

# Navigating change: Lessons learned from engaging stakeholders regarding the Oyu Tolgoi underground mine subsidence and river diversion project

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## Abstract

*The Oyu Tolgoi underground mine is one of the largest copper-gold mines in the world, situated in the southern Gobi Desert region of Mongolia. The mine has an expected lifespan of over 50 years, and is likely to become one of the top copper – gold producers globally. For the underground mining operation, Oyu Tolgoi adopts the block caving method, which entails undermining ore and allowing it to collapse under its own weight. The mining project has had a notable impact on the Mongolian economy, generating employment opportunities and making significant contributions to the country's gross domestic product (GDP). Nonetheless, this project has encountered several challenges concerning its possible environmental and social impacts.*

*One of the potential environmental, and social impacts of the block caving method used in underground mining is subsidence. Advanced geotechnical data modeling suggests that there is a high risk associated with rock mass movement and the following formation of a subsidence zone at the surface of the underground mine. At the Oyu Tolgoi site, it is anticipated that this subsidence would continue until 2042, requiring a river diversion project to mitigate its environmental effects. Furthermore, the Oyu Tolgoi mine site is situated within a sensitive ecosystem, and there have been vocalized concerns about the impacts mining might have on water resources, land use, and biodiversity. Disputes with local communities could be raised over compensation, transparent communication, and the loss of natural and cultural heritage due to the risk the subsidence poses.*

*Therefore, understanding the potential risk of a subsidence is an important consideration in the mine closure planning process, and appropriate measures should be taken to mitigate the potential impact of subsidence on the environment, the community, and the safety of mine closure activities.*

*To inform the involved stakeholders about the knowledge and impacts of the subsidence and the related river diversion project, a team of national experts has been working with the Oyu Tolgoi Department of Community Relations. The team will verify the findings found within the technical studies from the international expert team and explain them in simple, non-technical jargon to community stakeholders. The paper highlights the importance of effective communication with stakeholders, its challenges and the need for transparency throughout the project. It also explores the challenges of engaging with diverse groups, including local communities and herder families. The role of the expert team in building trust and understanding is discussed. And innovative methods, such as participatory mapping, communication planning and community meetings, are highlighted to involve stakeholders in the decision-making.*

*The lessons learned from this project can be applied to other mining projects in Mongolia and abroad facing similar challenges. By prioritizing stakeholder engagement and community involvement, mining companies can build stronger relationships with the local community and create more sustainable outcomes with the help of an external team of experts.*

*This paper contributes to the conference theme of community and change by emphasizing the importance of collaboration and communication in navigating the impacts of mining on local communities.*

**Keywords:** *underground mine, mine closure, community and change, subsidence, stakeholder engagement*

# 1 Introduction

Oyu Tolgoi mine site is located at a distance of approximately 545 km south of Ulaanbaatar, the capital city of Mongolia and 80 km north of the Chinese border. After years of planning and construction phase since 2005, the beginning of Oyu Tolgoi underground mine project was approved by the board in January 2022 and has officially started on March 13<sup>th</sup> 2023.

## 1.1 Oyu Tolgoi—underground mine operation

The majority of Oyu Tolgoi's copper resources lie deep underground, constituting over 80% of its total reserve. A considerable share of these underground resources is found in the Hugo Dummet deposit, which rests at a depth of at 1300 m below surface. Spanning 2.5 km in length and 300 m in width, this ore body is accessed through a highly advanced mechanized mining technique known as block caving. According to the Oyu Tolgoi Feasibility Study 2016, the production of the ore will gradually increase until it reaches its maximum level between 2027 and 2035, delivering an average of 95,000 t per day to the processing plant. After this period, production will gradually decrease until it ends in 2039. The initiation of production operation is planned to start in Panel 0 and eventually expand to Panel 2, followed by Panel 1. Panel 0's advancement is fairly considerable, and work is underway on the extraction, undercut, and apex levels. (Figure 1 shows the planning of operation.)

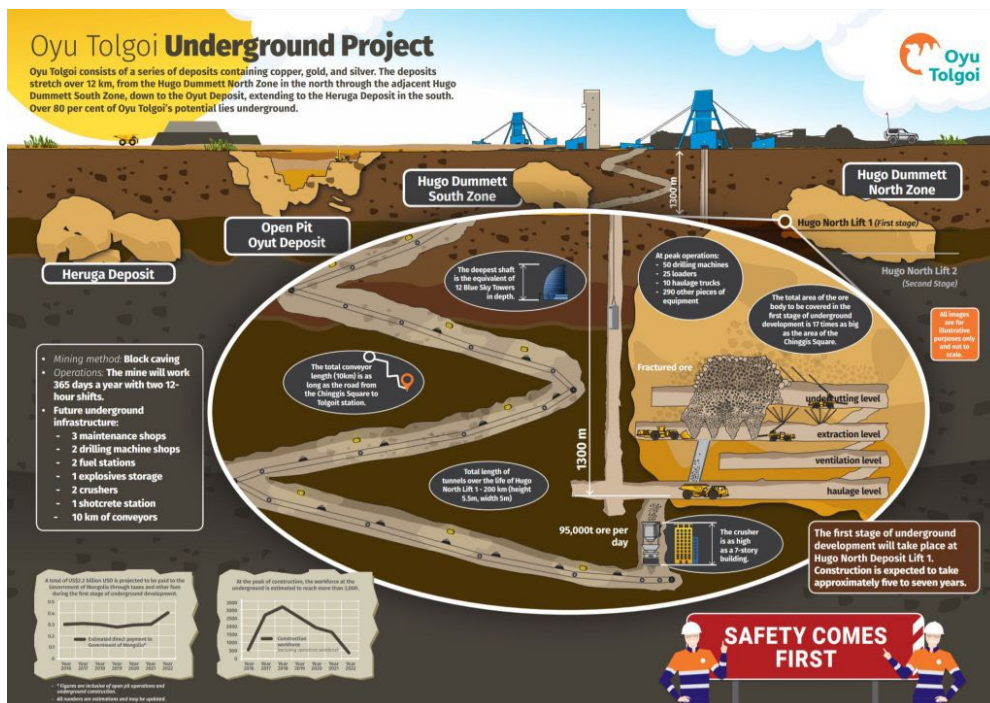


Figure 1 The underground project at Oyu Tolgoi and the block caving mining method (Image: Turquoise Hill Resources)

## 1.2 Reports and studies of subsidence

Itasca Australia Pty Ltd (Itasca) has performed a three-dimensional Numerical Subsidence Assessment for Panel 0, 1 and 2 in September 2021. As a result of this analysis, it is predicted that the surface will breakthrough after 54 months of production for Panel 0, 65 months for Panel 2 and 103 months for Panel 1. (Hebert 2021) (Figure 2 shows the Itasca report imagery) The Environmental and Social Impact Assessment (ESIA) for Oyu Tolgoi (Colloquially known, and mentioned in this paper as, 'OT'), which was approved in 2012, briefly discussed the potential of underground subsidence surface breakthrough and suggested the need for further detailed studies to be conducted. To address this recommendation, Ramboll LLC - an independent and internationally recognised consultancy is currently in the scoping phase of a supplementary ESIA. Furthermore, in 2016, a Detailed Environmental Impact Assessment (DEIA) was approved for Oyu Tolgoi, which touched on general issues related to ground subsidence. However, for the Underground Project, a supplementary DEIA is required to delve deeper into subsidence and the proposed Dugat river diversion, drawing from the technical assessments and modeling work performed by Ramboll LLC. The Dugat river Diversion's design work is currently in progress, being performed by Prestige LLC - an engineering firm.

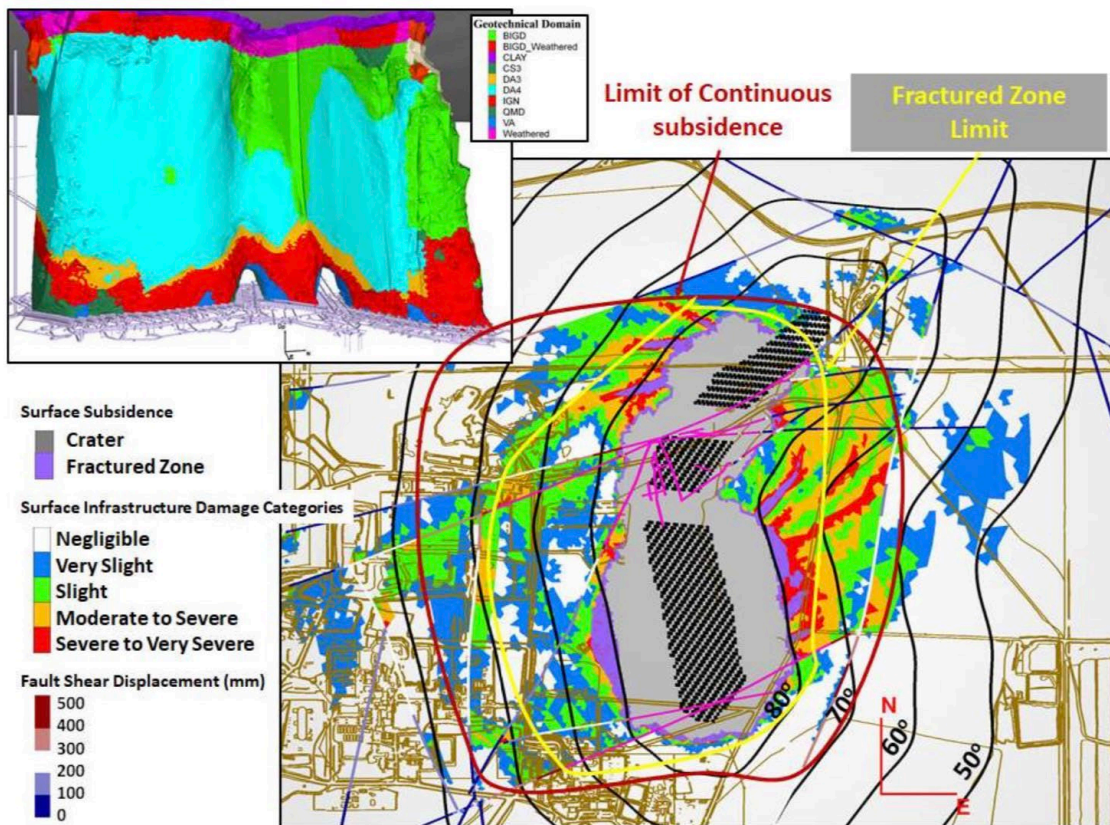


Figure 2 Subsidence zone predicted at the end of production (June 2042) (Hebert 2021)

### 1.3 National Experts Team

The project ‘National Expert Team’ is being conducted by the experts at QMC LLC, who are contracted by Oyu Tolgoi, playing a crucial role in supporting OT team’s communication efforts with national stakeholders. The National Expert Team's primary responsibility is to verify and adapt the technical findings of the international expert team to suit the Mongolian context and effectively convey them to community stakeholders in a clear and accessible manner. This requires individuals with strong technical qualifications and expertise in mining, hydrogeology, physical and social environment, and stakeholder engagement. (Please see Figure 3 for the team structure.) Rio Tinto places great emphasis on obtaining free, prior, and informed consent (FPIC) in its development projects and is dedicated to facilitating a comprehensive understanding of the impacts of underground mining. Additionally, the team aims to collaborate closely with key stakeholders to develop management plans through extensive consultation. There are several key objectives that the National Expert Team is entrusted with, as follows:

- Ensuring the quality of the technical study findings and their alignment with the Mongolian context
- Developing accessible, plain-language and non-technical reports and communication materials tailored to the needs of diverse audiences.
- Providing technical support to OT's community engagement team, enabling them to effectively communicate with key stakeholders such as the environment ministry, municipal government, and the local community. The goal is to build comprehensive understanding of the underground mining impacts, including surface subsidence among all involved parties.
- Assist in consulting with various stakeholders throughout the DEIA and ESIA development stages to ensure that the impacts of underground subsidence are adequately addressed and mitigated.

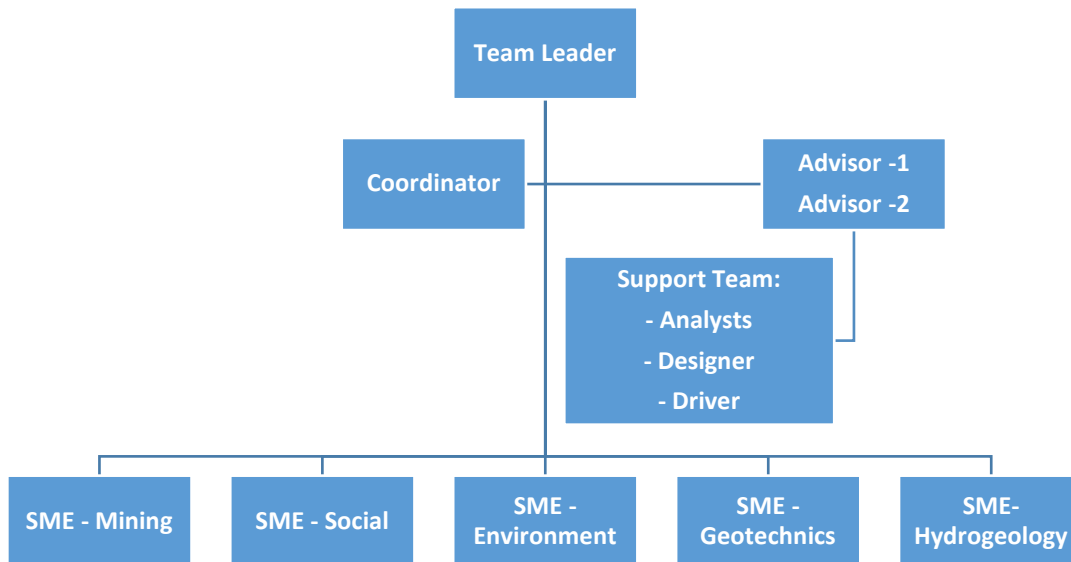


Figure 3 National Experts Team structure

- The team leader ensures that the team operates efficiently and effectively, makes sure the project is completed successfully and meets the required standards, as well as providing guidance and support to the team members.
- The coordinator is responsible for planning and organizing resources, tasks, and activities to achieve project objectives. Also, the coordinator facilitates communication among team

members, monitor project timelines, and ensure that all project deliverables are completed on time.

- The main duties of the advisors are to offer direction, counseling and suggestions throughout all phases of the project, and to represent the team as the primary speaker at meetings, forums and events, as well as being the public face of the team.
- The analysts in the support team are tasked with conducting impact analysis to address local concerns during the course of the project, and to help the team members with production of deliverables. The designer is responsible for creating and developing visual materials to communicate the message to a target audience. And the driver's responsible for delivering the team members to the destination of meetings, events and forums and to ensure safety.
- SME –Subject matter experts are responsible for providing specialized knowledge and expertise in their particular fields, such as environment, hydrogeology, geotechnics, mining and social expertise to the project team. They are expected to review and validate project deliverables, provide guidance on best practices, identify potential risks and recommend mitigation strategies.

#### 1.4 OT—mine closure plan on subsidence

The mine closure plan requires regular updates every five years. The most recent closure plan was created in 2012, with revisions made in 2014. However, due to the Covid-19 pandemic, the update of the closure plan was delayed and is currently in progress this year.

According to the 2014 OT Mine Closure plan, the subsidence area within the mine will act as a recipient of rainfall and groundwater, with a slow recharge into the underground workings. The possibility of re-establishing flow-through conditions in the long term will depend on the water table rebound relative to the base of the open pit, which will be evaluated throughout operations.

It is also mentioned in the Mine Closure Plan to ensure safety and restrict access to the subsidence zone, a safety berm will be constructed using coarse NAF (Non-Acid-Forming) waste rock. The berm will be positioned 100 m away from the predicted ultimate subsidence limit, with a minimum height of 5 m, side slopes of 1.5H:1V, and a 5 m wide crest for vehicular access and inspection. Monitoring of the subsidence area will also be carried out.

Furthermore, it is emphasized in the 2014 Mine Closure plan that the monitoring of ground movement for site stability using InSAR satellite technology is necessary. This technology not only accurately tracks vertical and lateral displacements over large areas, but also helps create Digital Terrain Models (DTM) for comparison with monitoring data. Visual inspections during site security visits will complement the remote monitoring system. These measures ensure comprehensive monitoring of ground movements and support the overall closure and rehabilitation objectives outlined in the plan.

There are some regional and community engagement programs planned by OT in the Mine Closure Plan 2014, such as:

- Local Business & Economic Development Program (LBED).
- Community Health, Safety, and Security Program (CHSSP).
- Herder Livelihood Improvement Program.
- Participatory Environmental Monitoring (PEM) Program.

One of the measures of the 'Herder Livelihood Improvement Program' is pasture land improvement and management. OT produced pastureland and livelihood improvement management plan in 2017, which primarily focuses on livestock grazing but includes measures to integrate agricultural, biodiversity, and water

management aspects for effective pastureland management. (Oyu Tolgoi, Pastureland and livelihood improvement management plan 2017)

In mining areas, subsidence could potentially affect the stability and productivity of pastureland, which is a vital topic amongst the herder community. However, the Closure plan and the Pasture management plan did not incorporate a specific engagement plan with stakeholders and herders concerning the issue of subsidence.

## 1.5 Human influx

Over the past three decades Mongolia has experienced significant human influx in, driven by various factors such as economic opportunities, urbanization, and environmental changes. The capital city, Ulaanbaatar, has witnessed rapid urban growth as people from rural areas migrate in search of better education, healthcare, and employment opportunities. Environmental changes, such as desertification and extreme weather events, have greatly impacted the herder families in rural areas to migrate to urban centers in search of alternative livelihoods over these years. According to the National census of population report in 2020 in the last 5 years, 72.9 thousand people moved to Ulaanbaatar, which is 2.5 times more than the 2010 census.

However, there's an interesting phenomenon is happening in Khanbogd soum (the second-to-last unit of municipality) for the last 10 years (see Figure 4), which is the urban to rural migration. One of the key drivers of human influx in Mongolia is the mining sector, particularly in regions with large mining projects such as Oyu Tolgoi. The promise of job opportunities and higher wages has led to a significant influx of people, including skilled workers, laborers, and support staff, to Oyu Tolgoi. This influx has not only impacted the local demographics but has also brought about social, economic, and environmental changes in the affected regions.

As of January 2023, 8055 citizens are registered in Khanbogd soum. Khanbogd soum has 5 baghs (the lowest unit of municipality). There are 2,301 registered citizens in Javkhlant, 1,889 in Gawilud, 1,304 in Nomgon, 2,301 in Bayan, and 426 in Khaikhan. It is estimated that the mobile population is between 25,000 and 28,000.

The Oyu Tolgoi site is situated in Javkhlant bagh area of Khanbogd soum, Umnugobi aimag, Mongolia.

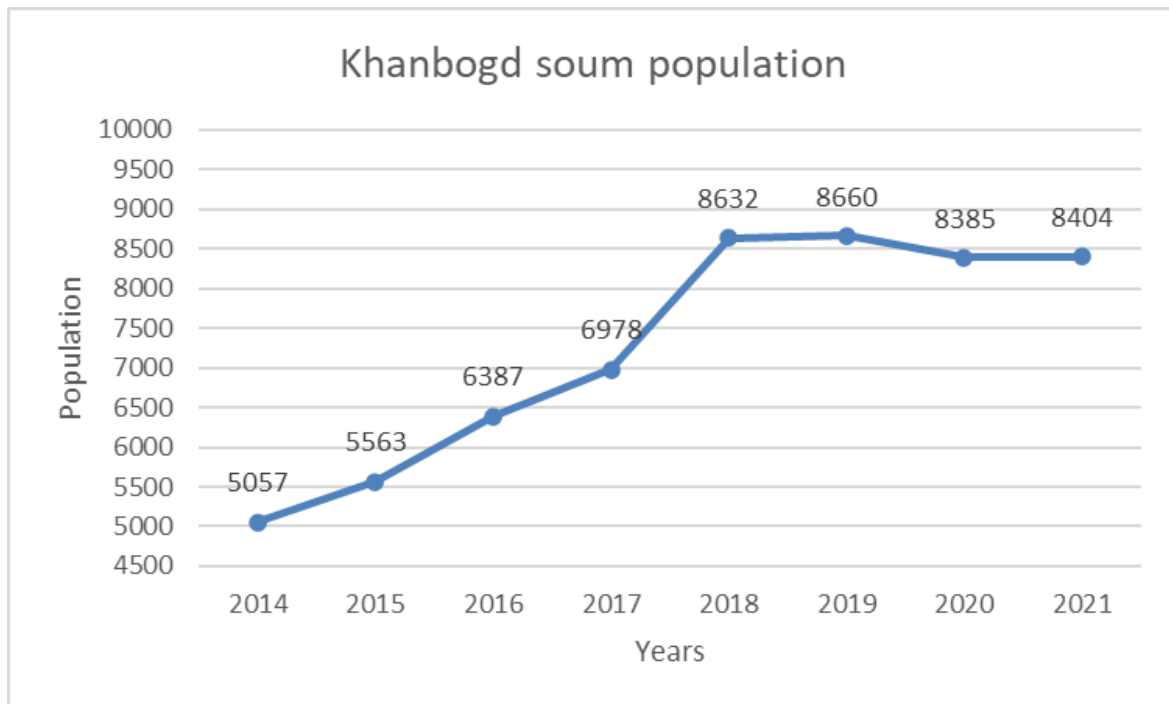


Figure 4 Khanbogd soum population over the years (source 1212.mn)

The in-migration Management Plan by OT emphasizes the importance of monitoring population growth rates and avoiding sudden spikes in residency registrations. It also highlights the collaboration with local governments to improve amenities based on actual population trends, including both managed and unmanaged in-migration. The implementation of infrastructure projects, such as the OT-Khanbogd road and educational facilities, has improved living conditions and supported the transition of OT camp residents to settle in Khanbogd soum center. Transparent communication of workforce requirements and information about the mine's life cycle is essential for managing stakeholder expectations and ensuring effective in-migration management. (Oyu Tolgoi, In-migration management plan 2017)

## 2 Methodology

QMC LLC managed the project primarily from its office in Ulaanbaatar, Mongolia, with occasional visits to Khanbogd soum in Umnugobi aimag (aimag is the first municipal category), where the OT stakeholder engagement team is located. Regular monthly meetings with the OT team, as well as quarterly meetings with other companies like Ramboll LLC and Prestige LLC, and meetings with other OT team such as communication team, geotechnical team and environment team were conducted to gather information and discuss progress. Additionally, the advisors visit events or bagh meetings that are being held in Umnugobi to deliver presentation. Moreover, our stakeholder engagement team made trips to Khanbogd soum to personally visit families and provide step-by-step information about subsidence in multiple levels.

### 2.2 Planning stage

Through the National Expert Team's research within the project scope and examination of technical studies and community baselines, we developed a strategic roadmap to convey our key messages. The project primarily focuses on four main areas: subsidence, potential impacts on the water table resulting from subsidence, the community baseline analysis, and other concurrent projects at Oyu Tolgoi.

The stakeholder engagement process encompasses five stages. Firstly, we conduct a thorough review and analysis of technical reports such as 'Numerical subsidence for panel 0, 1 and 2' for Oyu Tolgoi by Itasca in

2021, ‘Mine Water evaluation’ in Oyu Tolgoi block cave by Piteau Associates in 2022, 2021 Hydrogeologic Assessment Associated with Panel Caving at the Oyu Tolgoi Mine by Itasca, and the Dugat surface flow protection project report by Prestige, in addition to other pertinent information provided by the OT environmental and geotechnical teams. This enables us to obtain a comprehensive understanding of the technical aspects of the situation.

Secondly, we aim to establish consensus and verify information with OT by creating fact check document and a glossary that facilitate effective communication among all teams. These resources will also be instrumental in developing simplified visual materials.

Thirdly, we process the technical reports pertaining to subsidence and water-related issues. Based on these reports, we generate visual and communication materials to effectively convey the message to various stakeholders (Point 2.4 below).

The fourth stage entails continuous refining and tailoring the message through iterative reviews and adjustments. Notably, this stage allows us to incorporate feedback, update the materials, and revisit previous stages as needed.

Lastly, the message delivery stage not only involves conveying the message to stakeholders but also actively observing and gathering feedback. This feedback loop enables us to make necessary updates and further tailor the messages, completing a continuous cycle of communication and refinement.

In summary, the National Expert Team's project has been guided by a well-structured approach encompassing comprehensive research, consensus building, material development, iterative refinement, and message delivery. By employing this strategic framework, we ensure the effective dissemination of information while remaining responsive to stakeholder needs and fostering meaningful engagement throughout the process. (See Figure 5)

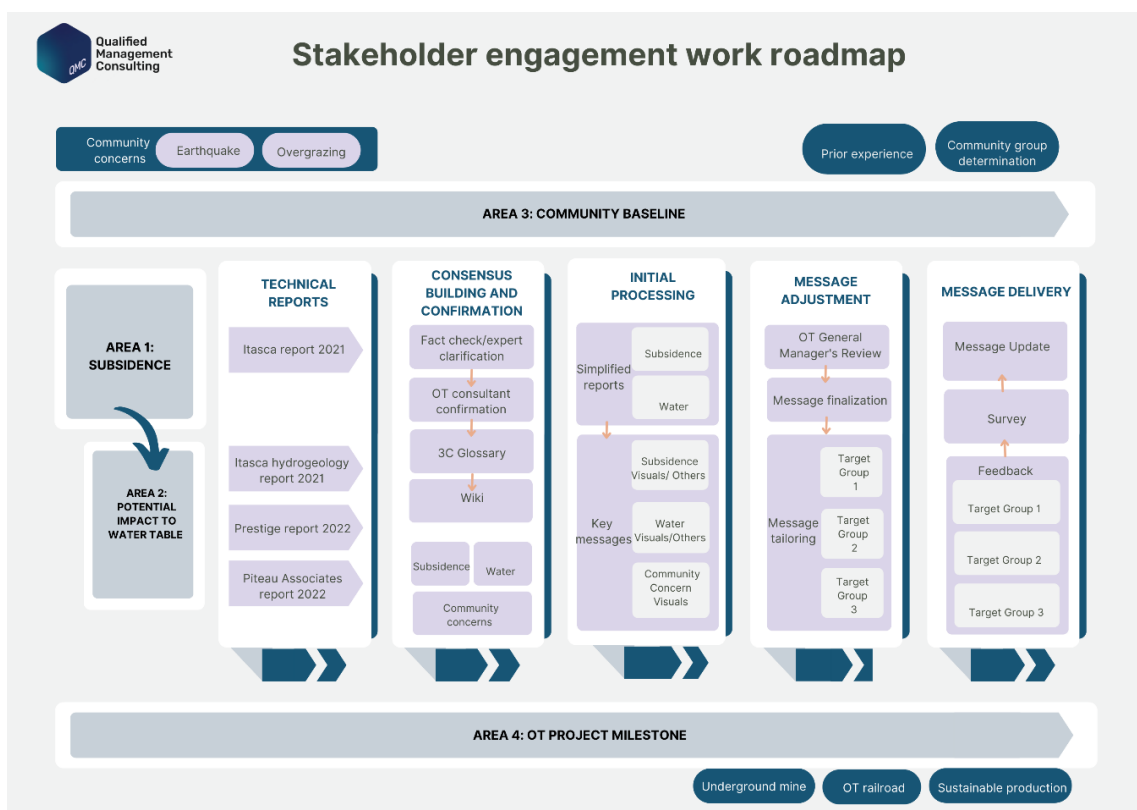


Figure 5 Stakeholder engagement roadmap planning



Figure 6 shows the workstream view of our project plan, including theme, target audience, message content, meetings, techniques to use for the meetings and expected outcomes.

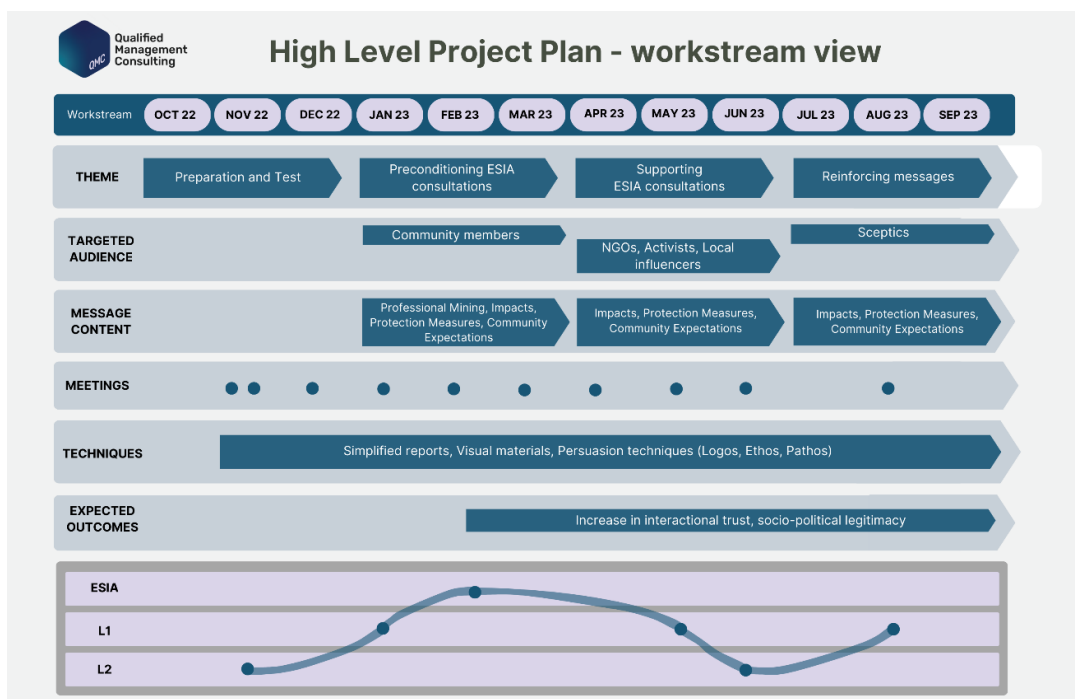


Figure 6 High level project plan—workstream view

### 2.3 KPI

QMC and OT has agreed that the Key Performance Indicators should be developed based on the Thomson-Boutilier (2011) Pyramid model for mining project’s Social License to Operate. Specific KPI’s developed to determine community and stakeholder groups acceptance and approval rates for the subsidence and subsidence related issues such as river diversion.

For this project, three specific target results have been set to guide the desired outcomes and progress. The target results indicate the intended level of achievement

The first target result for the indicator measuring the percentage of people who report receiving information about subsidence and river diversion project from the national experts is 80% of the total target group. This target aims to ensure that a significant majority of the stakeholders are informed about the key aspects of subsidence and its potential impact on the Dugat river water table.

The second target result for the indicator measuring the percentage of people who report understanding fully or somewhat about subsidence and water table from the national experts is 60% of the total target group. This target reflects the goal of achieving a substantial level of understanding among the stakeholders regarding these important aspects.

The third target result for the indicator measuring the proportion of people whose attitude has improved to a neutral or supportive level among those who initially had negative attitudes towards OT underground mining is 60%. This target signifies the aim to bring about positive changes in the attitudes of individuals who were initially sceptical or negative towards the underground mining operations.

These target results provide clear objectives for the project and help measure the effectiveness of the national experts' efforts in addressing concerns, disseminating information, promoting understanding, and improving stakeholder attitudes throughout the project duration.

## 2.4 Stakeholder engagement

The stakeholder engagement process plays a crucial role in ensuring effective communication, understanding, and collaboration between the National Expert Team and the relevant stakeholders. Engaging with stakeholders allows for the exchange of information, feedback, and the building of relationships based on transparency and trust. In this subsection, we outline the key aspects of our stakeholder engagement approach.

The first step in our stakeholder engagement process was to identify and map the relevant stakeholders who may be affected or have an interest in the project. We considered a wide range of stakeholders, including local community members, government authorities, environmental organizations, and other relevant parties.

Furthermore, our engagement strategy included a two-level approach to inform stakeholders prior to the community consultation planned to be facilitated by Ramboll LLC for the Environmental and Social Impact Assessment (ESIA). Level 1 aimed to establish an initial connection with stakeholders, introduce our team, and express our intention to provide information regarding subsidence. This stage served as a foundation for building rapport and setting the stage for further engagement. For the initial level of engagement, our focus has primarily been on involving herders from Khanbogd soum who reside in close proximity to the OT site and may potentially experience impacts from the subsidence and river diversion project. To facilitate this process, the OT community team has assisted us in identifying and compiling a list of herders who meet the criteria. Given that the significant portion of population in Khanbogd soum consists of migrants, we specifically directed our focus towards engaging with the native residents who lived there for generations and hold a genuine care for their homeland.

Level 2, on the other hand, delved into more specific and comprehensive details of the projects, ensuring stakeholders to gain a deeper understanding of the topics at hand. This stage will specifically target NGOs, authorities from Khanbogd soum and Umnugobi aimag, as well as revisiting the herders previously engaged to offer them additional, more detailed insights. By implementing this two-level approach, we aimed to foster a well-informed and engaged stakeholder community for the upcoming ESIA consultation led by Ramboll LLC.

We employ a diverse range of engagement methods tailored to each event and stakeholder. These include conducting face-to-face meetings, delivering presentations at public events and open days, disseminating printed information, distributing newsletters, and through other medias such as, videos, pictures and simplified brochures. By utilizing these various channels, we aim to effectively engage with stakeholders and ensure the dissemination of relevant information.

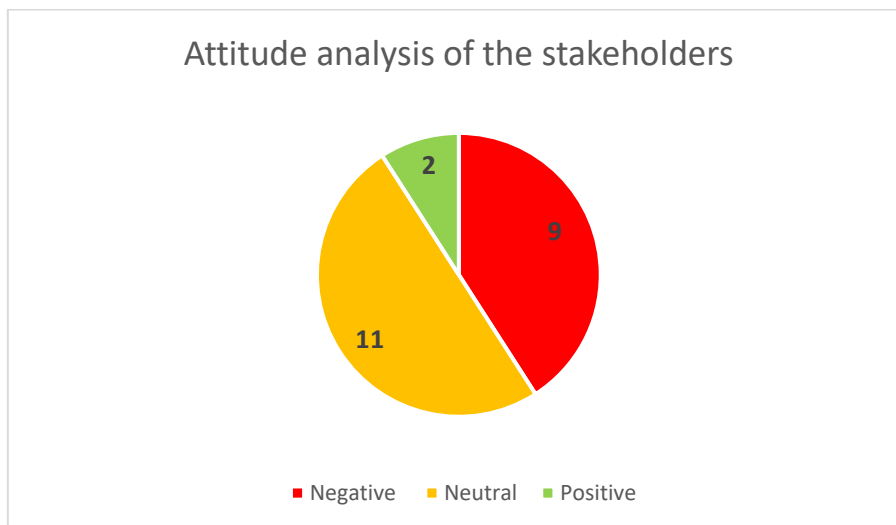
Based on the observation obtained from the engagement of level 1, we conducted a comprehensive analysis to understand stakeholder interests, concerns and level of influence. Depending on further analysis, third or fourth level meetings could be planned with the stakeholders.

## 3 Result

The thorough analysis of technical reports allowed the National Expert Team to gain a comprehensive understanding of the subsidence phenomena, potential water table impact, and associated mitigation measures. The insights derived from these studies formed the basis for our communication and engagement efforts with stakeholders. By translating technical information into simplified formats, we aimed to ensure that stakeholders could grasp the key aspects of the studies and actively participate in discussions regarding the project's impact and mitigation strategies.

Over the past few months from when this document has been written, the team has engaged in direct meetings with a total of 22 individuals. Out of these participants, 17 were Javkhlant bagh herders, while the remaining 5 represented local authorities such as members of the Khanbogd soum citizen representative meeting and the Khanbogd soum governor. When assessing the attitudes of the stakeholders we

encountered, it was observed that the majority held a neutral stance regarding the impact of the underground mine. Figure 7 illustrates the distribution of negative, positive, and neutral attitudes among the stakeholders we engaged with.



**Figure 7 Attitude analysis of the L1 stakeholder engagement**

This result is subject to change as the further stakeholder engagement is planned for the next months.

Common concerns and topics voiced during the stakeholder meetings:

- Prior history or dissatisfaction with compensation and benefits received from OT.
- Personal interests such as, finding job for their children in OT, getting tenders, getting their own wells repaired or drilled a new one.
- Different perceptions and understanding about the subsidence.
- General negative scepticism about pastures, dust, mines, destruction of land, lack of development in communities, etc.
- For people with a negative attitude, they tend not to accept the expert's explanation even if they understand it, believing the information provided is a form of brainwashing.
- While the water issue was not discussed in detail and the message was not given, the concerns relating to water has been voiced, asking in detail about the Dugat river, mentioning the current water situation, and the water leakage from the tailings dam. This showed that there is a risk of negative reactions from the local people when providing information related to the flow of the Dugat river in the future.
- Some herders have concerns that the proposed construction of a new railway by OT will result in the division of the pastureland, posing challenges for the grazing of livestock.

In addition to the face-to-face meetings, the team's advisor conducted a presentation during various events including the Open Day event in Khanbogd soum, the Open Day event in Dalanzadgad soum, the Khanbogd citizen meeting, and the Triple Party Council meeting. The purpose of these presentations was to provide information and raise awareness among the attendees regarding the subsidence and the Dugat river diversion project.

Through our diligent engagement efforts, we have successfully enhanced the stakeholders' comprehension and consciousness regarding the underground mine operation, its associated impacts, and particularly the mine closure process concerning subsidence. Our collaborative approach has fostered a better understanding

and heightened awareness among the stakeholders, enabling them to grasp the intricacies and implications of the mining activities and the subsequent rehabilitation measures.

Numerous concerns were raised during our discussions with herders, revealing that conversations often veered into unrelated areas such as compensation, tailing dam leakage, OT's railroad, dust, and trust issues with OT information, rather than focusing solely on subsidence or underground mining. Recognizing this observation, we are actively strategizing our future engagements to ensure their effectiveness and avoid alarming our audience. On that note, it was noticeable that the herders had diverse speculations regarding the future formation of subsidence. It encourages the importance of providing accurate and professional information to address their concerns and dispel misconceptions. Moreover, this also sparked their curiosity on how the subsidence will end up as a landform in long future and the measures OT intends to take in their mine closure plan to address it.

In addition, the OT community team concluded the outcomes of Level 1 meetings with the herders were effective in multiple aspects. Not only did these meetings help dispel any misunderstandings they may have had, but they also provided an opportunity for the herders to directly engage with experts and acquire a better understanding of the overall underground mining operations. They also mentioned that the attitude towards outside experts were more open in terms of receiving the information and expressing their concerns.

Overall, the contributions of the National Expert Team have been instrumental in ensuring the project's technical studies are effectively communicated, stakeholders are engaged, and potential impacts are properly addressed. The collaboration with international consultants, the OT team, and various stakeholders has facilitated a comprehensive and inclusive approach to project development. As the project progresses, the National Expert Team will continue to play a vital role in supporting effective communication, stakeholder engagement, and the pursuit of sustainable and responsible mining practices.

## 4 Conclusion

The National Expert Team has played a crucial role in supporting the Oyu Tolgoi project by effectively communicating with national stakeholders and addressing key concerns related to underground mining impacts. Through our involvement, the team has ensured the quality and alignment of technical studies conducted by the international Expert Team within the Mongolian context. Our efforts have led to the development of plain-language, non-technical reports and communication materials tailored to the needs of the identified audiences, facilitating a comprehensive understanding of the project's findings.

The project's emphasis on communication and engagement is crucial for fostering a collaborative approach to mine closure. By providing plain-language reports, communication materials, and engaging with national stakeholders, the National Expert Team facilitates meaningful dialogue and understanding among all parties involved. This inclusive approach promotes transparency, builds trust, and ensures that the closure process respects the rights and interests of local communities.

Furthermore, the national experts team has actively supported OT's community engagement team in engaging with national stakeholders, including the environment ministry, local government, and the local community. Our expertise in hydrogeology, physical and social environment, and stakeholder engagement has contributed to building a deeper understanding of underground impacts, particularly surface subsidence. It is planned that through consultations during the DEIA and ESIA development process, the team will ensure that the underground subsidence impact is adequately addressed, supporting a collaborative and inclusive approach to decision-making.

Additionally, the National Expert Team has been committed to achieving free, prior, and informed consent (FPIC) in line with Rio Tinto's principles. Their efforts to inform and involve stakeholders in the project, especially regarding the proposed Dugat river diversion, have aimed to foster a transparent and participatory

process. By actively engaging with herders, visitors, and other stakeholders, the team has sought to address concerns, provide accurate information, and facilitate meaningful conversation.

Mine closure is a multifaceted process that requires careful consideration of environmental, social, and economic factors. In the 2014 OT Mine Closure plan, it is notable that the specific plan for stakeholder consultation and mitigation concerning the subsidence issue is not extensively mentioned. While the plan addresses aspects such as the construction of a safety berm and the use of remote monitoring systems, there is limited information regarding stakeholder engagement and mitigation strategies directly related to subsidence. During the National Expert Team's work, we found that the Mine Closure plan should be addressed to ensure effective communication, community involvement, and mitigation measures concerning the subsidence impact. Our involvement ensures that the closure plans are technically sound, environmentally sustainable, and most importantly responsive to the needs and concerns of local communities. It is crucial to address this gap as one of the key components in the upcoming Mine Closure Plan for 2023.

## **Acknowledgement**

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