



OKACOM

*The Permanent Okavango River Basin Water Commission
Comissão Permanente das Águas da Bacia Hidrográfica do Rio Okavango*

Descriptive project information in support of the ECC Questionnaire

OKACOM - Angola, Botswana, Namibia

16 August 2021



1. Introduction

1.1 Overview of OKACOM

The Permanent Okavango River Basin Commission was established and mandated to advise the party states (Angola, Botswana, and Namibia) based on the OKACOM Agreement of 1994. OKACOM is a technical advisory and decision support body mandated with gathering technical information and expertise on sustainable long-term yield, reasonable demand, conservation criteria, development of water resources, prevention of pollution, addressing extreme events (short term problems such as droughts), equitable use of shared water resources and the overall sustainable management of the Cubango-Okavango River Basin (CORB). The role of OKACOM is to anticipate and advise Member States on how reduce or halt impacts that occur as a result of uncoordinated resource development. Oversight of OKACOM business is done by the Okavango Basin Steering Committee (OBSC) in tandem with OKACOM Secretariat. The OBSC prepares information and technical advice to the Council of Commissioners and to the Forum of Ministers.

1.2 Water resources management

OKACOM developed a basin-wide policy framework in the form of the Strategic Action Programme (SAP) which was approved by the Forum of Ministers in 2011. The focus of the SAP is to promote and strengthen the integrated, sustainable management, use and development of the Cubango-Okavango River basin at national and transboundary levels according to internationally recognised best practices in order to protect biodiversity, improve the livelihoods of basin communities, and the development of basin state. The SAP at the same time serves as a roadmap for OKACOM's ongoing work, and is being implemented through a variety of mechanisms.

Key SAP integrated management objectives highlights:

That the sustainable management of the Cubango-Okavango basin should be based on a shared basin-wide vision and jointly agreed decision framework. And secondly that decisions should be based on solid scientific analysis of available data and information and improved basin knowledge through research programmes designed to answer management questions (OKACOM, 2011). Hence OKACOM through funding support from European Union Technical Assistance Programme for Transboundary Water Resources Management is facilitating the installation of hydro-meteorological gauging stations at jointly agreed site in the basin. There are two objectives of the water resources management result area of the EU Project within OKACOM:

- (i) Improved availability of water resources data through implementation of monitoring stations and equipment covering surface and ground water resources, water quality and sedimentation including capacity of institutions for monitoring;
- (ii) Reduced flood damage in the basin due to improved flood forecasting and early warning systems (FEWS).



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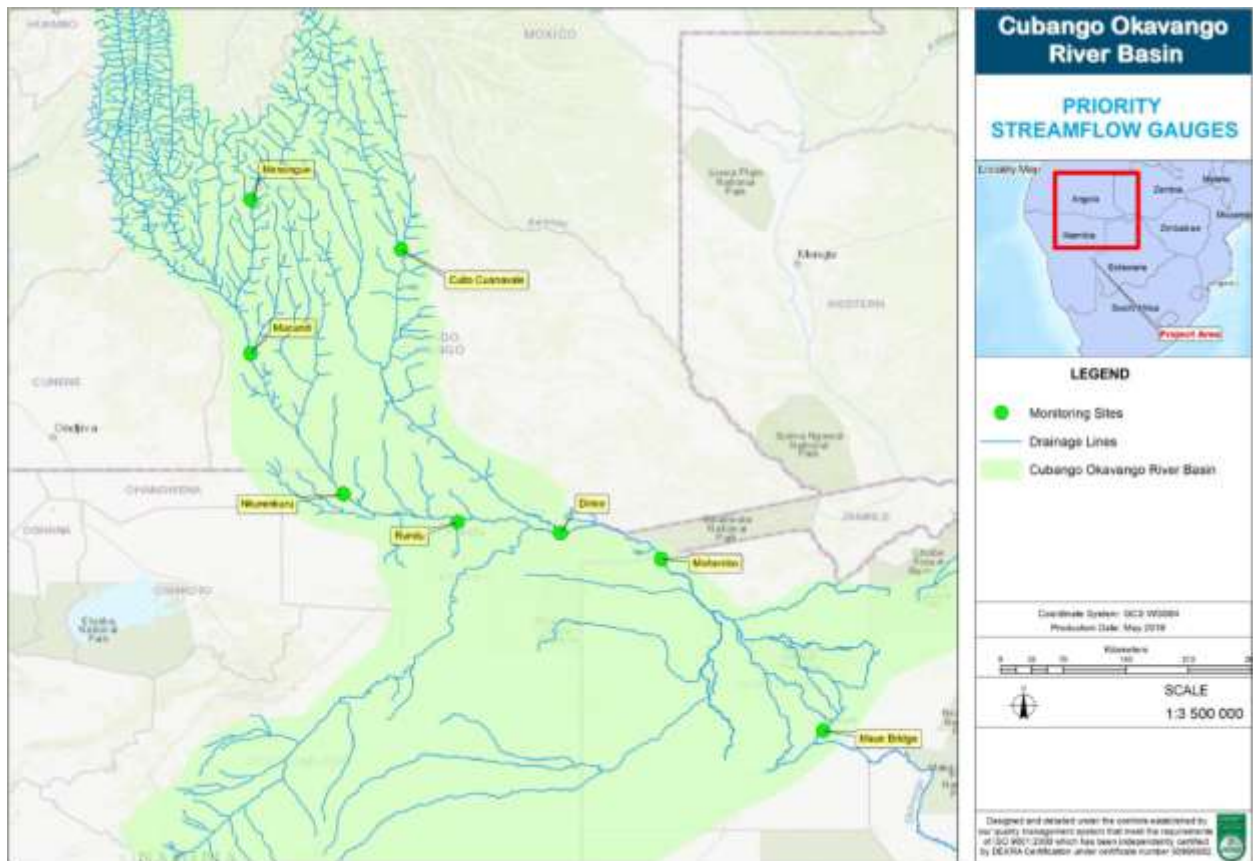


Figure 1 Proposed transboundary gauging network

Figure 1 shows the jointly agreed transboundary hydro-gauging network and it can be seen that two stations will be installed in Namibia at Rundu and at Nkurenkuru. The other transboundary stations will be installed in Angola and Botswana. This gauging network is expected to provide water resources data that will be used to meet integrated management objectives of the OKACOM Strategic Action Programme and at the same time ensure that water resources management and governance are based on scientific driven decisions.

2. Description of the Project

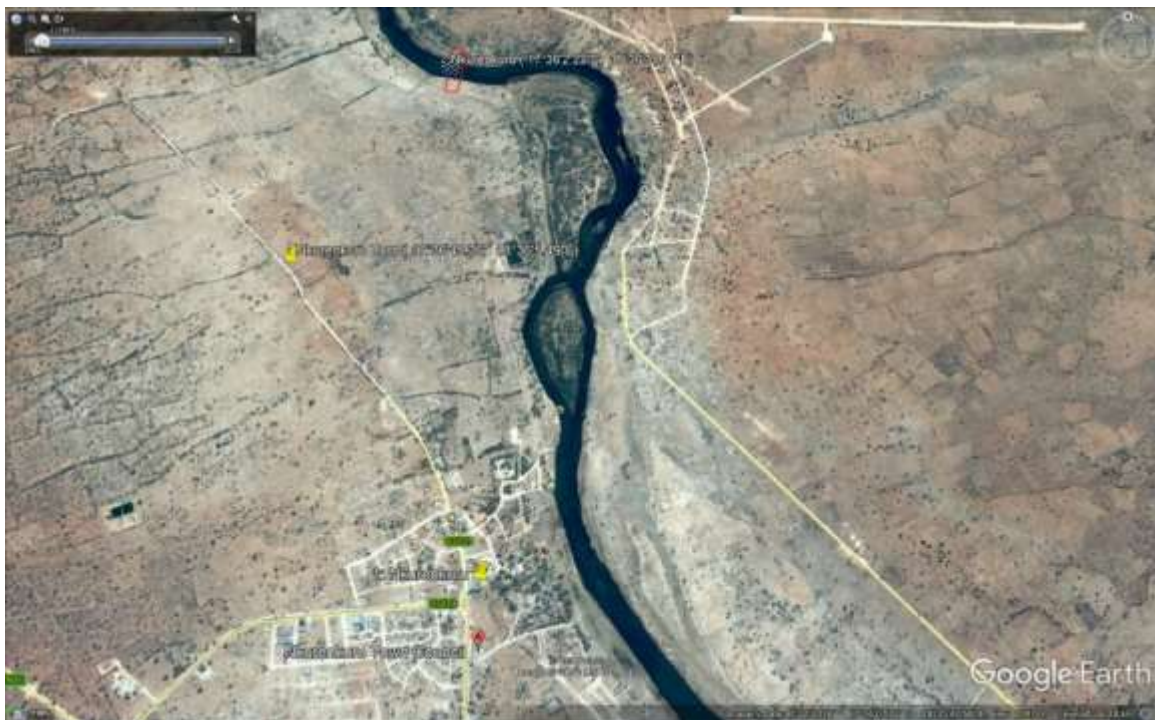


Figure 2 Location and area of influence for the Nkurenkuru gauging site

Nkurenkuru hydro-gauging station is located approximately 5km northwest of Nkurenkuru Town at GPS location -17.62766 and 18.61735 as shown in Figure 2. The station is situated on communal land with the nearest local homestead located about 1km west of the site. The area between the homestead and the gauging station is comprised of sparse bushy trees and open areas that are used by small and large stock for grazing during the dry season. The OKACOM Data Sharing Procedures of 2020 enlists the site as a critical transboundary data collection point that should transmit both flow and water quality data which will be utilised in the management of the basins water resources and ecosystem health. Therefore, the area of influence of this station is over the full width of the river i.e. it will take flow and water quality records that represent condition of the river over the entire cross section at this locality.

2.1 Existing infrastructure at the Nkurenkuru site



Figure 3 Existing hydro-gauging infrastructure

The Nkurenkuru site has existing infrastructure and is still operational as shown in the figure above. The station has a brick structure housing the data loggers. The pipe conduits (HDPE

pipe) extending from the house structure to river can also be seen. These pipes carry cables that transmit data from the recording pressure transducer which is situated in the river and transmitting it to the data logger in the house structure and during a station visit data is downloaded to a handheld gadget by a visiting hydrologist. The site also presently has gauging plates for manual readings of the water level at various flood levels. Importantly the site does not have a rating curve and as a result of this only measures water level and not discharge.

2.2 Proposed improvements

The proposed enhancement to the hydro-gauging system is based on very similar principles but has some key differences/enhancements both in the infrastructure and technologies that will be used. It should be noted that the proposed works are very much an upgrade/refurbishment of the existing and will be positioned in the same place as the existing infrastructure.

The works will involve with the installation of a 3m high vertical pipe structure which is secure and vandal-proof. This pipe structure will house the Cello 4S data logger and the GSM transmitter. Furthermore, the cable connecting the pressure transducer in the river to the data logger housing will be housed in a steel pipe structure. The GSM transmitter's purpose is to transmit data over GSM at near real-time scale to an office computer base station.

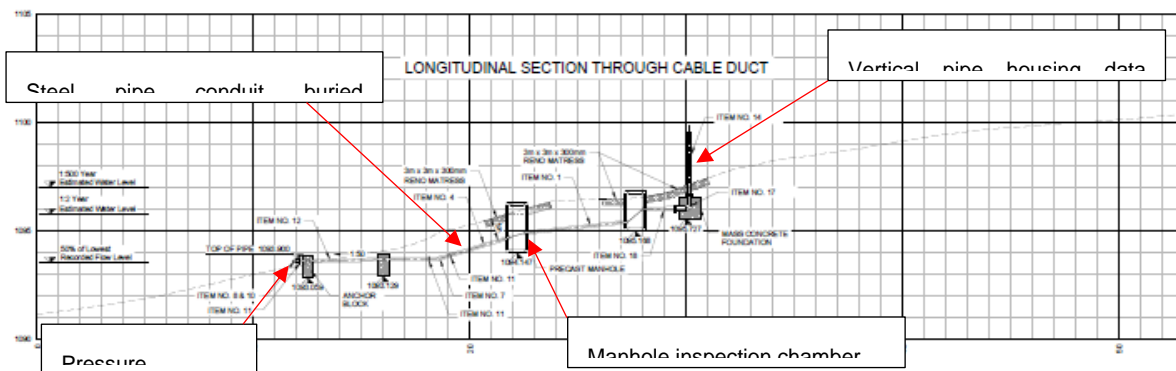


Figure 4 Design drawing snippet showing the steel pipe and manhole locations

This steel pipe design is shown in the figure above and, it will be carried underground and its main purpose is to prevent damage to the conduit and the electrical cable within it. The steel pipe structure will be intersected by precast manhole rings forming inspection chambers during the operational lifespan of the gauging station. This is to provide easy access for maintenance. Figure 4 shows a snippet of the full design and it shows the location of the manhole rings. This is a distinct enhancement of the existing installation.

Also part of the new installation will be the construction of new gauge plate installations. The current gauge plates appear to have been damaged over time and are a little displaced in some cases. These installations will include the construction of a concrete base. This will enable the manual reading of water levels to confirm the levels from the automated system.

The final part of the system is the pressure transducer coupled with a water quality meter probe which will be positioned at a fixed level within the river in order to enable accurate water level and water quality parameter readings. The water levels will be converted into discharge measurements based on a measured rating curve at the site.

3. Description of the Environment

3.1 Physical Environment and Land resources

The Kavango West region is characterized by an intricate mosaic of distinctive landscapes and landforms differentially sculptured by aeolian processes, incised by ephemeral river valleys, and modified by human interaction. A generally flat to gently undulating area, it lies at an elevation of about 1,100 m above sea level and receives about 500 to 600 mm of annual rainfall. The vegetation is characterised by patches of tall grass interspersed with shrubland and trees that form mixed forests that are dominated by develop into forests by deep rooted *Baikiaea* and *Schinziophyton* woodland (DEA, 2000; Haindongo *et al.* 2019).



Figure 5 Nkurenkurru gauging site and surroundings

The local site as seen in figure 5 above, shows that the river bank and terrace presents an open bear land with fragmented patches of bushland and forest on the eastern and southeastern parts of the environment adjacent to the hydro-gauging site. Also the slope increases as you move towards the river line and this elevates the risk for erosion of the river bank and the extended terrace.

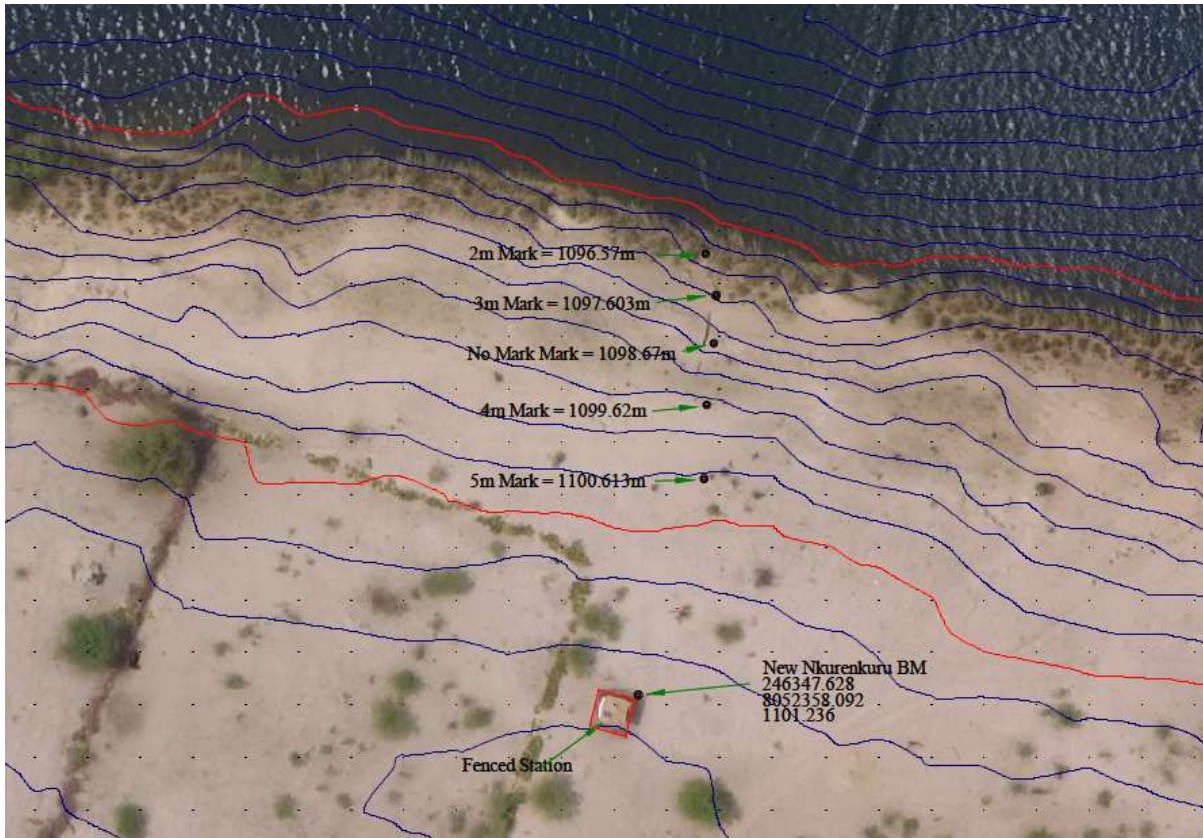


Figure 6 Contours from the site survey

The Kavango west region broadly is flat with an average slope of 0.08% , however, the river banks are usually very high with a fast dropping slope as aforementioned. Figure 6 above is snippet of Annex 2 which shows the contours generated from a land survey of the site. It can be observed from this figure that the slope of the land increases towards the river. A combination of such fast slopping and apparent bear land increases the risk of local erosion. The open parkland is a phenomenon of multiple local factors and it is not envisaged that construction activities will exacerbate this in any way. .

3.2 Social and Cultural Resources

The Kavango west region population based on the office statistics of 2011 is 86 569 which is equivalent to a population density of 3.9 people per kilometre. It is reported that 60% of the local household income comes from farming (NSA, 2015; Haindongo *et al.* 2019). Several researchers attribute the loss of riverine vegetation and forest land in the Kavango west to agricultural activities while at the same time land abandonment is driven by degradation of soil quality.

Locally at the sight it has been observed during field visits that during the dry season the open land is most used by small and large stock for grazing and browsing the marginal vegetation. While during the wet season some of the adjacent open land is used for rain-fed crop production. Some of the local uses include fetching water and fishing from time to time. There



are no graves sites and peculiar cultural resources in the vicinity, and the approach is to position the new infrastructure in the same, or immediate vicinity, of the existing infrastructure. The land is under communal management but pertaining to the site, there is no loss of land or any making of way for the construction site by the community. This is because while the land is communal, the hydro-gauging site has been under the management of the Namibian Government i.e. Hydrology Division of the Department of Water Affairs since 2010. And the new infrastructure will be positioned in the same place, or in the immediate vicinity, of the existing infrastructure. The access roads and clearing of the site were done during the development of the existing site and already a system of co-existence with the community is in place. No significant changes are anticipated.

4. Anticipated impacts and contingency plan

The purpose of the upgrade of the hydro-gauging station is to enhance the integrated transboundary management and improve data availability in the Cubango-Okavango River Basin. This is in support of the concerted effort by Member States to continue to keep a time series record of the condition of the river. This information will be utilised in planning and management of the river basin, as well as in a Flood Early Warning System which will assist in protecting the citizens of Kavango West living alongside the river.

The civil works for the hydro-gauging station is a micro-scale construction project both in land extent and length of time required. Therefore, it is envisaged that probable impacts on the environment that this project will elicit is negligible based on its scale. However, riverine systems and their surrounding environments are sensitive receiving environments therefore the following principles will be observed during construction:

- (1) Compliance with all relevant laws, regulations, policies and standards governing such projects will be ensured, and taking into account relevant regulations/practices of local communities.
- (2) Should comply with relevant regulations of the construction of hydrological systems of both Namibia and International Best Practice.
- (3) Should strive to reflect completely and objectively all benefits this investment will bring about, especially collecting data that will improve information availability on the health of the river and environment at basin-wide scale.
- (4) Contingency plan for the management of site, waste and water use efficiency and consider the impact of the quality of living by local communities during the construction and operation of the station.

4.1 Construction impacts

The main issues and potential impacts associated with the proposed project were determined at a desktop level and during various levels of engagement with the Member States. Overall



this is a micro-construction project that is envisaged to have negligible impact on the environment.

4.1.1 Impacts on Scour/erosion

The movement of construction vehicles and machinery can elicit disturbances that can trigger erosion. However, this will be a micro-construction project that will complete civil works to support hydrological gauging equipment installation. Therefore, no heavy construction machine will be on sight. Furthermore, the length on the site is likely to take only 4 to 6 weeks. Also this work will be done in the dry season where rainfall is not expected to fall and drive erosion at the site. The site has also been surveyed so the slopes and contours are fully understood and the construction lines have been well designed to minimize the sloping impacts along the construction line. Post construction any trenches and other excavation areas will be fully compacted and rehabilitated before the Contractor leaves the site to minimize the risk of erosion occurring at the site.

4.1.2 Impacts on Ecological Resources

The active construction size is approximately 60m² and the overall onsite footprint including the temporary campsite is expected to be a total of 500m². Therefore, the overall disturbance to both terrestrial and aquatic fauna and flora is expected to be negligible. Furthermore, the timeline of the project is 6 weeks, as such due attention will be taken to ensure that negligible impact will elicit from the construction activities.

4.1.3 Impacts on Socio-economic Resources

There are homesteads within the 1km radius of the construction site. However, there are no educational, religious and medical centres, or site of significant cultural importance and graveyard. Therefore, the probable social impacts such as dust and noise, which may potentially interfere with the quality of life of the homesteads, will be addressed in the subsequent sections.

Before any work gets underway on site, meetings will be held with the local community to ensure that they are aware of the project and to ensure minimal impact on them.

4.1.4 Loss of high value land through land acquisition

The site presently has existing infrastructure and it is already in the management of the Namibia Government, therefore co-existing systems are already in place. Additionally, there is no additional land that will be required or taken from the local communities as a result of this proposed civil works.



4.1.5 Climate change and greenhouse gas emissions

No heat, steam or greenhouse gases will be produced that can significantly enhance GHG emissions and potentially drive climate change. Furthermore, the duration of the site will be short so driving of cars and consumption of fuel by cars will be kept to a minimum.

4.1.6 Water quality

No effluent or any discharge of chemicals that can impact water quality will be discharged into the river system. River water will be used for the concrete works and any mixing of concrete will be undertaken away from the river to ensure no contamination of it. A quantity of 2 000 to 3 000 litres will be used during the concrete works.

4.1.7 Hazardous substances

This work involves cement and regular concrete handling. No hazardous substances will be used at any stage of the civil works. Due care will be taken by the contractor to ensure that no mixing of concrete happens close to the water course. The contained chemical toilet will be maintained with

4.1.8 Impacts on Socio-economic Resources

Construction camp, site offices and works yards/compounds

Pre-site clearing will not be required because the hydro-gauging station and immediate surroundings are mostly bear land. The contractor will install a contained flush toilet that will be used for amenities during the working hours. There will be no campsite setting as the site supervisor and the core construction team will home at the existing site 5 km outside of Nkurenkuru where the contractor (Stefanutti and Stocks) is doing a major project. The manual labour will be sought from the local communities. Furthermore, the contractor will place one camping tent that will be used for guarding duties.

Community health and safety

For the safety of local communities, a perimeter maker will be set-up and two hoarding to the south and west of the site will be fitted with warning information. At night there will be temporal guarding services. Furthermore, the site where access will be blocked to local communities for 6 weeks is approximately 60m². Existing users will have access to both the river, the footpath and grazing area as such, the civil works will not cause any disruption to existing users and local communities outside the construction site perimeter.

- ***Sites of significance***

There are no graveyards or sites of cultural significance in the area. The excavation to lay the steel pipe and manhole rings will be laid along the construction line where present pipes are laid. Therefore, it is not expected that any archeological artefacts can be discovered during the



4.1.9 Noise

Noise during the manual demolition works of the existing gauging station house will not exceed levels necessary to take any further action. Therefore, due to the nature of the works the level of noise expected during the construction is expected to be minimal and for a very short period. During operations relating to removing and demolishing the concrete slab of the existing infrastructure, it is expected that upper exposure noise will be produced. The demolition of the existing hydro-gauging housing is expected to produce 3 ton of building rubble and the removal of the building rubble will not generate noise exceeding upper exposure levels. Therefore, action is not required but nevertheless, this task is scheduled to be completed in two working where site work will start at 06h00 to 18h00. The vast majority of the works will be undertaken using manual labour and there will be very little need for any major machinery. Therefore, noise pollution during construction is expected to be minimal. The homesteads are located significantly further from the site so the quality of life of local communities will be affected adversely and during the day when local communities use the river adjacent to the site, a perimeter will be set offering warnings and cautionary measures. There will be no noise impact post construction.

4.1.10 Dust

As mentioned above there will be minimal use of large machinery in the construction of such a small project. Therefore, the impact of dust is expected to be negligible as the construction equipment and vehicles are not expected to mobilise airborne dust to any significant level., Therefore, dust from the construction site will not create a problem for local communities because the nearest homesteads are sparse and situated about a kilometre away from site. At the same time, for those activities that will generate dust of any sort, suitable dust suppression methods such as watering will be implemented by the Contractor. In the event that more dust than expected is mobilized, a hand-held bowser with spray head attachment will be available onsite and implemented during dust outbreaks and windy days especially during the demolition of the 2x2 metres hydro gauging house and its slab.

4.2 Operation Impacts

The project is expected not to use any water other than that used in the construction phase. The infrastructure is purely for monitoring purposes and will not be using any resources whatsoever post construction. Its purpose is to enhance water resource management of the Kavango River. There are no greenhouse gases that will be produced and no disruption to local community access to the land or water resources is expected. Hence, the operation is expected to be grievance free and the car path and access routes are in existence therefore, it is expected that hydrologist visits two to three times a year for routine check-up will not significantly impact the environment. There are no anticipated changes from what is already in place after the installation is complete.



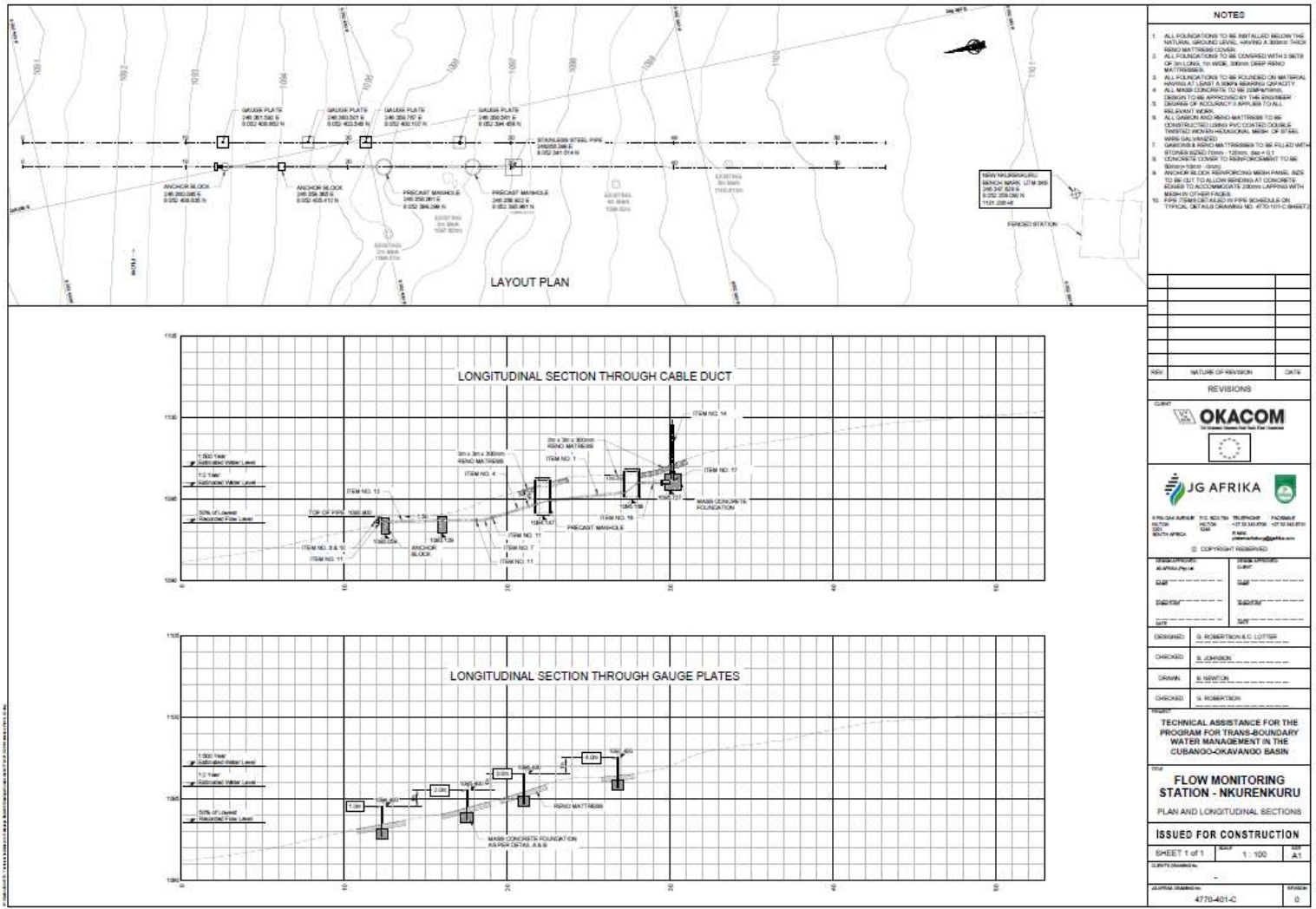
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4.3 Information disclosure and grievance redress mechanisms

This project is a collaboration between the OKACOM Secretariat and the Government through the Department of Water Affairs in the Ministry of Agriculture, Water and Land Reform. Hence, all information regarding the technical specifications, which are effectively the terms of reference for this work, and design drawings can be obtained through the Director of Water Affairs. Further communication was sent to the Regional Governors and the Regional Council who in turn have allocated their Development Planning Division to do visitation. It is envisaged that local communities can take any grievances through these dispensations at the same time OKACOM will have a site supervisor accessible for any queries. However, it is envisaged that it is highly improbable that conflict with local authorities will arise.

Annexure 1



- NOTES**
1. ALL FOUNDATIONS TO BE DETAILLED BELOW THE NATURAL GROUND LEVEL, UNLESS A DIFFERENT NOTE OR OTHER COVER.
 2. ALL FOUNDATIONS TO BE CONCRETE WITH 2 METERS OR 30 LITERS TO WORK, 300MM DEEP SAND OR MATTRESS.
 3. ALL FOUNDATIONS TO BE GRADED ON MATERIAL HAVING AT LEAST A 10% BEARING CAPACITY.
 4. ALL BEARS CONCRETE TO BE 20MPA.
 5. DESIGN TO BE APPROVED BY THE DESIGNER / ISSUES OF LIABILITY APPLIES TO ALL RELEVANT WORK.
 6. ALL CABLE AND SAND MATTRESS TO BE CONTACTED USING PVC COATED CABLES TESTED PERM MECHANICAL, MIN. OF STEEL WIRE GALVANIZED.
 7. SANDS & SAND MATTRESS TO BE FILLED WITH STONES 200 TO 100MM, 50% ± ST.
 8. CONCRETE COVER TO REINFORCEMENT TO BE MINIMUM 50MM.
 9. ANCHOR BLOCK REINFORCEMENT MESH PANEL SIZE TO BE CUT TO ALLOW SPACING AT CONCRETE JOINTS TO COMBING 200MM SPACING WITH MESH IN OTHER FACES.
 10. ALL ITEMS TO BE AS PER SCHEDULE ON TYPICAL DETAILS DRAWING NO. 4770-105-C-04857.

NO.	NATURE OF REVISION	DATE

REVISIONS

CLIENT: **OKACOM**
OKACOM - OKAVANGO KAWANGO AUTHORITY

JG AFRIKA
Engineering & Construction Solutions

PROJECT NUMBER: T10-02/19 TELEPHONE: +27 33 345 6700 FACSIMILE: +27 33 345 6700
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Annexure 2

