WATER RESOURCE MANAGEMENT AND DISCHARGE MANAGEMENT PLAN

I. Objective

The objective is to maintain the water resource, both in terms of quality and quantity, in particular by complying with the liquid discharge standards in force in the Republic of Cote d'Ivoire and international standards (IFC and World Health Organization) to protect the groundwater quality in the Project area. This objective also makes it possible to limit the impacts on environmental elements sensitive to discharges, such as biodiversity and the surrounding human populations (health, agricultural and economic activities).

II. General Conditions

A. Scope of Application

All the sub-contractors

B. Applicable Regulations

The overall objective of the National Water Policy is to provide appropriate solutions to water-related problems so that water is not a limiting factor in socio-economic development. It is oriented towards Integrated Water Resources Management (IWRM), so that this vital resource is managed in such a way as to reconcile the different physiological, social, cultural, environmental, economic and spiritual uses and functions of water to ensure sustainable management of the available resource.

The water resource management and discharge management plan that complies with:

- **Environment Code - Law n°96-766 of 3 October 1996**
- **Article 25:** The characteristics of the wastewater discharged must not harm the receiving environment.
- **Article 75**: It is forbidden to dump any solid, liquid or gaseous substances into waterways and water bodies and their surroundings, and to carry out any activity likely to harm the quality of the air and surface or underground water.
- **Article 77**: It is forbidden to discharge into maritime and lagoon waters: wastewater, unless it has been previously treated in accordance with the standards in force; untreated and harmful waste of all kinds.
- **Article 79**: The following are prohibited all spills, flows, discharges or deposits of any kind likely to cause or increase pollution of continental, lagoon and maritime waters within the territorial limits;

- **Article 80**: In accordance with the special provisions of the international conventions ratified by Côte d'Ivoire, the dumping, immersion and incineration in maritime waters under Ivorian jurisdiction of substances of any kind likely to : alter the quality of marine waters;

- **Law n° 98-755 of 23 December 1998 on the Water Code**
- **Article 12:** The taking of water from the public hydraulic domain and the construction of hydraulic works are subject, depending on the case, to authorization or prior declaration.
- **Article 17:** The right to use water and the use of hydraulic installations and works are limited by the obligation not to infringe the rights of riparian's and to return water in such a way that it can be reused.
- **Article 25:** No one shall impede the free flow of surface water and groundwater.
- **Article 48:** the dumping or deposit of waste of any kind or radioactive effluent, likely to cause or increase the pollution of water resources, is prohibited.
- **Article 49:** Any discharge of wastewater into the receiving environment must comply with the standards in force.
- **Article 51:** It is forbidden to discharge into the sea, watercourses, lakes In addition to the above-mentioned waste, the following must be disposed of: any waste, fermentable residue of vegetable or animal origin, any solid or liquid, toxic or flammable substance likely to constitute a danger or a cause of insalubrity, or to provoke a fire or an explosion, in ponds, canals, underground waters, on their banks and in alluvial layers.
- **Article 78:** "Water intended for human consumption must comply with the standards of potability set by joint order of the water authority and the Minister of Health.
- **Article 79:** Any person who offers water to the public for human consumption, whether in return for payment or free of charge and in any form whatsoever, including ice cream, is required to ensure that this water is potable and complies with the standards in force.

- **Decree n°2015-346 of 13 May 2015 determining the list of infringements of the water code that may give rise to a transaction and infringements excluding any transaction**
- **Articles 2 and 3 stipulate: I**nfringements include:

- taking water from the public domain in excessive quantities, without prior authorisation or declaration;
- wasting water;
- the discharge, dumping or flowing into surface waters, groundwater or the waters of the territorial sea, of waste or substances whose effects are harmful to health or cause damage to flora or fauna or alter the normal flow of water;
- the deterioration of the quality of water or of hydraulic installations or works;
- the offer to the public of water which does not comply with public health and hygiene standards, for human or animal consumption, whether free of charge or in return for payment.

- **Order N°01164/MINEF/CIAPOL/SDIIC of 4 November 2008 relating to the regulation of discharges and emissions from installations classified for environmental protection**
- **Article 6:** Spreading of water and sludge

- IFC Performance Standards (PS 3) and the Environmental, Health and Safety (EHS) Guidelines, IFC, 2007.

- WHO recommendation

III. Measures

Water supply (drinking water and process)

The management of water resources aims to maintain the groundwater quantity at an acceptable level allowing the continuity of uses for the inhabitants.

Each worker receives 3L of bottled drinking water per day for consumption (WHO recommendation). Various containers as 0.5-liter plastic bags and 1 liter plastic bottles.

A tank is regularly filled out for works' needs (car washing, concrete preparation, etc.). This tank will be linked to a rainwater collection system to minimize the filling frequency if possible.

Domestic wastewater

A conventional sanitation network with wastewater treatment with installation of conventional septic tanks is set up for base camp and worker's camp by each sub-contractors (SCs)

Each septic tank is sized considering the maximum number of users that will be on the SCs camp simultaneously. The device is designed according to properly operated and maintained to ensure that it is not a source of contamination. Chemical toilets or dry toilets are also installed on the construction site.

Each septic tank is located 50 m from any watercourse and outside floodplain at least.

Septic tank waste (sludges) will be collected by company who has agreement form the state to that operation.

Process wastewater

Area used for washing and maintenance of engines or equipment are located at a distance from sensitive receptors, 50 m from any watercourse and outside floodplain at least. They are equipped with wastewater treatment systems. As far as possible, water discharges must be designed in such a way to encourage gradual infiltration of the effluent (e.g. infiltration ditch).

A concrete plant will be installed on-site later. The treatment measures for water from washing concrete mixers or concrete plants, including the description of the treatment units (location, design of facilities, capacity, type of treatment, quality control at the outlet of the plant) and the expected results in terms of the quality of the discharge into the environment will be specified. A readjustment of the pH before discharge will probably be necessary.

The type of treatment units is not yet selected, and the discharges points locations are unknown. ARISE Ivoire is expected to update the procedure once information is available.

Stormwater

Works during rainy seasons will be avoided as much as possible, in order to minimize the risk of leaching from the soil exposed by the work. The relief of the site is relatively flat, characterized by a central natural drain. Therefore, drains will be created at the start of the works along the site according to the natural flow direction and in order to ensure the stability of the land and the roads and avoids local retention. These ditches created along the service tracks will create infiltration zones in the ground or, in the event of a larger volume, flow by gravity to reach the existing streams (temporary streams).

Soil excavation for the installation of buried network can lead to the production of stagnant water if works occur during the rainy season. Following measures will be implemented to limit the production of stagnant water:

- works during rainy seasons are avoid as much as possible,
- trenches are kept open during a minimum period,
- in case of stagnant water, water will be pumped and discharged into the natural environment, in the project trenches, if they are already created.

The pumped water is not expected to be contaminated. If discharge water has been contaminated with oil, grease, or chemical products directly, all water will be pumped in a dewatering bag that will be then connected to an oil/water separator.

In order to favour the natural water ground infiltration, for asphalted road, Sub-contractors should propose the selection of **porous asphalt** to favor water infiltration and reduce runoff water on all Project new roads.

Water quality & monitoring

As drinking water is provided by bottles, no monitoring of water quality according to Cote d'Ivoire regulation or WHO recommendation is performed.

The water quality discharges from the septic tanks and oil separator (from vehicle maintenance and washing area or dewatering system) are monitored, based on the analytical program as follow:

- Sanitation:
    - total coliforms,
    - BOD5,
    - COD,
    - Total nitrogen,
    - total phosphorus,
    - pH,
    - suspended solids,
- Hydrocarbon separators:
    - total hydrocarbons or oil
    - grease;

The monitoring is performed on a monthly basis at the discharge point. Analytical results of the monitoring is recorded in a dedicated register with the dates of the analyzes.

Regarding Sedimentation basin including discharge from the concrete plant, the following physico-chemical indicators will be monitored on a monthly basis during the construction phase:

- pH
- suspended solids.

Analytical results of the monitoring is recorded in a dedicated register with the dates of the analyzes.

Physico-chemical parameters	Units	(A) Permitted daily average concentration		(B) Quantity of contaminant released
		If quantity released < B	If quantity released > B	
Conventional parameters				
DBO_5	mg/l	100	30	30 kg/j
MES	mg/l	100	35	15 kg/j
DCO	mg/l	100	125	100 kg/j
Total oils and fats	mg/l	100	30	1 kg/j
PH	6< PH < 9 anytime			n/a
Temperature	°C	5°C higher than the temperature of the receiving waters		n/a
Unconventional parameters				
Phosphore (2)	mg/l	100	10	15 kg/j
Azote total (NTK) (2)	mg/l	200	30	50 kg/j

(Source: Decree n°2001-109 of 4 April 2001)

Stormwater monitoring

In order to ensure the good conditions of the drainage network, monthly visual observations during the rainy season or after a period of heavy rains will be carried out to ensure the correct hydrological functioning of the streams and the absence of erosion problems.

Monitoring indicators	• monitoring of results of the discharge points monitoring (most restrictive threshold between local value / international standards), • rate of treated water (on plan), • selection of porous asphalt, • water consumption and origin of water, • Presence of waterproof platform • number of retention tanks and pits in good condition • number of piezometric network implemented, • Presence of level water monitoring sheet • number of complaints about water supply.
Reference documents	Waste management plan

	Hazardous product management plan Emergency plan
Procedure approved by	