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| **SCOPE STATEMENT** | |
| **Project Name** | Borno Ruwa Project |
| **Project Deliverables** | |
| Preliminary Treatment System | This is a higher-level deliverable which is a part of the water purification plant. The main function of this unit is to remove all the large debris and equalize the flow to protect the downstream process.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Wastewater Pipeline Connection * Wastewater Pump Station * Automatic Bar Screen * Grit Tanks * Equalization Basin   The people involved in building these deliverables are the Civil Engineers, Mechanical Engineers, Electricians, and Construction Workers. The construction of this system must be done in the Initial Construction Phase and will be done with the aid of various equipment, machinery, and tools.  These deliverables will be measured based on the percentage of large debris removed by the Automatic bar screen, the quality standard is to remove 95% of all debris which are larger than 6mm which would be measured monthly during the testing phase.  The deliverable will also be measured based on the consistency of the flow rate entering the plant, the quality standard is to maintain the flow variation within ±10% of the average flow rates which would be measured daily during the testing phase period. |
| Primary Treatment System | This is a higher-level deliverable which is a part of the water purification plant. The main function of this unit is to settle out the suspended solids and reduce the organic load.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Primary Clarifiers * Blower Building & Primary Sludge Pump * Primary Anaerobic Digester   The people involved in the building of this deliverable are Civil Engineers, Mechanical Engineers, Electricians, and Construction Workers. The construction of this system must be done after the Preliminary Treatment System has been set up and will be completed using various equipment, machinery, and tools.  These deliverables will be measured based on the percentage of suspended solids removed in the primary clarifiers, the quality standard is the removal of 60-70% of suspended solids which should be measured weekly during the testing phase.  The deliverables will also be measured on the reduction in Biochemical Oxygen Demand (BOD) after primary treatment. The quality standard will be to achieve a 30-40% reduction in BOD. This will be measured weekly during the testing phase period. |
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| Secondary Treatment System | This is a higher-level deliverable which is a part of the water purification plant. The main function of this unit is to further reduce the number of suspended solids remaining and the organic load.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Aeration Tanks * Secondary Clarifiers * R.A.S. Pumping Station, * W.A.S. Holding Tanks * Secondary Anaerobic Digester   The people involved in the building of this deliverable are Civil Engineers, Mechanical Engineers, and Electricians. The construction of this deliverable must be done after the Primary Treatment System has been completely set up and will be completed using various equipment, machinery, and tools.  The deliverables will also be measured by the level of dissolved oxygen within the optimal range for biological activity, the quality standard is to have a dissolved oxygen level between 2-4 mg/l which will be measured continuously throughout the testing phase.  These deliverables will be measured based on the reduction in BOD and Total Suspended Solids (TSS) after secondary treatment. The quality standard is to achieve the range of 85-95% reduction in the BOD and TSS which will be measured weekly during the testing phase period. |
| Tertiary Treatment System | This is a higher-level deliverable which is a part of the water purification plant. The main function of this unit is to smoothen the effluent to achieve stringent discharge standards.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Treatment Tanks * Tertiary Treatment Unit * Membrane Brine Concentrator * UV Disinfection System * Excess Disinfection Unit.   The people involved in the building of this deliverable are Civil Engineers, Mechanical Engineers, and Electricians. The construction of this deliverable must be done after the Secondary Treatment System has been set up and will be completed with the aid of various equipment, machinery, filtration systems, and tools.  These deliverables will be measured based on compliance with regulatory standards for contaminants, the quality standard is to meet all the regulatory limits for the effluent quality in Nigeria and it will be measured continuously throughout the testing phase.  The deliverable will also be measured on the log reduction of pathogens in the effluents, the quality standard is to achieve a 99.99% reduction in pathogens. It will be measured continuously throughout the testing phase period. |
| Sludge Treatment structure | This is a higher-level deliverable which is a part of the water purification plant. The main function of this unit is to treat and reduce the volume of the sludge for disposal or reuse.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Centrifuge & Biosolid Storage * Sludge Thickener   The people involved in the building of this deliverable are Civil Engineers, Mechanical Engineers, and Electricians. The construction of this deliverable must be done after the Secondary Treatment System has been set up and will be completed with the aid of various equipment, machinery, filtration systems, and tools.  These deliverables will be measured based on the measure of the percentage of solids present in dewatered sludge, the quality standard to achieve 20-25% content of solids which will be measured weekly during the testing phase.  The deliverable will also be measured based on compliance with the biosolids regulation for pathogen reduction. The quality standard is to meet Class A Or Class B Biosolids standards which will be measured monthly during the testing phase period. |
| Chemical Systems | This is a higher-level deliverable which is a part of the section required in the facility of the water purification plant. The main function of this unit is to add chemicals to various treatment processes.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Chemical Storage & Feed System * Ph Meter Device.   The people involved in the building of this deliverable are Instrumentation Engineers, Mechanical Engineers, and Electricians. The construction of this deliverable must be done after the Primary Treatment System has been set up and will be completed using various equipment, machinery, dosing system, PH meter, and control panels.  These deliverables will be measured based on the measure of the precision of chemical dosing, the quality standard is within ±5% of the required amount, which will be measured daily during the testing phase.  The deliverable will also be measured based on the pH levels within the optimal range for treatment purposes. The quality standard is between 6.5 8.5 pH levels, which will be measured continuously during the testing phase. |
| Support Facilities | This is a higher-level deliverable part of the required structure needed in the facility of the water purification plant. The main function of this unit is to provide a temporary building for testing processes and administrative support during the entire project execution page.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Administrative Building & Laboratory * Odor Control System   The people involved in the building of this deliverable are Civil Engineers, Mechanical Engineers, Laboratory Technicians, HVAC Technicians, and Electricians. The construction of this deliverable must be done in the Early Construction Phase and will be completed using various equipment, HVAC systems, laboratory systems, odor control systems, ductwork and tools.  The deliverable will also be measured based on the effectiveness of the odor control system. The quality standard is to have odor levels below detectable limits, which will be measured continuously during the testing phase.  These deliverables will be measured on the response time to issues, the quality standard is to respond to issues within 30 minutes, which will be measured continuously during the testing phase period. |
| Instrumentation Unit | This is a higher-level deliverable which is a part of the required units needed in the water purification plant facility. The main function of this unit is to monitor and control the plant construction phase.  This high-level deliverable has been broken down into a lower-level package which is the:   * Instrumentation And Control Systems   The people involved in the building of this deliverable are Instrumentation Engineers and Electricians. The construction of this deliverable must be done throughout the construction phases and will be completed using sensors, control panels, and lifting.  These deliverables will be measured on the percentage of times the systems are operational, the quality standard is 99.90% of uptime, which will be measured monthly during the testing phase period.  These deliverables will be measured on the precision of the monitoring instruments, the quality standard is ±2% of data accuracy, which will be measured continuously during the testing phase period. |
| Effluent Management System | This is a higher-level deliverable which is in the water purification plant facility. The main function of this unit is to manage the treated water discharge.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Flow Bending Structure * Effluent Discharge * Storage Tanks   The people involved in the building of this deliverable are Mechanical Engineers, Instrumentation Engineers, Construction Workers, Plumbers, and Electricians. The construction of this deliverable must be done after the Secondary Treatment System and will be completed with various equipment, connection materials, and monitoring devices.  These deliverables will be measured against the adherence to the discharge permits, the quality standard is to meet 100% compliance with the discharge limits, which will be measured continuously during the testing phase period.  These deliverables will be measured on the percentage of storage capacity, the quality standard is the utilization of 70-90%, which will be measured weekly during the testing phase period. |
| Communication and Market Outreach | This is a higher-level deliverable which is required to be delivered during and after the completion of the water purification plant. The main function of this deliverable is to provide information about the water purification plant, promote the benefits of this project and its services through various media channels, and engage the local community to educate them and involve them in the project.  This higher-level deliverable has been broken down into lower-level deliverables known as work packages they are the:   * Website * Advertisement & Publication * Community Engagement   The people involved in the execution of this deliverable are Web Developers, Content Creators, Marketing Team, Graphic Designers, Community Outreach Coordinators, and Educators. The execution of this deliverable must be done during the initial phase and is ongoing throughout the project. The use of project management tools, educational materials, communication platforms, and web development platforms will be applied.  These deliverables will be measured by the Server Response Time (SRT) and the user accessibility based on the Largest Contentful Paint (LCP) metrics of the website, the quality standard is 300 milliseconds for STR and 2.5s for the LCP, which will be measured continuously throughout the project lifecycle.  These deliverables will be measured on the percentage of conversion rates i.e. visitation to websites and contact to the administrative office, the target is to achieve a 5% conversion rate, which will be measured per campaign or seminar. |
| **Project Exclusions** | |
| 1. **Installation of a complete pipeline system:** This project does not cover the installation of a pipeline system that distributes clean water to the community's households and collects sewage from each household to the state sewer system. 2. **Water Plant Maintenance**: This project does not cover the servicing and maintenance of the purification plant after the construction and testing are completed and handed over to the Nigerian Authorities. 3. **Purchase of Land**: This project does not include payment for the site location for the water plant construction. The selection of the land will be done by the project team, but the land will be acquired from the Nigerian government through the free land allocation scheme for non-profit organization projects hence no payment will be made. 4. **Multiple Sources of Wastewater**: This project does not include the collection of wastewater from various sources within the state as the source of collection is limited to the two sources (the centralized Maiduguri sewage system and River Ngadda) from which the wastewater will be recycled from. 5. **Construction of Sewer System**: This project does not cover the construction of the sewer system in Maiduguri as the state sewer system is one of the points of wastewater source which would be used for the project. | |

Visual Inspiration and Point of Reference used by Team One for The Borno Ruwa Project

Diagram of a solar panel system

Description automatically generated

*Waste Water Treatment Plants* [Photograph]. FWSPL. [Waste Water Treatment Plants – FWSPL](https://fwspl.com/waste-water-treatment-plants/)

**REFERENCES**

American Water Works Association (2004). *Water Treatment Plant Design*(4th ed., Vol. 1). McGraw-Hill Education.

Flosys Water Solutions Pvt. Ltd. (2019). *Waste Water Treatment Plants*. [Waste Water Treatment Plants – FWSPL](https://fwspl.com/waste-water-treatment-plants/)

Obertreis, R. (2024). Project Management Templates: *Project Scope Statement Template* [PowerPoint slides]. eConestoga.

Obertreis, R. (2024). Week 7: *C7d - MGMT 8560 - Weekly Assessments* [PowerPoint slides]. eConestoga.

Pendergast, M. M., Nowosielski, S. M. & Tracy, J. (2016). Going big with forward osmosis. *Taylor & Tracy Group,* *57*(2016), 26529-26538. <http://dx.doi.org/10.1080/19443994.2016.1168581>

Rasmussen, E. (2024, October 10). How fast should your website be in 2023? *EnterSpeed*. [How fast should a website be 🤔](https://www.enterspeed.com/blog/how-fast-should-your-website-be)

United States Environmental Protection Agency. (2015, February).Water Treatment Pilot Plant Design Manual. *EPA*. <https://nepis.epa.gov/Adobe/PDF/P100LXYJ.pdf>