

Sarah Unruh, P. E.
Professional Engineering Consultants, P. A.
303 South Topeka
Wichita, KS 67202

Dear Ms. Unruh,

I am responding to a request to review the Dodge City Water Reclamation Facility to be located north of Dodge City, KS. Overall the project looks feasible but I have some questions regarding the irrigation and sludge disposal portions of the project. I have done work at the southern wastewater irrigation facility in conjunction with Servi-Tech and CH2MHILL-OMI. The project there is located on similar soils (Harney silt loams) and has a general overall increasing nitrate problem occurring in the ground water in the area.

The southern waste irrigation site has operated since 1986 in portions of the field. The nitrate concentration in some of the monitoring wells shows increasing trends and some of the wells have nitrate-N values greater than 10 mg/L. The soils have measured nitrate-N concentrations well above 10 mg/kg. The concentrations in the soil-water are in the hundreds of mg/L nitrate-N. The study in the southern area indicated that macropore flow has influenced the movement of nitrate and chloride to the ground water in the area. In addition, carbonate in the soils may have affected the nitrogen chemistry over time with changes in pH and bacterial action affecting the ammonium to nitrate transformation.

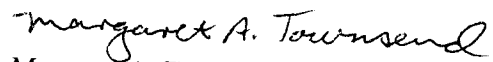
My concerns with your project include not knowing where you will irrigate the treated wastewater; what the potential volume of irrigation will be; the chemical composition of the treated water in terms of nitrate, ammonium, and salts; the type of plants to be grown on the sites to maximize uptake of the nitrogen components; the frequency of the irrigation; and the pharmaceutical concentrations present in the irrigation water. Also, you mentioned in my conversation with you that the sludge from the treatment process will be land applied somewhere in the area. The concentrations of salts, organic carbon, possible pharmaceuticals, and nitrogen may be an issue over time for both the irrigation process and the sludge application process.

Because I did not receive information concerning a number of these issues I would strongly suggest that these concerns be evaluated before the project moves forward. I would suggest some in-depth soil characterization in terms of chemistry, permeability, and evaluation for possible presence of macropores. I would recommend that soil-water lysimeters and monitoring wells be installed and sampled on a regular basis prior to the beginning of the project and throughout the life of the facility in order to facilitate changes in procedures if needed to preclude nitrate, pharmaceuticals, and/or chloride buildup in the soils and the ground water. It may be that these types of concerns are already addressed in the KDHE application and review process. If not, I would recommend that the above concerns be evaluated before the project is approved to move forward.

The above comments are based on regional geologic conditions and limited information available to the KGS at the time of writing and cannot be used in substitute for a detailed site characterization. Other geologic conditions, not discussed here, or for which the KGS has no knowledge, may affect the viability

or safe operation of this facility or property. Geotechnical engineering and design are outside the purview of the KGS. It is the responsibility of the applicant to produce any detailed site characterizations, geotechnical or environmental testing, or design by a licensed professional geologist or engineer to complete the project.

Sincerely,

A handwritten signature in cursive script that reads "Margaret A. Townsend".

Margaret A. Townsend
Hydrogeologist

The following form may be used by the Review Agency/Commission for comments in response to the request for clearance from the proposed Public Water Supply Loan Fund Project.

☐ Army Corps of Engineers
☐ Kansas Biological Survey
☐ State Conservation Commission
☐ Kansas Corporation Commission
☐ Division of Water Resources/Kansas Department of Agriculture
☒ Kansas Geological Survey
☐ Kansas State Historical Society, State Historic Preservation Office
☐ Kansas Water Office
☐ Kansas Department of Wildlife & Parks
☐ US Dept of Agriculture - Natural Resources Conservation Service
☐ Kansas Department of Health and Environment
☐ US Dept of the Interior - Fish and Wildlife Service

Agency Review Comments: (to be completed by reviewing agency and returned to applicant contact person at name and address shown below)
Comments:

Recommended Action: (to be completed by the reviewing agency and returned to applicant contact person at name and address shown below.)

☐ 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.)

Margaret A. Townsend
Reviewer's Name

KGS
Division/Agency/Commission

7-6-09
Date

Project Title: Public Water Supply Loan Fund Application

Applicant: City of Dodge City

Contact Person: Sarah Unruh, P.E.

Address: 303 S. Topeka

City, State: Wichita, KS Zip: 67202 Phone: (316)-262-2691



Professional Engineering Consultants, P.A.

May 28, 2009

Kansas Geological Survey
University of Kansas
1930 Constant Ave Campus West
Lawrence, KS 66047

Reference: Dodge City Water Reclamation Facility
State Revolving Loan Fund
PEC Project No. 34-08827-1009

To Whom It May Concern:

The City of Dodge City is preparing an application to the Kansas Department of Health and Environment for a State Revolving Loan for the referenced project.

The proposed project includes construction of four (4) sanitary collection and treatment system components. All portions of the project are located in Township 26 S, Range 25 West, within the area bounded by Sections 10, 11, 12, 13, 14, 15, 22, and 23. A project location map is attached for your reference. The approximate total budget for the listed projects is \$29.5 million.

1. Water Reclamation Facility designed to process an average day flow of 1.25 MGD. The facility will produce a high quality effluent of which the majority will be re-used for irrigation of public ground, with the remainder discharged into an unnamed tributary of Duck Creek.
2. Beneficial Re-Use System consisting of pumps and force main to deliver high quality effluent to existing storage ponds for use as irrigation water at public facilities.
3. Sanitary sewer interceptors to collect flow in the northern portion of the City.
4. Pump station and force main to deliver flow from the collection system to the Water Reclamation Facility.

We would appreciate your review of the project description and location, and any comments you may have within 30 days. Please find enclosed in addition to the project site map a project review form for your comments.

If you have any questions, please call Sarah Unruh, P.E. at (316) 262-2691, who is the primary contact and design engineer for this project.

Sincerely,

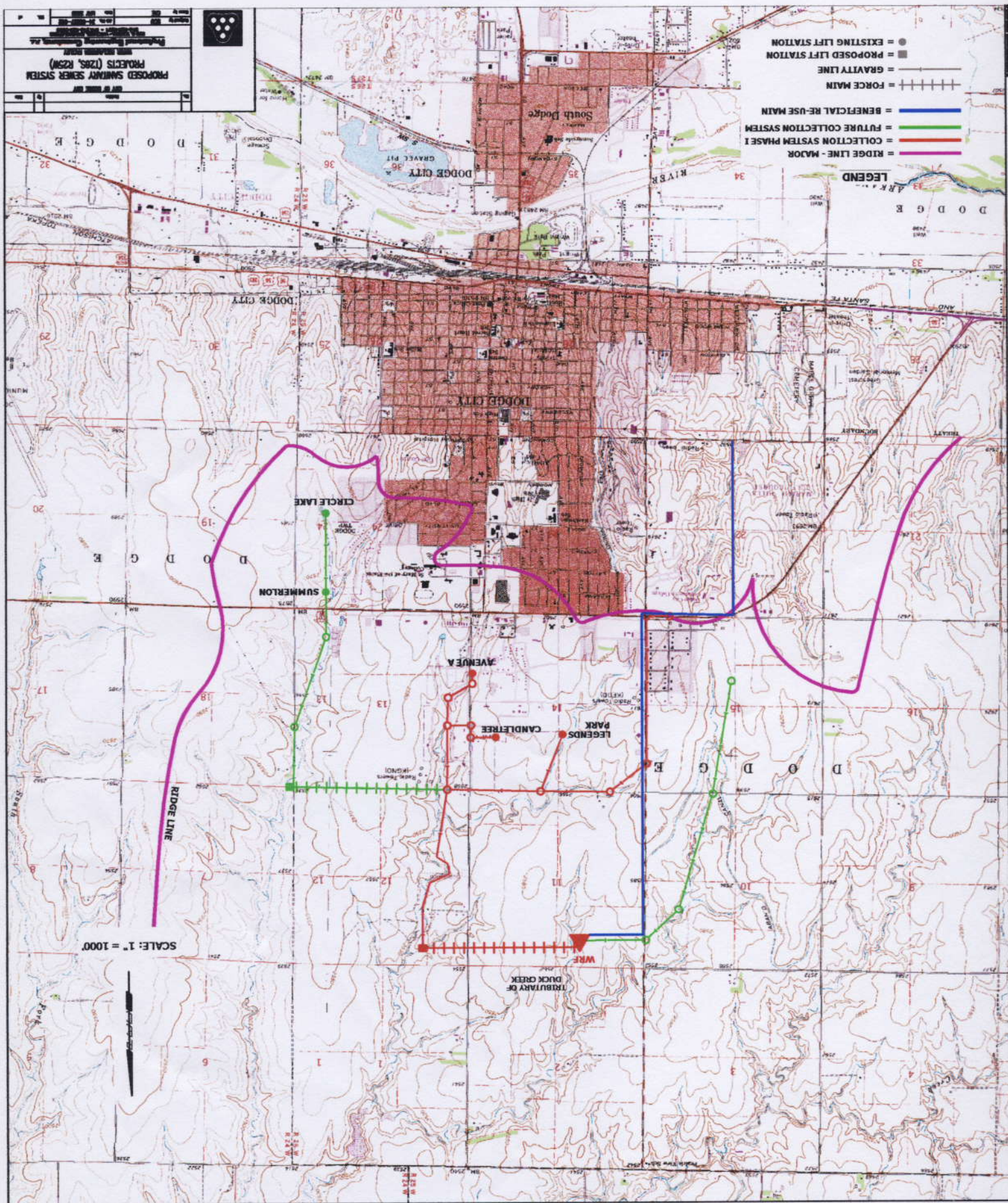
PROFESSIONAL ENGINEERING CONSULTANTS, P.A.

Glenda K. Lorenz by tac

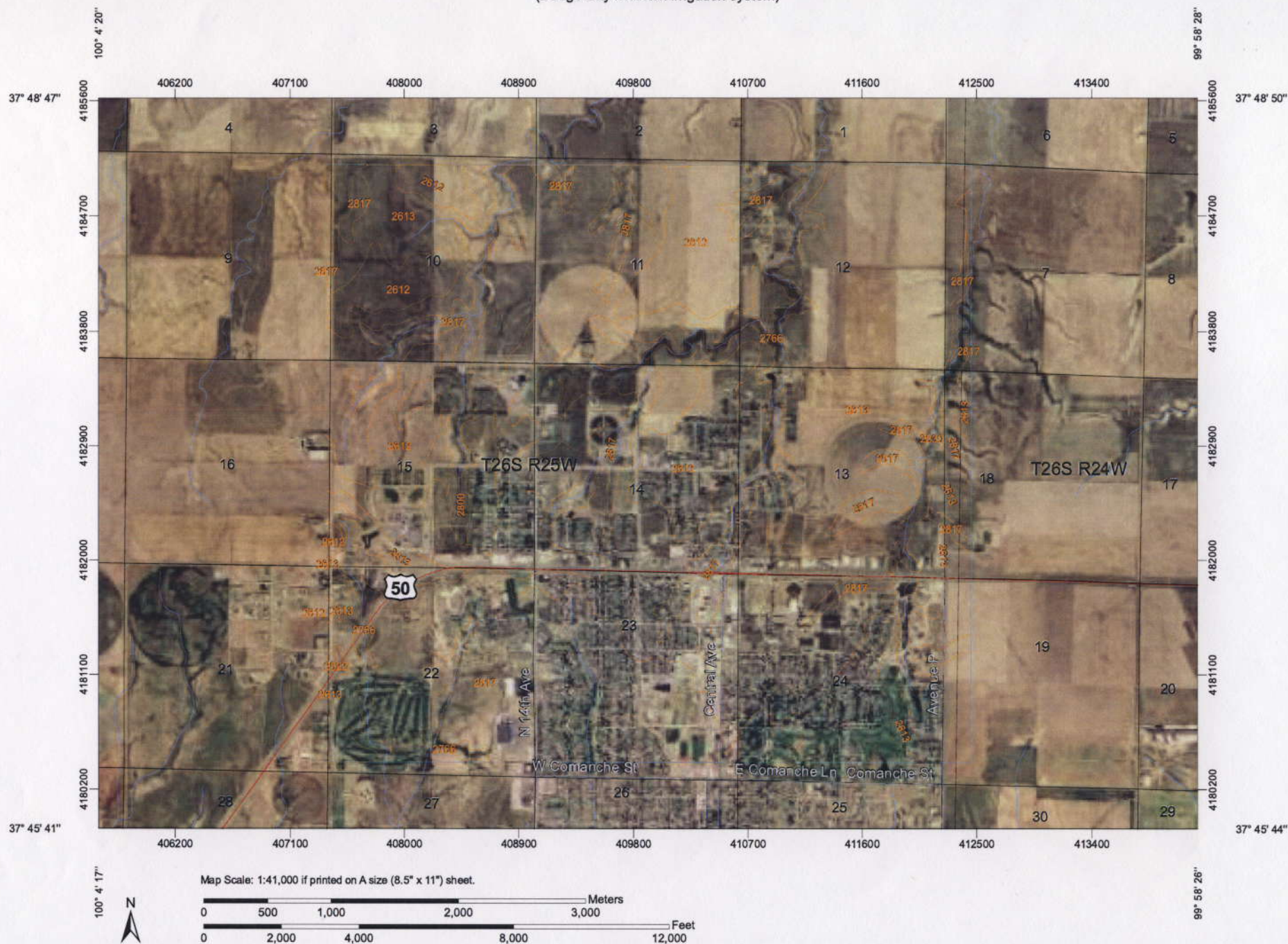
Glenda K. Lorenz
Water & Wastewater Division Project Management Assistant

GKL/tac

Encl: As noted



Soil Map—Ford County, Kansas
(Dodge City northern irrigation system)



Soil Map—Ford County, Kansas
(Dodge City northern irrigation system)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot

 Very Stony Spot

 Wet Spot

 Other

Special Line Features

-  Gully
-  Short Steep Slope
-  Other

Political Features

-  Cities
-  PLSS Township and Range
-  PLSS Section

Water Features

-  Oceans
-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads

MAP INFORMATION

Map Scale: 1:41,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 14N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Ford County, Kansas
Survey Area Data: Version 6, Nov 13, 2008

Date(s) aerial images were photographed: 6/19/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Map Unit Legend

Ford County, Kansas (KS057)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2612	Harney silt loam, 0 to 1 percent slopes	878.4	14.9%
2613	Harney silt loam, 1 to 3 percent slopes	2,991.3	50.7%
2766	Penden-Tobin complex, 0 to 15 percent slopes	233.0	4.0%
2800	Spearville complex, 1 to 3 percent slopes, eroded	21.2	0.4%
2817	Uly silt loam, 3 to 6 percent slopes	1,694.1	28.7%
2822	Uly-Coly silt loams, 3 to 6 percent slopes, eroded	6.8	0.1%
2830	Uly-Tobin complex, 0 to 6 percent slopes	69.6	1.2%
Totals for Area of Interest		5,894.5	100.0%

Dodge City, Kansas

Proposed Water Reclamation Facility – Process Description

The proposed facility will utilize a biological treatment process, with membranes and disinfection added to treat the effluent to the required quality for re-use as irrigation water on public grounds within the City. The elements of the new facility are summarized below and illustrated in Figure 1.

- On-Site Pump Station – The collection system drains to a common pump station at the head of the wastewater treatment facility. This pump station provides the head necessary for the wastewater to flow by gravity through the treatment process.
- Headworks Building – Non-treatable debris, materials, and grit are removed by screening equipment in the Headworks. The screening process provides protection for downstream equipment.
- Biological Treatment System – Organics and nutrients are removed through anaerobic, anoxic, and aerobic biological processes. Biodegradable organic substances in wastewater are removed by activated sludge treatment, a process that promotes the growth of microorganisms that reduce organic materials and nutrients. These microorganisms are kept active in suspension by mixing and by infusing water with dissolved oxygen through physical means. The aeration basin is designed for oxidation of ammonia and BOD, and is the basin where phosphorus is taken up by the bacteria after conditioning for biological phosphorus removal. The anaerobic basin upstream of the aeration basin conditions bacteria for phosphorus release. The anoxic basin is for the removal of nitrogen or denitrification.
- Membranes – Filtration occurs within the membranes, separating solids and effluent for further treatment. Hollow fibers are immersed in the wastewater. Vacuum pumps draw water through the fibers, which act like a barrier to allow treated effluent to be pumped to the disinfection process, leaving the separated solids on the outside of the fibers in the membrane tank. Intermittent air scouring is used to remove solids from the membrane surface. Removed solids are then processed through the Biosolids Handling system for additional treatment.
- Disinfection System – The purpose of disinfection is to reduce the concentration of pathogenic organisms in the plant effluent. An enclosed ultraviolet disinfection system will be used.
- Biosolids Handling – Aerobic digesters stabilize the waste sludge, which is then sent to a centrifuge for dewatering. The solids from the centrifuge can then be stored as a dry material.
- Dried Biosolids Storage – Biosolids from centrifuge dewatering are stored prior to land application. Storage allows for land application to work in harmony with farming operations.
- Beneficial Re-Use Water Pump Station and Distribution System – Treated effluent from the proposed system will be of a high enough quality to be used for irrigation purposes on public grounds. An on-site storage pond will hold treated effluent until it is pumped through a transmission main to the City for use.



LETTER OF TRANSMITTAL

Professional Engineering Consultants, P.A.

303 S. TOPEKA • WICHITA, KANSAS 67202 • 316-262-2691 • FAX 316-262-3003

www.pec1.com • designers@pec1.com

TO: Kansas Geological Survey
1930 Constant Avenue
Lawrence, Kansas 66047

DATE: 6/15/09

PROJECT NO.: 34-08827-002-1009

PROJECT: Dodge City Water Reclamation Facility

ATTENTION: Ms. Margaret Townsend

REFERENCE: Environmental Review - Additional

FROM: Sarah C. Unruh, P.E.

Information as Requested

WE ARE SENDING YOU: ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	06/15/2009		Aerial Map of Proposed Water Reclamation Facility Site
1	06/15/2009		Treatment Process Description

THESE ARE TRANSMITTED as checked below:

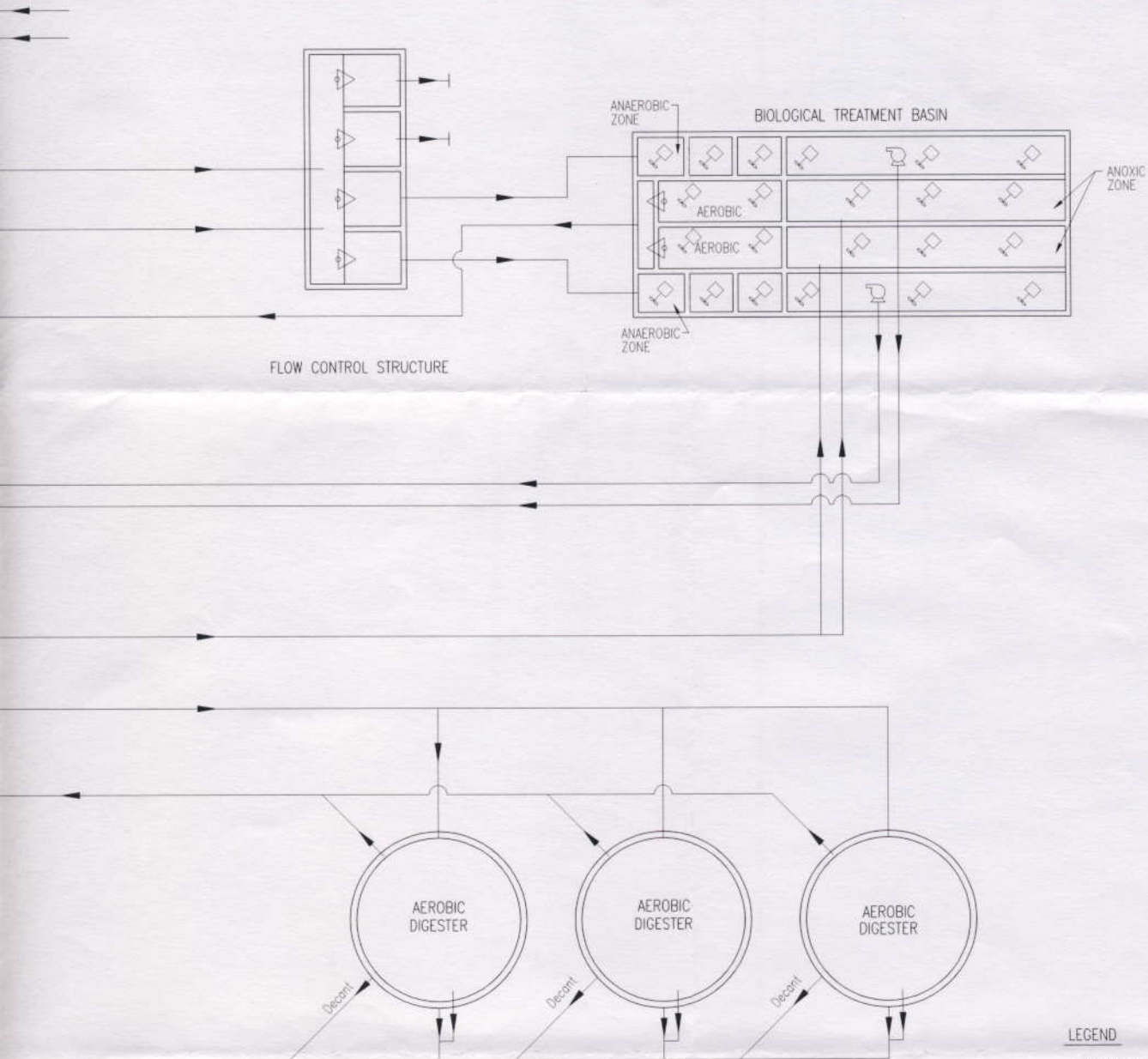
☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS: Ms. Townsend:

Attached are the items you requested to complete your Environmental Review of the project. Please contact us with any questions.

COPIES TO: _____

By: Sarah C. Unruh, P.E. *SCU*



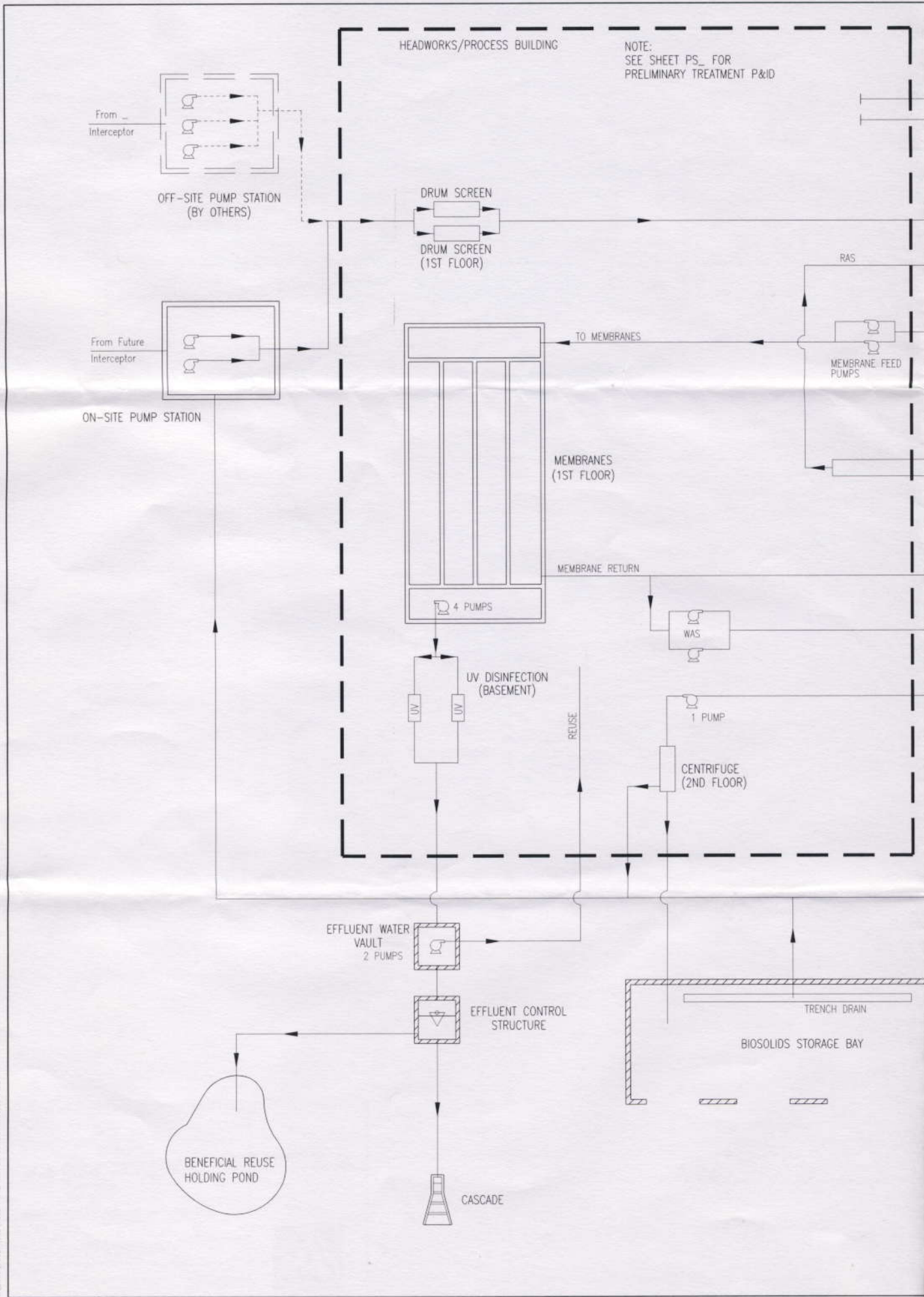
LEGEND

- PROPOSED PIPING
- FUTURE PIPING
- ➔ DIRECTION OF FLOW
- ▨ PROPOSED STRUCTURE WALL
- ⊡ PUMP
- ⊞ MIXER
- ⊥ BLIND FLANGE

30% GMP SUBMITTAL
REV. DATE:

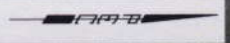


No.	Revision	By	Date
DODGE CITY, KANSAS			
PROPOSED WWTP SCHEMATIC			
FIGURE 1			
WASTEWATER SYSTEM IMPROVEMENT - PHASE 1 WWTP & REUSE			
Professional Engineering Consultants, P.A.			
303 S. TOPEKA • WICHITA, KANSAS 67202 316-262-2691 • FAX 316-262-3003			
Designed by	SCU, SG	Job No.	34-08827-002
Drawn by	CAE	Date	June 2009
		Sht. PS_ of	



HORSESHOE RD.

SCALE: 1" = 1000'



SECTION
10

14TH AVENUE

IRON RD.



SECTION
11

AVENUE A



WATER RECLAMATION FACILITY

FACILITY LOCATION

No.	Revision	By	Date

CITY OF DODGE CITY

Professional Engineering Consultants, P.A.

303 S. TOPEKA • WICHITA, KANSAS 67202
316-262-2691 • FAX 316-262-3003

Designed by	SCU	Job No.	34-08827	Sh.	of
Drawn by	SCU	Date	JUNE 2009		