WW Variance File
18C.5-1

# VARIANCE REQUEST

**Iowa Department of Natural Resources**

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|---|---|---|---|---|---|
| 1. | Date: | February 23, 2007 | 13. | **Decision:** | approved |
| 2. | Review Engineer: | Satya Chennupati | | Date: | 2/26/07 |
| 3. | Date Received: | February 22, 2007 | | | |
| 4. | County Number: | 4 (Appanoose) | 14. | **Appeal:** | |
| 5. | Facility Name: | City of Plano | | Date: | |
| 6. | Program Area: | CP (Wastewater) | | | |
| 7. | Facility Type: | CO5 | | | |
| 8. | Subject Area: | 350, number of lagoon cells | | | |
| 9. | Rule Reference: | 507-64.2(9)a | | | |
| 10. | Design Stds Ref: | 18C.5.1 | | | |
| 11. | Consulting Engr: | Garden & Associates | | | |
| 12. | Variance Rule: | 507-64.2(9)c | | | |

15. Description of Variance Request:

The City of Plano requested a variance from the design standard which requires a minimum of three cells for all controlled discharge lagoon facilities greater than one acre total surface areas. The City is proposing a two-cell lagoon even though the total surface area is approximately 4-acres.

16. Consulting Engineer's Justifications

Equivalent effectiveness. Engineer has experience with similar projects and designs and has not learned of any deficiencies or problems in the past 9 years. Potential for reduction in material costs and construction costs.

17. Department's Justifications

Recommend variance ***approval.***

A letter from this department on March 8, 1995 stated "This Department will approve two cells as a value engineering concept for most of these unsewered communities." Departmental approval is recommended since this project is for an unsewered community that will be owned and operated by the Appanoose Davis Lucas Monroe Counties Facilities Management Systems (ADLM). Two-cell lagoon for surface areas larger than 1-acre is one of variance approved. No problems have been reported for previously approved projects.

18. Precedents Used

Previous small community pilot projects from Rural Water Association Small Community Wastewater Pilot Projects for smaller systems. Tingley, Arispe, Floris, Persia, Cromwell.

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| 19. | Staff Reviewer: | Satya Chennupati | Date: | 2/26/07 |
| 20. | Supervisor: | | Date: | |
| 21. | Authorized by: | Wayne Farmer | Date: | 2/26/07 |

Fields of Opportunities

STATE OF IOWA

CHESTER J. CULVER, GOVERNOR
PATTY JUDGE, LT. GOVERNOR

DEPARTMENT OF NATURAL RESOURCES
RICHARD A. LEOPOLD, DIRECTOR

February 26, 2007

Mr. Bill Millani
ADLM Environmental Health
101 East Van Buren Street
Centerville, IA 52544

Subj: Department Response to Variance Requests

RE: Wastewater Collection & Treatment Systems, Plano, Iowa

Dear Mr. Millani:

The Department has received a request for several variances from the Iowa Wastewater Facilities Design Standards from your Engineer in a letter dated February 22, 2007. This letter transmits the Department's comments regarding the variance request for the above referenced project. The responses are grouped in the same order as they were requested.

1. **Collection System**

A. Design Standard 12.5.1 – request variance to allow 6-inch diameter sewer where sufficient hydraulic capacity exists.

The above variance is **approved** based on the small community pilot project concept as providing equivalent effectiveness for the small collection system that is proposed to serve 60 people.

B. Design Standard 12.5.3 - request variance to allow 6 inch diameter sewer installed at slope of 0.5%.

Variance to allow sewer construction at a slope of 0.5% is **not required** for unsewered communities when 6-inch sewer variance is granted above. The use is listed as an exception for unsewered communities that states that minimum slopes for 6-inch sewers when flowing full at 2.0 feet per second and 1.5 feet per second shall be 0.6% and 0.34% respectively. The City will be **required to give written assurance** that any additional sewer maintenance required by reduced slopes and velocities will be provided. The City has submitted a letter to that effect and placed on file with the Department.

C. Design Standard 12.5.7.1 – request variance to allow maximum manhole or single cleanout (end of line) spacing of up to 600 feet on gravity sewer of 6-inch and 8-inch) diameter.

The above variance is **approved** based on the small community pilot project concept as providing equivalent effectiveness for the small collection system that is proposed to serve 60 people. However, for the spacing greater than 400 feet, the city will be **required to give written assurance** that appropriate sewer cleaning equipment suitable to clean the distances between manholes will be made available when necessary. The City has submitted a letter to that effect and placed on file with the Department.

D. Design Standard 12.6 – request variance to allow installation of PVC gravity sewers by directional boring as an alternative to open trench installation with conditions requested in the City's letter dated February 22, 2007.

The variance to allow directional drilling of gravity sewers in lieu of open-cut installation is **approved** based on equivalent effectiveness and the City's compliance with the conditions requested in the City's letter dated February 22, 2007.

2. **Treatment System**

A. Design Standard 18C.5.1 – request variance to allow a two-cell controlled discharge lagoon with approximately 4 acres of total surface area.

The above variance is **approved** in accordance with the Small Community Pilot Project concept as providing equivalent effectiveness.

B. Design Standard 18C.7.4.4 – request variance to allow installation of influent lines at or above the elevation of the pond seal; influent lines will be installed with a splash block at the end.

The above variance is **approved** based on the small community pilot project concept as providing equivalent effectiveness for the small system with the following conditions:

a. Ductile iron influent piping shall be used.
b. The influent discharge lines shall rest on a suitable concrete apron which is large enough such that the terminal influent velocity at the end of the apron does not cause soil erosion as required by the Iowa Wastewater Facilities Design Standards 18C.7.4.6. The apron must have a lip or baffle at the opposite end of the discharge point.
c. Adequate measures must be taken to ensure that the line is properly/securely anchored.

C. Design Standard 18C.7.4.6 – request variance to eliminate saucer –shaped depressions at the discharge point of the influent piping for primary and secondary cells.

The above variance is **approved** based on the small community pilot project concept as providing equivalent effectiveness for the small system with the following conditions:

a. The influent discharge lines shall be ductile iron and rest on a suitable concrete apron which is large enough such that the terminal influent velocity at the end of the apron does not cause soil erosion as required by the Iowa Wastewater Facilities Design Standards 18C.7.4.6. The apron must have a lip or baffle at the opposite end of the discharge point.

D. Design Standard 18C.10.6 – request variance to allow pond level measurements to be accomplished in riser piping in lieu of pond level gauges.

The above variance is **approved** based on the small community pilot project concept as providing equivalent effectiveness for the small system with the following conditions:

a. The riser piping shall be arranged so that independent level measurement from all lagoon cells can be obtained.
b. Another acceptable means of cell depth measurement will be installed if freezing proves to be a problem.

If you have any questions, please call Satya Chennupati, P.E. at 515-281-8995.

Sincerely,

Wayne Farrand, P.E.
Wastewater Construction Section Supervisor

Cc: Mark Fincel, P.E. – Garden & Associates
City Clerk- City of Plano
IDNR Field Office #5 – Janet Gastineau
IDNR Sewage File 6-04-84-0-01

GARDEN & ASSOCIATES, LTD.

1701 3rd Avenue East, Suite 1 • P.O. Box 451 • Oskaloosa, IA 52577

Phone: 641.672.2526 • Fax: 641.672.2091

February 22, 2007

Satya Chennupati, Project Manager
Wastewater Section Iowa Department of Natural Resources
Wallace State Office Building
502 East 9th Street
Des Moines, IA 50319

Re: Revised Request for Variance
Wastewater Collection & Treatment System
ADLM-Facilities Management Systems
Plano, Iowa - G&A 3000180

Dear Satya:

We previously submitted a variance request related to the above referenced project, as a supplement to the Preliminary Engineering Report; the request was dated October 27, 2005. Please accept the following revised request as it relates to the finally designed project:

Collection System:

1. Design Standard 12.5.1 – request to allow 6 inch diameter sewer where sufficient hydraulic capacity exists.
2. Design Standard 12.5.3 – request to allow 6 inch diameter sewer installed at slope of 0.5%.*
3. Design Standard 12.5.7.1 – request to allow maximum manhole or single cleanout (end of line) spacing of up to 600 feet on gravity sewer of 6 inch and 8 inch diameter.*
4. Design Standards Section 12.6 – request to allow installation of PVC gravity sewers by directional boring as an alternative to open trench installation with the following conditions:*

   - The maximum Standard Dimension Ratio (SDR) for all directionally bored PVC gravity sewer shall give a calculated long-term deflection of not more than 5% for all anticipated loads assuming prism loading (minimum of SDR 21).
   - The average sewer slope between manholes including the maximum allowable elevation tolerances must provide a calculated minimum full flow pipe velocity of 1.5 feet per second based on Kutter's formula using an "n" value of 0.013 (minimum sewer slopes of 0.5% for 8 inch and 6 inch is allowable based on pipe lengths of 200 feet or more).

* Written assurance has been submitted to the department that any additional maintenance required will be provided if the average sewer slope between manholes results in calculated minimum full flow pipe velocities of less than 2 feet per second; and that the necessary maintenance equipment to clean increased length of sewer main will be made available as needed.

Treatment System:

5. Design Standard 18C.5.1 – request to allow two cell controlled discharge lagoon system for facility with approximately 4 acres of total surface area.
6. Design Standard 18C.7.4.4 – request to allow installation of influent lines at or above elevation of pond seal; influent lines will be installed with a splash block at the end.
7. Design Standard 18C.7.4.6 – request to eliminate saucer-shaped depression at discharge point of primary and secondary cell influent. Influent in Primary Cell and in Secondary Cell will discharge at splash blocks located at elevation of ponds seal.
8. Design Standard 18C.10.6 – request to allow pond level measurement to be accomplished in riser piping in lieu of Pond Level Gauges.

It is our opinion that the requested Design Standards variances for the Collection System (Items 1 through 4 above) will provide equivalent effectiveness of transporting the wastewater from the service connection to the treatment system. The smaller diameter gravity sewer should adequately serve the small and stable population of Plano, and measures will be taken to restrict extraneous flows from entering the sewer system. The other items will require maintenance equipment and capabilities that will be available to ADLM-FMS.

Garden & Associates has first-hand experience and knowledge of design of similar systems to that requested above; as constructed in other small unsewered communities during the past nine (9) years. We have observed the construction of similar systems and have continued discussion with the owners and operators of these systems, and have not learned of any deficiencies. Similarly we have observed a reduction in material costs and construction costs for these systems.

If you are in need of additional information or justification to fully consider the requested variances, please contact us at 641-672-2526.

Sincerely,
**GARDEN & ASSOCIATES, LTD.**

Mark J. Fincel, P.E.

cc: Bill Milani, ADLM-FMS, Centerville
Dave Dowdy, USDA-RD, Albia
Jim Carroll, P.E., USDA-RD, State Office