

A. DESCRIPTION OF WORK

A.1 GENERAL

This Scope of Work covers all Mechanical Works associated with the Rooiwal Wastewater Treatment Plant Upgrade and Refurbishment Contract. The scope includes activities at Rooiwal East Works.

Mechanical works shall form an integral part of:

- Civil upgrade works at Rooiwal East, where mechanical systems interfaces with new and modified civil structures,
- Refurbishment works across Rooiwal East encompassing the repair, replacement, refurbishment and rehabilitation of mechanical equipment, pipelines and process units.

The objective of the mechanical works is to restore and upgrade the entire wastewater treatment plant to full operational functionality in strict compliance with:

- City of Tshwane Metropolitan Municipality requirements,
- National Department of Water and Sanitation standards and regulations,
- Applicable environmental legislation and statutory requirements.

Mechanical works shall include, but are not limited to, the supply, installation, refurbishment, modification, testing and commissioning of all mechanical plant and equipment necessary to meet the above objectives.

A.2 SCOPE OF WORK

This contract covers the full mechanical works for Rooiwal Wastewater Treatment Plant across Rooiwal East . The works form part of a larger plant-wide upgrade and refurbishment initiative intended to restore all process units to full operational functionality.

DETAILED SCOPE OF MECHANICAL WORK- ROOIWAL EAST

3.9 INLET WORKS

1. Refurbish three inlet sluice gates,
2. Derusting and Corrosion protection of inlet works mentis grid hand railing and floor gratings
3. Supply and installation of fine expanded metal or grating downstream of the three rung steps at inlet channel number
4. Refurbishment of the mechanical inlet screen no 1
5. Supply and installation of a new mechanical inlet screen to no 2
6. Recovery and major service of the removed screen on inlet channel no 2.
7. Refurbish and modification of the horizontal screw
8. Supply and Install rising (inclined) screw conveyor for the of fine grit classifier,
9. Refurbish three Outlet sluice gates
10. Supply and install of plain stainless steel identification plates at the inlet screens.

3.10 DEGRITTER CHAMBERS

1. Refurbish two Degritter Inlet sluice gates
2. Replacement of all twenty-six the deflector plates at the Degritter chamber.
3. Removal, corrosion protection, painting, and reinstallation of the twenty-six mentis handrails at the Degritter Chambers.
4. Corrosion Protection of the four floor gratings at the Degritter chamber bridge
5. Supply and Installation of two new mild steel and corrosion protected Grit scrapers
6. Replacement of the grit scraper drive motor
7. Refurbish grit scraper motor gearbox

8. Supply and Installation of two new grit removal submersible pumps complete with hose, non return and isolation butterfly valves
9. Modify and refurbish grit classifier No 1
10. Refurbish grit classifier No 2.
11. Supply and install a new screw conveyor at grit classifier no 2
12. Refurbish two manual hoists at grit chambers
13. Corrosion treatment of two gritter bridges
14. Supply and install identification plates for Degritter chamber equipment

3.11 PRIMARY SETTLING TANKS

1. Refurbish four inlet sluice gates at the PST D-Boxes
2. Refurbish eight Sluice gates at the PST Inlets.
3. Replace all the asbestos scum baffles at the Primary settling tanks with Stainless Steel baffles,
4. Replace all the eight scum remover bridges and accessories for all the PST's including the tipping trough, valves and actuators,
5. Refurbishment of eight scum removal isolating valves,
6. Refurbish all eight IQ Rotork Actuators for Primary Sludge Draw off.
7. Supply and installation of all eight pedestal supports for the shafts connecting the draw off valves and the Rotork actuators at the valve chambers
8. Refurbish the fine screens 1 to full operational functionality,
9. Refurbish the fine screens 2 to full operation functionality,
10. Supply of new fine screen bins
11. Supply and install of plain stainless steel identification plates at the primary settling tanks

3.12 PRIMARY SLUDGE PUMP STATION

1. Refurbish three Manual Isolation valves into the Primary Sludge Pump station. This includes the bypass valve between sump 1 and 2,
2. Refurbish five Manual Suction Isolating valves for the sludge pumps,
3. Supply and install emergency submersible drainage pump including float switch and piping to discharge back into the primary sump.
4. De-rust, corrosion treatment, and painting of the 2T beam inside the plant room
5. Load Test and certify 2T Single Beam lifting equipment.

6. Supply and install of plain stainless steel identification plates at the primary sludge
7. Refurbish Fines Screen No 1,
8. Refurbish Fine Screen No 2,

3.13 ANAEROBIC DIGESTER PLANT

1. Replace three Vaughan Mixing Pumps complete with their motors
2. Refurbish eight Inflow Isolating Valves,
3. Refurbish eight Manual Outflow Isolating Valves,
4. Refurbish twenty-four Manual Supernatant Water Isolating Valves,
5. Refurbish twenty-four Mixing Valves,
6. Refurbish eight Rotork actuators for the mixer Inlet valves.
7. Derusting, corrosion protection and painting of all exposed piping and fittings at each digester tank.
8. Refurbish two sludge feed manifold Isolating valves,
9. Supply and install of plain stainless steel identification plates at the Anaerobic Digester Plant.

3.14 DIGESTED SLUDGE PUMP STATION

1. Refurbish one Gorman Rupp Ultra V6A60 pumps,
2. Replace one Gorman Rupp Ultra V6A60 Pump,
3. Refurbish four manual suction and discharge valves,
4. Supply and install submersible emergency drainage pump including float switch and piping to discharge
5. Derust, corrosion treatment, and painting of the 2T beam inside the plantroom.
6. Load Test and certify 2T Single Beam lifting equipment.
7. Supply and install of plain stainless steel identification plates at the Digested Sludge Pump Station.
8. Refurbishment of two inlet valves in situ at Digested sludge Pumpstation

3.15 TRICKLING BIO-FILTERS

1. Refurbish all eight Sluice Gates at the main dividing chambers.
2. Refurbish all the eight-dosing siphon cast iron dome which includes rust removal, corrosion treatment and coating.
3. Replace dome pipe and fittings,

4. Supply and Install dome Supports,
5. Supply and Install Hand Stops at the Biofilter dividing Chambers.
6. Quote to Strip and Refurbish eight biofilter center column
7. Provision for Replacement of eight center columns.
8. Replacement of cross wire ropes holding distribution piping including replacement of the turnbuckles.
9. Replacement of wire ropes from the supporting rods including the replacement of turnbuckle
10. Refurbish sixteen scour valves,
11. Supply and install of plain stainless steel identification plates at the Biofilters.

A.16 FERRI-CHLORIDE DOSING PLANT

1. Supply and Installation of a pre-assembled Dosseuro or equivalently approved Ferri Dosing plant with four duty peristaltic pumps @ 271 l/h + one standby pump. New plant must come fully tested and precommissioned to connect only to the existing outlet piping.
2. Replace all PVC Piping inside the plantroom.
3. Integrity Test and Certification of existing Ferri Bulk Tanks including sealing off the gap between the tank bottom and the floor with concrete.
4. Replace all the PVC Ferri Chloride piping from the refill points, to the ferri tanks and then to the ferri dosing plant
5. Supply and install of plain stainless steel identification plates at the Ferri Dosing Tanks.

3.17 EFFLUENT AND HUMUS PUMPSTATION

1. Refurbish four Isolating manual valves at the sump,
2. Refurbish four Isolating manual humus valves at the humus pumps,
3. Paint all the humus piping inside the plantroom.
4. Supply and Install one End Suction Farmer Pump.
5. Repair all leaks, treat corrosion and paint all piping at the farmers pumps
6. Derust, corrosion protect and paint the 5T Single beams inside the plantroom.
7. Certify and load Test beams and lifting equipment.
8. Supply and install emergency submissile drainage pumps
9. Supply and install of plain stainless steel identification plates

ROOIWAL EAST BIOGAS HEATING SYSTEM

3.18 DIGESTER 8 -15,

The scope of work detailed below shall apply per each digester,

1. Supply and Install 1200x900x12mm Stainless Steel Gr 316 Checker Plate inspect hole lid
2. Remove existing 1200 x 900mm cast iron neck at the inspection hole and replace with a stainless steel 12mm x GR316 Stainless steel including welded flanged lip to fit new lid with pre-drilled holes. This should include removal and recasting concrete neck
3. Replace the 800dia x 12mm cast iron lid for the mixer inlet hole,
4. Supply and Install 500dia x 12mm mild steel steam injection hole lid complete with pipe extension to connect to the 65mm steam supply line.
5. Replace DN65 Steam Injection line into the digester,
6. Replace the DN800dia x 12mm cast iron lid for the mixer inlet hole,
7. Replace all AC Piping from the methane gas outlet to the valve chamber with welded stainless-steel GR 316,
8. Remove, recast and replace existing methane gas outlet cast iron neck and replace with stainless steel GR316 neck complete with lip flanges with pre-drilled holes and gasket to mount new lid of size 1100mm x 12mm,
9. Supply and install new stainless steel dome lid for methane gas outlet dome,
10. Remove existing and replace pressure and vacuum breather valve including the DN125mm inline deflagration flame arrester,
11. Derust and repaint all hand railings at the Digester plant including those leading to the ground level,
12. Shorten existing DN225 cast iron scum removal/overflow piping to required level
13. Supply and Install DN225 mechanical flange adapter,
14. supply DN225mm loose removable flange (to be used during crust removal),
15. Supply and install steel handrails to fully enclose the digester tank valve chamber,
16. Refurbish DN125 methane gas isolating valve in the valve chamber,
17. Replace all DN125 AC Methane gas piping with welded stainless steel Gr316 piping including properly coupling the piping to underground AC Piping to the boiler plant,
18. Supply and install new thermocouple with Analogue gauge for local readout,

3.19 METHANE GAS FLARE BURNER

1. Isolate, Dismantle, safely relocate and reassemble the flare burner unit from the valve chamber to the designated area next to the steam boiler plant.
2. Refurbish and Recommission Flare Burner ,
3. Supply and Install Welded DN100 stainless piping from the valve chamber to the new location of the flare burner. Stainless Steel piping to run overhead on existing platforms,
4. Supply and install DN100mm detonation flame arrestor,

3.20 VALVE CHAMBER AND METHANE GAS HOLDER

1. Clean 150mm Concealed AC Methane Gas Line,
2. Pressure Test DN150 AC Line,
3. Repairs as per pressure test report,
4. Refurbish three DN150 methane gas isolating valves,
5. replace three existing DN150mm inline deflagration flame arrestors,
6. replace 150mm corroded and AC Piping section in the valve chamber with welded stainless steel,
7. Refurbish isolating valve to the gas holder,
8. Supply and install handrailing's at the main valve chamber (7m x7m),
9. Clean valve chamber and unblock all drains,
10. Replace DN80 AC overflow pipe with Mild Steel piping,
11. Refurbish DN150 Scour valve at the methane gas holder,
12. Replace Overflow Float and ball valve in the make-up tank
13. Corrosion Protection of the entire gas collection dome (13000mm diameter) in situ
14. Refurbish guide rollers and frame columns of the gas collecting dome frame
15. Replace all frame anchor bolts (4 per column x 8 columns)

3.21 STEAM PIPING

1. Remove existing steam piping, lagging, cladding, hangers and brackets from digester 8-15 and to the old steam boiler plantm
2. Properly dispose of fiberglass insulation removed from the steam pipes,
3. Supply and Install DN65mm Welded steam piping including 25mm fiberglass insulation and Stainless-Steel Cladding including bends, tees, reducers and Expansion Bellows. Contractor to use existing platforms for mounting steam piping but these excludes the mounting brackets

4. Supply and install eight 65mm Globe valves for Isolating steam supply to Digesters 8-15
5. Supply and Install DN80 Sch80 Welded steam piping including 25mm fiberglass insulation and Stainless-Steel Cladding including bends, tees, reducers and Expansion bellows. Contractor to use existing platforms for mounting steam piping but these excludes the mounting brackets
6. Supply and install eight DN65 Steam Non-Return Valves,
7. Supply and install four DN20mm complete steam trap arrangement,
8. Supply and Install DN100mm Sch80 Welded steam piping including 25mm fiberglass insulation and Stainless-Steel Cladding including bends, tees, reducers and Expansion bellows. Contractor to use existing platforms for mounting steam piping but these excludes the mounting brackets,
9. Supply and install new DN200mm inline deflagration flame arrestor outside the boiler plant,

3.22 OLD STEAM GENERATOR/BOILER PLANT

1. Conduct and submit a comprehensive Non-Destructive Testing Report to evaluate the structural integrity of the old biogas Cyclotherm Steam Boiler (Serial 2800...33/Type CE...2800)
2. Relocate the boiler from the old boiler plant to the new boiler plant,
3. Based on the NDT Findings, perform necessary repairs to restore the boiler to full operational status. Preparation and repairs work to meet or exceed standards required for a 36-Month Interval Inspection. All repair activities to be conducted at the new boiler
4. Hydrostatic Pressure Testing and Approved Inspection Authority Certification of the Cyclotherm Boiler,

3.23 NEW STEAM GENERATOR/BOILER PLANT

1. Conduct and submit a comprehensive Non-Destructive Testing Report to evaluate the structural integrity of the new uncommissioned biogas Cyclotherm Steam Boiler (Serial 2800...33/Type CE...2800),
2. Based on the NDT Findings, perform necessary repairs to restore the boiler to full operational status. Preparation and repairs work to meet or exceed standards required

for a 36-Month Interval Inspection. All repair activities to be conducted at the new boiler plant,

3. Hydrostatic Pressure Testing post repairs and Approved Inspection Authority Certification (AIA),
4. Supply, install and commissioning of new boiler water treatment plant,
5. Supply, Install and commissioning of new water filtration and softening plant for the feedwater system,
6. Twelve Months Supply of Water Treatment Chemicals and brine for water softening plant,
7. Supply and Install DN50mm Galvanized feedwater water piping including accompanying fittings from the feedwater tanks to the two commissioned boilers
8. Commission feedwater tanks and Pumps,
9. Supply and install 100dia Steam piping including 25mm fiberglass lagging and stainless-steel piping from the boiler outlet to the supply header and from the header to connect to the outside lines ,
10. Supply and Install DN100dia Steam Globe valves for steam supply Isolation,
11. Supply and Install DN50mm galvanized water piping including fittings from the gas collecting dome to the new boiler plant,
12. Supply, install and commission 2 x 48kg LPG Gas bank outside the galvanized new boiler plant including piping to the boilers, changeover switch pressure testing, commissioning and certification,