GEODYN SOLUTIONS™

GREEN WATER RECYCLING AND ENERGY PLANT IN SOUTH AFRICA

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PROJECT OVERVIEW

- ***Project Name:*** Green Loop Utility Plant – South Africa
- ***Location:*** To be determined in consultation with local municipalities
- ***Plant Capacity:*** Treats 150,000 m^3/day of municipal wastewater
- ***Capital Investment (CAPEX):*** $250 million (including 20% contingency)
- ***Electricity Production Cost:*** $0.19/kWh
- ***Water Recycling Rate: 90%***
- ***Fertilizer Production:*** From recovered biosolids and nutrients

OBJECTIVES

- Transform municipal wastewater into clean water and biosolids.
- Use biosolids to generate electricity using ORC (Organic Rankine Cycle) and heat recovery.
- Recover phosphorus, nitrogen, and potassium to make commercial-grade fertilizer.
- Achieve net water reuse and zero-discharge operations.
- Support sustainable agriculture and grid resilience.

KEY COMPONENTS AND TECHNOLOGIES

- ***Microbial Treatment & Algal Reactors*** – First stage for organic load breakdown.
- ***Advanced Membrane Filtration (MBR/UF/RO)*** – For water purification.
- ***Sludge Digestion & Dewatering*** – To concentrate biosolids.
- ***ORC & Steam Turbine Units*** – Converts biosolids into heat and electricity.
- ***Nutrient Recovery Units (Struvite Crystallization)*** – Extracts NPK.
- ***Solar Panels & Biogas Capture*** – Enhances energy efficiency and reduces emissions.

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IMPLEMENTATION STEPS

PHASE 1
FEASIBILITY AND PLANNING (MONTHS 1–6)

- Conduct site selection, EIA (Environmental Impact Assessment), and secure permits.
- Finalize MoUs with local government and utility partners.
- Engage engineering firms and technology partners.

PHASE 2
DESIGN AND PROCUREMENT (MONTHS 7–14)

- Detailed engineering designs.
- Equipment procurement: microbial bioreactors, membranes, turbines, nutrient separators.
- EPC (Engineering, Procurement, Construction) contractor appointment.

PHASE 3
CONSTRUCTION AND INSTALLATION (MONTHS 15–32)

- Civil works: tanks, pipelines, sludge processing.
- Install mechanical, electrical, microbial systems.
- Workforce training and local hiring.

PHASE 4
COMMISSIONING AND OPERATION (MONTHS 33–36)

- System calibration, testing, and tuning.
- Start full-scale operation.
- Begin water distribution, fertilizer packaging, and electricity sales.

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FINANCIAL SUMMARY

CAPEX ($250 million including 20% contingency)

- ***Core Technology & Equipment:*** $100M
- ***Construction & Installation:*** $80M
- ***Engineering & Legal:*** $20M
- ***Contingency (20%):*** $50M

OPEX (Estimated $15 million/year)

- ***Labor:*** $3M
- ***Energy & Maintenance:*** $5M
- ***Chemicals & Microbial Inputs:*** $2M
- ***Insurance, Admin, Compliance:*** $5M

ROI AND REVENUE STREAMS

REVENUE STREAM	ESTIMATE (ANNUAL)
Electricity sales (50 GWh @ $0.19/kWh)	$9.5M
Fertilizer sales (50,000 MT)	$10M
Recycled water sales (40 million m³)	$12M
Carbon credits & ESG incentives	$3M
Total Revenue (Annual)	**$34.5M**

- Payback Period: ~10 years
- ROI after 10 years: ~12–15% annual return

LAND REQUIREMENT

TOTAL LAND AREA: 20–25 HECTARES

BREAKDOWN:

- ***TREATMENT FACILITY:*** 10 HA
- ***POWER & ORC UNIT:*** 5 HA
- ***STORAGE & PACKAGING:*** 5 HA
- ***BUFFER & FUTURE EXPANSION:*** 5 HA

JOB CREATION AND COMMUNITY IMPACT

- **Construction Phase:** ~400 jobs
- **Permanent Operations:** 120 direct jobs + 300 indirect jobs
- Local contracts for waste transport, packaging, maintenance
- Training programs with local universities for green jobs

ENVIRONMENTAL BENEFITS

- ***Zero Wastewater Discharge:*** 90% water reuse, 10% safely evaporated or processed
- ***Carbon Footprint Reduction:*** Over 50,000 tons CO□eq avoided annually
- ***Soil Health Restoration:*** Organic fertilizer from biosolids and nutrients
- ***Air Pollution Control:*** No incineration; low-emission ORC energy recovery
- ***Methane Capture:*** From biosolids for energy
- ***Groundwater Recharge:*** Safe clean water used for agriculture

STRATEGIC PARTNERSHIPS

This project embodies Geodyn Solutions' mission to lead the next-generation water-energy nexus. The $250M investment will:

- Address South Africa's wastewater challenges,
- Support green agriculture and energy,
- Deliver strong financial returns, and
- Drive environmental and social transformation.

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