



**Oyu Tolgoi LLC**

Health, Safety, Environment and Communities  
Management System Plans

Water Resources Management Plan

Water Resources Management Plan		
Effective Date: 2013.09.01	Document Number: OT-10-E11-PLN-0001-E	Version: 1.3

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## 1. INTRODUCTION

### 1.1 Purpose

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, operational procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators (KPIs);
- defined training requirements; and
- set out references for supporting materials and information.

### 1.2 Application

The requirements set out in this Management Plan apply to all OT operations including contractors.

This Management Plan is based on the Rio Tinto E11 Water Quality Protection and Water Management Standard, issued on 1 April 2015. The Rio Tinto E11 Water Quality Protection Guidance Note includes a water withdrawal threshold, regardless of source, of 100 ML. OT operation requires water extraction of greater than 100 ML per year which means that OT operation is an above threshold operation and must strictly adhere to the full extent of the Rio Tinto E11 Water quality protection standard. Any subsequent changes to the Rio Tinto Water Use standard may result in the changes to this OT Management Plan.

This Management Plan is owned by the OT General Manager Health, Safety, Environment, Security, and Communities (HSESC).

### 1.3 Commencement

This Management Plan applies from 1<sup>st</sup> September 2013.

### 1.4 Authority and Management

The OT Executive Committee approved this Management Plan on 1<sup>st</sup> September 2013.

The OT General Manager HSESC is the custodian of this Management Plan. This Management Plan will be reviewed on a two year period to determine whether any changes or updates are required to the plan unless a more frequent update is required to reflect changing Project design or procedures. Any requests for changes to this Management Plan will be subjected to the appropriate review and approval processes as outlined in the Management of Change (MOC) procedure.

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**2. SCOPE**

**2.1 Scope of this Management Plan**

The intent of this Management Plan is to ensure efficient, safe, and sustainable use and protection of water resources and ecosystems in and around OT, by all OT departments and contractors. This requires an understanding of the water resources, their spatial and temporal interrelationships, ownership in the region, and the needs of catchment stakeholders. This provides the basis for the development of an integrated and strategic approach to water management including social, environmental, operational, and economic aspects.

This Management Plan covers all water used by OT, from the point of abstraction, through to its loss from the system in the tailings management facility or elsewhere, and emphasises the need to maximise the recycling and re-use of water to minimise the daily volume abstracted from the aquifers. It also covers the protection and monitoring of the water resources in the area, which are essentially for the sustainability of the local communities and wildlife. This includes the ephemeral flows in the local rivers, the shallow aquifers used by the communities and wildlife, and the associated springs and ephemeral lakes.

Implementation by contractors is addressed in the Contractor Management Framework (OT-07-PLN-0001-E).

**2.2 Overlaps with other Management Plans**

This Management Plan is part of the overall suite of Operations Management Plans developed for the OT Project and as described in the Environmental and Social Management Plan (ESMP) Framework (OT-10-PLN-0001-E).

This Management Plan has overlaps and cross-linkages to a number of other Management Plans which have water resources implications, including:

- The Community Health Safety and Security Management Plan (RD-10-PLN-0001-E), particularly in relation to potential impacts on surface and groundwater resources used by herders or the local communities;
- The Emergency Preparedness Response Plan (OT-12-PLN-0011-E), particularly in relation to accidental contamination of surface and groundwater resources;
- Stakeholder Engagement Plan (RD-10-PLN-0003-E), particularly in relation to potential impacts on surface and groundwater resources used by herders or the local communities;
- Mineral Waste Management Plan (OT-10-E13-PLN-0001-E), particularly in relation to waste rock management and the protection of surface and groundwater;
- Hazardous Materials Management Plan (OT-10-E13-PLN-0001-E), particularly in relation to control of potential contamination of surface and ground waters;
- Biodiversity Management Plan (OT-10-E00-PLN-0003-E), particularly in relation to potential impacts on springs and shallow water resources utilised by wildlife and flora; and
- Influx Management Plan (RD-10-PLN-0004-E), particularly in reference to the water requirements for Khanbogd, and OT’s support to the identification of a suitable groundwater supply.

**2.3 Roles and Responsibilities**

**2.4 Key Roles and Responsibilities for Management Plan Implementation**

Principal roles and responsibilities for the implementation of this plan are outlined below.

**Table 1: Key Roles and Responsibilities**

Role	Responsibilities
<b>HSESC General Manager</b>	<ul style="list-style-type: none"> <li>• Ensuring that adequate resources are provided to allow implementation of water monitoring, mitigation, research, and development activities.</li> <li>• Responsible for ownership and overall implementation of this plan and ensuring</li> </ul>

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Role	Responsibilities
	Principal Contractors implement applicable elements of this plan.
<b>Manager Environment &amp; Biodiversity</b>	<ul style="list-style-type: none"> <li>• Overall ownership and responsibility for submitting development projects to the Ministry of Environment, Green Development, and Tourism for environmental screening and, where required, for the preparation and submission of DEIAs.</li> <li>• Overall ownership and responsibility for submitting Environmental Protection Plans (EPP) that address all requirements associated with related, approved DEIAs and for ensuring implementation of related monitoring and mitigation requirements.</li> <li>• Ensuring payment of the required environmental performance bond to the Ministry of Environment, Green Development, and Tourism associated with annual EPPs.</li> <li>• Overall ownership and responsibility for the development of Annual Environmental Reports (AER) that present environmental achievements during the course of the year and demonstrate that the requirements of the annual EPP have been satisfied.</li> <li>• Ensuring that all implementation teams within the Environment Department are appropriately staffed and supported.</li> <li>• Creating and implementing an on-going environmental monitoring and measurement programme.</li> </ul>
<b>Water Leader Team</b>	<ul style="list-style-type: none"> <li>• Ensuring that a water monitoring plan is implemented.</li> <li>• Developing Annual Water Reports that describe research, monitoring and impact mitigation activities for submission to the Water Authority of the Ministry of Environment, Green Development, and Tourism and for developing water sections of AER's.</li> <li>• Developing routine water reports, as required, to notify and guide site activities.</li> <li>• Ensuring that all planned hydrogeological drilling activities are permitted.</li> <li>• Ensuring that all water abstraction wells are permitted, that water use is accurately measured using certified flow meters, and that related water use fees are promptly paid to the local <i>soum</i> governor's office.</li> <li>• Establishing and implementing water research programmes.</li> <li>• Attendance at routine meetings with local <i>soum</i> representatives, including herders, on water related topics and issues.</li> <li>• Supervising monitoring and measurement programmes.</li> <li>• Reviewing field documents and procedures, data analysis, and preparing related reports.</li> <li>• Ensuring water infrastructure, such as Wastewater Treatment and Water Treatment/Bottling Plant, are being operated normally, as per project standard.</li> <li>• Conducting Water Committee meeting to ensure effective cooperation with operational departments on water conservation.</li> </ul>
<b>Hydrogeologists/ Environmental Officers</b>	<ul style="list-style-type: none"> <li>• Day-to-day operation, water level measurement, and water quality sampling.</li> <li>• Implementing monitoring and measurement programmes.</li> <li>• Reporting results and findings of periodic reviews and evaluations to Water Team leader and Manager Environment &amp; Biodiversity.</li> <li>• Immediate reporting of abnormal test results to the Water Team leader.</li> <li>• Maintaining all water monitoring documents.</li> <li>• Maintaining water monitoring database and ensuring correct input of data.</li> <li>• Undertaking routine inspections of water facilities and activities, including by Contractor's, and advising the Water Team leader and Manager Environment &amp;</li> </ul>

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<b>Role</b>	<b>Responsibilities</b>
	<ul style="list-style-type: none"> <li>Biodiversity of any non-compliant activities.</li> <li>Supporting the implementation of the Regional Development and Social Performance Department’s (SP) Participatory Water Monitoring (PWM), which is a component of the Participatory Environmental Monitoring (PEM) Programme.</li> <li>Conducting research study on acid rock drainage control analysis and assessment.</li> </ul>
<b>OT Infrastructure Department</b>	<ul style="list-style-type: none"> <li>Operational management control at the Raw Water Supply System, Water Treatment and Bottling Plant and Wastewater Treatment plants.</li> </ul>
<b>Other OT Department and Principal Contractor Mangers</b>	<ul style="list-style-type: none"> <li>Ensuring that relevant activities are undertaken in accordance with this Management Plan and related procedures.</li> <li>Ensuring that department personnel are fully trained in water management practices, particularly with regards to water conservation.</li> <li>Ensuring incident investigations are undertaken and reported.</li> </ul>
<b>Area HSE teams</b>	<ul style="list-style-type: none"> <li>Providing oversight and conduct routine work area inspections to ensure relevant activities are in accordance with this Management Plan and related procedures.</li> <li>Ensuring that all water data is properly recorded and reported.</li> <li>Reporting all hazards, non-conformances, and incidents.</li> </ul>
<b>All personnel</b>	<ul style="list-style-type: none"> <li>Conserving water.</li> <li>Reporting any misuse of water to the Environment Department.</li> <li>Obtaining permission from the Environment Department for access into water monitored areas.</li> </ul>
<b>Herders</b>	<ul style="list-style-type: none"> <li>Providing observation on water levels and general environmental changes. This is primarily from the herders involved in the PEM Programme. These herders gather data on groundwater levels in their wells up to twice daily (before and after watering their animals) using equipment provided by OT.</li> </ul>

**2.5 Key Interfaces**

Key interfaces in the implementation of this Management Plan (i.e., roles with responsibility for delivering elements of this Management Plan) include:

- All Operational Departments in the use of water in the work place;
- Concentrator Department, particularly in relation to the re-use and recycling of water at the concentrator;
- Open Pit, particularly in relation to the protection of surface and groundwater resources from the WRD and potential acid rock drainage; and
- Infrastructure Department, particularly in relation to the control of wastes which have the potential to have an impact on water resources and management of the Waste Management Centre.

**3. PROJECT STANDARDS**

Applicable Standards must be complied with for all Project activities (the “Project Standards”). Project Standards comprise:

- applicable Mongolian Laws and National Standards;
- DEIA requirements;
- other commitments to and requirements of Mongolian Government authorities;
- applicable lender standards and guidelines;
- applicable Rio Tinto standards; and

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- other industry guidelines with which OT has committed to comply.

### 3.1 Applicable Mongolian Laws and National Standards

#### Laws

- Law of Mongolia on Water, 2012. This provides a statutory framework for the administration of surface and groundwater resources of Mongolia and prescribes responsibilities of the stakeholders for protection and management of these resources.
- Law of Mongolia on Water Supply and Sewerage System Service of Cities and Residential Settlements, 2012. The purpose of this law is to ensure that the city and residential settlement residents receive water that meets standards requirements; and to regulate engineering and construction requirements for management of waste water removal and treatment.
- Law of Mongolia on Natural Resources Use Fees, 2012. This regulates the fees for the use of water and mineral water in addition to plant, animal, forest as well as procedures on paying these fees to the local budget.
- Law on Water Pollution Fee, 2012. This outlines the water pollution fee imposition and collection procedure. Any water user-business entity that pollutes water / produces waste water is subject to water pollution fee.
- Law of Mongolia on Environmental Protection, 1995 (amended in 2012). This regulates the relationships between citizens, the state, economic entities and organisations in order to guarantee the general human right to live in a healthy and safe environment. Other environmental laws are originated from this law.
- Law on Mongolia on Environmental Impact Assessment, 2012. This outlines the requirement for all projects that intend to use natural resources for a commercial gain to undertake an EIA (DEIA if needed).
- Law of Mongolia on Special Protected Areas, 1994 (amended in 2008). This regulates the use and procurement of lands under special protection. The law also aims to protect the natural landscape in order to keep particular features of natural zones and belts, their peculiar formation, forms of rare fauna and flora, historical and cultural sites and natural sightseeing as well as studying and identifying their evolution.

#### Mongolian Standards and Regulations

- Drinking Water Hygiene Requirements and Quality and Safety Assessment, MNS 900:2010 (amended in 2010).
- Water Quality. Water Sampling. Guideline for Developing Programme of Water Sampling, MNS 5667-1:2001.
- Water Quality. Water Sampling. Guideline for Sampling from Drinking Water and Water to be used to Produce of Food and Beverage. MNS 5667-5:2001.
- Water Quality. Water Sampling. Guideline for Sampling from Wastewater, MNS 5667- 10:2001.
- Water Quality. Water Sampling. Guideline for Sampling from Ground Water, MNS 5667-11:2001.
- Bottled Drinking Water. Technical Requirements. MNS 5007:2007.
- Sample Contracts for Using Water and Water Environment, Order No. 152 of Minister of Environment, 1995.
- Regulation on Protection of Water Resources from Pollution, 1st annex to Joint Order of Minister of Nature, Environment and Minister of Health and Social Welfare No. 143/A/352, 1997.
- Water Quality Norms and Requirements for Drinking and Domestic Water Facilities, 2nd annex to Joint Order of Minister of Nature, Environment and Minister of Health and Social Welfare No. 143/A/352, 1997.



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- Classification norms of Pure Level for Surface Water, 3rd annex to Joint Order of Minister of Nature, Environment and Minister of Health and Social Welfare No. 143/A/352, 1997.
- Clarification of Classification of Pure Level for Surface water; 4th annex to Joint Order of Minister of Nature, Environment and Minister of Health and Social Welfare No. 143/A/352, 1997.
- Permissible Maximum Rate of Toxic Substances for Drinking and Domestic Water Facilities, 5th annex to Joint Order of Minister of Nature, Environment and Minister of Health and Social Welfare No. 143/A/352, 1997.
- Regime for Special and Ordinary Protected Zones of Water Resources and Sanitary Zone of Water Supply Resources, Joint Order No. 51/75 of Minister of Nature, Environment and Tourism and Minister of Health, 2009.
- Water Use Fee Rate, Resolution No. 326 and 327 of The Government, 2013.
- Regulation on Mineral Water Protection and Use, 1st annex to Joint Order No. A-79/99 of Minister of Nature, Environment and Tourism and Minister of Health, 2010.
- Water Quality Wastewater Effluent Standard, MNS 4943:2011.
- Regulation to Set-up Wastewater Removal Point, 2nd annex to Joint Order No. 167/335/a/171 of Ministers of Environment, Infrastructural Development and Health, 1995.
- Protection of underground water from pollution, MNS 3342:1982.
- Water Quality: Sampling – Guidance on the preservation and handling of samples MNS (ISO) 4867:1999.
- Water Quality: General Requirements MNS 4586:1998.
- Environmental Protection Hydrosphere – General requirement for the protection from pollution of underground water MNS 4288:1995.
- MNS 13.060.50 Water quality standard.

### 3.2 DEIA requirements

Water management and monitoring requirements set out in EPPs and EMPs which accompany DEIAs have been incorporated into this Management Plan.

### 3.3 Other Commitments to and Requirements of Mongolian Government Authorities

The range of applicable regulatory agreements, permit and licenses applicable to water use by the Project include:

- the OT Investment Agreement (IA);
- approved Detailed Environmental Impact Assessments (DEIA);
- approved Environmental Protection Plan (EPP);
- approved Environmental Monitoring Plan (EMP);
- approved Water Reserve Conclusion;
- Water Use Permission and Contract;
- Government Ministry approvals and notices;
- Government Authority approvals and notices;
- *Aimag* (regional) Government approvals and notices; and
- *Soum* (local) Government approvals and notices.

#### Investment Agreement Obligations

The key document setting out commitments to a requirement of Mongolian Government authorities is the Investment Agreement (dated 6 October 2009) for the OT Project. Chapter Six (Environment) addresses the management of water resources:

- The Investment Agreement requires that OT obtains the necessary permits for water supply. (*Clause 6.3*).

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- It also requires that if any material adverse impact on water is found by the environmental monitoring and analysis programme, OT shall take necessary measures to eliminate the impact at its own expense. (*Clause 6.10*).
- Any available water surplus to OT's requirements should not be offered for use by other economic entities by anyone except the state Administrative Authority, though it is expected that water will be made available for household purposes and for the agricultural needs of local *soum* communities (*Clauses 6.13.2 and 6.13.3*).
- Fees are payable for surface and underground water removed and consumed for the purpose of the mining of minerals, at the rate specified in the Law on Fees for Use of Water and Mineral Water [now the Law on Natural Resource Use Fees, 2012] (*Clause 6.14*).
- OT shall support the Government in the establishment of safe drinking water for the local *soum* centre (*Clause 6.15*).
- OT shall support the Government to upgrade or treat the water resource for use by the local *soum* communities, or provide infrastructure for water transportation for local household use only (*Clause 6.16*).
- The Investor shall have the following obligations in regard to water utilisation:
  - (6.19.1) abide in all material respects with the conditions and requirements set forth in Article 24 of the Water Law, the contract on water utilisation, and the EIA Reports and compliance with such conditions and requirements will be audited once every 5 (five) years, within 3 (three) months after the end of the relevant year, by an independent, competent, professional firm, and the audit outcome shall be provided to the State central administrative authority in charge of environment with a copy to the Investor; and
  - (6.19.2) not reduce from the current level the quality and quantity of the existing potable and livestock water supplies used by existing users.
- OT will apply modern technology and procedures to minimise the volume of water used by the OT Project, maximise the efficiency of water usage, and recycle used water where reasonably practicable to do so having regard to technology and procedures used in similar operations (*Clause 6.20*).
- OT may provide the public, Government, and third parties with access to certain Investor Infrastructure/Services ("Public Use Infrastructure/Services"), provided the access does not interfere with the operation of the OT Project. (*Clause 7.13*) This includes water/heating systems and water drawing facilities (*Clause 7.14*).

### 3.4 Applicable International Standards and Guidelines

The international standards which OT will implement are those set by the International Finance Corporation (IFC) and by the European Bank for Reconstruction and Development (EBRD). These include:

- EBRD Performance Requirements (2008) (particularly PR1: Environmental and Social Appraisal and Management and PR3: Pollution Prevention and Abatement);
- IFC Environmental, Health, and Safety (EHS) General Guidelines (April 2007);
- IFC EHS Guidelines for Mining, 2007;
- IFC Environmental, Health, and Safety Guidelines for Water and Sanitation (December 2007); and
- IFC Performance Standards (2006) (particularly PS1: Social and Environmental Assessment and Management Systems (2006) and PS3 - Pollution Prevention and Abatement).

OT has also incorporated standards and guideline limits set out in the following into this Management Plan:

- World Health Organisation, Guidelines for Drinking-water Quality, Revision 3, 2004;
- Codex Alimentarius Commission, General Standard for Bottled / Packaged Drinking Waters (Other than Natural Mineral Waters), CODEX Stan 227-2001;
- EU Council Directive 98/83/EC of 3rd November 1998 on drinking water quality; and
- EU Council Directive of 21 May 1991 concerning urban wastewater treatment.

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**3.5 Applicable Rio Tinto Standards and Guidelines**

The key Rio Tinto Standard that applies to water quality is E5 - Water Quality Protection and Water Use Minimization Standard , 2015.

Other relevant Rio Tinto documents include:

- Rio Tinto HSEQ Management System Standard;
- Water Use and Quality Control Guidance Note;
- Rio Tinto Water Strategy;Chemically Reactive Mineral Waste Control Standard(E2);
- Hazardous Materials and Non-Mineral Waste Control and Minimization Standard (E3);
- Closure Standard;
- Surface mining standard design and management of dumps (and related guidance);
- Legionnaires disease guidance note; and
- Annual S&E survey guidelines.

**3.6 Summary of Applicable Project Standards**

OT will comply with the more stringent of national standards, applicable lender standards, and applicable Rio Tinto Standards, with the more stringent standards representing the Project Standards. The exception to this is where equipment used has previously been designed to meet Mongolian or other standards and retrospective tightening of the discharge standard (e.g., at the wastewater treatment plant) is not feasible at this stage.

Specifically the Project has set numeric standards for the following water types:

- drinking water; and
- effluent wastewater discharge (including mine area surface runoff, but note that all process waste water is discharged to the TSF for recycling and is not released into the environment).

The specific numeric values for the above are presented in *Annex A*, together with a comparison with applicable national and international standards. *Annex A* presents the full list of substances controlled under Mongolia regulations. OT will undertake analysis of effluent discharges against all parameters on a periodic basis (annually). In between these full analyses, OT will analyse a suite of indicator parameters, unless results suggest a full analysis (or more detailed analysis of certain parameters) is prudent.

Drinking water will be sampled every two weeks.

**4. MANAGEMENT CONTROLS**

**4.1 General Approach to Water Management**

The general intent of this management plan is to ensure efficient, safe, and sustainable management and protection of water resources and ecosystems in and around the OT mine. This requires an understanding of the water resources, their spatial and temporal interrelationships, their ownership in the region, and the needs of catchment stakeholders. This provides the basis for the development of an integrated and strategic approach to water management including social, environmental, operational, and economic aspects.

The following table presents the key management controls. These controls are supported by specific procedures (e.g., water monitoring) or standard working practices (e.g., operation of the waste water treatment plant).

**4.2 Implementation**

Water resources management measures will be implemented by means of the procedures and Monitoring Plans that will be drafted to reflect the requirements of the Key Management Controls as described in *Table 2*. These documents will follow the Rio Tinto *Water Use and Quality Control Standard* and set out detailed procedures to implement the Standard, this Management Plan, and any other relevant requirements.

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The principal procedure is the Water Monitoring Plan (WMP) OT-10-E10-PLN-0002. This WMP presents an integrated approach to gathering and interpretation of the information on surface and groundwater, flood events, and erosion. The plan is separated into specific sets of procedures such as for monitoring surface (including floods, etc.) and groundwater, and focuses on features such as the Undai. The plan extends to cover the monitoring of erosion in the Undai diversion, downstream, and around culverts. It also presents details on data QA/QC and evaluation and how OT will assess the significance of any changes to the baseline data and, where appropriate, identify the need for additional actions and mitigations. Implementation of these measures also aims to enable understanding of any impacts to herder wells, so that necessary assessment and mitigation can be undertaken.

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Table 2: Key Management Controls

ID	Applicability/ Activity	Control Description	Responsible Parties	Means of verification
WR01	Cumulative Impact Assessment	<p>Develop and maintain an appropriate understanding of the cumulative demands and impacts being placed on related water resources and ecosystems. This shall include understanding of the current and future water requirements of key upstream and downstream users and stakeholders, and the flow regime and quality required to maintain ecosystem integrity.</p> <p>OT will endeavour to work with the Government of Mongolia, other water users (both private and public), NGOs and donors to:</p> <ul style="list-style-type: none"> <li>• improve the knowledge base and understanding of the area's groundwater resources;</li> <li>• develop a water use, treatment and efficiency model that maximises water use efficiency in the region;</li> <li>• work with other industrial water users to coordinate activities to improve resource efficiency to support the economic development of the South Gobi region and Mongolia;</li> <li>• educate workers on efficient water use; and</li> <li>• develop a common understanding of available water resources and the priority uses for that water.</li> </ul> <p>The aim is to develop a sustainable model for water use in the South Gobi region of Mongolia. This aligns to the Rio Tinto Water Strategy.</p>	HSESC Department	<p>Water investigation, assessment, and modelling reports for different water basins.</p> <p>DEIAs</p> <p>Annual EPP and EMP.</p> <p>Cooperation Agreement with local communities, to include commitments on environment, culture, animal and land management, water, social development, and infrastructure.</p> <p>Participation in the IFC Water, Mining, and South Gobi Industry, Roundtable and other related efforts.</p>
WR02	Site Water Balance	<p>Further develop and maintain the site water balance. The site water balance will assist OT to manage its water demand, maximise recycling of wastewater effluent (and other lower quality waters), and serve as a tool to manage predicted future water requirements (such as demands from a future power plant). The site water balance will identify opportunities for water</p>	HSESC Department	Site Water Balance

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ID	Applicability/ Activity	Control Description	Responsible Parties	Means of verification
		<p>management improvements, and includes consideration of impacts of climate variability.</p> <p>The site water balance will be reviewed on an annual basis to determine whether updates or revisions are required. Updates will be made if material changes have occurred such as a significant change in the process or a significant change in realised operational water consumption.</p>		
WR03	Water Conservation	Implement effective water conservation measures that ensure water usage is minimised through avoidance of use or implementation of recovery and recycling measures so that OT can strive to be one of the most water conservative mines of its type, worldwide.	Operations Departments	Water use reporting Water use benchmarking KPIs; WR-KPI 02, 03 & 04
WR04	Water Investigations	<p>Water investigations – e.g., for exploration for the northern extension of the Gunii Hooloi aquifer, or for development of groundwater supply at Khanbogd – will be based on the ‘OT Boring and Drilling Specifications’, and ‘Drilling and Aquifer Testing Specifications for the Gunii Hooloi Wellfield’, or other suitable formal drilling specifications with engineering designs, that will protect shallow aquifers from contamination and prevent inter-aquifer connectivity, and undertaken in accordance with the WMP.</p> <p>When drilling water abstraction boreholes:</p> <p>(i) the operations will use water based polymer drilling mud;</p> <p>(ii) the cuttings and excess mud will be collected in local mud pits; and</p> <p>(iii) upon completion of the works, the mud pits will be allowed to evaporate and will then be covered, and the areas rehabilitated.</p> <p>Mitigation measures will be undertaken in the event of</p>	HSESC Department	Drilling Specifications Investigation Designs

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ID	Applicability/ Activity	Control Description	Responsible Parties	Means of verification
		interconnection of hydrogeological units. Groundwater monitoring is addressed in <i>WMP Sections 3.2.3, 3.3.3, 3.4.3, 3.5.3, 3.6.3 and 3.7.3</i> . A list of bores to be rehabilitated is listed in <i>WMP Section 3.6.7</i> .		
WR05	Water Criteria	Develop and implement criteria on water abstraction, dewatering, and effluent water-quality, based on government regulations. Contractors to be prevented from using herder's wells.	HSESC Department	Water Use Permits Water Reporting to Ministry of Environment, Green Development, and Tourism Effluent Standards Water Reserve Approvals Environment & water mandatory training for OT employees including contractors
WR06	Facility Operations	The operation of all water facilities will conform to approved design criteria and operational procedures, and include trigger and response criteria which conserve water (prevent uncontrolled releases to the environment), and protect ecosystems and aquifers (e.g., maintain the Gunii Hooloi aquifer in a confined state).	Operations Departments	Design Criteria Operational procedures Operational monitoring: tank fill status, flow meter balances, etc.
WR07	Water Treatment	All drinking water will meet Mongolian Standards and WHO guidelines. Drinking water will be assessed against a full suite of determinants (see Table A1) on an annual basis to confirm that no water quality issues are present. In between these full-suite tests, a risk-based approach to drinking water quality will be adopted, with samples tested every two weeks. Where required, alternative supplies of bottled water shall be provided.	Infrastructure Department	Water Treatment Plant Operation Records
WR08	Wastewater Treatment	Operate wastewater treatment plants to applicable Project Standards, with effluent to be re-used (in the process plant or for dust suppression) wherever possible, or stored for future re-use or evaporation treatment. Treated effluent will only be	Infrastructure Department	Wastewater Treatment Plant Operation Records

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		discharged to watercourses if it meets applicable Project Standards.		
WR08a	Wastewater Treatment	Wastewater from remote camps without wastewater treatment facilities will be returned to OT for treatment.	Camp and Site Services	Camp Records
WR09	Emergency Response	Prepare emergency and contingency plans for: <ul style="list-style-type: none"> <li>• drought;</li> <li>• flood;</li> <li>• failures in large water retention structures; and</li> <li>• unplanned effluent discharges.</li> </ul>	Emergency Response Team	Business Resilience and Recovery Plans
WR10	Impact Assessments and Mitigations	OT will develop and implement a comprehensive monitoring program that will identify possible impacts to surface and groundwater.  In the event that any impact to water level (quantity) or quality is indicated (e.g., impacts on water availability at herders' wells, impact on the gradient or flows of ephemeral watercourses), undertake a hydrogeological assessment in order to establish the nature and cause of the impact in accordance with the WM P. In the event that an impact is identified, establish an effective mitigation action plan, where required, that fully addresses the nature of the identified impact and which is undertaken in consultation with local stakeholders (e.g., herders), in terms of continuity of water supply of an appropriate quality.	HSESC Department	WMP ( <i>Section 6 Alerts and Actions</i> ) Impact Assessments Mitigation Action Plans
WR11	Participatory Water Monitoring	Continue to support and develop the ongoing participatory water monitoring programme with the involvement of local herders, including enabling participants to undertake self-monitoring of water sources, and involving routine joint reviews of monitoring results.	SP	Minutes of PWM meetings



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WR12	Undai River Diversion	<p>Complete installation of the Undai river diversion, in accordance with the ESIA, DEIA, and detailed engineering designs. The diversion will ensure the continuity of downstream supply (i.e., the diverted flow will re-join the natural watercourse downstream), and will include the creation of a new spring that replicates the size, nature, water availability and water quality of the original Bor Ovoo spring.</p> <p>See <i>Section 3.4.3</i> of the WMP for further details on the development of suitable baseline data to assess the performance of the diversion.</p>	HSESC Department Principal Contractor	Complete, subject to ongoing consultation and agreement on any community and biodiversity improvements to the new spring
WR13	Undai River Diversion - Monitoring	<p>The effectiveness of the Undai diversion and the extent of impacts on downstream water resources during and immediately after construction will be monitored. The monitoring will include monthly and quarterly monitoring of water levels and quality in downstream wells and springs and measurement of the flux through the groundwater diversion pipe, and will include the participation of local herders. See <i>Table 3.7</i> and related Figures in the WMP for details of the monitoring. Monitoring will also be conducted of the water quality and quantity at the replacement to the Bor Ovoo spring. The diversion will be revised if necessary to ensure continuity of downstream water supply, or to control impacts on herders' wells as a result of increased flood flows. Monitoring of the success of the diversion will form part of the Participatory Monitoring Programme to be implemented with local herders. <i>Sections 3.6.2</i> and <i>3.6.3</i> of the WMP set out a process for assessing the monitoring results. <i>Section 6.6</i> of the WMP requires mitigation to occur if the decline in groundwater flux in the Undai diversion pipe falls outside of the range anticipated for seasonal variation. If issues are identified, OT will work with local, potentially affected, herders in accordance with WR10 to develop, implement, and monitor a mutually acceptable solution (such as provision of an alternative water supply</p>	HSESC Department	Monitoring Records Participatory Monitoring Program

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ID	Applicability/ Activity	Control Description	Responsible Parties	Means of verification
		through drilling of a new water borehole).		
WR13a	Undai River Diversion - Monitoring - Construction	During the construction of the Undai diversion there will be dewatering required to enable the excavation of the Undai cut-off wall. This is being undertaken slightly differently to that described in the ESIA and monitoring measures have been revised to reflect differing Project circumstances; however, monitoring will revert to the planned approach once the diversion has been constructed. In order to ensure that the impact of this diversion on baseflow in the Undai is managed and minimised, the volume of water pumped and discharged into the diversion pipeline will be monitored, and groundwater levels in the monitoring network within the Undai up and down stream of the diversion will be used to assess the extent of any aquifer responses to the works. WMP Section 3.4.3 sets out the monitoring requirements for the Undai diversion and requires groundwater levels and flows in the diversion pipe to be monitored monthly.	HSESC Department	Complete - no further monitoring/verification required
WR14	Groundwater Modelling	On-going development of the groundwater model by a competent person. An annual independent review will be carried out in accordance with WRm11. Model updates will be performed if identified by this review. At each model update and review, a check will be made to determine whether there are users of this groundwater within the groundwater cone of depression created by the open pit. If there are any springs or wells in the cone of depression, then mitigation measures will be developed to avoid or minimise the impact to the local herders.  OT will develop and implement a risk-based programme to grout identified boreholes within the Mine Licence Area that have been recommended for closure due to interconnection of aquifers.	HSESC Department	Monitoring Records Progress against agreed programme and schedule

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<b>ID</b>	<b>Applicability/ Activity</b>	<b>Control Description</b>	<b>Responsible Parties</b>	<b>Means of verification</b>
WR15	Water Supply Boreholes	Any temporary water supply boreholes will be individually assessed prior to use, to confirm that its area of influence does not include any existing springs/boreholes used by third parties or wildlife. Boreholes will be installed in accordance with WR04.	HSESC Department	Monitoring Records Drilling Specifications
WR16	Road Construction in River Crossings	Where Project construction facilities/infrastructure (e.g., Project roads) cross ephemeral surface water channels or playa areas, fords or culverts will be constructed. Where culverts are used, these locations will be individually assessed, designed, and installed to ensure adequate flow of flood waters and to avoid significant erosion upstream or downstream of the culvert. Culverts will be designed to accommodate 1 in 10 year flood events, except in headwater locations, where they will be designed to accommodate 1 in 100 year flood events. Working in ephemeral watercourses when flash floods may occur will be avoided to reduce the risks of erosion. Disturbed stream banks will be rehabilitated to minimise risk of erosion.	Construction Department	Road Design Documents DEIAs

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## 5. IMPLEMENTATION SCHEDULE

### 5.1 Review and Revision of this Management Plan

This Management Plan will be reviewed at least every two years or more frequently when operational or environmental conditions so dictate. Revision of this Management Plan will be the responsibility of OT General Manager HSESC who is the custodian of this Plan.

If material changes to operating procedures are required (as identified through the Management of Change procedure contained within the OT HSE Management System), this Management Plan may be updated on an “as required” basis.

Any revisions to this Management Plan will be uploaded to the OT Portal to ensure that all OT staff have access to the latest version of this Management Plan.

## 6. MONITORING

### 6.1 Overview of Monitoring Requirements

The monitoring measures to be implemented during the operations phase to assess compliance with Project Standards (see *Section 4: Project Standards*) are described below. This includes an on-going and evolving participatory monitoring program which involves local herders in monitoring of well water levels.

In the event that monitoring identifies non-conformance with Project Standards, these will be investigated and appropriate corrective actions identified (see Element 14 Non-conformance incident and action management of the OT HSESC MS).

### 6.2 Key Performance Indicators

OT will evaluate water resource management performance throughout the operational period. Specific monitoring provisions are detailed in *Section 6* above. The KPIs which will be used to assess its water resource management are presented in *Table 3*.

**Table 3: Key Performance Indicators**

ID	KPI	Target/threshold	Monitoring measure
WR-KPI 01	Number of recorded water-related non-conformances with this Plan.	Minimise and continued improvement in number of reported water-related non-conformances.	Number of reported water-related non-conformances per year.
WR-KPI 02	Site water usage.	Target: 700 l/s Threshold: 918 l/s	Bore field water supply flow meter readings.
WR-KPI 03	Water recycling efficiency.	Target: 90% Threshold: 80%	Concentrator flow meter readings (return water from TSF and tailings thickener).
WR-KPI 04	Water consumption.	OT (Site) 547 l/tonne ore	Concentrator ore inputs. Concentrator and site water use.
WR-KPI 05	Number of water-related	Minimise and continued	Number of reported water

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ID	KPI	Target/threshold	Monitoring measure
	complaints from local communities as recorded in the grievance management system.	improvement in number of water-related community complaints.	related community complaints per year (via liaison with SP Dept.).
WR-KP1 06	Number of reported and confirmed instances of impacts to surface water sources.	Target: zero Threshold: 1 - with agreed mitigation.	Number of confirmed impacts to herder wells, springs and/or groundwater dependent receptors.

**6.3 Key Monitoring Activities**

Key monitoring activities will focus on assessing the quantity and quality of the surface water and groundwater in the area of influence of the OT Project.

The key monitoring measures are set out below.

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Table 4: Key Monitoring Measures

ID	Topic/Aspects	Parameters	Methods	Periodicity	Location	Comments
WRm 01	Surface and Groundwater	Water Level and Flow	Field measurements (herder wells, monitoring bores, pumping wells). Observations (stock numbers). Photographic record (springs, pit seeps). Performance of Undai diversion to be monitored in accordance with details in WMP Section 3.4, including level, flow and quality.	Routinely	Includes herder wells (including Khukh khad, Zurkh zuun salaa, Buural spring, Ekhen Burkhant, Saglagar shine us, Saglagar ikh us, hand dug wells along the Khaliv riverbed, Suurin Shavag, Khulsan deep well, Burgasan us), springs (including Khukh khad, Budagt, Maanit and Burkhant springs, and the replacement Bor Ovoo spring), pit seeps, and monitoring boreholes located around the mine site, along the Undai River, and in the Gunii Hooloi aquifer, and selected pumping wells on the mine site and in Gunii Hooloi. (Note – coordinates of all above wells to be confirmed and used in monitoring programme to avoid duplication). Observations of stock numbers and herder water consumption. For Undai Diversion monitoring, see WMP Table 3.7 for location details (at herder wells, springs, monitoring bores, and diversion pipe).	Details of periodicity and location are provided in the Water Monitoring Plan. Monitoring of water levels and abstraction rates at each borehole will be routinely undertaken to ensure that water levels and abstraction rates are as anticipated. If water levels and/or abstraction rates significantly exceed anticipated levels, a re-evaluation of the borehole will be performed to determine if any additional mitigation actions are required. Estimates of water use by stock will be made by the Communities and Pastureland Team, using stock numbers, as noted in Pastureland Management Strategy, and shared with the Ecosystem Services Working Group, who will use this and well-level information to identify any issues for follow-up action. For Undai diversion monitoring, WMP Section 6.2 sets out the approach for analysis and the triggers for remedial actions.

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ID	Topic/Aspects	Parameters	Methods	Periodicity	Location	Comments
WRm 02	Surface and Groundwater	Water Quality	Field measurement (pH, conductivity, temperature).  Laboratory analysis (other parameters).  Photographic record (springs, herder wells).	Routinely	Various, including herder wells, springs (including replacement Bor Ovoo spring), and monitoring boreholes located around the mine site, along the Undai River, and in the Gunii Hooloi aquifer.  For Undai Diversion, see <i>WMP Table 3.7</i> for locations (wells, springs and monitoring bore).	Details of periodicity and location are provided in the WMP.  <i>WMP Section 6.3</i> sets out analysis protocol and trigger levels for remedial action.  Groundwater flow in the Undai diversion pipe will be measured by fortnightly readings of the installed mechanical flowmeters. OT will evaluate the cost and safety implications of installing an automated monitoring system, which will enable continuous measurements to be made.  Data on flow through the diversion will be assessed regularly (every quarter and once per month during the months of June, July, August, and September) along with information from proximal piezometers to assess possible impacts to the amount of water subjected to the diversion. Any identified impacts will result in further investigations and mitigation as required.
WRm 03	Aquifer Settlement	Elevation	Geodesy survey	Annually	At main line pump stations	To confirm settlement assessment results.
WRm 04	Total Water Use	Total Water Volume and Flows	Flow meters, truck movements, observations.	Continuously with monthly data review	All water abstraction locations, including production bores and open pit mine sumps.  Flow of underground water into	For monthly water use fee payments.  During construction activities, undertake periodic review of water usage. In the event that water usage

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ID	Topic/Aspects	Parameters	Methods	Periodicity	Location	Comments
					the open pit to be estimated, using measurements and observations, in accordance with <i>Table 3.4 WMP</i> .	significantly exceeds predicted levels, the potential impacts of this will be assessed and any necessary additional mitigation measures will be identified.  Procedure for estimation of underground pit inflows to be developed.
WRm 05	Water Balance and Conservation	Water Volume	Flow meters	Continuously with quarterly data review	Principal site water balance flow meters.	For assessments of water balance and water recycling.
WRm 06	Erosion / Sedimentation	River Bed Characteristics and Herder Wells Conditions	Visual inspection and photography	Prior to operations, Annually after each wet season. After significant flood event	Western channel Undai downstream of diversion Downstream Undai herder wells Downstream Undai Springs Significant road culverts	For assessments of changes to the sedimentation and or erosion in river beds, and identification of remedial engineering measure which may be required.  Monitoring details in WMP <i>Section 3.4</i> .
WRm 07	Drinking Water	Drinking water standards	Field and Laboratory analysis	Routinely	Water treatment and bottling plant	Details of periodicity and methods are per operating procedure for water treatment and bottling plant (every two weeks for key parameters and annually for the full suite of analytes).
WRm 08	Treated Wastewater	Wastewater effluent standards	Field and Laboratory analysis	Routinely	Wastewater treatment plant	Details of periodicity and methods are per operating procedure for wastewater treatment plant.



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ID	Topic/Aspects	Parameters	Methods	Periodicity	Location	Comments
WRm 09	Workplace Inspections of water leakage, spill and inefficient usage	Visual	Regular inspections will be carried out by area leaders and HSESC department	Daily	All main workplaces	
WRm 10	Groundwater	All monitoring data	Independent review of borefield and shallow aquifers, by competent person, including check on groundwater users in cone of depression.	Annual	All monitoring locations	This review shall include a review of drawdown levels in the borefield and advice on on-going pumping, in order to limit unnecessary groundwater drawdown beneath herders' wells.  This information will be used to alter pumping rates to create even drawdown in the aquifer, as appropriate. The Project is committed to minimising groundwater drawdown as part of borefield operational management.
WRm 11	Water monitoring plan review	All water monitoring processes and determinations	Water monitoring plan should be reviewed and assessed by HSESC Department	Annual	All monitoring location and frequency, methodology, etc.	Water monitoring plan should be reviewed on an annual basis, however it should ensure long-term monitoring reliability and assessment database is in compliance with national and project requirements and standards. Water monitoring database should be screened through the QA/QC project plan.

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## **7. TRAINING**

### **7.1 Overview**

All necessary training is provided as part of induction training (to provide general awareness) and job-specific training as necessary.

### **7.2 Induction Training**

All employees of OT and Contractors working at OT will be provided with general induction, site specific induction, and HSE awareness training, including a specific content on water management.

### **7.3 Job-Specific Training**

All personnel working at OT, in water resource-related management activities, shall be subject to routine toolbox training. This will include details on the importance of water resource conservation and management.

### **7.4 Other Training Requirements**

Additional, specialist training, shall be provided to key personnel involved in environmental water monitoring and sampling.

All Hydrogeologists/Environmental Officers undertaking monitoring and/or water sampling will be trained in the sampling protocols and QA/QC project plan.

### ***Participatory Water Monitoring***

Any herders taking part in the Participatory Water Monitoring (PWM) programme will be provided with training which is appropriate and applicable to their situation. The aim will be to develop the herders understanding and appreciation of the local surface and groundwater interactions and what the results of the data collected by OT and the herders illustrate. The PWM programme will be run by the RDSP Department and training provided by OT Hydrogeologists/Environmental Officers. Training will include the use of the measuring equipment, recording of results, and will be given in the context of the overall monitoring programme. Additional training may be given at the three-monthly meeting with the herders, when the results are reviewed and/or at the annual review of the PWM, which will be attended by RDSP staff in charge of PWM, OT water team, herders, local stakeholders such as representatives of local authority, water working group, and NGOs.

When appropriate, competencies in emergency response scenarios must be obtained.

## **8. AUDIT AND REPORTING**

### **8.1 Internal Auditing**

Periodic inspections are completed by operational area superintendents/supervisors and HSE department covering a HSE aspects.

Any incidents identified during these inspections will be reported to the incident management system (Element 14).

Conformance will be monitored via annual internal audit program in accordance with Element 16 Performance Assessment and auditing. This will be undertaken to assess broad compliance with requirements of HSE management system (including ESIA and management plans).

All incidents and non-conformances identified during these inspections are reported as per the requirements of the OT HSE Management System as described in the Environmental ESMP Framework Document (OT-10-PLN-0001-E).

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### **8.2 External Auditing**

Conformance with this plan will be subject to periodic assessment as part of the Rio Tinto HSEC Business Conformance Audit programme and by Project Lenders.

Water issues (including the status of water balance, water extraction, and water monitoring) are covered in the scope of work to be completed by the Independent Environmental and Social Consultant (IESC), through periodic audits. Further, the Project Lenders working with the IESC and agreed with Oyu Tolgoi can request a comprehensive presentation/discussion of the monitoring results and interpretation thereof, to be provided by the OT issue experts to coincide with one of the periodic auditing events (no more than once per year, notified at least four weeks in advance) to occur immediately before or after the site audit.

### **8.3 Record keeping**

Records of audits, inspections, and incidents will be managed in accordance with Element 8 Documentation and Document Control and Element 15 Data and Records Management.

Rio Tinto Business Solution shall be used to record Internal and External Audit findings and related actions and Incidents and related investigations and actions.

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**9. DOCUMENT INFORMATION**

File Name	OT-10-E11-PLN-0001-E-Water Resources Operating Management Plan	
Description	Water Resources Operating Management Plan	
Original Author(s)	Water team	
Creation Date	2013.09.01	
Approved By	Mark Slater, GM HSE	
Approval Date	2013.09.01	
Change Number	Record	#

Risk Ranking	Assessment Date	Risk Assessor	Review Schedule	Next Review Date
Moderate	2013.09.01	Water team	2 Yearly	2019.04.12

Version	Revision Date	Author(s)	Approved by	Revision Notes
1.0	2013.09.01	Environment department, Water team	Mark Slater, GM HSE	Approved version.
1.1	2013.11.23	Munkhtsatsral.L	Mark Slater, GM HSE	Corrected reference document numberings and completed the document control section.
1.2	2015.06.29	Erdenebayar Naran Mark Newby Dennis Hosack Mahoney D'Alterio	Kerrie Edwards, GM HSESC	Updated as per scheduled review NOC 2015-006
1.3	2017.04.12	Erdenebayar Naran Dan Eason	Kerrie Edwards, GM HSESC	Referenced the threshold of 100 ML as per E11 standard. Improved the translation of the Effluent waste water standard

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**ANNEX A: DRINKING WATER STANDARDS & EFFLUENT WASTEWATER**

**Table A1: Drinking Water Standards**

Note that in the event that national analytical laboratories are unable to measure to the limits set out in Project Standards, Mongolian Standards will be applied, as these can be measured by national laboratories.

<b>DRINKING WATER GENERAL ANALYSIS CONTENT AND LIMITS</b>					
<b>Parameter</b>	<b>Units</b>	<b>Mongolian Standard</b>	<b>WHO Standard</b>	<b>EU Standard<sup>3</sup></b>	<b>Project Standard</b>
<b>Physical Quality</b>					
pH	---	6.5 – 8.5	6–9	6.5-9.5	6.5 – 8.5
Total Dissolved Solids	mg/l	1,000	---	---	1,000
Hardness	Mg*eqv/ l	– 7	---	---	– 7
Turbidity	mg/l	1.5	---	---	1.5
Taste	Score	2.0	---	As above	No Observable Taste
Odour	Score	2.0	---	As above	No Detectable Odour
Colour	degree	20	---	As above	20
<b>Microbial Quality</b>					
Total Coliform	Coli / ml	100	---	0/250 ml	100
E.Coli or Thermotolerant Coliform Bacteria	E.Coli / 100ml	0 (at source)	Not detectable in any 100ml Sample	0/250 ml	Not detectable in any 100ml Sample
<b>Inorganic Chemical Quality</b>					
Aluminium (Al)	mg/l	0.5	---	0.2	0.2
Ammonium ion (NH <sub>4</sub> )	mg/l	1.5	---	0.5	0.5
Antimony (Sb)	mg/l	0.02	0.02	0.005	0.005

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<b>DRINKING WATER GENERAL ANALYSIS CONTENT AND LIMITS</b>					
<b>Parameter</b>	<b>Units</b>	<b>Mongolian Standard</b>	<b>WHO Standard</b>	<b>EU Standard<sup>3</sup></b>	<b>Project Standard</b>
Arsenic (As)	mg/l	0.01	0.01	0.01	0.01
Barium (Ba)	mg/l	0.7	0.7	---	0.7
Beryllium (Be)	mg/l	0.0002	---	---	0.0002
Boron (B)	mg/l	0.5	0.5	1.0	0.5
Cadmium (Cd)	mg/l	0.003	0.003	0.005	0.003
Calcium ion (Ca <sup>2+</sup> )	mg/l	100	---	---	100
Chloride ion (Cl <sup>-</sup> )	mg/l	350	---	250	250
Chlorine (Cl)	mg/l	0.3	0.2 – 1.0	---	0.2 - 1.0
Chromium (Cr)	mg/l	0.05	0.05	0.05	0.05
Copper (Cu)	mg/l	1	2	2.0	1
Cyanide (CN)	mg/l	0.01	0.07	0.05	0.01
Fluoride ion (F <sup>-</sup> )	mg/l	0.7 – 1.5	1.5	1.5	0.7-1.5
Hydrogen Sulphide (H <sub>2</sub> S)	mg/l	0.1	---	---	0.1
Iodine (I)	mg/l	1.0	---	---	1.0
Iron (Fe)	mg/l	0.3	---	0.2	0.2
Lead (Pb)	mg/l	0.01	0.02	0.01	0.01
Magnesium ion (Mg <sup>2+</sup> )	mg/l	30	---	---	30
Manganese (Mn)	mg/l	0.1	0.4	0.05	0.05
Mercury (Hg)	mg/l	0.001	0.001	0.001	0.001
Molybdenum (Mo)	mg/l	0.07	0.07	---	0.07
Nickel (Ni)	mg/l	0.02	0.02	0.02	0.02
Nitrate ion (as NO <sub>3</sub> <sup>-</sup> )	mg/l	50	50	50	50

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DRINKING WATER GENERAL ANALYSIS CONTENT AND LIMITS					
Parameter	Units	Mongolian Standard	WHO Standard	EU Standard <sup>3</sup>	Project Standard
Nitrite ion (as NO <sub>2</sub> <sup>-</sup> )	mg/l	1.0	3 or 0.2	---	1.0
Phosphate ion (PO <sub>4</sub> <sup>2+</sup> )	mg/l	3.5	---	---	3.5
Selenium (Se)	mg/l	0.01	0.01	0.01	0.01
Silver (Ag)	mg/l	0.1	---	---	0.1
Sodium (Na)	mg/l	200	---	200	200
Sulphate ion (SO <sub>4</sub> <sup>2+</sup> )	mg/l	500	---	250	500
Strontium (Sr)	mg/l	2.0	---	---	2.0
Uranium (U)	mg/l	0.015	0.015	---	0.015
Vinyl Chloride (C <sub>2</sub> H <sub>3</sub> Cl / H <sub>2</sub> C)	mg/l	0.0003	0.0003	0.0005	0.0003
Zinc (Zn)	mg/l	5	---	---	5
Radiological Quality					
Total α radioactivity	Bq/l	0.1	0.5	<sup>4</sup>	0.1
Total β radioactivity	Bq/l	1	1		1

Note:

1. This table shows upper limit values, unless indicated otherwise as a range or lower limit value.
2. This table does not include organic chemicals, detergents, pesticides, or disinfection by-products. Refer to Mongolian Standards and WHO Guidelines for Drinking Water Quality for Chemical Lists and Guideline Values, the most stringent of which will also form the Project Standard.
3. EU Council Directive 98/83/EC of 3<sup>rd</sup> November 1998
4. EU Standard for radioactivity expressed as Tritium 100 Bq/l with a total indicative dose of 0.1 mSv/year

Domestic water (not intended for routine drinking) shall meet the Project Standard for drinking water and the chlorine disinfection standard shown on the table below:

DOMESTIC WATER GENERAL ANALYSIS CONTENT AND LIMITS					
Parameter	Units	Mongolian Standard	WHO Standard	EU Standard	Project Standard

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DOMESTIC WATER GENERAL ANALYSIS CONTENT AND LIMITS					
Disinfection Treatment					
Residual Chlorine (after 30 min contact time)	mg/l	---	>0.5	---	>0.5
Chlorine (at end of distribution system)	mg/l	---	---	---	0.3 – 0.5

Note:

- Given that domestic water will not typically be used for drinking purposes, consideration will be given to accepting higher inorganic/organic chemical limits than those shown.

**Table A2: Effluent Wastewater Standard**

Maximum permitted content of pollutants and highest values of the effluent dischargeable into soil shall be as indicated in the table below.

Note that all treated effluent from the waste water treatment plant (WWTP) and site-based run-off within operational areas is collected and sent to the TSF. As a result, the effluent discharge standards set out below are not all applicable to treated effluent from the WWTP as this is not direct to an off-site water body.

Treated effluent may be used for dust suppression on roads within the Mine Licence Area. All surface water within the Mine Licence Area will be captured within the drainage capture zone of the open pit, and, given the very high evaporation rates within the Mine Licence Area, there is a very limited likelihood that any water used for dust suppression will migrate off-site (hence it is not considered to be “discharged” to the environment). As a result, on a risk-based approach, treated effluent from the WWTP may be used for dust suppression as it poses little or no risk to human health or the environment as there is no pathway or sensitive receptor that could potentially be affected.

For all parameters, except total nitrogen, the Project Standard has been developed using the more stringent requirement from the Mongolian Standard, the IFC guidelines, and EU guidance. The IFC and EU standards are based on direct discharge to off-site surface water bodies, and no treated effluent from the Project will be discharged to off-site surface water bodies.

No.	Parameters	Unit	Project Standard	Comparative Standards	
			Range or Maximum Allowance <sup>1</sup>	IFC Guidelines <sup>2,4</sup>	EU Guidance <sup>3</sup>
1.	Water temperature	°C	20	<3 degree differential	-
2.	Odour	Sense	no odour	-	-
3.	pH		6-9	6-9	-
4.	Biochemical Oxygen Demand	mgO/l	20	50 [30] <sup>4</sup>	25



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No.	Parameters	Unit	Project Standard	Comparative Standards	
			Range or Maximum Allowance <sup>1</sup>	IFC Guidelines <sup>2,4</sup>	EU Guidance <sup>3</sup>
5.	Chemical Oxygen Demand	mgO/l	50	150 [125] <sup>4</sup>	125
6.	Permanganate oxidation	mgO/l	20	-	-
7.	Suspended Solids	mg/l	50	50 [50] <sup>4</sup>	-
8.	Dissolved salt	mg/l	1000 <sup>5</sup>	-	-
9.	Cyanide	mg/l	0.2	1 (free cyanide 0.1)	-
10.	Mineral oil	mg/l	1	-	-
11.	Fat oil	mg/l	5	10 (Oil & Grease)	-
12.	Sulphide	mg/l	0.5	-	-
13.	Copper	mg/l	0.3	0.3	-
14.	Cadmium	mg/l	0.03	0.05	-
15.	Manganese	mg/l	0.5	-	-
16.	Mercury	mg/l	0.001	0.002	-
17.	Arsenic	mg/l	0.01	0.1	-
18.	Nickel	mg/l	0.2	0.5	-
19.	Selenium	mg/l	0.02	-	-
20.	Beryllium	mg/l	0.001	-	-
21.	Cobalt	mg/l	0.02	-	-
22.	Barium	mg/l	1.5	-	-
23.	Strontium	mg/l	2	-	-
24.	Vanadium	mg/l	0.1	-	-
25.	Uranium	mg/l	0.05	-	-

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No.	Parameters	Unit	Project Standard	Comparative Standards	
			Range or Maximum Allowance <sup>1</sup>	IFC Guidelines <sup>2,4</sup>	EU Guidance <sup>3</sup>
26.	Iron	mg/l	1	2	-
27.	Lead	mg/l	0.2	0.2	-
28.	Total chrome	mg/l	0.3	-	-
29.	Chromium (VI)	mg/l	0.1	0.1	-
30.	Zinc	mg/l	0.5	0.5	-
31.	Ammonium	mg N/l	6	-	-
32.	Aluminium	mg/l	0.5	-	-
33.	Antimony	mg/l	0.05	-	-
34.	Molybdenum	mg/l	0.5	-	-
35.	Boron	mg/l	0.3	-	-
36.	Total nitrogen	mg/l	30	[10] <sup>4</sup>	15
37.	Total phosphorus	mg/l	1.5 <sup>5</sup>	[2] <sup>4</sup>	2
38.	Organic phosphorous	mg/l	0.2	-	-
39.	Phenols	mg/l	0.05	0.5	-
40.	Trichloroethylene	mg/l	0.1	-	-
41.	Tetrachlorethylene	mg/l	1	-	-
42.	Remaining chlorine	mg/l	1	-	-
43.	Pathogens and other irregular bacteria	-	not detectable in 1 mg/l	[400] <sup>4</sup>	-

Notes: <sup>1</sup> MNS 4943:2011,

<sup>2</sup> IFC Environmental, Health and Safety Guidelines for Mining 2007 unless otherwise stated (see note 4 below)

<sup>3</sup> EU Council Directive of 21 May 1991 concerning urban waste water treatment

<sup>4</sup> IFC General EHS Guidelines 2007 – Indicative values for treated sanitary sewage discharges (Table 1.3.1) to surface water.

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<sup>5</sup> Level can be more (than 1000mg/L) depending on original mineralization of the water in nature and if it is polluted (referring increase of TDS during the usage) by minerals, then that increase should be less than 20 % of the natural content (which means acceptable limit is absolutely 120% of original TDS). If the first mineralization of water is less (than 1000mg/L), it cannot be polluted more than 3 times (not %) of that mineralization

<sup>6</sup> While for most parameters the Project Standard is the most stringent of Mongolian standards and international guidelines, there are a number of parameters where Project Standards are not more stringent than international guidelines. This is due to the fact that many project features (such as the WWTP) were specified and designed prior to the involvement of international Lenders and the development of corresponding Project Standards and also due to the fact that national laboratories are not able to measure to some of the levels set out in international guidelines.