



Earthen Manure Storage Facility for Swine Waste Treatment

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Environmental Systems Engineering



01 Objectives

- Improve environmental stewardship practices of Pig farming.
- Treating waste to use it as fertilizer.
- Recover nutrients and energy from manure.
- Enhance economic viability and sustainability of the industry in Southern Saskatchewan.



02 Site Location

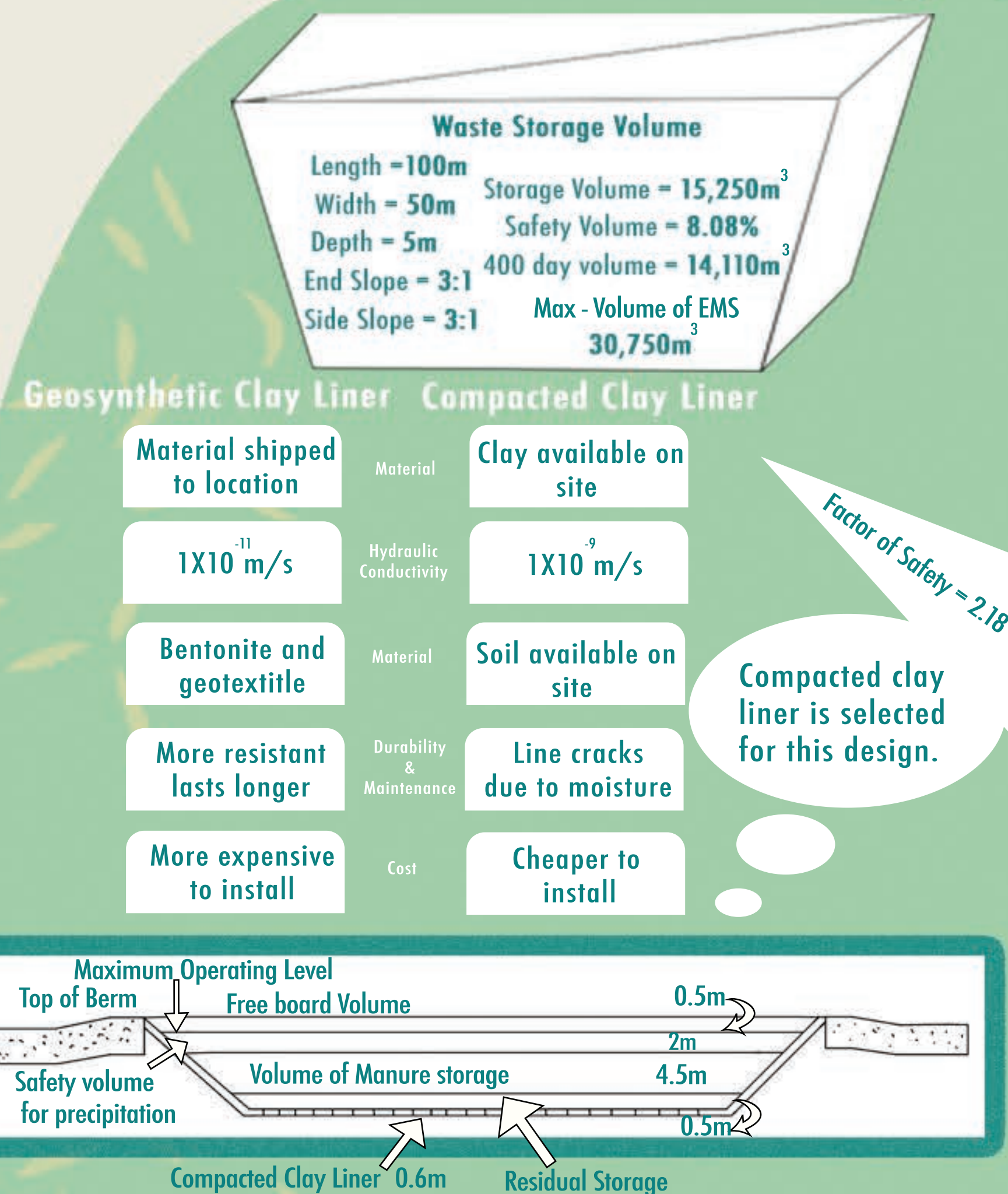
- Southeast part of Saskatchewan.
- SW 32-11-01 W2.
- Located on Highway 48.
- Close to the town of Wawota.



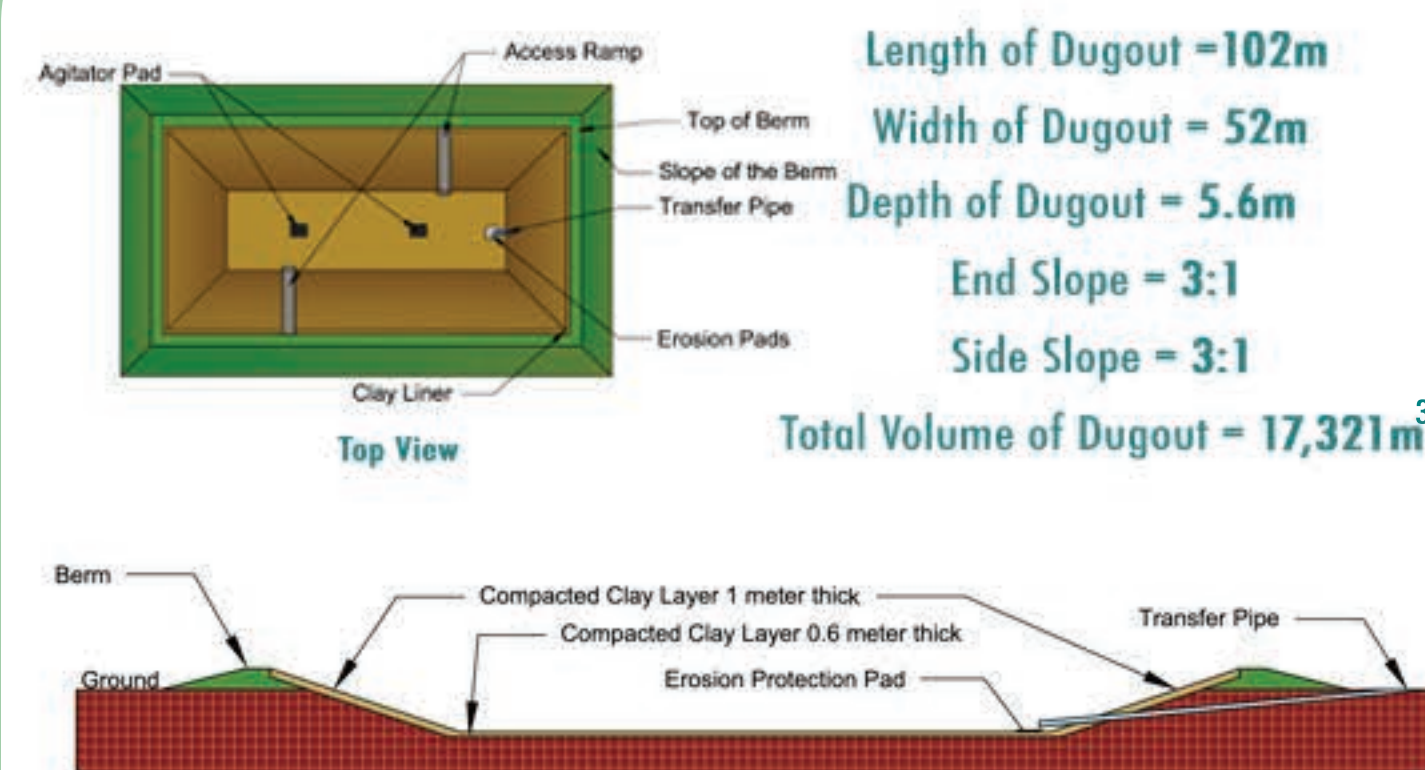
03 Treatment Process



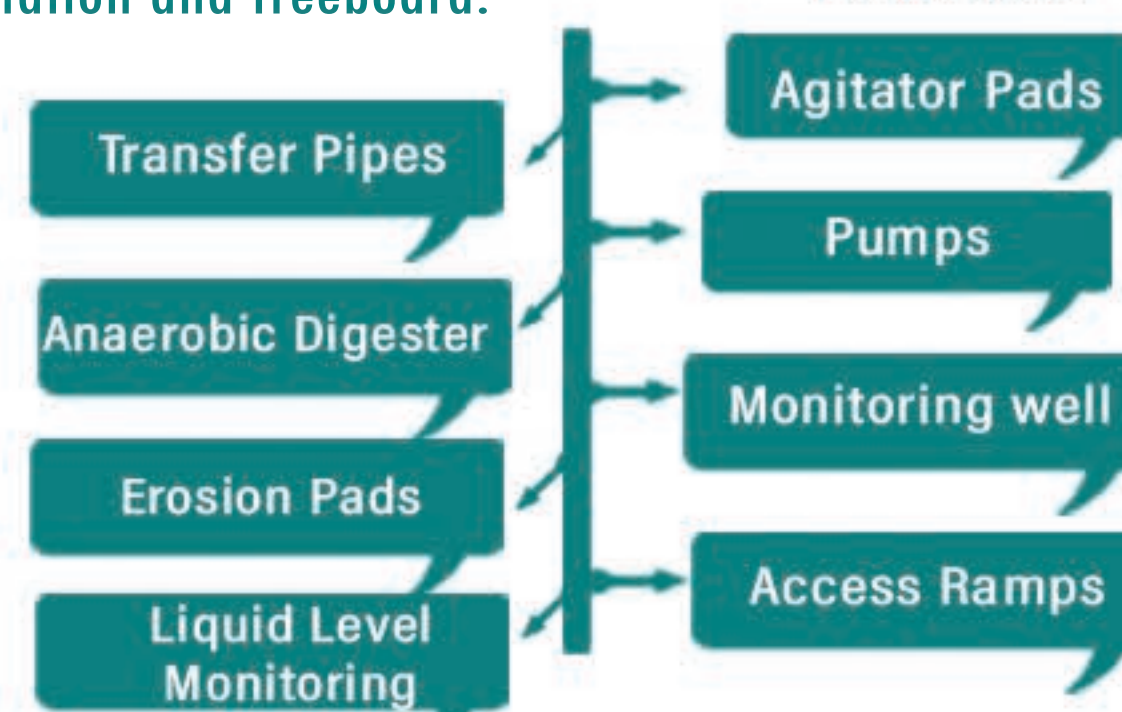
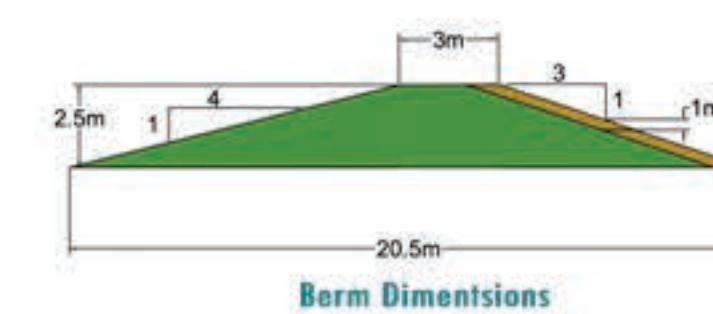
04 EMS Design



Design Specification

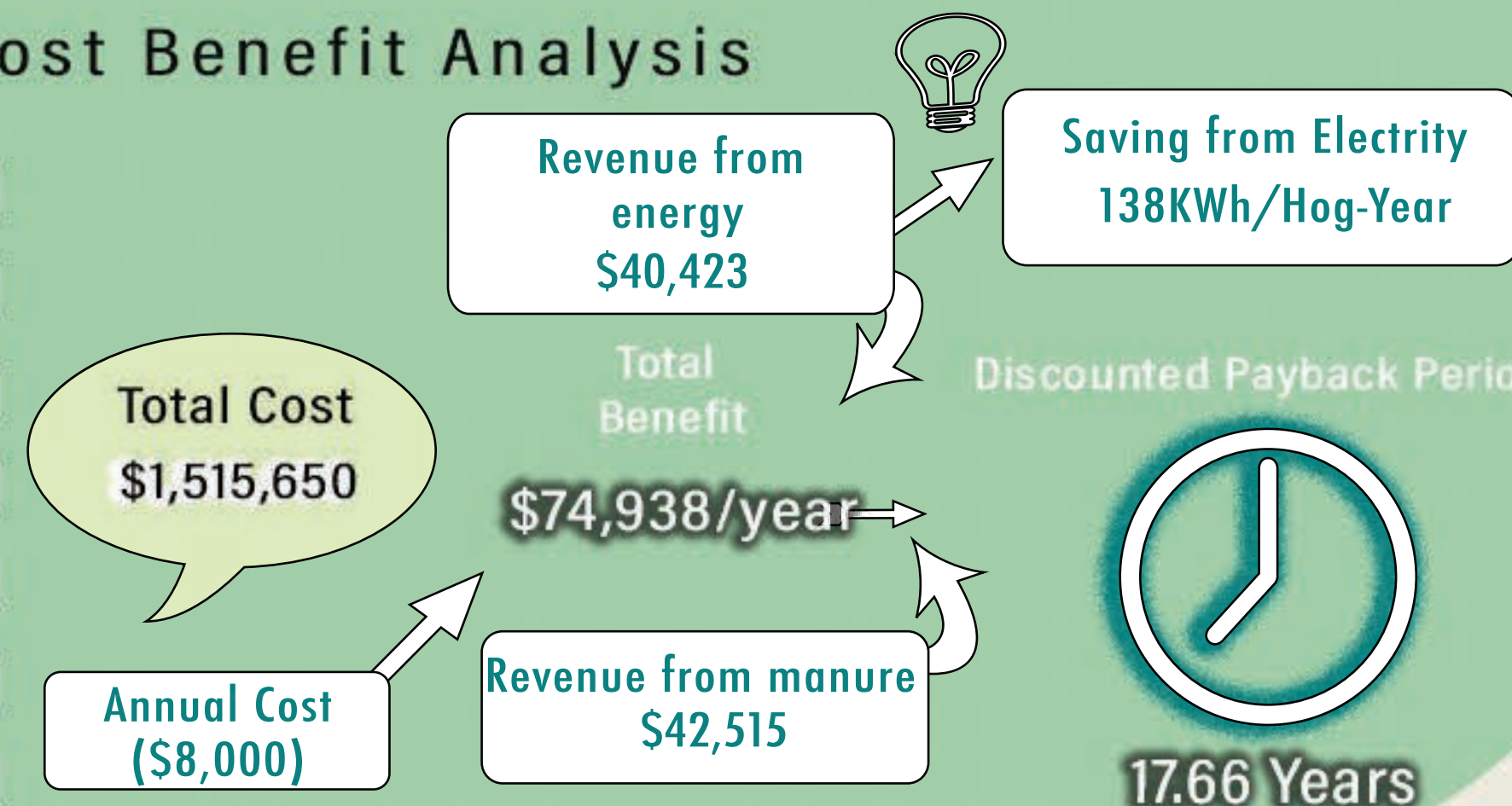


- Berms are constructed to contain contaminants.
- Berm height of 2.5m gives the design a better margin of safety, also accommodates precipitation and freeboard.



05 Cost Benefit Analysis

Cost of Different Parts	Cost
Cost of Excavation & Compaction	\$173,200
Mobilization & Demobilization	\$8,000
Construction of Berms	\$44,000
Erosion Pads	\$950
Agitation Pads	\$1800
Pump Pads	\$150
Pump (1m/s)	\$900
Access Ramps	\$600
Fencing	\$1900
Overhead Cost	\$10,000
Engineering Cost	\$24,150
Transfer Pipes	\$50,000
Anaerobic Digester	\$1,200,000



06 Safety

- Perimeter Fencing - Installing a 1.2 meter high fence will keep the manure structure safe.
- Leak Protection - Pipes that extend below the liner must have anti-seeping collar installed to prevent leakage.
- Deep rooted trees or bushes are not allowed near the close banks as it can pierce the liner.
- Inspection, maintenance and preventative repairs should be performed regularly.



07 Environment Evaluation and Analysis

Priority Value	Site Construction	Collection of Manure	Manure Storage	Manure Treatment	Fertilization	Leaks	Spills and Leaks	Lohani & Thanh				
9 Air Pollution	-2	1	3	2	4	2	3	-1	2	-7	4	-108
8 Soil Activity	-1	2	3	3	4	4		4	3	-6	4	88
9 Surface Water Quality		1	1	1	1			-1	1	-8	6	-423
9 Ground Water Quality		2	2	3	1			-2	2	-5	5	-198
10 Farm Animal Odour		4	3	-2	3	3	3	3	3	-5	4	100
7		-3	2	-2	1			-2	1	-3	3	-133
Lohani & Thanh	-4	26	26	13	14					-154		

- Overall the project has a positive impact on the environment.
- Mitigation methods will be used to control negative impacts.

08 Conclusion

- The EMS design integrates environmental, agricultural efficiency and adherence to regulatory compliance.
- Collaboration between stakeholders and engineers is vital for this project's implementation.
- This project will protect the environment by mitigating groundwater contamination and provide revenue by sustainable practices.