

YONTOOY WATER TREATMENT PLANT FLOOD DAMAGE ASSESSMENT REPORT

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1 GENERAL

This report is a follow up on the joint assessment carried out on February 05, 2024 at the Yontooy Water Treatment Plant by representatives from the Contractor (Elite Builders Ltd) and Consultants (Civil Eng Consulting Company Ltd)

From the assessment, it appeared that the structures within the WTP were structurally sound and the floodwaters mainly affected fittings and finishes on structures. However, we note that the assessment carried out involved visual inspection of the Yontooy water treatment plant structures only and no other methods were employed to determine the structural integrity of the structures. Subsequent sections of this assessment report cover the following areas;



- a) Completely submerged structures
- b) Partially submerged structures
- c) Structurally Affected Structures
- d) Flooded Areas.



1.1 COMPLETELY SUBMERGED STRUCTURES



The assessment applies to support structures of the WTP as follows;



- Administration Building
- Chlorine Storage and Mixing Building
- Pump House
- Air Blower Room
- Generator Room
- Staff Houses
- General Site works

These structures within the WTP were completely submerged by the floodwaters resulting to extensive damages to fittings and finishes.

	Photos indicating extent of damage	Observations on defects	Proposed Corrective Measures
1.	Roofing (iron sheets and timber) 	<p>Damaged and torn Iron sheets</p> <p>Roofing timber- may have been compromised by the prolonged wetting and uneven drying which alternately caused the timber to swell and shrink. Warped timber observed.</p>	<p>Removal and replacement of iron sheets</p> <p>Removal and replacement of the timber.</p>
2.	Ceiling 	<ul style="list-style-type: none"> • Deformations observed on ceiling boards causing some sections to also collapse. • Boards discoloration 	<p>Removal and replacement of the ceiling board and ceiling timber.</p>

	Photos indicating extent of damage	Observations on defects	Proposed Corrective Measures
3.	Tile works		
		<p>Prolonged exposure to water leading to reduced adhesive bond between floor/wall and tiles evident by wobbling tiles.</p> <ul style="list-style-type: none"> • Discoloration on tiles • Hollow sound on tapping • Observed wetted areas between tiles and floor/wall 	<p>Removal and replacement of tiles</p>
4.	Electrical and plumbing fittings		
		<p>Functionality of fittings and wires cannot be guaranteed due to exposure to moisture which may have reduced their integrity, which poses a risk of short-circuiting, electrical fire, shock and electrocution. Observations included;</p> <ul style="list-style-type: none"> • Switches failing to turn on and off, non-functional panel boards and switchboards • Bulb holders, electrical wire conduits fallen off • Electrical wires and conduits damaged and cut off 	<p>Removal of currently installed wires and electrical fittings. Ensuring conduits embedded within wall dry off. Reinstalling of damaged conduits and all wires and electrical fittings. This will include plumbing works which are likely to be damaged or clogged.</p>

	Photos indicating extent of damage	Observations on defects	Proposed Corrective Measures
		<p>Walls (Plaster and Paint)</p> <ul style="list-style-type: none"> • Salt water resulted to damage to plaster, developing from the borders of a pattern of cracks possibly caused by drying shrinkage • Drying shrinkage at joints. <p>Flaking and discolored Paint</p>	<p>Repair on affected areas through exposing the cracks and treating with mortar and re-plastering.</p> <p>Cleaning and scrubbing off old paint and repainting.</p>
5.	Timber Doors		
		<p>Timber Doors have been compromised by the prolonged wetting and uneven drying which alternately caused the timber to swell and shrink.</p> <ul style="list-style-type: none"> ➤ Doors were observed to be stuck and couldn't open easily without being forcefully opened ➤ Also evident from warping observed on frames 	<p>Complete removal and replacement of doors</p>
6.	Metal doors and Windows		

	Photos indicating extent of damage	Observations on defects	Proposed Corrective Measures
		<p>Metal works seem to have greatly rusted due to degradation resulting from excessive corrosion, evident from ease of breakage. Corrosion has affected inner parts for hollow sections.</p>	<p>As a long-term measure and to avoid short life on metal works, replacement of the affected metal doors and windows recommended</p>
7.	<p>Aluminum Windows and Doors</p>		
		<p>Force exerted by water has caused external doors and windows to loosen leading to some falling off. Notable damages include;</p> <ul style="list-style-type: none"> ➤ Dirt trapped between windows and clogging mosquito mesh ➤ Bond between windows and wall seem to have been affected causing windows to loosen ➤ Access door to administration building damaged ➤ 12No. windows observed to be damaged 	<ul style="list-style-type: none"> ➤ Replacement, of mosquito mesh of all windows. ➤ Removal of all windows cleaning and reinstallation. ➤ Replacement of damaged 12No. windows and 1no. door accessing the administration building

1.2 PARTIALLY SUBMERGED STRUCTURES

The assessment applies to support structures of the WTP as follows;

- Chemical Storage, Mixing and Dosing Building
- Filter gallery control room

These structures within the WTP were partially submerged by the floodwaters since they lie on high ground such that floodwaters resulting to minimal effect on finishes and fittings.



Photo 1: Interior of the Filter Gallery Control Room

The only affected part of these structures include;

1. Floor and paint works up to about 1m from the floor level- This will require repainting works to be done up to the affected section and replacement of tiles.
2. It was observed that animals including snakes and bats had taken habitat inside the ceiling of these structures during this period - This will require removal of ceiling, cleaning, sanitizing the areas and re-installation of the ceiling.

1.3 STRUCTURALLY AFFECTED STRUCTURES

From the visual assessment, concrete cracks appeared on top roof slab of the 1000m³ Clear Water Tank. This is likely to have occurred due to overloading of the slab due to excessive weight from floodwaters.



Photo 2: Cracks at top of Roof Slab on 1000m³ Clear Water Tank

Further assessment will be carried out after the water in the tank is pumped out and the soffit of the slab and sidewalls are assessed. Water tightness test will also be carried out to ensure no leakage joints have formed

1.4 FLOODED AREAS.

Some of the areas at the WTP were still flooded with water since the flooding started in December 2023. The area ground at the treatment plant appeared to still be water logged and soil saturated with water evident from the wet ground and pools of water around the plant that are yet to dry up despite the sunny weather.

The flooded areas include

- 1000m³ Clear Water Tank
- Pump House
- Excavated area around the pump house and clear water tank
- Partially water filled sedimentation tank
- Filter gallery pipe area

These flooded areas are also inhabited by fish and snakes, works will involve pumping out the water and discharging to the river since pumping to nearby area will result to pools of water and probable flooding back at the site, scrubbing off molds and sanitizing the 1000m³ Clear Water Tank and the sedimentation tank. The estimated volume of water at these flooding sites is approximately 4500m³.

The flooded sections are as per the below photos.



Photo 3: Water filled 1000m³ Clear Water Tank



Photo 4: Flooded area at the excavated area around the pump house and clear water tank



Photo 5: Flooded sedimentation tank



Photo 6: Flooded area at the filter gallery

2 RENOVATION COST ASSESSMENT

The cost for undertaking the works are derived from the original Contract BOQ rates and measured quantities for each item while works on dewatering, removal of cleaning of walls including (damaged plaster/painting works), removal of damaged tiles, roof and ceiling works are considered to be undertaken under day works.

The breakdown on sections to be corrected is shown below. The detailed estimates are attached separately.

<u>Total Cost Renovation works on Works Damaged by Floods at Treatment Works</u>		Amount (USD)
1	Bill No. 4.10 - Chlorine Storage and Mixing Building- Roofing, Floor & Painting works	
2	Bill No. 4.11 - Pump House-Roofing, Floor & Painting works	
3	Bill No. 4.12 - Air Blower Room-Roofing, Floor & Painting works	
4	Bill No. 4.13 - Generator Room- Roofing, Floor & Painting works	
5	Bill No. 4.14 - Admin Building- Roofing, Floor & Painting works	
6	Bill No. 4.15 - Site and Ancillary Works at Treatment Works Site	
8	Bill No. 4.17 - Electrical Works	
9	Dewatering Cost	
10	Roof Removal Works	
11	Ceiling Removal Works	
12	Tile Removal Works	
13	Cleaning of walls/Disinfection, Cracks repair and damaged worktops removal (capentry works only)	
TOTAL		