

**Proposed Project for Application to the Kansas Department of Health and Environment
for the Kansas Water Pollution Control Revolving Loan Fund and to the Kansas
Department of Commerce for a Grant**

Applicant: City of McFarland
Wastewater Treatment System Improvements

Contact Person: Donna Crawford
Address: Governmental Assistance Services
905 Joseph Drive
Lawrence, KS 66049

Sent to the Kansas Geological Survey for environmental review.

Agency Review Comments:

The proposed location for the third treatment cell appears to be close to a stream. It is possible that the depth to ground water may be shallow because of the proximity to a stream. Thus, it may be necessary either to construct a shallower cell with a larger area to meet the volume requirement or construct higher walls to the cell so as to keep the bottom of the third cell far enough above the ground-water table level to meet the KDHE regulations.

Any short-term adverse impacts during construction should be offset by the long-term benefits of the improvements to the wastewater treatment system.

Recommended Action:

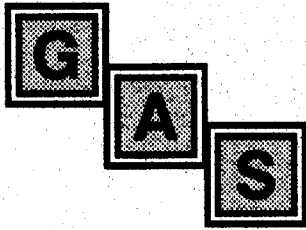
- ☒ Clearance of project should be granted
☐ Clearance of project should not be granted
☐ Clearance of project should be delayed until the issues or questions have been clarified
☐ Clearance of project should not be delayed, but the applicant (in the application) should address or clarify the questions or concerns indicated above

Donald O. Whittemore
Reviewer's Name

Geohydrology Section, Kansas Geological Survey
Division/Agency

5/13/03
Date

Donald O. Whittemore
Reviewer's Signature



Governmental Assistance Services

905 Joseph Drive

Lawrence, Kansas 66049

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Toll Free 888-832-3335

e-mail: gasdonnaa@aol.com

April 28, 2003

Dr. Lee Allison
KS Geological Survey
University of Kansas
1930 Constant Ave., Campus West
Lawrence, KS 66047

RE: Environmental Review – McFarland, KS – Sewer System Improvements
NW ¼, Section 31, Range 11E, Township 11S

Dear Dr. Allison:

McFarland, Kansas is in the planning stages of applying for a Kansas Department of Commerce grant of \$400,000 and a KDHE state revolving loan for \$204,318 for sewer system improvements to add a third cell, expansion of the first cell while sludge is being removed, new wet well and lift station.

Please note the attached engineering write-up and maps.

Please submit all your comments to Governmental Assistance Services, 905 Joseph Dr., Lawrence, KS 66049.

If you should have questions please call my office toll free at 888-832-3335.

Sincerely,

Donna J. Crawford
Project Coordinator

Enc/ Engineering Report
Topo Map

Section 5

ALTERNATIVE FOR UPDATING WASTEWATER TREATMENT FACILITIES

5.1 NO ACTION

The existing wastewater treatment facilities for the City of McFarland, Kansas currently cannot continuously comply with state and federal permit regulations. During the last four years only three tests passed out of 14 that was taken for BOD5. Also, according to KDHE Minimum Design Standards the treatment facility shall be three cells and have at least 120 days of detention with proper piping. No action allows the problem to worsen and is not considered an option at this time. KDHE will not tolerate another year of non-compliance with permit limits.

5.2 Aeration of Existing Lagoon

Due to the existing size (surface area) and depth and the layout of the existing two cell lagoon system, aeration of the facility is not very cost effective. Electrical supply costs and future maintenance costs to operate the system will be excessive. The first cell would have to be split and a concrete wall installed to allow for super aeration. The overall facility would still require a third cell to be consistent with the KSDHE Minimum Design Standards. For the above mentioned reasons aeration of the existing wastewater facilities will no longer be considered in this report.

5.3 Mechanical Plant with Existing lagoon

A Mechanical plant is more desirable to a larger community than the size of McFarland. The initial cost of a mechanical plant and monthly operation is cost prohibitive to be considered. The permit limits set for a mechanical plant are more strict and will very hard to comply.

5.4 New Continuously Discharging 3-cell System, 120 days of Detention

The continuous discharge waste stabilization lagoon is designed on organic loading as previously discussed and hydraulic detention or storage. The minimum KSDHE requirement for wastewater detention is 120 days at average daily flow. The total volume and surface area needed to accommodate this requirement, based on the future design parameters is as follows.

- a. Future Population Equivalent:

$$350 \text{ P.E.} \quad \times \quad 100 \text{ gpcd} \quad = \quad 35,000 \text{ gpd}$$

- b. Allowable Infiltration:

$$250 \text{ gpd/inch/mile} \times 8 \text{ inch} \times 2.0 \text{ mile} = 4,000 \text{ gpd}$$

- c. Total average daily flow:

$$35,000 \text{ gpd} + 4,000 \text{ gpd} = 39,000 \text{ gpd}$$

- d. 120 days, Detention Time:

$$39,000 \text{ gpd} \times 120 \text{ days} = 4,680,000 \text{ gallons}$$

- e. Volume Required:

$$4,680,000 \text{ gallons} \div 7.48 \text{ gallons/ cu. ft.} = 625,668 \text{ cu. ft.}$$

- c. Surface Required at the 5' water level:

$$625,668 \text{ cu. ft.} \div 5 \text{ feet} = 125,134 \text{ Sq. Ft.}$$

- g. Surface area required for the treatment facility:

$$125,134 \text{ Sq. Ft.} \div 43,560 \text{ Sq. Ft./Acre} = 2.87 \text{ acres}$$

- h. BOD5 Loading:

$$\text{Loading} = .17 \text{ lb./cap./day}$$

$$\text{Rate} = 34 \text{ lbs./BOD5/acre/day}$$

$$350 \text{ P.E.} \times .17 \text{ lb./cap./day} = 59.5 \text{ lb./day BOD5 loading}$$

$$59.5 \text{ lb./day} \div 34 \text{ lb./acre/day} = 1.75 \text{ acres primary treatment}$$

$$\text{Existing Cell No. 1} - 2.0 \text{ ac.} > 1.75 \text{ acres required}$$

- i. Possible size of treatment facility:

Existing cell no. 1 has accumulated sludge that should be removed. During sludge removal cell no. 1 can be expanded to accommodate the unused land to the north. This expansion of cell no. 1 will allow for additional future growth.

Existing cell no. 2 has accumulated sludge at the same depth of no. 1 but will not be removed at this time and the cell will remain the same size.

The third cell is not needed for the storage volume but is needed for proper treatment. This cell should be small, but sized to accommodate construction equipment. Although, a smaller cell is best for proper treatment and reduction of algae that may be discharged. This final cell can be up to 10 feet in depth if groundwater is not a problem. During design of the third cell it should be determined if a 10 foot deep cell can be used. A good advantage of a 10 foot deep cell is the multiple discharge points that can be achieved for discharge.

Possible Treatment Facility Size:

Cell No. 1	2.50 acres
Cell No. 2	1.10 acres
Cell No. 3	<u>1.00 acres</u>
Total Surface Area	4.60 acres

5.5 Irrigation

The intention of wastewater irrigation is to irrigate crops that are not produced for direct human consumption. Also, to provide total effluent discharge irrigation would required a large area of irrigation. The City should, although the feasibility of total effluent irrigation is not advisable, consider and discuss with the adjoining landowners the possibility of intermittent short term irrigation around the facility, including the existing grassed dikes and waterways. During hot summer days the water level may be lowered by irrigation resulting in less of a discharge in the fall and spring.

The following management and monitoring requirements apply for treated wastewater from the treatment facility utilized for irrigation purpose at the dikes and waterways.

- Irrigation shall be limited in such a manner as to avoid runoff of effluent to adjacent landowners.
- Control tailwater to prevent runoff to surface waters of the State
- Draw water only from the final cell in the treatment process.
- Irrigation using treated wastewater shall occur only at times when public access to the irrigated area is restricted.
- No ponding of wastewater on the ground surface.
- All monitoring of the treated wastewater shall be conducted using EPA approved methods and KDHE certified laboratories.
- The results of the analyses shall be reported quarterly to the address shown on the standard discharge monitoring report.

5.6 Land Requirements for the third cell

The minimum separation requirements for a facility of 100 P.E. or larger are as follows. This information is reproduced from the KDHE Minimum Design Standards, Section IV General Design Considerations for Sewage Treatment Works.

<u>Plant Type</u>	<u>Existing Habitations</u>	<u>Proposed Development</u>	<u>Property Lines</u>
*Aerobic Lagoon	500'**	350'	100'

* This is the same type of treatment facility that the City of McFarland currently uses.

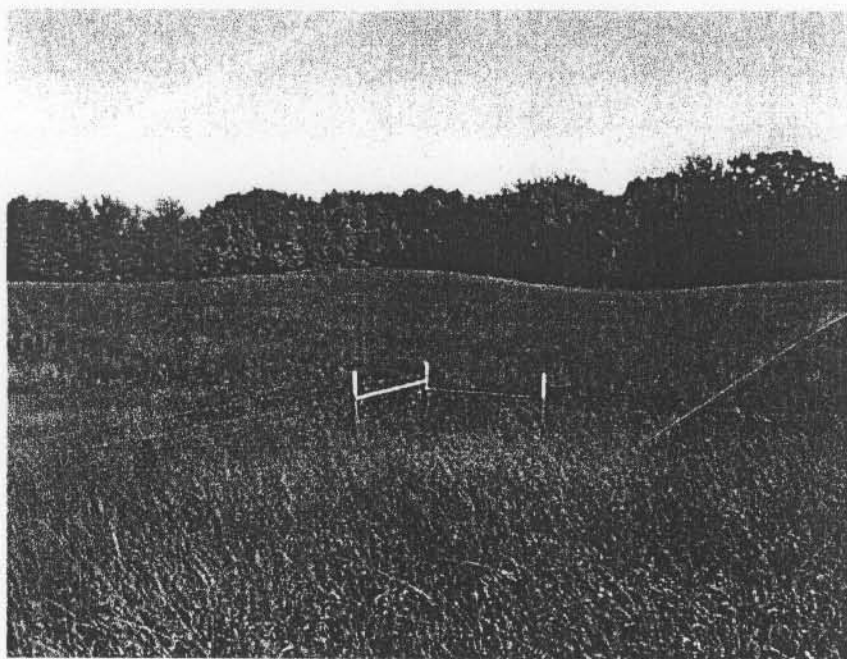
- **This distance may be reduced to a minimum of 350 feet with the written permission of the affected property owner.

- Where an existing treatment plant has been established on a site with fixed boundaries, modifications, and/or additions to the plant should only be concerned with the 100 foot separation from property lines.
- The separation distances may include roadway or railway right of way as long as a minimum of 100 feet from property lines is observed.

**Opinion of Probable Cost
City of McFarland, Kansas
January 31, 2003**

ITEM	ESTIMATED QUANTITY	UNIT PRICE	TOTAL PRICE
Part A: Pump Station			
1 Mobilization	Lump Sum	\$3,000.00	\$3,000.00
2 Lift Station	1 EA	60,000.00	60,000.00
3 Generator	1 EA	30,000.00	30,000.00
4 Wet Well	1 EA	10,000.00	10,000.00
5 Force Main	50 L.F.	20.00	1,000.00
6 Connection to Existing Wet Well	1 EA	2,000.00	2,000.00
7 Seeding	Lump Sum	750.00	750.00
Subtotal			\$106,750.00
Part B: Wastewater Treatment Facility Expansion			
1 Mobilization	Lump Sum	\$15,000.00	\$20,000.00
2 Clearing and Grubbing	Lump Sum	7,000.00	7,000.00
3 Dewatering Existing Cells No. 1 and 2	Lump Sum	4,000.00	4,000.00
4 Removal of Sludge in Cell No. 1	Lump Sum	15,000.00	15,000.00
5 *Unclassified Excavation	10,500 C.Y.	5.00	52,500.00
6 Compaction	8000 C.Y.	4.00	32,000.00
7 Pond Sterilization	3.5 AC.	300.00	1,050.00
8 Pond Sealant	3.5 AC.	6,000.00	21,000.00
9 Finish Grading	4 AC.	700.00	2,800.00
10 Distribution Box	1 EA	6,000.00	6,000.00
11 Flow Control Structures	6 EA	5,000.00	30,000.00
12 Outlet Manhole	1 EA	6,000.00	6,000.00
13 Transfer Piping	1000 L.F.	35.00	35,000.00
14 Pond Piping	200 L.F.	50.00	10,000.00
15 Outfall Piping	250 L.F.	20.00	5,000.00
16 Splash Blocks	15 S.Y.	500.00	7,500.00
17 Concrete Backslope Lining	100 S.Y.	70.00	7,000.00
18 Level Indicator	3 EA	1,000.00	3,000.00
19 Rock Riprap (Recycled Concrete, Cell no. 1 N. E. and 3)	3000 S.Y.	8.00	24,000.00
20 Surfacing	300 S.Y.	6.00	1,800.00
21 Fence	1700 L.F.	6.00	10,200.00
22 12' Gate	2 EA	600.00	1,200.00
23 Concrete Headwall	1 EA	3,500.00	3,500.00
24 18" Rock Embankment	6 C.Y.	50.00	300.00
25 Seeding	Lump Sum	10,000.00	10,000.00
Subtotal			\$315,850.00
Total Part A and B			\$422,600.00
10% Construction Contingency			\$42,260.00
Total Construction Cost			\$464,860.00
30% Contingency, Design, Const. Adm. Legal, Financing, etc.			\$139,458.00
*Opinion of Probable Cost			\$604,318.00

* This Opinion of Probable Cost assumes that Cell No. 3 has no rock excavation



PROPOSED AREA FOR TREATMENT FACILITY EXPANSION



LOOKING SOUTHEAST AT EXPANSION AREA

Section 6

RECOMMENDATIONS

6.1 FINAL RECOMMENDATION FOR UPDATING THE WASTEWATER TREATMENT FACILITY

Based upon the data contained within this report it is the recommendation that a third cell be constructed with the expansion of cell no. 1 while the sludge is being removed. A new wet well and lift station should be constructed at its current location. The proposed cost of those improvements is approximately \$605,000.00.

TopoZone.comTarget is UTM 14 739057E 4326060N - **MC FARLAND** quad [[Quad Info](#)]