

4.0 Selected Alternative

4.1 Description of the Selected Alternative

The selected alternative incorporates the following components:

- WWTP sludge Research, Development, and Demonstration Project (RDDP)
- Green, renewable electricity generation utilizing landfill and WWTP digester gas

4.1.1 Relevant Design Parameters

The RDDP will be sized to accept the municipal solid waste generated within the study area and maximize the beneficial use of the waste water sludge contributed by the WWTP. As a result of the ongoing landfill operations and RDDP, landfill gas is generated. To account for projected gas generation over the next 20 years, the gas collection and control system upgrades must be able to collect and conduct at least 2,000 SCFM of landfill gas to the proposed gas-to-energy facility. This facility is therefore tentatively sized to produce a maximum 3,200 kilowatts (kW) of electricity from this gas.

Figure 4-1 presents a schematic diagram of the overall utility improvements proposed in this project plan. Key features include 1) utilization of waste water sludge in the RDDP, 2) disposal of leachate to the City WWTP, 3) collection and supply of landfill gas to the gas-to-energy facility, 4) generation of green, renewable electricity at the gas-to-energy facility, and 5) supply of electricity and heat to WWTP operations, WTP operations, and other City facilities.

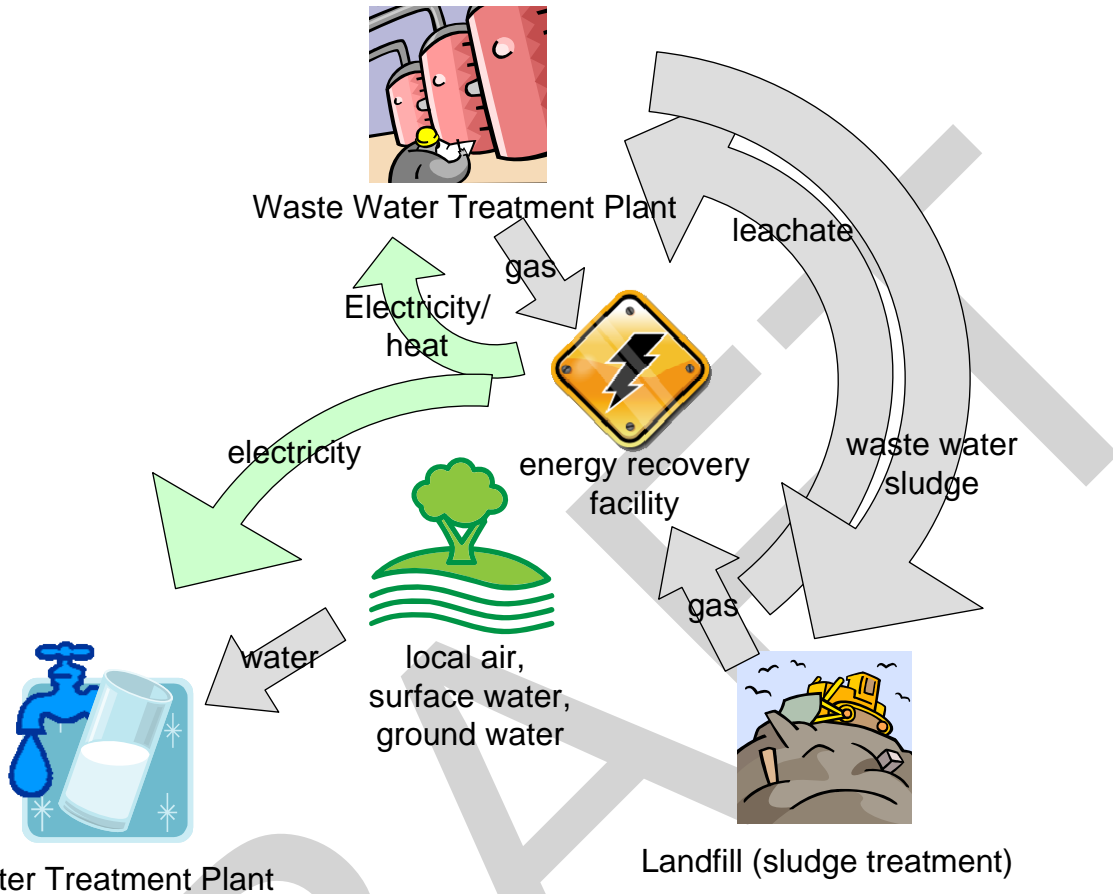


Figure 4-1. Schematic Diagram of Proposed Integrated Utility Improvements, Including Renewable Energy Development

4.1.2 Controlling Factors

Final design and construction of the proposed integrated utility improvements are controlled by the following key factors:

- Adherence to the MDEQ-stipulated landfill construction permit, RDDP permit application procedures, landfill operating license, and air permit requirements
- Mitigation of the potential environmental impacts as described below
- The length (distance to the WWTP) and required flow rate (up to 2,000 SCFM) to operate the gas compressor and gas pipeline

- The required flexibility in the gas collection system and gas-to-energy system to accommodate fluctuating gas generation rates and gas constituents
- The State of Michigan requirements for the operation of electric generators and their connection to the electric distribution grid

4.1.3 Project Maps

The following project maps are provided in the attached figures:

- Figure 7: The proposed pipeline route to transmit landfill gas from the landfill to the wastewater treatment plant
- Figure 8A-8C: The proposed gas extraction system to be constructed at the landfill
- Figure 9: The proposed gas-to-energy facility to be constructed at the wastewater treatment plant

4.1.4 Sensitive Features

The City has undertaken a methodical program to identify various sensitive environmental, historical, and archaeological features within the area of potential effects due to planned construction activities. This program has determined that no sensitive features are located near the construction areas. Details of this program and its associated correspondence with responsible agencies are documented in the attachments.

4.1.5 Mitigation of Environmental Impacts

Details of the methods planned to mitigate the environmental impacts of the project are documented in section 6.0 of this report. Costs associated with these mitigation efforts were included in the cost estimates for the project and are integral to the project implementation.

4.1.6 Schedule for Design and Construction

The schedule provided below is structured for a 1st Quarter closing of the SRF loan.

Table 4-1. Project Schedule

Project Milestone	Date
Submittal of Draft Plans & Specifications	July 27, 2009
Submittal of Final Plans & Specifications	September 8, 2009
Issuance of Construction Permit	September 25, 2009
MDEQ Approval of Plans & Specifications	September 25, 2009
Submittal of CWRF Application Part I	September 4, 2009
Submittal of CWRF Application Part II	September 25, 2009
Submittal of CWRF Application Part III	November 6, 2009
Publication of Bid Advertisement	September 21, 2009
Resolution of Tentative Contract Award	November 5, 2009
Start of Construction	November 30, 2009
End of Gas to Energy Construction	July 15, 2011
End of RDDP Construction	September, 2014

4.1.7 Cost Summary

Table 4-2 summarizes the costs for the design, planning, construction, and inspection of the selected alternative.

Table 4-2. Integrated Utility Improvement Project Costs

Green Energy Recovery Components	
LFG compressor system	\$ 758,100
LFG dryer system	\$ 284,855
LFG siloxane removal system.	\$ 553,495
Low energy (LFG) fuel engine/generator system	\$ 2,684,000
Digester gas compressor system	\$ 83,950
Pre-engineered metal building	\$ 743,475
Process piping	\$ 558,325
Electrical	\$ 669,990
Plumbing	\$ 167,555
HVAC	\$ 279,220
LFG Pipeline	\$ 603,405
Gas Collection System	\$ 1,467,212
Heat Recovery Equipment	\$ 1,235,000
Green Energy Recovery Subtotal	\$ 10,088,582
WWTP Sludge Utilization Components	
RDDP Bioreactor Permit/Construction - Year 1	\$ 300,000
RDDP Bioreactor Construction and Monitoring - Year 2 - 5	\$ 500,000
Sludge Press Upgrades	\$ 690,000
Sludge Utilization Subtotal	\$ 1,490,000
Engineering, Permitting, and Construction Inspection (2007 - 2014)	
Previous Engineering, Design, Drawings, and Specifications	\$ 203,274
Project Plan Development Cost	\$ 45,000
Construction Quality Assurance/Contract Management/Bid Support	\$ 543,900
Engineering Subtotal	\$ 792,174
INTEGRATED UTILITIES IMPROVEMENTS TOTAL COST	\$ 12,370,756
SRF Funding Request	\$ 10,000,000
Project Cost Funded Through Grant(s) or Existing Utilities Budget	\$ 2,370,756

4.2 Authority to Implement the Selected Alternative

The City of Midland is responsible for the wastewater and solid waste services to the City and also owns and operates the sewer system, wastewater treatment system, and landfill. Furthermore, the City has the authority to issue bonds to fund the project under Section 517 of Act No. 34, Public Acts of Michigan, 2001, as amended. Therefore, all aspects of the proposed project plan are within the existing authority of the City of Midland.

4.3 User Costs

The proposed improvements are designed to reduce the operations costs of the wastewater treatment plant and sewer system through improved efficiencies and green energy recovery and development. The effects of these measures are reflected in the present worth analyses presented in the monetary evaluation section. The analyses showed that the selected alternative results in a net reduction in City operating costs. Therefore, existing City funding allocated to the utilities division is sufficient to finance and operate the proposed improvements. No increase to the user costs is proposed as part of this project plan.