Standard 6

# 6 WATER MANAGEMENT STANDARD

## 6.1 STANDARD

The purpose of this Standard is to define the requirements for effectively managing water at sites, including site water balances, process water, stormwater, discharges and mine dewatering activities, to ensure no loss of beneficial use and that human health and the environment are protected.

Additional water management requirements related to mining infrastructure are included in B2Gold Environmental and Biodiversity Performance Standard 3 – Tailings Management and Standard 5 – Non-Process Waste Management.

This Standard does not address the management of wastewater from sites that are connected to public sewage networks and/or when sewage treatment facilities are not managed or operated by B2Gold.

## 6.2 CRITERIA AND REQUIREMENTS

### 6.2.1 Regulatory Compliance

Sites shall manage water discharges, water extraction, stormwater and mine dewatering in compliance with all relevant in-country regulatory requirements, licences and any other applicable requirements.

If regulatory discharge requirements do not exist or are incomplete, appropriate site-specific, risk-based discharge criteria shall be determined from: baseline conditions, potential pathways of pollutants applicable to environmental receptors, known adverse impacts, and inputs from relevant specialists. These criteria shall be periodically reviewed as required.

### 6.2.2 Water Management Plan and Water Balance

Sites shall develop, implement, maintain and communicate a Water Management Plan that defines all applicable strategies, operational controls and management practices relating to on-site water management.

Applicable water quality objectives and internal performance criteria shall be established for water discharges, utilising relevant in-country standards.

The site water distribution network (inclusive of process and non-process water) shall be documented and periodically reviewed.

To effectively manage water resources and on-site use, a site-specific water balance shall be developed, maintained, operated and updated in conjunction with the site Water Management Plan and relevant Life-of-Mine (LOM) plans. The water balance shall consider both present and future water management.

Sites shall consider and document relevant water use and water risks and impacts during site management of change processes. Sites shall also consider and document water risks and impacts during the technical and financial evaluation of relevant capital projects.

### 6.2.3 Baseline Conditions

Baseline surface water, groundwater hydrology (including identification of site water users and uses) and geochemical characterisation of waste rock shall be conducted for any new site or project expansion to establish pre-operational conditions.

Appropriate hazard identification, risk assessment and risk control planning shall be incorporated into any new project design or expansion to ensure that water related risks and impacts are identified, communicated and controlled.

Potential risks and adverse impacts to surface water and groundwater shall be quantified during new project designs and project extensions, inclusive of cumulative demands. Identified actual and potential impacts shall be mitigated.

### 6.2.4 Water Extraction

Sites shall comply with all regulatory requirements and conditions, inclusive of extraction volumes, specified in site water licences. Extraction regimes shall not result in adverse environmental impacts.

Sites shall optimise their water extraction and distribution networks to maximise efficiencies, inclusive of maintenance and operational schedules.

### 6.2.5 Tailings and Process Facilities

Tailings and on-site processing facilities shall be designed, constructed, managed and operated in a manner that precludes releases to the receiving environment. Where engineering design constraints and climatic conditions require process water discharges from any tailings and/or process facilities to occur, discharge water quality shall meet applicable criteria defined within regulatory and B2Gold Standards.

Storage facilities used to impound process or contaminated water shall be suitably lined (e.g., HDPE) depending on the characteristics of the water to be contained. If impounded water contains contaminants that could impact groundwater (i.e., cyanide, acid water, metals, etc.) these facilities shall have a suitable Leak Collection and Recovery System (LCRS).

### 6.2.6 Stormwater and Erosion and Sediment Control Structures

Temporary stormwater structures shall be designed based on the level of risk of failure. Permanent stormwater structures shall, at a minimum, be designed, operated and closed to convey and withstand the 100-year, 24-hour storm event. For any impoundments or conveyance structures up-gradient of sensitive regions (e.g., high-value habitat/ecosystems, etc.), additional capacity or protection shall be considered based on the risk associated with failure.

Erosion and sediment control facilities shall be designed and installed prior to major ground disturbance. These shall be utilised and maintained during construction, operations and the post-closure monitoring phase to manage stormwater, minimise erosion, and treat surface water from disturbed areas and areas undergoing reclamation.

### 6.2.7 Wastewater

Wastewater shall be treated using sewage treatment plants or septic systems that will produce effluent quality that meets regulatory requirements.

Sewage treatment plants shall be designed and constructed with sufficient capacity for current and foreseeable future volumes requiring treatment (i.e., during shutdowns).

Only domestic wastewater shall be connected to on-site sewage systems (i.e., no trade, workshop, process or industrial wastewater).

Solid screenings and sludge from sewage treatment plants shall be managed in accordance with regulatory requirements and be protective of human health.

On-site septic systems shall be designed, constructed, operated and maintained in accordance with an applicable industry code or engineering standard. Adequate absorption capacity by the receiving environment shall be demonstrated for any planned or existing discharges prior to locating and installing relevant septic facilities.

### 6.2.8 Monitoring

To enable an accurate water balance to be maintained, suitable instrumentation and measures shall be utilised for metering and/or determining site water use and production on at least a monthly frequency.

The quantity and quality of sewage treatment plant effluent shall be monitored in accordance with relevant licence conditions. The data shall be used to maintain and optimise plant performance.

Where required, groundwater shall be monitored down gradient of septic infiltration trenches, landfill sites, process dams, waste rock disposal facilities, tailings dams or other potential sources of contamination. This monitoring shall be conducted in accordance with relevant regulatory requirements, licence conditions and any other applicable requirements.

Sites shall develop and implement suitable monitoring and inspection/audit programs to verify that site water management systems and processes remain fully functional and are achieving the targeted performance.

Sites shall develop and implement suitable marine, groundwater and surface water quality and quantity monitoring programs that evaluate local water resources, point source and non-point source discharges and any receiving waters potentially impacted by off-site discharges.

Water monitoring shall be conducted by trained and competent personnel.

Water quality analyses shall be conducted by external laboratories that are third-party accredited to perform the required analysis.

### 6.2.9 Data Analysis, Management and Retention

Sites shall determine water quality and usage/consumption trends at relevant monitoring locations. The site action management system shall be utilised to address any potential or actual identified variances or detected adverse impacts.

Monitoring data shall be periodically reviewed (at least annually) inclusive of trend analysis, and results communicated to site management.

The site water/environmental monitoring database shall be maintained and retained until final lease relinquishment.

## 6.3 TERMS AND DEFINITIONS

Relevant key terms and definitions that relate to B2Gold's Water Management Standard are provided below:

**Baseline Conditions:** The existing environmental conditions, i.e., the physical, chemical, or biological setting, of a proposed project area prior to disturbance by project-related development.

**Closure:** The process followed when a site has reached the stage in its life cycle where the intended mining use has been permanently concluded. This generally includes issues such as decommissioning activities, reclamation and revegetation of disturbed areas for long-term physical and chemical stabilisation of the site. This also often includes stakeholder consultation regarding post-mining use.

**Decommissioning:** The process that begins near or at the cessation of mineral processing and ends with the removal of all unwanted infrastructure and services.

**Environmental Impact:** Any change to the environment whether adverse or beneficial, wholly or partially resulting from a site's activities.

**Leak Collection Recovery System (LCRS):** Fluid pumping system located between two liners (with at least one of the liners being a geosynthetic liner) that collects and pumps out detected fluid.

**Monitoring:** The gathering, analysis (especially for trends) and interpretation of information for the assessment of performance.

Examples of monitoring subjects are: occupational health and safety, air, soil and water quality, flora and fauna, reclamation, social aspects including complaints, operational dust, noise, vibration, property damage, community health, community investment, historical and cultural sites.

Monitoring may be continuous, short-term or long term and may be undertaken manually or automated.

**Point Source:** A stationary location or fixed facility from which pollutants are or may be discharged (e.g., a pipe, stack, ditch, well, or ore pit).

**Reclamation:** The return of disturbed land to a physically and chemically stable, self-sustaining condition compatible with future land use objectives.

## 6.4 REFERENCE MATERIAL

Nil

## 6.5 DOCUMENT CONTROL

| Revision | Approved | Date | Description |
|---|---|---|---|
| Final | Ken Jones | 17th August 2014 | Original 2014 issue of the B2Gold Environmental and Biodiversity Performance Standards |
| Final | Ken Jones | 24th May 2018 | 2018 revision, update and issue of the original 2014 B2Gold Environmental and Biodiversity Performance Standards |