former mine into a tourist attraction.

21. Landau Colliery

The last operations at Landau consisted entirely of open cast mining. Mining activities continued to the end of 2018. The active rehabilitation programme is planned to take three years post-mining. The largest population in the vicinity of Landau is in eMalahleni with a population of 395,466 individuals.

Education levels are low with approximately 26% of the adult population having no education. The unemployment rate is approximately 27% for the economically active (15–65 years), however, for the youth (14–35 years) the unemployment rate is 36% (2011).