



THE PAPUA NEW GUINEA  
**UNIVERSITY OF  
TECHNOLOGY**

# Lae City Second Seventh Landfill Rehabilitation

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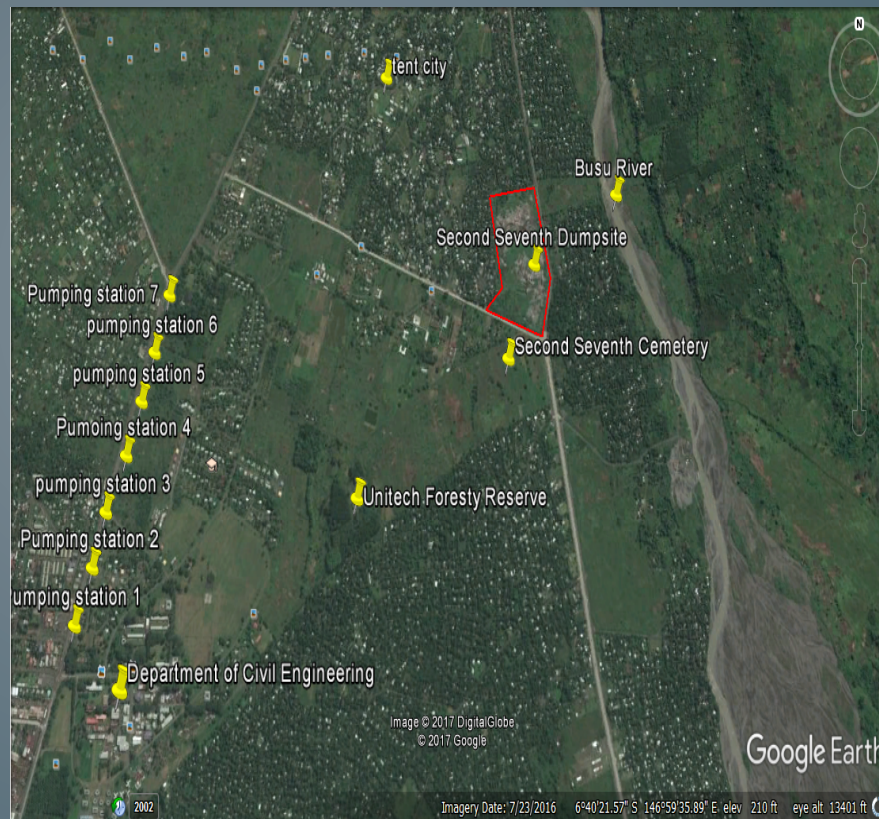
# Presentation Outline

- Introduction
- Rehabilitation Strategy
- Impact to the Rehabilitation



# Introduction

- What is the Second Seventh Landfill?



- a 40-year-old municipal solid waste dumpsite located at the Second Seventh of West Taraka in Lae City of Papua New Guinea.
- The location of the landfill is at the heart of a community of Lae City settlers and the Papua New Guinea University of Technology (Unitech).



# Introduction

- What is the Second Seventh Landfill?



- The landfill continues its operation in open dump causing the effects of leakage concentrations in the soil and hydrology system in which the water supply of Lae City depends located along the Unitech perimeter at Independence Drive.



# Introduction

- According to the National Research Institute (2017) of the country, the Department of Environment and Conservation study in 1985 at Baruni Dump in Port Moresby shows that the production of solid waste is between 0.21 to 0.39 kilogram per day, per person, of which 47% was non-biodegradable.
- Since there is no basis for Lae, the authors use this data to make some estimates on the generation of wastes in Lae. For Lae population as of 2017 (World Population Review) is 76,255 persons, and calculating the waste generation of this population is 16 to 30 tons/day.
- Also, the Department of Environment and Conservation study in 1993 showed that domestic waste in Port Moresby is 66.8% biodegradable (including wood), 30.7% recyclable materials (i.e., metals, plastics, and glasses) and a 2.5% non-recyclables (i.e. textiles and ceramics).



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# Rehabilitation Strategy

- LEGGRC Model





# Land Mining



- Land mining is the process of excavating former landfills by removing hazardous wastes materials and minimizing the risk, while taking recovery, and recycling of valuable wastes materials before reuse of the landfill.
- Begins with the systematic method of excavating land, sieving the soil and sorting the scraps into categories group.
- Soil conditioning can be done to use the conditioned soil as material for the greening (park) for the recreation of the community in tent city





# Energy Generation



- Waste-to-Energy process
- As the waste materials decompose, a mixture of gases is produced especially methane gas with high ignition rates.
- Energy System Groups (2017) discussed some percentages released from the landfills like methane with 50%, 47% of carbon dioxide, 7% of Nitrogen and 1% oxygen which will reduce the contribution to the increasing warming of the Earth.



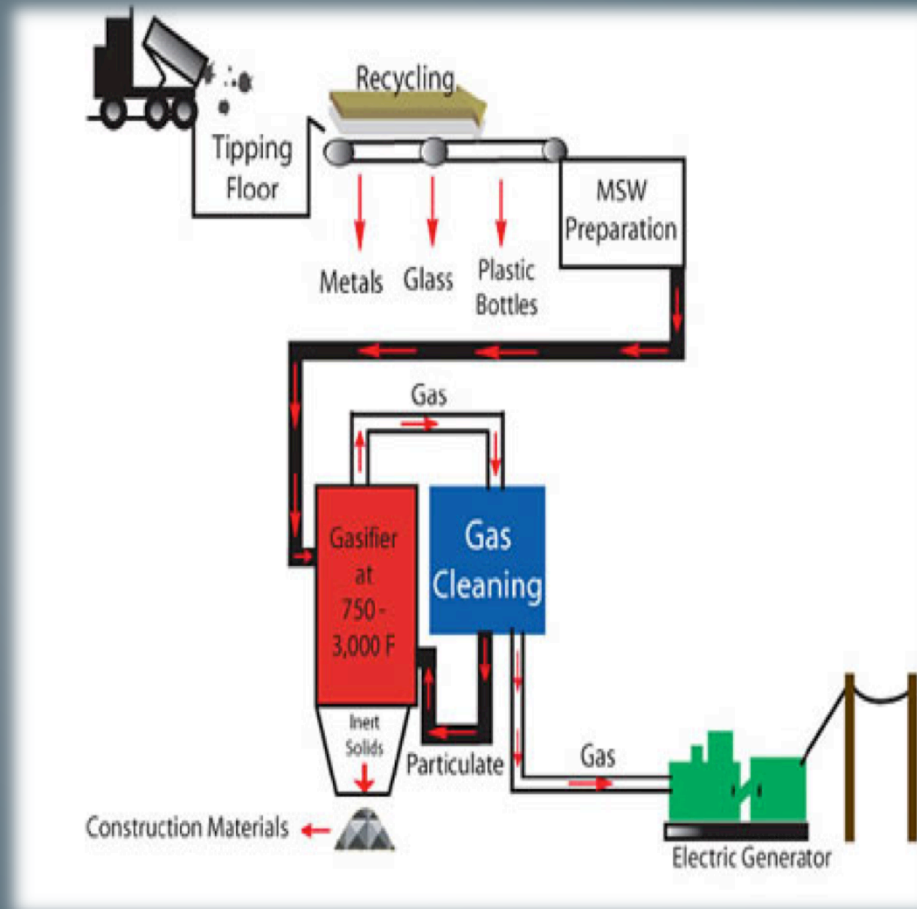
# Energy Generation



- The fact that the Second Seventh landfill emits fires due to toxic gases is unhealthy. Those tiny particles known as Sub PM2.5 is smaller than 2.5 millionths of a meter in diameter are suspended in the air for days.
- Those are contaminants that when inhaled goes into the bloodstream (Mauritius Landfill burning experience, 2013), which was experienced by one of the authors during visits at the landfill causing to feel nausea and fatigue after their visit for two (2) days.



# Gasification



- Waste-to-energy where energy is recovered from the waste materials to produce electricity, heat, fuels, and producing other chemicals at the same time.
- Most of these gases mainly methane gas is highly flammable and easily to explode when extremely compressed.

source: Steve Thornberry Powerpoint presented in the Philippines



# Green & Recreation



- Phytoremediation solutions
- Dense woodland as water barrier
- Stabilization pond
- Fountain & Fish pond



# Recycling & Conservation

- Minimize scavenging (PGK200- PGK300 or 50-75 euro/day)
- Zero leachate contamination





# Composting





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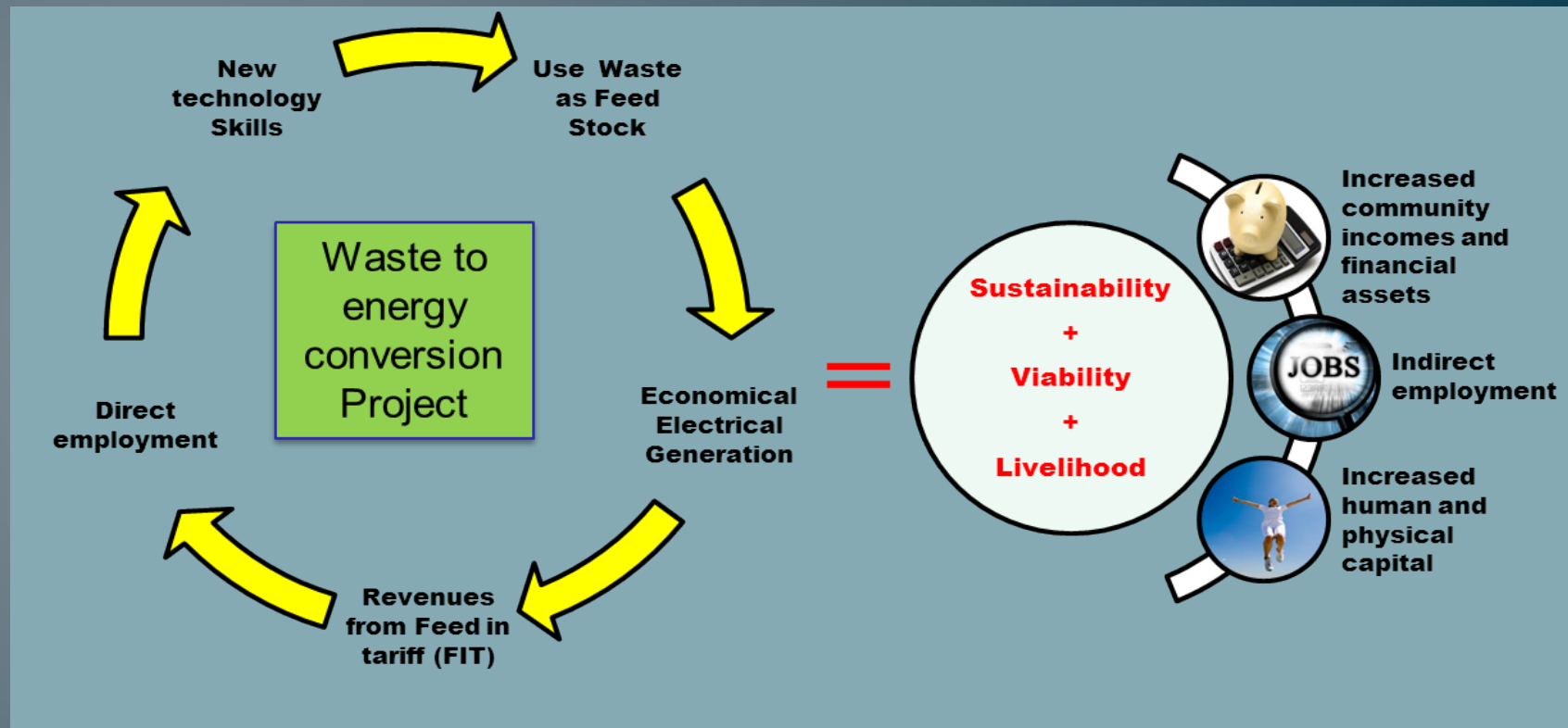
## Impact to Rehabilitation- Land Mining

- More space of the land with minimum risk of its utilization
- Waste valorization
- Soil for greening park – community recreational space of tent city dwellers
- Reduce leachate contamination of the groundwater and river system
- Energy resource to augment power outage in the city
- Creates job





# Impact to Rehabilitation – EnergyGen, Gasification



source: Steve Thornberry Powerpoint presented in the Philippines



# Impact of the Rehabilitation

- The facility intends to create a resource and energy recovery system to create 120 direct and indirect jobs.
- It will save around K106M per year on waste disposal costs that generate an economical electrical generation at K0.50 per KW, and providing electricity to 3000 homes.
- It will reduce landfill growth by 16,000 tons per year, preventing the release into the air of 1600 tons of CO<sub>2</sub> per year, reduce public health issues related to garbage scavenging and groundwater



# Impact of the Rehabilitation

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# THANKS