

**RioTinto**

# Rio Tinto Serbia Highlights

Innovating to develop new resources





## Sustainable development of Jadar Project

# Committed to highest environmental standards and sustainable future with partnership with the local community

After I was appointed general manager of Jadar Project in December 2020 came a period that was exceptionally dynamic, in which each new week brings important steps forward in the development of one of the biggest greenfield lithium projects in the world. I believe that it is a great privilege for all of us participating in the Jadar Project to have the opportunity to contribute to the implementation of such a complex and unique project. Jadarite is a mineral with a unique composition and has been discovered only in Serbia, and its importance reaches far beyond the borders of our country. The investment we are planning to carry out is one of the biggest industrial and mining investments in Serbia in the past few decades.

This year, Rio Tinto will be celebrating 20 years of operations in Serbia, and during all these years we have developed our project responsibly, acknowledging and respecting the community that is our host. We are committed to continuing to do so, primarily by transparently sharing information about the Jadar Project with all stakeholders. The newsletter you see before you is the result of that work.

A few weeks ago, Rio Tinto committed USD 2.4 billion for further development of this project, with the prerequisite of obtaining all the necessary approvals, permits and licences, and with continued engagement with local communities, Government of Serbia and civil society. This is an important milestone for us and a strong confirmation of Rio Tinto's commitment to supporting Serbia as the leading lithium supplier, having in mind the size and high quality of the Jadar site.

The Jadar Project is currently in the Feasibility Study stage, which is expected to be completed by the end of the year. During our recent meeting with the Serbian President, Prime Minister and competent ministers, we expressed our firm resolve to complete the Environmental Impact Study by the end of the year, which will be made available to the public and be the subject of public debate. Only after this study is approved can the realisation of this project continue, provided the remaining necessary permits to construct industrial and mining facilities and carry out mining operations are obtained. We are resolute in our intention to continue developing the project in partnership with the Government of the Republic of Serbia, local self-government units, communities and civil society, with absolute confidence that Jadar Project will bring long-term benefits for communities and Serbia for many generations to come.

The project has the potential of contributing 1% of Serbia's GDP directly and 4% indirectly, and many domestic companies will be involved in the construction of the mine, ore processing



Photo: Rio Tinto, Jadar Project

Vesna Prodanović,  
General Manager Rio Sava Exploration d.o.o.

facility and accompanying infrastructure. We will help local suppliers so that they are able to support the mine's operation during the upcoming decades. The implementation of the project will make Jadar a major employer – about 2,000 jobs will be created during the construction stage, while 1,000 people will be employed during the mining and mineral processing stage. Construction is expected to start in 2022, and first market production is expected in 2026. We are preparing the Jadar Project so that it not only complies with the laws of the Republic of Serbia, but also complies with EU regulations from the very beginning.

I am honoured to lead a team of top local and international experts developing this project. With the goal of bringing Jadar closer to you, and, I believe, answer some of the questions you may have, I invite you to read more about our work on the following pages.

## Safety first



Photo: Rio Tinto, Jadar Project

Jadar Project, Loznica office

# Celebrating three years injury free on Jadar Project

On May 30, 2021, we've completed 3 years without an injury at work on the Jadar Project and have achieved over one million safe working hours, which is the largest number of safe working hours since the launch of the Jadar Project in Serbia. This extraordinary achievement is even more significant since over the last three years we have completed intensive and extensive field work with many geological and hydrogeological drillings, and with various environmental field researchers and socio-economic surveys completed. Working hours on the project have never been higher. While we are proud of the result, we continue with an even bigger focus on the safety of our people.

As part of our continuous efforts to ensure a zero-harm working environment for our people, we will work to further simplify and standardise our safety tools and processes to increase efficiency and improve the quality of our verification data. This is particularly necessary as we start to prepare for the next stage of the project. We are working hard today to prepare and implement the right tools and processes to deliver safe future operations.

With the onset of the COVID-19 pandemic, we adjusted our business accordingly in order to safely continue our feasibility study work. With effective measures in place, we did not have a single case of internal transmission of COVID-19, and colleagues who, due to the nature of their work, spent time in the office or in the field showed a high level of responsibility towards themselves and their colleagues. The health and safety of our people is also about general wellbeing. As such, we provided, and continue to provide, support programmes for our employees and their families in order to support them as much as possible during these challenging times.

We are dedicated and focused on achieving zero harm in all our activities. It is our key value and commitment to our people and communities.



## The 21<sup>st</sup> Century Underground Mine that is helping us to manage our impacts to the environment

The Jadar deposit has no surface outcrop or underground access yet. Since its discovery in 2004, the deposit has been entirely defined by drilling. So far, over 400 holes and over 200 km of geological material as drill core sample been completed. The exploration and drill campaigns helped us to collect necessary data on rock chemical composition, structural fabric, rock strength and other naturally occurring features. This collected data is used for the design of a geological model which is a statistical mathematical model showing a spatial representation of the distribution of different type rocks in the subsurface. This model is used to plan and design the potential future underground mine in a way that will support the use of modern, safe and sustainable mining techniques. The orebody will be connected with the surface by two shafts. These shafts include access lifts for personnel and supplies, mine services (power, water, dewatering) and ventilation. Underground, the mining fleet will be almost entirely electric which reduces emissions and energy consumption.

The safety of our people and communities is our first priority, and we are committed to a zero-harm work environment. The mine and processing operations are being designed to the highest industry standards and in compliance with Serbian and EU regulations. The operation will be managed in line with Rio Tinto's health and safety standards and procedures, and employees will be trained and certified before they can work in the underground mine.

The mine will use the latest methods and the best available technology, to help protect the health and safety of our underground teams, including:

**Automation and Remote operation:** Remote operation of certain underground equipment to remove employees from all risky jobs and hazards.

**Ventilation:** The underground mine design includes ventilation with both cooling and heating infrastructure, to moderate temperature variations and ensure optimal temperatures for working. The system will maintain an effective maximum temperature lower than international standard practice of 27-28 °C "wet bulb" maximum temperature, since Serbian regulations require a more strict and lower operating temperature. This will be monitored by a network of air quality sensors, to ensure the conditions are maintained as designed.

**Electric vehicles:** Almost all of the vehicles used in the underground mine will be powered by electricity. This reduces emissions and improves the air quality in the underground working environment. Other benefits include increased efficiency and reduced heat and vibrations.

The safety of our people is our highest priority and we will use technology to help us improve and sustain our already

high level of safety performance. Jadar will be a technologically advanced operation using leading edge solutions, data and technology to ensure a safe working environment. For example, our vehicles will be equipped with both pedestrian alert and collision avoidance technology. And some of our electric fleet will be operated from a control station located on the surface in an area removed from any at risk activities in the underground mine.

Environmental protection is also a priority, and we will use technology to not just monitor environmental compliance but also to predict and prevent issues. The topic of a "digital twin" or "digital assets" is the latest buzz in industrial automation. At Jadar we will produce digitally modeled representations of our physical assets that provide operators and maintainers with the ability to optimise performance.

Technology will enable our Jadar Project to derive industry leading recoveries and operate on the lowest point of the cost curve. We will also model the mineral resource, our mine schedule and connect them with the dynamic model of our processing plant. This allows the plant to operate optimally by predicting the characteristics of the ore and making automatic adjustments in the downstream process.

Almost 30% of total waste from processing will be used to fill in space in the underground mine, once the ore is removed. This solution will limit the amount of waste that is stored in the industrial landfill, provide support for the mining operation and reduce the surface subsidence.

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The currently estimated life of mine schedule is 40 years. Following ramp up to full production in 2029, the mine would produce ~58,000 tonnes of lithium carbonate, 160,000 tonnes of boric acid (B<sub>2</sub>O<sub>3</sub> units) and 255,000 tonnes of sodium sulphate annually, making the operations one of the top ten lithium producers in the world.\*

\* These production targets were previously reported in a release to the Australian Securities Exchange (ASX) dated 10 December 2020, "Rio Tinto declares maiden Ore Reserve at Jadar" (for battery-grade lithium carbonate it was 55,000 tonnes). All material assumptions underpinning the production targets continue to apply and have not materially changed.

## Engaging with one of the world's best design companies to provide design for Jadar

# HATCH

The Jadar Project requires the development of the world's first lithium-boron separation plant. We have engaged Hatch, one of the world's best engineering and design companies to develop solutions for the Jadar Project. Hatch was originally engaged in 2013 as the designer working with Rio Tinto to develop the process flowsheet. Hatch is also a leader in designing lithium conversion projects and has been retained to complete process plant engineering services through the pre-feasibility, feasibility phases, and into front end detailed engineering.

In 2020, Hatch was also awarded the engineering works and design for underground mine access and industrial waste

landfill. Termonenergo, as Hatch's subcontractor, provides civil engineering design support and prepares the Serbian compliance design. Delta Inzenjering has been engaged to provide engineering and design services for above ground mining facilities and buildings, and Enengoprojekt Entel has been engaged to provide engineering and design services for high voltage transmission lines and switchyards.

Together, we are committed to pursuing the best available standards of health, safety, environmental protection while providing design solutions that will ensure future operations as a safe, innovative, and sustainable business.



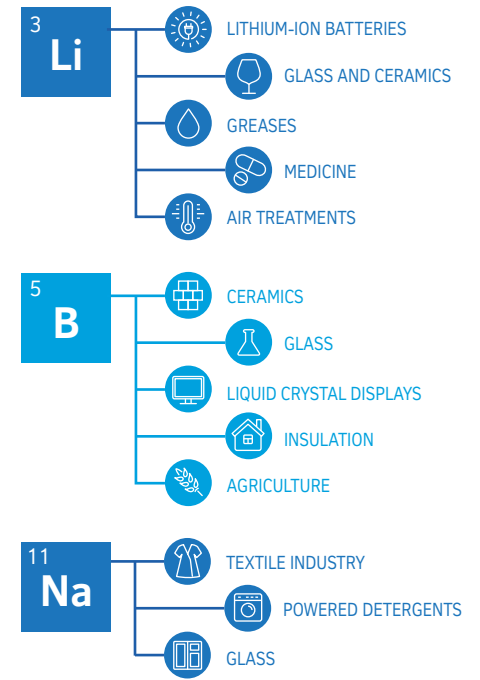
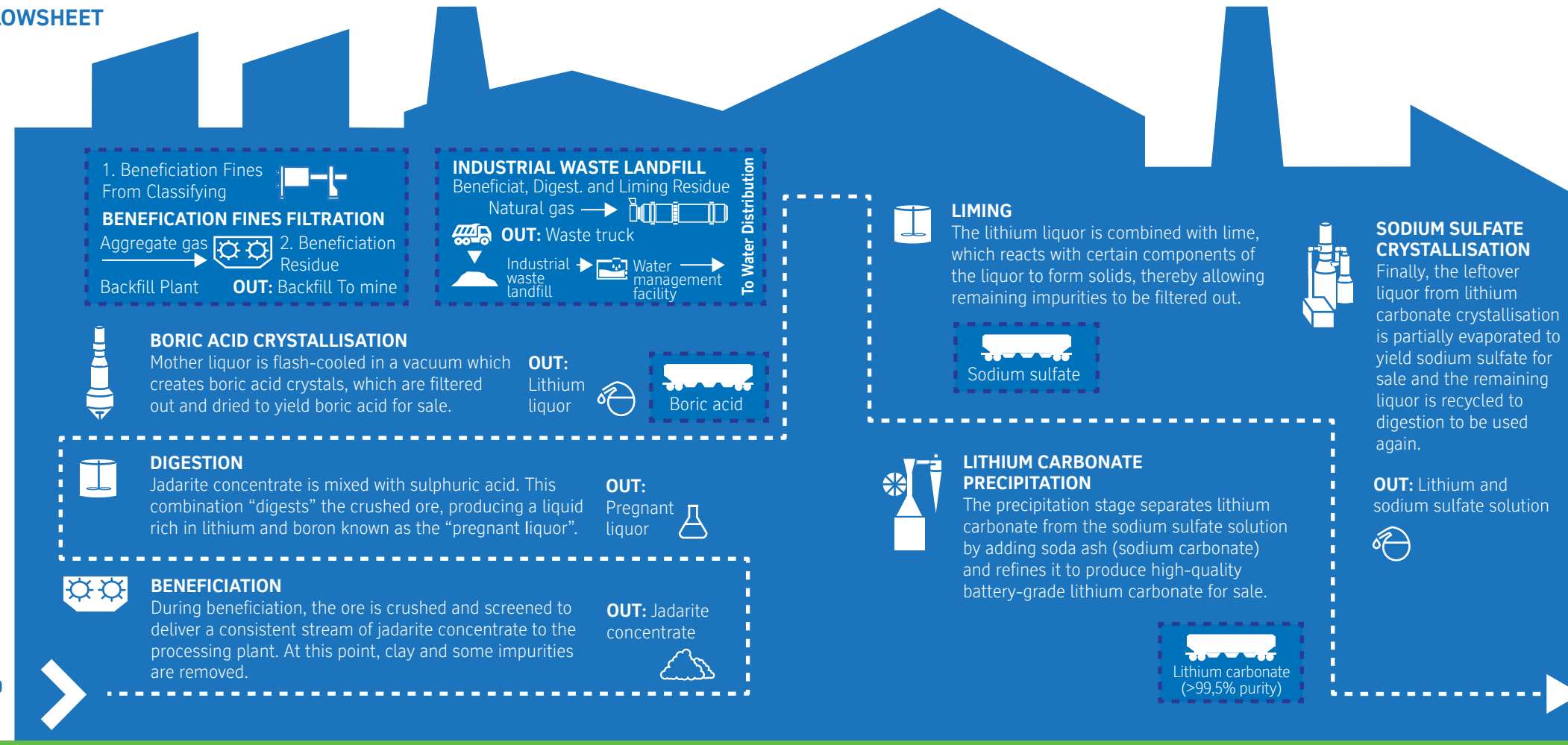
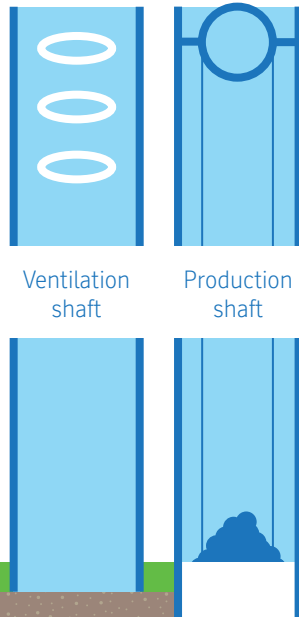
Layouts: Rio Tinto, Jadar Project





## SIMPLIFIED JADAR PROCESS FLOWSHEET

Operations at Jadar will go well beyond mining, extending into the downstream chain to deliver added value for both Serbia and Rio Tinto. A Serbian and international team of technical experts, chemical and processing engineers has worked on the development of this patented technology over several years.



### 3 FINAL PRODUCTS



A modern 21st century underground mine will perform the underground exploitation using the latest methods and the best available technology to ensure the safety and sustainability of expropriation and processing and minimize the possible impact on the environment. In the mine, an almost entirely electric fleet of vehicles will be used, minimizing emissions and energy consumption. Approximately 30% of the total waste from processing will be used to fill in spaces in underground structures. This solution is will reduce the amount of waste that is stored in the industrial landfill and prevent surface subsidence.

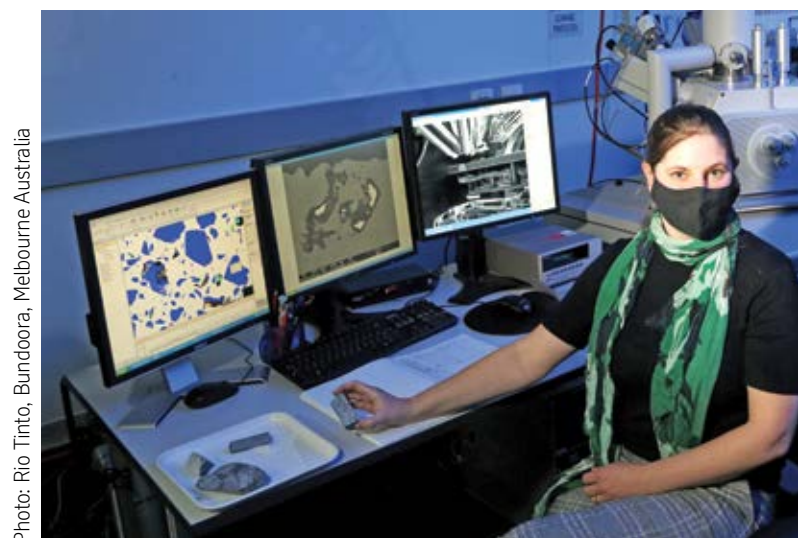
## Improved mineralogical understanding unlocking unforeseen value

Most of the lithium and boron in the ore that we plan to mine at Jadar is contained in the mineral jadarite<sup>1</sup>. Jadarite is unique to the Jadar ore deposit and the first step in the future processing plant will be to recover most of the valuable jadarite that is mined and separate it from a large portion of the waste to enrich it into a concentrate. This helps to reduce the overall amount of material for further processing. Once it is in the concentrate, the lithium and boron that is contained in jadarite will be extracted downstream in the processing plant.

There is also a minor but significant amount of boron contained in other minerals (non-jadarite boron minerals), which do not contain any lithium but are also recovered into the concentrate. This is important because the amount of concentrate that we will be able to process at any time in our future processing plant will be restricted by the amount of boron that the plant extracts from the concentrate. Consequently, this will limit the production rate of lithium carbonate.

Up until recently, it was assumed that most of the non-jadarite boron present was mostly in the form of a mineral called proberite<sup>1</sup>. Boron in the proberite will be extracted by the processing plant and thus offset the rate at which jadarite will be able to be processed and lithium carbonate produced. However, a recent orebody knowledge (OBK) study, sponsored by Rio Sava, found that a significant proportion of the non-jadarite boron in the ore that we plan to mine is present in a mineral called searlesite<sup>1</sup>, from which the boron cannot be extracted by the process. This is great news because any boron contained in what we now know is searlesite but used to think was proberite will not end up reducing the amount jadarite we will be able to process! This will enable an increase in the rate of lithium carbonate production to be achieved above what was previously thought and thus add value to the project.

The work is now focused on developing an understanding of the occurrence (where and how much) of both searlesite and



proberite are in the ore that we plan to mine and its immediate surrounds. Fourier Transform Infrared Spectroscopy (FTIR), which incorporates digital learning methods, has been adopted as a new tool to help accelerate this. The improved understanding will then be incorporated into the resource block model and, subsequently, the mine schedule. The mineralogical work has been performed by the geometallurgical team at Rio Tinto's Bundoora Technical Development Centre (BTDC) in Melbourne, Australia. Close collaboration with Jadar's Processing, Geology and Mining teams has been a key to success to date.

<sup>1</sup>) Jadarite = NaLiB<sub>3</sub>SiO<sub>4</sub>(OH) or Na<sub>2</sub>O.Li<sub>2</sub>O.3B<sub>2</sub>O<sub>3</sub>.SiO<sub>2</sub>, Proberite = NaCaB<sub>3</sub>O<sub>7</sub>(OH)<sub>2</sub>.3H<sub>2</sub>O or Na<sub>2</sub>O.CaO.5B<sub>2</sub>O<sub>3</sub>.11H<sub>2</sub>O, Searlesite = NaBSi<sub>2</sub>O<sub>5</sub>(OH)<sub>2</sub> or Na<sub>2</sub>O.B<sub>2</sub>O<sub>3</sub>.4SiO<sub>2</sub>(OH)<sub>2</sub>



## Environmentally responsible, sustainable industrial operation

The preparation of the environmental impact assessment (EIA) studies is one of the main objectives in the feasibility study phase. EIAs are an indispensable part of technical documentation, and the prescribed measures contained therein affect the review and adoption of technical and technological solutions. We have started the process of preparing three EIA studies as follows:

1. Study on environmental impact assessment for the project of underground exploitation of lithium and boron deposits "Jadar" in compliance with the Law on Environmental Protection.

2. Study on environmental impact assessment of the Processing Plant for Processing of Jadarite Mineral "Jadar" in compliance with the Law on Environmental Protection.

3. Study on the environmental impact assessment of the project of the industrial waste landfill "Štavice" in compliance with the Law on Environmental Protection.

In addition to the three main studies, we will carry out the procedures for all infrastructure projects planned to support the construction and management of the future Jadar complex. The company obtained the Scope and Content for environmental impact assessment for the Mine from the Ministry of Environmental Protection. Regarding the other EIA, preparation activities for starting the scoping processes are in progress.

## Commitment to the highest standards in waste management



Photo: Rio Tinto, Bundoora, Melbourne Australia

Jadar Project, filter cake

We will utilize industry leading technological processes, strict quality control and strong governance to reduce the potential impact of the waste. The waste comprises three primary residue streams that come from the beneficiation, digestion, and liming phases of the process.

To minimise the quantity of waste, around 30% of the generated residue will be used in the mine backfill, which is an essential component of the mining operation.

Less waste, a reduced footprint, reduced leachate seepage potential and greater landform stability are achieved with filter and drier technology, which dewater the residue to an optimum moisture content for placement and compaction at the industrial waste landfill.

Product monitoring and control measures ensure appropriate mixing homogeneity, moisture content, and compaction levels.

The industrial waste landfill is sized to ensure minimal impedence to floodwaters and is protected by a containment dyke designed to handle the probable maximum flood event, meeting the highest global standards for flood mitigation structures.

Groundwater will be protected and monitored through an impermeable liner system, a leachate collection and monitoring system, a network of groundwater monitoring bores around the facility, compaction of the waste to reduce its permeability, and progressive covering and revegetation of the stack to prevent rainfall ingress.

Key in controlling dust emissions off the facility are compaction and progressive covering, watering of the surface to prevent over-drying and dust generation, and monitoring wind conditions and dust emissions.

## Livelihood restoration programme for the enhancement of the quality of life



Photos: Rio Tinto, Jadar Project

Loznica, Brezjak

The focus of engagement is now on the livelihood restoration programme and assistance to households impacted by land acquisition. For each household, there will be an individual livelihood restoration plan developed. The programme includes support in the agricultural field, such as the process of identifying new agricultural land, legal assistance in the new agricultural land purchasing process, support in agricultural development by covering costs of purchasing machinery, goods, and materials in farming shops located in the affected communities. The programme also consists of financial management support, such as household financial management training, business development or start-up support, and skills training to contribute to higher employability in the work market.

To help with this, are working with local real estate agencies, legal and financial experts.



We are very proud of the positive feedback we have received from the landowners. Together, we have been able to develop support programme to fit individual household circumstances.

The assistance has ranged from covering the costs of agricultural goods which will make land cultivation easier and more profitable, to support provided by lawyers who have identified property issues and helped solve these issues before purchase. Some landowners or members of their households have expressed interest in developing their skills, and through the livelihood restoration programme, they have been able to enroll in vocational programme at Academia Educativa, an adult education center in Loznica.

Courses in English, Microsoft Office or vocational training are popular since those skills can improve possibilities for employment.

## Protecting Cultural Heritage - preserving Paulje for future generations

Cultural heritage is a valuable aspect of a community's past and present. Located in the Jadar Valley is the biggest central Balkans cemetery from the Bronze Age - the archeological site Paulje.

Using innovative technology called LIDAR for the first time in Serbia for archeology, the site was detected long before filed works began. The Paulje necropolis is a unique site as it is the only one with a settlement. Since 2010, we have been in partnership with the Jadar Museum in Loznica to preserve its history and carry out our work in accordance with the legislation of Serbia. Decorated pottery, jewelry, tools made of painted stone and bronze objects, rare specimens such as an ornamented ceramic spool and a three-legged altar have been found and preserved by Jadar Museum.



Photo: Rio Tinto, Jadar Project

Loznica, Archeological site Paulje



## Partnering with the Hunters Association “Gučevo”



We have established cooperation with The Hunters Association “Gučevo” in financing a part of the construction works for their pheasantry project over the next three years. The goal of this cooperation is to help the Hunters Association maintain a regular and sustainable cycle of pheasants and partridges in the designated hunting area in order to preserve their natural habitat as much as possible and to continuously improve the sustainability of local biodiversity in that area. Other partners who are supporting the project are the Ministry of Agriculture, Forestry and Water Management and the city of Loznica.

There are many benefits to this project. With regard to the local community, it will support the continuation of the hunting tradition and the preservation of significant cultural heritage activities in this part of the country. In addition, it can lead to the improvement and promotion of hunting tourism in the region by attracting hunters from abroad and other regions from Serbia. It could also have the potential to create new jobs and provide additional economic benefits and opportunities for the local community. In terms of environmental benefits, the project aims to improve the maintenance of the hunting ground and ensure better control of compliance with the hunting rules.

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**The Hunters Association “Gučevo” from Loznica is a citizen association which has existed for more than 120 years and is in charge of the hunting ground “Jadar”, on an area of 45,417 ha in the Municipality of Loznica. The Association has approximately 800 members and was founded with the aim of managing and improving the hunting grounds with basic activities: caring for wildlife, protection and improvement of their habitat, maintenance of hunting grounds and improvement of hunting conditions. The Association has an important role in protecting human and animal health by actively participating in the prevention and reduction of the possibility of the spread of rabies, as well as in monitoring the oral vaccination of foxes in the Jadar region.**

## Being close to all interested parties - transparent communication at our core

One of our priorities is constant, transparent communication with all the interested parties. We are open for dialogue. We recognise that in progressing this project, we must listen to and respect the views of all stakeholders. Throughout the pandemic, we continued the dialogue with civil society by starting online open meetings so that we could continue to provide information about the Jadar Project, answer all questions transparently, and correct misinformation.

These meetings were held in addition to Open Day meetings that were organised in our information centres in Loznica and Brezjak before COVID-19. So far, we have organised four open meetings, with more than 80 people at the first meeting and a further 70 people at the second, third meetings and fourth meeting. Representatives of Rio Sava, as well as independent experts, professors, and scientists, took part in the meetings. More than 150 questions were answered, and all materials publicly available. We will continue to demonstrate efforts to engage in broad public forums, working to understand the public concern and the importance of the project in Serbia.

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**We believe that factual, accurate information is crucial. So far, we have organized four open meetings, with more than 80 on the first, nearly 70 entrants on the second and third open meeting, and around 70 participants at our meeting where we discussed topic of jadarite processing. Representatives of Rio Sava, as well as independent experts, professors, and scientists, took part in the meetings. More than 150 questions were answered, and all materials publicly available. We will continue to demonstrate efforts to engage in broad public forums, working to understand the public concern and the importance of the project in Serbia.**

## Accurate information is most important - with media, we cooperate

From the beginning of this year, we have held two press conference events with over 50 media outlets present. During these events, we provided updates on environmental, economic, infrastructure and development aspects of the Jadar Project, and answered questions from journalists. We will continue to engage and communicate publicly about our work and plans for our project Jadar.



Photo: Rio Tinto, Jadar Project

Jadar Project Media Event, Belgrade



Jadar Project Media Event, Belgrade

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