Case study:

LEARNINGS FROM THE NEW BUGARAMA MINING COMPANY'S PROGRESSIVE JOURNEY

From informal mining to formal artisanal and semi-mechanised operations

The case study has been developed in parallel with the Beyond Conflict-Free Tungsten report which focuses on the identification of impact areas based on the current mining operations. It showcases the progress of the tungsten mine operated by the New Bugarama Mine Company (NBM) since 2009 and illustrates how the mine's journey has affected several impact areas. The case study aims to inform stakeholders and the wider public not only about the changes at the mine site, but also highlight broader lessons which can be drawn from the NBM's experience. The Beyond Conflict-Free Tungsten report provides further detail of the context in which NBM operate and the impact areas, as well as perspectives from stakeholders' interviews and the methodology employed for data collection and analysis.

Introduction

The case study showcases the journey of a tungsten mining company operating in Rwanda. Over the last 12 years, the organisation has transitioned from largely informal artisanal mining to formalised artisanal and small scale semi-mechanised mining operations, progressively establishing management systems and integrating modern mining techniques. The report outlines how the operations and production have evolved over the years, and features analysis of the factors that have facilitated the journey. Where possible, building on the Beyond Conflict-Free Tungsten report, the relationship between key impact areas and the progression of NBM is considered. Finally, lessons learned which could be applied in other contexts are presented.

Since 2009, NBM, whose major active shareholder is Specialty Metals Resources (SMR), have been operating the Bugarama Mining Concession, located in Nyamabuye, Kiringa and Kayenzi cells, Kagogo Sector, Burera District, Northern Province in Rwanda. The concession is 900 hectares in size, 120 of which are presently mined for tungsten ore. NBM renewed the mining license on 3 July 2017, which is valid for 25 years from this date. There are currently 45 active artisanal sites and 30 modern tunnels which have been built since 2014. In 2009, when NBM arrived at the concession, there were many artisanal sites operating in a disorganised manner, without clear ownership. Since then, NBM has taken significant steps to organise the production and formalise the mining operations and processes. While there are still 45 controlled operational artisanal tunnels, many others have been closed or adapted as ventilation pathways for other sites and access for mining has been restricted over safety concerns. The mine also operates processing facilities which produce tungsten concentrates with 71 – 72% WO_3 content on average. In 2020, NBM produced about 252 tonnes of tungsten concentrate. Since 2012, production has steadily increased, ranging from 179 and 216 tonnes per annum. NBM employs 185 permanent staff (including security personnel) and has contracts with six subcontractors. The latter are responsible for hiring workers allocated to the mineral production (referred to as miners when addressed separately from other workers and staff members), including those working in both the original artisanal and the modern tunnels. Based on data from 2020 and 2021, the number of miners hired by the subcontractors varies between 600 and 750. The company also takes on casual workers on an ad hoc basis; there may be up to 100 casual workers at the mine at any given time.

NBM IN NUMBERS

- **120 hectares mined for tungsten ore concentrate**
- **25 years mining license as of 2017**
- **45 active artisanal sites**
- **30 modern tunnels**
- **252 tonnes of tungsten concentrate produced in 2020**
- **185 permanent staff**
- **600 to 750 subcontracted miners**

The journey of NBM provides a qualitative example of how a progressive and well-managed transition from informal artisanal mining to formalised operations, including introduction of some modern mining techniques, can improve social and environmental impacts, as well as production outputs. Whilst improvements are highlighted in the report, there are limitations to the data on which they are based. There is a lack of baseline

data from 2009 for the purpose of comparison with the present context. To compensate, stakeholders gave qualitative accounts of changes over time which may impact the accuracy of the information provided. There is likely to be a difference between actual and perceived social impacts. In addition, information collected during the development of the case study is purely qualitative and not statistically significant. This has particular relevance in relation to the section on the changes in terms of impact areas. Nevertheless, the study collected data from a variety of stakeholders, not only NBM management, including staff members, miners and representatives of the local communities and institutions, to ensure that a variety of perspectives were considered.

The case study is designed for a general, international audience to extract lessons learned from sourcing from artisanal and small-scale mining (ASM) in the Great Lakes Region, while supporting continuous and progressive improvement in terms of responsible sourcing requirements, formalisation and impacts management. The work supporting the development of the case study, has been co-funded by Fairphone, Specialty Metals Resources (SMR) - the major shareholder of NBM, and Wolfram Bergbau und Hütten AG (WBH), an Austrian Tungsten smelter which is the sole buyer of tungsten concentrates from NBM, making the supply chain a closed pipeline.

Figure 1: Ventilation sign

Organisational and production journey

This section of the case study outlines the organisational and production changes since 2009 as reported by stakeholders.

Figure 2: The New Bugarama Mining (NBM) Company Logo

Until 2009, when NBM took over the operations of the mine, the area was characterised by disorganisation, informality, and an imbalance of power relations, where "strong men" would take ownership of the production illegitimately. The term "chaos" has been used by several stakeholders to describe the state of the concession prior to 2009. Anyone could go to the site and start mining, therefore proper organisation and control of the operations was very difficult. Incidents and robberies of material were frequent, miners had limited protection and risked not being paid for the material produced. The weighing system was also less transparent and controlled. Production methods were mainly artisanal, with many open pits, which, as it will be further explored, had greater negative environmental impacts. No machines were used at the time. Besides the lack of clear ownership, the organisation of the extraction activities was also largely uncoordinated.

Since the establishment of NBM, there has been gradual and continuous progress. The major changes are organised in four groups:

(1) Formalisation of operations and establishment of management systems,
(2) Traceability and conflict-free certification,
(3) Investments in mining methods, infrastructure and equipment, including effects on better material recovery and increase in operating cost and
(4) Investment in social and environmental programmes.

(1) FORMALISATION AND MANAGEMENT SYSTEMS

The first step and important change which has characterised NBM's journey relates to the organisation of the mine, including proper and formalised management systems for all mining operations and management practices. This was a priority and major enabler for the progress in other areas, including technical advancements which have been happening continuously over time. Management systems and policies include, but are not limited to, operating procedures, health and safety systems comprising incidents logging, clear organisational structure with roles and responsibilities well defined. For instance, blasting is now performed in a controlled and safe manner; it always happens at the same time every day and all personnel at the site are alerted. In terms of health and safety, policies that foresee the use of PPE are in place and implemented and regular checks are made in the tunnels to manage risks of hazardous gases and falling rocks.

Since 2016, when the mine completed the ICGLR audit, more formalised audits and controls have started to take place. As explored in the next section, introducing the ITSCI system also supported the initial stages of formalisation of the mining operations.

(2) TRACEABILITY AND CONFLICT-FREE CERTIFICATION

While due diligence and traceability requirements have not been the focus of the analysis detailed in the Beyond Conflict-Free Tungsten report, in the context of describing the journey of NBM, the progress in terms of formalisation and traceability is an important factor to highlight.

At the time of acquiring the mining license in 2009, NBM found the mine in an unstructured state. As a first step NBM tried to formalise the engagement of miners and focused on organising and structuring the mining operations (*see above*). Later, when the ITSCI programme was introduced in Rwanda, NBM was one of the pilot companies who worked with the ITSCI partner organisation PACT to implement it. The mine was open to engage with the programme and advantages were experienced in terms of production increase and the ability to export. The ITSCI onboarding started with capacity building and training activities and the staff at the mine were trained on due diligence and traceability requirements. During the first years of implementation, PACT also delivered training to the Rwanda Mines, Petroleum and Gas Board (RMB) who would become responsible for the traceability programme implementation. Today, RMB is responsible for mine inspections.

For NBM, the need to introduce traceability and the ITSCI system was clear. It provided access to the international market and brought reputational advantages after the introduction of the US Dodd Frank Act in 2010. The Act required downstream users of tin, tungsten, tantalum and gold originating from the African Great Lakes Region (including Rwanda) to report on their due diligence measures to ensure that the minerals were conflict-free. According to stakeholders, since the beginning of the adoption of ITSCI, the mine has demonstrated a good understanding of international mining and due diligence standards. The progress made by NBM enabled the mine to pass the Regional Certification Mechanism (RCM) by the International Conference on the Great Lakes Region (ICGLR) in 2017 and the mine has maintained the green status since then.

The traceability and certification system has generated other advantages for the mining operations at NBM. Firstly, it provides easier access to production data and helps the monitoring and identification of errors (e.g., in the weighting system). It has also positively impacted security at the mine. When comparing the NBM results in terms of ITSCI implementation to other mines in the country, stakeholders consider NBM among the best performing companies which could represent a model to other operations, as a result of the RMB inspections and recorded conformance against ITSCI requirements. In fact, peer learning days have been organised at NBM, during which other companies' representatives visit NBM to learn from their experience.

In summary, the introduction of traceability and due diligence systems has helped NBM formalise its operations, increasing production, and allowed the company to continue to sell to international markets.

In terms of written documentation of the journey, the sources which can be referred to are the ICGLR audit report and the later due diligence reports for ITSCI. Stakeholders, especially NBM management, have reported an improvement in broader stakeholder relationships, with many recognising the advantages of more organised mining operations, for example in terms of security around the concession and absence of conflicts in comparison to before 2009.

(3) MINING METHODS, INFRASTRUCTURE AND EQUIPMENT

Supported by the improvements in formalisation and management systems, NBM's investments through the years have resulted in changes with respect to infrastructure, equipment, and extraction methods.

Development of a mining master plan. The mine is working in line with its mining master plan, developed with the engagement of local experts. The plan has been a major enabler for progressive improvements, it sets the base for NBM operations and is referred to in daily mining operations.

Introduction of machines. Equipment such as excavators, compressors, shaking tables and trucks were introduced to support the mining operations. At the same time, the role of ASM techniques and production remains essential for the extraction given the specific structure of the mineral veins.

Development of modern tunnels. The modern tunnels developed over the past years have increased the accessibility and safety of underground work. These tunnels are built with timber structures. They have water and compressed air pipes and rails to ease the transportation of the mined material outside of the tunnel.

Figure 3: Entrance modern tunnel - 2021

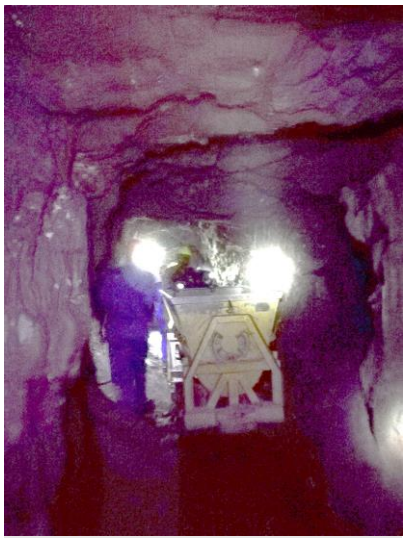

Figure 4: Mining cart on rail inside modern tunnel - 2021

Some of the differences in production between the old artisanal tunnels and the modern ones include:

- In the artisanal tunnel it is harder to differentiate soft and hard rock (*NB:* soft rock leads to risks of rocks falling), and obtaining proper ventilation is more difficult.
- In a modern tunnel the access is easier, and ventilation is improved (See figure 1 and 13).

Increased recovery of the material. The introduction of equipment and modern mining techniques has increased the recovery of tungsten. Both complement the manual process which is still conducted for the initial washing and recovery. For example, the shaking tables are now used to recover more production from the waste of the manual washing process.

Access to better equipment. Prior to 2009, all miners had to obtain their own equipment. Purchasing tools independently generated higher costs for miners. Since 2012, NBM has provided equipment to all workers, both those hired directly by NBM and those hired by sub-contractors, so that they could have access to proper tools.

Improved infrastructure at the mine. In 2009, there was only an open hut which served as an office. During the visits in 2021, several buildings were in function and that are used for administration, traceability, storage, first aid, kitchen, security equipment, sanitation services and changing rooms.

Figure 5: Office and meeting room: 2009-2012

Figure 6: Office: 2016-today

Introduction of electricity. In 2020, NBM stopped using generators for electricity generation after obtaining connection to an electrical line. The energy is mainly generated from hydropower. Besides the advantages in terms of the reduced environmental impact associated with burning fossils fuels, the air pollution and noise derived from the generators, the introduction of electricity has reduced the energy costs for the company.

Increase in operating costs. The improvements, formalisation and organisation introduced at the mine over the years have increased the mine operating costs given the introduction of machines and the development of tunnels. To provide some context, it requires between RWF 200,000 and 250,000 (~ € 166-210) to advance a modern tunnel by one meter, including labour costs. Two of the modern tunnels visited were 239 m and 260 m long. It is important to recognise the required investment to achieve the improvements outlined throughout this case study. Ultimately, the investment will facilitate systematic and planned mining which should in turn lead to better recovery of the resources. As a result, the increased costs, should be understood in the context of NBM's longer-term vision for the mine.

Figure 7: Closed unsafe artisanal tunnel

In summary, the investments in infrastructure, semi-mechanisation, and professionalisation of extraction processes have enabled NBM to become a well organised and more productive mining operation. It is important to underline that in parallel to the development at NBM, the government of Rwanda has also been promoting the integration of modern mining techniques and equipment to improve skills development in the sector. The government's aim is to improve working conditions and attract more investment in the sector. NBM's journey in terms of better mining techniques, equipment and infrastructure can be seen as an example of progress in this enabling environment, as will be further examined.

(4) INVESTMENT IN SOCIAL AND ENVIRONMENTAL PROGRAMMES

Throughout the years, NBM has also been investing to improve social and environmental impacts, including by building relationships and engagement opportunities with stakeholders and communities around its operation. For example, NBM contributed to the local infrastructure, set up tree planting facilities, provided donations to education and health institutions and established childcare at the mine to support breast-feeding women with young babies. As a new and upcoming initiative, NBM is developing an Early Childcare facility, in cooperation with RMB, REWU and UNICEF. This has supported NBM's social license to operate and has helped demonstrate to communities and stakeholders that the professionalisation and mechanisation of the mine will benefit a broader set of stakeholders. It also illustrates how accounting for social and environmental impacts works hand in hand with other organisational changes. Further details on how the journey has affected the impact areas are shared in the dedicated section on the impacts' progress section below.

Figure 8: The plant nursery

Enablers and success factors

This section explores the factors which have made NBM's journey possible, and which can be considered enablers of progressive improvement. In the content of the case study, the term enabler refers both to actions taken by or under the influence of NBM, as well as the external environment.

These are organised in four categories:

(1) Environment in terms of national regulations and context,
(2) Formalisation and professionalisation of operations,
(3) Collaboration with stakeholders including local authorities and communities and
(4) Support and collaboration with supply chain partners.

(1) REGULATORY ENVIRONMENT

Figure 9: Tagged tungsten concentrate bags

National and regulatory enabling environment. The integration of responsible mining, as part of mineral resource governance in Rwanda, has played an enabling role in the formalisation process at NBM. Through national regulations, Rwanda has adopted and implemented the International Conference of the Great Lakes Region (ICGLR)'s Regional Certification Mechanism (RCM). In this context and as part of the implementation of ITSCI, RMB has developed tools enabling companies like NBM to adhere to compliance standards and monitor adequate implementation – namely the 2012 Mines Inspection Manual. While these frameworks were established to guarantee conflict-free production of minerals, RMB has integrated and implemented the verification of impact areas beyond the conflict-free requirements, such as risks and impacts of health and safety. More recently, the 2018 revised mining law explicitly requires mining companies and cooperatives to contribute to local socio-economic development where they operate through corporate social responsibility (CSR) activities, employing local labour and assuring skills transfer between international experts and local workforce, purchasing local materials where applicable (local content), and through promoting gender equality.

(2) FORMALISED AND PROFESSIONAL OPERATIONS

Professional geological assessment and mining master plan. NBM commissioned a geological study which has been pivotal to understanding the mineral potential of the concession and increasing the confidence of investors. The study estimated the presence of around 1000 tonnes of WO_3 tungsten ore on the NBM concession. Following the geological study, the mining master plan was developed by local experts to provide guidance on the operations, and it is still broadly used today to guide extraction and investments.

Formalisation of mining operations and long-term planning. Moving away from disorganised pits to a defined structure of tunnels and a multi-year mine development and investment plan has brought practical advantages not only in terms of production, but also guaranteeing proper management and control over the operations and the safety of workers. This has included resolving conflicts of ownership and identifying responsibilities within the team to manage operations. The work of NBM's management team has been recognised as a catalyst for the improvements which occurred at the mine.

Mining and geology competence. Considering the state in which the mining operations were in 2009, reorganisation, formalisation and progressive improvements would have been difficult without the professional mining engineering and geological expertise brought in by NBM management. Expert local executives and technicians lead operations and have played a pivotal role in the progress made to date.

Figure 10: An ore vein

Capacity building of employees and miners. NBM focused on building the capacity of its staff which is an important enabler. Measures such as promoting PPE and introducing employment contracts required changing people's habits and ways of operating. It took considerable effort and dedication from management and persistent training to onboard new procedures.

(3) COLLABORATION WITH STAKEHOLDERS

Awareness of responsible sourcing standards. Early recognition of the importance of implementing a traceability and due diligence scheme to retain access to international markets, and the early adoption of ITSCI has been crucial for the management of the mine. The motivation and knowledge of the management contributed to the implementation by the broader team. Equally, noting the advantages to the formalisation process encouraged the team to sustain the efforts made. This included effective collaboration with stakeholders such as PACT and RMB during the early implementation of ITSCI.

Promotion of local employment. NBM's mining workforce comes largely from the Kagogo sector where NBM operates. The NBM management team emphasise that the organisation intentionally seeks to promote local employment. The strategy has generated goodwill among the local community and the artisanal miners, providing an enabling factor in the company's progressive journey. However, as the Beyond Conflict-Free Tungsten report details, persisting barriers exist in terms of hiring technical and management personnel locally.

Engagement of local authorities and support to the community. Since NBM's establishment at the concession, the organisation recognises the importance of working with local authorities during the formalisation and development of the mines. These authorities include but are not limited to district, sector and villages administration, schools, and healthcare providers. Collaboration has allowed the mine to be recognised as a partner, and authorities have requested and recognised NBM's support in areas of education, health, and job creation.

(4) SUPPORT AND COLLABORATION WITH SUPPLY CHAIN PARTNERS

Support from the shareholders and ability and willingness to invest in the mine development. Most of the progress would not have been possible without the support of NBM shareholders and the availability of investment to support improvements. For instance, the geological assessment strengthened the case for financing and continued investment to advance the status of the mine, its operations and production outputs. The mine development plan materialised this aspiration into vision for expected progress and commitments.

Continuous engagement and commitment from the smelter. WBH has been an active and reliable partner for NBM, going beyond a purely commercial relationship to enable improvements at the site. WBH have engaged in knowledge building by sponsoring a consultant who works directly with NBM to advise on technical developments. Decisions as to whether to invest in equipment or techniques following the consultant's recommendations remain with NBM, who would ultimately be making the investment.

Secure and long-term off-take agreement and adoption of continuous improvement approach. The NBM supply chain is a closed pipeline and the entire production of the mine is sold to WBH. The nature of the off-take agreements provides security to the mine in terms of having a defined market. This has resulted in the ability to plan for the longer term, as well as increasing the confidence of the mine operator to progressively make investments while sales are safeguarded by commercial agreements. In addition, NBM recognise the value of having stakeholders (e.g., commercial partners, investors) who understood that changes in terms of formalisation and overall management take time to materialise and that quick wins are at times neither desirable nor realistic. Understanding of continuous improvement and commercial partners' trust in the progress made was another major enabling factor NBM's journey.

Progress of impacts through the NBM journey

This section briefly synthesises the journey and changes seen in some of the "impact areas" identified Beyond Conflict-Free Tungsten report. It does not reflect all the impact areas identified in the report. Rather, it focuses on areas where interviews with stakeholders suggested changes in how NBM might have generated or contributed to impacts through the transition from artisanal to semi-mechanised operations. The changes listed are based on the interviewed stakeholders' perceptions and opinions.

Working conditions and health and safety

Figure 11: Investment into safety equipment

TERMS OF EMPLOYMENT

BEFORE 2009

- None of the miners working at the sites had a contract or equivalent employment agreement.
- All payments, at different levels, were made in cash.
- Child labour could occur, and there were no checks on the age of the miners. This also led to school dropouts because of children starting to work at the mine while still in school.
- Greater consumption of alcohol and drugs around the site leading to misbehaviour.

PROGRESS MADE SINCE 2009

- Permanents workers, subcontractors and miners all have contracts with formalised terms of employment.
- Most payments are made through bank transfers. Avoiding cash payments where possible is important from a compliance point of view as it provides more security in terms of the counterparties to whom payments are made. The only remaining cash payments are those from team leaders to miners. However, NBM manages the accounting of those payments and there is full transparency on who the subcontractors engage. Refer to the Beyond Conflict-Free Tungsten report for details on payment structures.
- The age of miners is checked and no one is allowed to work at the mine before they are 18 years old. Reportedly, the transition to reduce child labour at the site involved three key elements:
- The mine started applying the national law on minimum working age and child labour.
- The mine helped in terms of ensuring parents would be the ones employed at the mine.
- The priority was to ensure children would go to school, and the local authorities worked to realise this aim.
- The permanent staff who enjoy a fixed salary have better access to finance, as they can request loans more easily.
- NBM has set up a childcare facility for workers, including those contracted by sub-contractors, who recently gave birth and who returned to work while still breastfeeding. Plans are being made to build another childcare facility in collaboration with RMB, REWU and UNICEF.

Figure 12: Awareness campaign on child labour

HEALTH AND SAFETY

BEFORE 2009

- Given the lack of organisation at the concession, monitoring health and safety was difficult. For example, the challenging access to artisanal tunnels did not allow for regular safety checks.

PROGRESS MADE SINCE 2009

- The mine has a clear organisational structure, policies, and management systems to guarantee health and safety measures are in place. In particular, efforts are made in terms of incident prevention, by guaranteeing that proper health

- More incidents took place, especially related to asphyxiation and falls.
- Fatalities were relatively frequent and this also exposed children in the community to the risk of becoming orphans.
- Personal protective equipment (PPE) usage was less common, and it also was not easy to verify and monitor.

Figure 13: Safety ventilator

and safety checks take place and policies are followed by all workers at the site.
- All the technical staff at each mine site are responsible for verifying the use of PPE and adherence to safety measures and protocols.
- The modern tunnels are built with a supporting timber structure which increases safety for miners working in the tunnel and improves access for monitoring and safety checks.
- The accessibility of tunnels has positively impacted women's perception of safety at the mine. This, together with the availability of childcare, has increased women's participation in mining at NBM.
- The number of fatalities is significantly reduced; there has been no fatalities at the mine since 2017.
- Reduced frequency and number of safety incidents, especially those related to the lack of ventilation which could potentially lead to asphyxiation. Gas measuring devises are also now used. The improved ventilation experienced at the sites does not only refer to the modern tunnels but also to the remaining artisanal ones.
- Since NBM reimburses the value of the health insurance for all its staff, including miners, and their families, more people have access to health insurance. This reportedly also supported a change in the community where people would start relying more on public healthcare services as opposed to traditional medicine, which stakeholders signalled as a positive development.

REMUNERATION

A proper assessment on the changes to remuneration cannot be done considering the lack of baseline data prior to 2009 and of current statistically significant information. Therefore, the following reflections focus on changes in payment structures and practices

BEFORE 2009

- Payments were not organised equally or formally, but rather depended on the benevolence and fairness of the person exercising illicit or informal ownership over the production. Miners had even less negotiating power and they could earn as little as RWF 450 (~ € 0.40) per kg.
- There were more disputes over payments.

PROGRESS MADE SINCE 2009

- Payments are properly organised and formalised, not only from NBM but also between subcontractors, team leaders and miners. There are now very few disputes over payments.
- Many stakeholders observed that the regular weekly payments, although variable according to production, could improve household cash flow management practices. This might also help accumulation of resources and savings. In fact,

- It was reportedly more common that money earned from mining was misused, in particular by men, for example for the consumption of alcohol, prostitution, and drugs.
- Payments were made daily, which was seen as a positive factor by some of the stakeholders interviewed, because that allowed them to cover their daily expenses immediately.
- Even people working in mining could hardly afford healthcare.

many miners have been joining local savings groups.

- Although stakeholders mentioned that production increased since 2009, the world market prices per kg have decreased. Therefore, the increase in production was balanced out by the reduction of world market prices, therefore stakeholders perceived that the miners do not benefit from higher production to the degree one might have expected in terms of overall income.

Environment

BEFORE 2009

- There was limited control and monitoring over the usage of water for the mining operations. No tests were done to check for the presence of potential toxic elements in the water.
- The water from the Burera lake was largely used for the mining activities. The lake was (and still is) a source of water shared with the communities.
- There was no management of waste and tailings which were simply disposed of in the environment.
- Artisanal miners used open pit techniques which created additional degradation to the environment.

PROGRESS MADE SINCE 2009

- Overall, a holistic improvement of the management of environmental impacts has been reported. The increased formalisation of operations made environmental protection manageable and a priority to monitor. In 2016 NBM completed an Environmental Impact Assessment which outlined not only the environmental impacts of the organisation but also a management plan and mitigation measures.
- The usage of water has improved, and the mine now has a water recycling system in place, where the water disposed from the washing is collected in ponds and reutilised. The mine also performs regular tests to identify and eliminate the presence of toxic substances in the water. These improvements were progressive over several years.
- Tailings and waste management have improved. The waste sands and rocks are either given to the community to make bricks or organised in planned and developed hills.
- Extraction now happens fully underground, limiting the degradation caused by the open pits.
- A potential new negative impact is the utilisation of timber to secure tunnels which could lead to deforestation. However, NBM has taken steps in terms of environmental impact management, mitigation and remediation, in fact the EIA report provides the actions and guidance for continuous progress. For example, NBM has implemented a program of tree planting to mitigate the impact of timber use and deforestation.

Figure 14: Part of the mine site

Education and vocational skills

MINERS' TRAINING

Whilst there is limited information on skills development of miners pre-2009, there are anecdotal reports that it involved skill transfer from more experienced miners to younger ones and learning was accumulated through experience rather than through formal education. Since 2009, the organisation and formalisation of the operations by NBM has brought an opportunity for miners to receive on the job training, in addition to training related to health and safety. More specialised training is offered to miners (e.g., for the use of new equipment), and miners who perform best can be given more responsibilities.

Local added value and socio-economic contribution

JOB CREATION

One area of particular attention with the introduction of machines has been the impact on jobs, including for women. Based on the perceptions and feedback from stakeholders, the levels of mechanisation introduced at NBM led to higher material recovery rates and therefore increased production but did not affect the number of

jobs needed. Rather than loss of employment, some of the types of jobs required have changed. There has been a certain level of transition in terms of the skills and activities required. This is because the equipment and machines introduced increased the production of ore which still needs to be processed by miners. The table below summarises the changes in roles:

JOBS INCREASED	JOBS DECREASED
• Miners working in the tunnels • Transporters • Washing and panning	• Crushing of ore • Loading of truck

The time spent at the mine by miners has also been reduced, as the introduction of machines has made production more efficient. In addition, the creation of modern tunnels has had a positive impact on women's access to mining, as it has become easier for them to work in the tunnels (either as diggers but mostly transporters) in comparison to former artisanal sites, which were more dangerous and less accessible (e.g., in modern tunnels it is easy to just walk in for most parts while artisanal tunnels require crawling in certain areas). This resulted in increasing women's integration in mining and in women being able to access roles beyond washing and panning.

Overall, the level of mechanisation thus far is balanced in terms of increasing production while not impacting jobs. Reportedly, this could change should further mechanisation be introduced.

SOCIO ECONOMIC DEVELOPMENT AND LOCAL SPENDING

In terms of local added value and socio-economic contribution, limited data is available to make a accurate comparison to the situation pre-2009. Some potential impacts that were mentioned by stakeholders are listed below, however there is limited information to verify the causality between the NBM journey and these improvements in the community and the broader general context.

- Changes in community housing and infrastructure have been observed. According to stakeholders, houses in the villages around the mine mainly used to be made from straw prior to 2009, while now more are constructed with bricks. This change should be put in the context of the government policy to promote better housing.
- NBM has made several donations towards local infrastructure, education, and health services.
- NBM workers have also been supporting building projects when workforce was needed.
- Safety and security in the village has improved given that prior to NBM there was great confusion and disorganisation around the mine.
- The bank used by NBM for most transactions (including salary payments) has started providing more services to the community with the increase of the formalisation at the mine.

When it comes to understanding the impacts of the mine in terms of local content, economic diversification, and development of economic activity around the mining operations, only anecdotal impacts can be noted based on the mixed perceptions of stakeholders. Hence the following should be taken as observations, which will need more in-depth evaluation. On the one hand, it was reported that four business centres (i.e., shops and services) had been developed over the last few years around the mine, which demonstrates a positive opportunity brought by the mining activity to the community. On the other hand, it was noted that since the latest changes in price paid to miners per kg, especially since 2017, and considering the parallel increase in the price of basic goods, miners have lost some of their purchasing power, and it was observed by stakeholders that economic activity in the villages started to reduce. In addition, some shops reported economic disadvantages since miners transitioned from daily to weekly pay. Miners started to accumulate debts, which they were then not able to pay once they received the weekly payment. Although more data is needed, it can be deduced that

the changes in payment frequency and total amount of the payment affects miners and local shopkeepers, actions. Capacity building in cash management and business skills could be considered to address these challenges. Further context and recommendations are provided in the Beyond Conflict-Free Tungsten report.

Conclusions and lessons learned

In combination with the Beyond Conflict-Free Tungsten report, the case study demonstrates how mining and mineral extraction can move beyond the realm of "conflict-free". It provides an example of how, over time, an artisanal and small-scale mining operation can be professionalised and formalised without excluding artisanal miners, and in turn deliver social and environmental benefits to the broader community.

The story of NBM provides important learnings for mining operators in the African Great Lakes region and beyond, as well as for commercial partners further downstream. The recommendations drawn from this case study are targeted towards ASM operations and their (downstream) value chain business partners, but some could also be adapted to suit larger mining projects.

FORMALISATION OF MINING OPERATIONS AND RESPONSIBLE MINING PERFORMANCE

Formalisation of processes and operations, and establishing management systems can lay the foundation to not only enhance the mine technically, but also create the conditions to manage and address social and environmental impacts. This ranges from defining clear management and production structures to establishing adequate policies and procedures. The case study outlines how improvements in terms of formalisation also lead to other positive impacts, such as all miners having formal contracts or increasing the level of security at the mine and in the surrounding communities.

Importantly, each mining operation will be at different stages of maturity when it comes to organisational structures and management systems. **Taking a step-by-step approach, starting by identifying priorities** allows for realistic planning, which can also account for processes and behavioural changes of workers and other stakeholders over time.

Mining expertise and technical understanding of those managing operations are crucial. The reserve and resource potential of a mine is pivotal to attract investment, retain workforce and increase the confidence of commercial partners. Therefore, geological assessments and studies of the mining area at the outset are important, as it will enable proper production planning and more structured identification of mineral veins (resulting also in better targeted excavation, reducing negative environmental impacts). Ensuring the mine management and those involved in daily operations are also equipped with the technical competence and knowledge facilitates formalisation and production development. This ultimately translates into more efficient and increased production, which leads to more revenue and allows for further re-investment into the mine and investment improving the conditions of workers and communities.

A well-established regulatory framework, including mandatory and voluntary systems, can set the formalisation and management of social and environmental impacts on the right track. The case of Rwanda is specific given the broad implementation of the Regional Certification Mechanism, the ITSCI system and their integration into national legislation. On one hand, these frameworks can be useful to guide and encourage the development of policies and procedures across different aspects of mining operations, from traceability to health and safety measures. On the other hand, they represent an opportunity to access international markets while creating long-lasting commercial partnership based on commitments made and demonstrated progress.

Advocacy for such an enabling environment, where missing or lacking efficiency, should be advocated for not only by local actors in producing countries but also by their commercial counterparties and broader industry stakeholders.

Environmental and social impacts, beyond conflict-free specific indicators, will exist with any type of operation and understanding these impacts and risks as early as possible can facilitate the integration of appropriate management systems. This might entail looking beyond the mandatory and voluntary due diligence and traceability requirements and analysing the impacts of mining operations considering its duty to protect the environment, respect human rights and contribute to local socio-economic development. This includes, for example, impacts of mechanisation on job creation and improvements in environmental management. For instance, this can be done by focusing on initiatives that improve the conditions of miners such as safety, health insurance structures, women's access to mining, skills development, and training.

Finally, finding the right balance between accommodating artisanal and small-scale mining (involving larger workforce and creating livelihood opportunities) and introducing modern mining techniques and mechanisation can mitigate or help manage potential negative impacts. The case study demonstrates how the level of mechanisation introduced by NBM has had generally positive impacts, as an increase in production has only involved a certain level of task reallocation and no job losses. When properly managed, miners welcome the introduction of better equipment and recognise the associated improvements in safety.

INTERACTION WITH STAKEHOLDERS AND COMMUNITY ENGAGEMENT

Understanding social and environmental impacts can be aided by planned and appropriate collaboration with local authorities and communities. As they represent the parties directly or indirectly affected by mining operations, efforts to build trust with local stakeholders can result in better integration in the community and contribute to the mine's social license to operate. Regular collaboration allows mining operators to ascertain stakeholders' needs and explore how the mine can address them, ultimately by identifying how the mining operations can contribute to the community. At the same time, it creates a channel for stakeholders to raise concerns and recommendations. The NBM case study shows that even small operations can generate cooperation and provide in-kind or monetary support, alongside more direct impacts such as job creation and health insurance policies for families.

During the formalisation process, there should be consideration of which structures would be more functional within the local context. This is particularly relevant when it comes to workforce organisation, where actors such as subcontractors might play a social role in terms of having better access to local communities for recruitment. Advantages can also be observed in keeping the production organisations in teams, where each team manages their work and team members, while creating a collaborative and familiar environment.

ENGAGEMENT OF MID- AND DOWNSTREAM ACTORS

Besides the actions at the mine level, engagement and collaboration among supply chain actors is recognised as a major enabler of formalisation and improved social and environmental performance, beyond conflict-free requirements.

First, **firm commitments and long-term commercial agreements from off-takers and buyers can motivate efforts and improvements at mine site level.** These have proven particularly effective when they go beyond commercial terms, where mid-downstream actors invest time and capacity to create the partnership, while recognising that improvements happen progressively.

Secondly, **in addition to contributions of time and knowledge, financing improvements remains important to complement the guarantee of market access.** These investments function as further enablers for improvement and form part of the long-term planning and engagement among supply chain actors.

Finally, **prioritising engagement over exclusion strategies strengthens trust among supply chain actors.** Engaging strategies mean considering sourcing from less safe locations and embracing continuous improvement principles. Such an approach can evolve through collaboration to achieve production targets and conflict-free compliance and create avenues to advance broader social and environmental impacts, such as improving working conditions for miners and contributing to local communities. The outcome of the case study and the impact identification analysis highlight that risk management practices based on exclusion limit the improvement of social and environmental impacts along minerals value chains.

This project, enabled by the collaboration between NBM, SMR, WBH and Fairphone, stands apart from broader market dynamics, which have sometimes resulted in the avoidance of sourcing from the African Great Lakes Region and in some cases, more broadly from the continent. Exclusion practices as a risk management strategy might protect a given company from conflict-related risks and impacts in the short term. However, such approaches also limit the positive development of the sector and thus cannot be considered responsible sourcing.

While conflict-free requirements address fundamental aspects of responsible sourcing, the case study highlights the potential of looking beyond to broader social and environmental impacts. It builds the case for inclusive due diligence and responsible sourcing practices which seek to understand the actual impacts at the production level from the perspective of affected stakeholders.