General Sewer Plan
Hanford Site- 200 East

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited
General Sewer Plan

Hanford Site- 200 East

Project No: L-853 and L-854 Utilities Sewer

Document Type: PLAN

Program/Project: Water and

A. J. Fazzari
Mission Support Alliance

Date Published
August 2017

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited
TRADEMARK DISCLAIMER
Reference herein to any specific commercial product, process, or service by tradename, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America
GENERAL SEWER PLAN

HANFORD SITE - 200 EAST

HNF-55909, Rev. 1.

July 2017

Prepared by

J-U-B ENGINEERS, Inc.
2810 W. Clearwater Ave. Ste. 201
Kennewick, WA 99336
GENERAL SEWER PLAN

HANFORD SITE - 200 EAST

HNF-55909, Rev. 1.

July 2017

Certification

This General Sewer Plan for the Hanford Site Area 200 East for Mission Support Alliance has been prepared under the direction of the following Registered Professional Engineer, in compliance with the Washington Department of Ecology Requirements for General Sewer Plans, WAC 173-240-050.

Digitally signed by
Alexander J Fazzari
Date: 2017.07.25 11:23:37 -07'00'

Alex J. Fazzari, P.E.
J-U-B ENGINEERS, INC.
2810 W. Clearwater Ave., Ste. 201
Kennewick, WA 99336
(509) 783-2144
Table of Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>1.1</td>
<td>Background</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>1.2</td>
<td>Related Plans</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>1.2.1</td>
<td>200 West Area Evaporative Sewer Lagoon Engineering Report</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>1.2.2</td>
<td>Hanford Site Sewer System Master Plan</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>1.3</td>
<td>Study Scope</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>1.4</td>
<td>System Overview</td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>1.4.1</td>
<td>2607-E1A</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.4.2</td>
<td>2607-E8A</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.4.3</td>
<td>2607-EP</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.4.4</td>
<td>2607-EQ</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.4.5</td>
<td>6607-13</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.4.6</td>
<td>6607-11</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>1.4.7</td>
<td>2607-E10</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>1.4.8</td>
<td>2607-E12</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>1.4.9</td>
<td>W-519</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>1.4.10</td>
<td>6607-16</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>1.4.11</td>
<td>6607-17</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>1.4.12</td>
<td>HWVP Holding Tank</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>1.4.13</td>
<td>MO143 Holding Tank</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Planning Area</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>2.1</td>
<td>Planning Area</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>2.2</td>
<td>Service Area</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>2.3</td>
<td>Service Area Characteristics</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>2.3.1</td>
<td>Topography</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>2.3.2</td>
<td>Climate</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Soils</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>2.4</td>
<td>Domestic Water System</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>2.5</td>
<td>Population</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>2.6</td>
<td>Existing Wastewater Facilities</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>Flow and Load Analysis</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>3.1</td>
<td>Introduction</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>3.2</td>
<td>200E Flows</td>
<td></td>
<td>26</td>
</tr>
<tr>
<td>3.3</td>
<td>Infiltration and Inflow</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>4</td>
<td>Wastewater Treatment Plant</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>4.1</td>
<td>Introduction</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>4.2</td>
<td>SWDP Permit</td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>
4.3 Existing & Projected Influent WWTP Flow ................................................................. 31
Chapter 5 – Collection System .................................................................................. 34
5.1 Introduction ............................................................................................................. 34
5.2 No-Action Alternative ......................................................................................... 34
5.3 Hydraulic Model Development .......................................................................... 34
5.3.1 General .............................................................................................................. 34
5.3.2 System Layer ................................................................................................. 34
5.3.3 Flow Generation Layer .................................................................................. 37
5.4 Hydraulic Model Analysis .................................................................................. 41
5.5 Lift Stations ........................................................................................................... 44
5.5.1 6607-13 ........................................................................................................... 45
5.5.2 2607-EQ ........................................................................................................... 46
5.5.3 2607-E8A ........................................................................................................ 46
5.5.4 2607-EP .......................................................................................................... 46
5.5.5 2607-E1 .......................................................................................................... 46
5.5.6 6607-11 .......................................................................................................... 47
5.5.7 2607-E3 .......................................................................................................... 47
5.5.8 2607-E11 ....................................................................................................... 47
5.5.9 2607-E10 ....................................................................................................... 47
5.5.10 W-519 ......................................................................................................... 47
5.5.11 2607-E12 ..................................................................................................... 48
5.5.12 2607-E6 ..................................................................................................... 48
5.5.13 Main Regional Lift Station ........................................................................... 48
5.6 Pipe Joints and Locations of Manholes and Lift Stations .................................. 49
Chapter 6 – Capital Improvement Plan ................................................................. 51
Works Cited ............................................................................................................. 53
Appendices .............................................................................................................. 54
Appendices

Appendix A – Flow Data ..........................................................55
Appendix B – Model Assumptions ...........................................61
Appendix C – Model Results ..................................................66
Appendix D – Environmental Documents .................................81
Appendix E – State Waste Discharge Permit .............................85
Appendix F – Standard Lift Station Design ...............................160
Appendix G – Technical Memorandum – Hydrogen Sulfide 163
Appendix H – Ecology Review Comments ...............................167

Figures

Figure ES-1 – 200E Planning Boundary ......................................9
Figure 1-1 – Hanford Site & Surrounding Area ............................11
Figure 1-2 – Existing Onsite Sewer Facilities at 200E ....................15
Figure 2-1 – Drainage Basins ..................................................20
Figure 2-2 – 200E Service Area ...............................................21
Figure 2-3 – Water and Sewer Mainlines .....................................23
Figure 4-1 – 200W Treatment Lagoon WWTP ............................30
Figure 5-1 – Hydraulic Profile Schematic ...................................35
Figure 5-2 – Hydraulic Model System Layer ..............................36
Figure 5-3 – Sources of Peak Hour Flows ..................................40
Figure 5-4 – d/D ....................................................................42
Figure 5-5 – Reserve Capacity ................................................43
Figure 6-1 – 200E Collection System Master Plan ..........................52

Tables

Table 2-1 – Climatological Data ..............................................19
Table 3-1 – Design Average Volumes .......................................27
Table 3-2 – Workday Design Flows .........................................28
Table 4-1 – Projected WWTP Influent Flows From 200E ............32
Table 5-1 – Allocation of 2607-E1A Drainfield Flows ..................38
Table 5-2 – Design Gravity Influent Flows .................................38
Table 5-3 – Lift Station Preliminary Design Criteria ......................45
# List of Commonly Used Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Acre</td>
</tr>
<tr>
<td>CFS</td>
<td>Cubic Foot per Second</td>
</tr>
<tr>
<td>CIP</td>
<td>Capital Improvement Plan</td>
</tr>
<tr>
<td>CSB</td>
<td>Container Storage Building</td>
</tr>
<tr>
<td>CWC</td>
<td>Central Waste Complex</td>
</tr>
<tr>
<td>d/D</td>
<td>Depth Over Diameter</td>
</tr>
<tr>
<td>DOE</td>
<td>US Department of Energy</td>
</tr>
<tr>
<td>Ecology</td>
<td>Washington State Department of Ecology</td>
</tr>
<tr>
<td>ERDF</td>
<td>Environmental Restoration Disposal Facility</td>
</tr>
<tr>
<td>ETF</td>
<td>Effluent Treatment Facility</td>
</tr>
<tr>
<td>FOG</td>
<td>Fats, Oils, &amp; Grease</td>
</tr>
<tr>
<td>FT</td>
<td>Feet</td>
</tr>
<tr>
<td>FPS</td>
<td>Feet Per Second</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographical Information System</td>
</tr>
<tr>
<td>GPD</td>
<td>Gallons Per Day</td>
</tr>
<tr>
<td>GPM</td>
<td>Gallons Per Minute</td>
</tr>
<tr>
<td>HP</td>
<td>Horsepower</td>
</tr>
<tr>
<td>IN</td>
<td>Inches</td>
</tr>
<tr>
<td>J-U-B</td>
<td>J-U-B ENGINEERS, Inc.</td>
</tr>
<tr>
<td>LF</td>
<td>Linear Feet</td>
</tr>
<tr>
<td>LOSS</td>
<td>Large On-Site Sewer System – An OSS with design flow of 3,500-100,000 gpd</td>
</tr>
<tr>
<td>LS</td>
<td>Lift Station</td>
</tr>
<tr>
<td>MASF</td>
<td>Maintenance and Storage Facility</td>
</tr>
<tr>
<td>MH</td>
<td>Manhole</td>
</tr>
<tr>
<td>MHID</td>
<td>Manhole Identification Number</td>
</tr>
<tr>
<td>MGD</td>
<td>Million Gallons per Day</td>
</tr>
<tr>
<td>MSA</td>
<td>Mission Support Alliance</td>
</tr>
<tr>
<td>OSS</td>
<td>On-Site Sewer</td>
</tr>
<tr>
<td>PFP</td>
<td>Plutonium Finishing Plant</td>
</tr>
<tr>
<td>PNNL</td>
<td>Pacific Northwest National Laboratory</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>ROW</td>
<td>Right-of-Way</td>
</tr>
<tr>
<td>SEPA</td>
<td>State Environmental Policy Act</td>
</tr>
<tr>
<td>SWDP</td>
<td>State Waste Discharge Permit</td>
</tr>
<tr>
<td>USGS</td>
<td>United States Geologic Survey</td>
</tr>
<tr>
<td>WAC</td>
<td>Washington Administrative Code</td>
</tr>
<tr>
<td>WDOH</td>
<td>Washington State Department of Health</td>
</tr>
<tr>
<td>WESF</td>
<td>Waste Encapsulation &amp; Storage Facility</td>
</tr>
<tr>
<td>WRAP</td>
<td>Waste Receiving and Processing</td>
</tr>
<tr>
<td>WTP</td>
<td>Waste Treatment Plant</td>
</tr>
<tr>
<td>WWTP</td>
<td>Wastewater Treatment Plant</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

ES-1 Purpose

Historically, wastewater treatment on the Hanford Site has been a decentralized approach, utilizing the localized drainfields to support site wide operations. However, the US Department of Energy (DOE) and Mission Support Alliance (MSA) are moving towards a more centralized approach to wastewater treatment. In 2012, the 200W Treatment Lagoon was constructed as the long-term wastewater treatment and disposal option. Currently, there is no centralized sewer collection system for the 200W Treatment Lagoon and all wastewater is trucked to the facility. This General Sewer Plan (GSP) outlines the first step of a strategy to accomplish the end state vision of a consolidated sewer collection system for the 200W Treatment Lagoon – beginning with the 200E area.

This GSP was developed in accordance with WAC 173-240-050. Upon Ecology approval of this GSP, DOE intends to construct the collection system identified in this GSP. Per WAC 173-240-030(5), it is assumed that the construction plans and specifications for this collection system will not require Ecology approval. Once 200E sewer consolidation projects are completed, DOE will evaluate the possibilities of further sewer consolidations throughout 200W – which may require amendments to this GSP.

MSA authorized J-U-B ENGINEERS, Inc. to undertake development of this General Sewer Plan in 2016. The major goals of the 2016 General Sewer Plan are as follows:

- Evaluate sewer flow generation assumptions used in the previous efforts
- Develop a hydraulic model to be used for pipe sizing in the collection system
- Evaluate the ability of the existing collection system trunk pipes and lift stations to provide service to the 200E area
- Review existing gravity sewer alignments and lift stations to determine if future pipes could be constructed to eliminate the lift stations
- Determine preferred flow routing through the existing system and impacts to the existing system
- Establish the final sewer collection system design for the 200E area
- Evaluate the ability of the 200W Treatment Lagoon facility to receive the additional flows from the 200E area
- Meet Ecology criteria for a General Sewer Plan per WAC 173-240-050
ES-2 Planning Boundaries

This General Sewer Plan develops the master plan for the sewer collection system to serve 200E and direct flows to the 200W Treatment Lagoon. The pipes and lift stations are evaluated for existing flow conditions and the expected flow conditions from four potential future sewage sources (office locations). These four include the WRPS 4th Street Trailer Complex, WRPS Construction Trailers, DFLAW Facility, and the HWVP Holding Tank. The planning boundaries for the 200E collection system are depicted in Figure ES-1.

Figure ES-1 – 200E Planning Boundary

ES-3 Collection System Summary

The proposed collection system to serve 200E will include 13 lift stations, several miles of forcemain, a gravity interceptor, and utilization of a few thousand feet of existing gravity pipe and forcemain. A hydraulic model was developed in order to verify that existing pipes have adequate capacity and to confirm sizing for new piping.

Several of the proposed lift stations have been identified as candidates for replacement by gravity sewer pipe; however, additional survey data is necessary in order to determine if adequate hydraulic grade exists. During final design of the collection system, survey data will be used to determine if gravity pipe would work in lieu of the lift stations and forcemains for the identified areas.

Each new lift station will consist of a pre-cast concrete wetwell with duplex submersible pumps and a separate valve vault. With the exception of the main regional lift station, all lift stations will have 4-inch diameter forcemains and an 80 gpm pumping capacity to maintain a minimum flow velocity of 2 feet per second (fps). Because of the relatively low influent flows, the long cycle times will result in sewage being stored in the wetwells for periods that could cause septic conditions. Therefore, all wetwells will be coated with a lining system, all hatches will have gasketed air-tight connections, and the vent tubes will have carbon filters for odor control.

The main regional lift station will pump approximately 260 gpm through a 3.6-mile-long 6-inch diameter forcemain. This forcemain will discharge into a new manhole situated adjacent to the existing inlet chamber at the 200W Treatment Lagoon. The 200W Treatment Lagoon is currently loaded at 14% capacity and the addition of the 200E collection system is expected to increase loading to 76% capacity.
Chapter 1 – Introduction

1.1 Background

Established in 1943, the Hanford Site’s original mission was to produce plutonium for national defense. Operations to make the raw materials for nuclear weapons continued until the late 1980s. When production activities were halted, the mission of the site shifted to cleanup of the waste generated by 45 years of plutonium production.

The existing 200E sanitary sewer system is comprised of a combination of the following:

- a centrally located evaporative sewer lagoon facility located at 200W
- several localized (large) on-site septic systems with drainfields
- several in-ground or above-ground holding tanks
INTRODUCTION

Each of these subsystems play an integral role in the collection and treatment of sanitary sewage at Hanford. Historically, wastewater treatment has been a decentralized approach, utilizing the localized drainfields to support operations. It remains the desire of the US Department of Energy (DOE) to move towards a more centralized approach to wastewater treatment, utilizing the 200W Treatment Lagoon as the long-term wastewater treatment option. DOE is the owner of the site sewer systems and also operates and maintains the sewer systems included in this General Sewer Plan (GSP) – although contractors could be responsible for day-to-day operations under DOE oversight. This GSP outlines the first step of a strategy to accomplish the end state vision of a consolidated sewer collection system – beginning with the 200E area.

Once the 200E sewer consolidation projects are completed, DOE will evaluate the possibilities of further sewer consolidations throughout 200W – which may require amendments to this GSP.

The planned sewer collection system summarized in this General Sewer Plan is in support of the Hanford Site cleanup mission. Because there are a large number of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste sites within the 200 East Area, the planned sewer collection system will cross a variety of these waste sites. Excavation materials will be appropriately managed during construction of the sewer collection system.

1.2 Related Plans

1.2.1 200 West Area Evaporative Sewer Lagoon Engineering Report
The November 2011 “200 West Area Evaporative Sewer Lagoon Engineering Report MSA Project L-691” by Jacobs provides the basis of design for the wastewater treatment and disposal facility. This facility consists of aerated lagoons, settling lagoons, and a 14.7-acre evaporation pond. The design criteria is based upon an average daily flow of 55,000 gpd. This document did not address a sewer collection system as the plan was to initially truck all waste to the facility. However, the Engineering Report did note that a subsequent General Sewer Plan would be prepared at the time that the collection system was planned and designed.

1.2.2 Hanford Site Sewer System Master Plan
The September 2016 “Hanford Site Sewer System Master Plan HNF-6612 Revision 5” by Mission Support Alliance provides a ten-year strategy for managing and operation the Hanford sanitary sewer system. This plan documents the strategy for managing repairs, life extensions, replacements, and deactivations for facilities and equipment for the sewer systems. This plan is a living document, updated every two years according to the changing conditions for Hanford sanitary sewer systems as the cleanup mission progresses.

1.3 Study Scope

MSA authorized J-U-B to undertake the development of this General Sewer Plan in 2016. This plan identifies the planning and design for the sewer collection system to serve the 200E area. The items specifically addressed in this General Sewer Plan are as follows:

- Evaluate flow generation assumptions used in the previous reports
- Develop a hydraulic model to be used for pipe sizing of the collection system
- Evaluate the existing collection system trunk pipes and lift stations to provide service to 200E
INTRODUCTION

- Review existing gravity sewer alignments and lift stations to determine if future pipes could be constructed to minimize the number of lift stations

- Determine preferred flow routing through the existing system and impacts to the existing system

- Establish the final proposed sewer collection system design for the 200E area

- Provide a general overall evaluation of the capacity of the Wastewater Treatment Plant

- Meet Ecology criteria for a General Sewer Plan per WAC 173-240-050

Subsequent chapters in this report are summarized as follows:

Chapter 2 – Planning Information
The planning area characteristics, land use, and population projections are presented in this chapter. In addition, information regarding the existing environment is summarized.

Chapter 3 – Flow and Load Projections
The flow and load projections for the study area are summarized in this chapter.

Chapter 4 – Wastewater Treatment Plant
This chapter provides a general description of the 200W Treatment Lagoon and its capacity and ability to accommodate additional flows from 200E. A detailed review of the unit processes was not performed as part of this GSP as it is provided in the Engineering Report.

Chapter 5 – Collection System
The development of the hydraulic model of the collection system is summarized in this chapter. An evaluation of the existing capacity of the collection system as well as development of a Master Plan for collection system expansion and development is also presented.

Chapter 6 – Capital Improvement Plan
The final design concept for the 200E collection system is provided in this chapter.

Note that a checklist of criteria for WAC 173-240-050 and the corresponding locations within this GSP is included in Appendix H.

1.4 System Overview
The Hanford Site sanitary sewer system accommodates the wastewater generated from domestic use only. Domestic wastewater originates primarily from facility domestic plumbing for restrooms, showers, and sinks. There are several On-Site Sewage Systems (OSS) on the site. An OSS is defined as an integrated system of components, located on or nearby the property it serves, that conveys, stores, treats, and provides subsurface soil treatment and disposal of domestic sewage. An OSS also refers to a holding tank sewage system or other system that does not have a drainfield. A Large On-Site Sewer System (LOSS) is an OSS with design flows of 3,500 to 100,000 gallons per day (gpd).
There are 10 active subsurface soil absorption systems (drainfields) which serve the 200E Area of the Hanford Site. In addition, there are 3 permitted holding tanks in 200E. The condition of many of these septic systems is deteriorating, with many systems requiring substantial maintenance repairs or replacements in order to maintain operability. As the septic systems fail or reach the end of their useful life, holding tanks have been installed, and the sewage is pumped and trucked on a routine schedule to the 200W Treatment Lagoon. The age and condition of these septic systems further supports the strategy to retire their associated drainfields and consolidate them to the 200W Treatment Lagoon.

The 200W Treatment Lagoon is a treatment and disposal facility on the north side of the 200W Area. It was constructed in 2012 and is expected to serve the long-term sanitary sewer needs of Hanford. Currently, all wastewater treated at the 200 W Treatment Lagoon is transported via pumper trucks. With a permitted average annual capacity of 55,000 gallons per day, the 200W Treatment Lagoon was sized to accommodate the majority of wastewater on the Hanford Site Central Plateau.

Sewer demands are anticipated to increase in the 200E Area in preparation for the Waste Treatment Plant operations. Accordingly, MSA W&SU’s near term focus is the consolidation of many of the 200E drainfields. The sewer consolidation projects identified in this GSP will consist of a series of new lift stations, a gravity interceptor, and a regional lift station and force main to pump sewage collected in 200E over to the 200W Treatment Lagoon. This represents the first step towards achieving the consolidated sewer collection system for the 200 Areas of the Hanford Site.

The immediate plan for 200E is to abandon eight existing drainfields and one storage tank within 200E and pump them to the 200W Treatment Lagoon. Four existing systems (6607-16, 6607-17, HWVP Holding Tank, M0143 Holding Tank) will be retained. System abandonment will be performed in accordance with the applicable WAC. Figure 1-2 depicts the locations of these existing facilities. The following is a brief description of these systems.
Mission Support Alliance
General Sewer Plan

Figure 1-2
Existing Onsite Sewer Facilities at 200E

Legend
- Existing Sewer Pipe
- Planning Boundary
- Existing Drain Field
- Existing Storage Tank
- Existing Lift Station

Date: Jul 12, 2017
INTRODUCTION

1.4.1 2607-E1A
The 2607-E1A Large On-Site Sewer System (LOSS) was constructed in 1997 as part of project L-272 200 East Central Core Septic Systems Replacement. Project L-272 was constructed to consolidate five failing drainfields in 200E (2607-E1, 2607-E3, 2607-E5, 2607-E6, and 2607-E11). These five systems were converted to lift stations pumping to the newly constructed 2607-E1A LOSS. This LOSS is located on Baltimore Ave., north of 4th St. in the 200 East Area. It consists of a septic tank, a dosing/pumping chamber, and three pressure distribution soil absorption fields. It has a permitted capacity of 14,500 gpd.

1.4.2 2607-E8A
The 2607-E8A LOSS was constructed in 1996 as part of project L-218 2750E and Adjacent Facilities Drainfield – 200 East Area. Project L-218 provided for a new drainfield and septic tank to support 2750E and surrounding facilities. This LOSS is located on Baltimore Ave., south of 4th St in the 200 East Area. It consists of a septic tank, a dosing/pumping chamber, and three pressure distribution soil absorption fields. It also has a permitted capacity of 14,500 gpd.

1.4.3 2607-EP
Located in the western portion of the drainage basin, the 2607-EP LOSS was constructed in 1994 as part of project L-132 2721EA and Adjacent Facilities Emergency Drain Field Replacement. Project L-132 provided for a newly installed drainfield and septic tank capable of servicing 2721EA and surrounding facilities. This LOSS is located on 4th St. in the 200 East Area. It consists of eight septic tanks (five with effluent pumps), a common dosing/pumping chamber, and three pressure distribution soil absorption fields. It also has a permitted capacity of 14,500 gpd.

1.4.4 2607-EQ
Located in the southwest portion of the drainage basin, the 2607-EQ LOSS was constructed in 1992 as part of project L-092 2751E, 2752E, 2753E Emergency Drainfield Replacement. Project L-092 provided for a new drainfield supporting the 2751E, 2752E, and 2753E facilities. This LOSS is located on Anaheim St. and 2nd St. in the 200 East Area. It consists of a septic tank, a dosing/pumping chamber, and three pressure distribution soil absorption fields. It has a permitted capacity of 14,297 gpd.

1.4.5 6607-13
Also located in the southwest portion of the drainage basin, the 6607-13 OSS was constructed in 1993 as part of project FP-0003 Core Area Septic. Project FP-0003 installed the septic system to support unsecured corridor facilities in 200E. This On-Site Sewer System (OSS) is located on Albion and 1st in the 600 Area. It consists of a 6,500-gal septic tank, dosing chamber, and a gravity distribution soil absorption field. It has a permitted capacity of 2,850 gpd.

1.4.6 6607-11
Located in the northwest portion of the drainage basin, the 6607-11 LOSS was constructed in 1993 as part of project B-595 Larger Onsite Septic System to Support Personnel for the Hanford Waste Vitrification Plant. Project B-595 installed a new septic tank and drainfield to support the 2704-HV facility and surrounding offices. This LOSS is located on Akron Ave. and Cherry St. in the 600 Area. It consists of a septic tank, dosing chamber with siphon, and a gravity soil absorption field. It has a permitted capacity of 11,800 gpd.
1.4.7 2607-E10
Located in the eastern portion of the drainage basin, the 2607-E10 OSS was constructed in 1997 as part of project W-299 Septic Tank System 2607-E10. Project W-299 added a new drainfield to the existing 2607-E10 system. This OSS is located on 4th St., East of Canton in the 200 East Area. It consists of two 1,000-gal septic tanks in series, a dosing/pumping chamber, and two gravity-distribution soil absorption fields. It has a permitted capacity of 1,100 gpd.

1.4.8 2607-E12
Located in the eastern portion of the drainage basin, the 2607-E12 LOSS was constructed in 1992 as part of project W-172 272-AW Septic and Drainfield Replacement. Project W-172 provided a new septic tank and drainfield to support the 272-AW facility and proposed office buildings in the vicinity. This LOSS is located on 4th St. and Akron Ave. in the 200 East Area. It consists of a septic tank, a dosing/pumping chamber, and three pressure distribution soil absorption fields. It has a permitted capacity of 6,700 gpd.

1.4.9 W-519
Located in the eastern portion of the drainage basin, the W-519 storage tank has a permitted capacity of 230 gpd.

The proposed design for a collection system to provide service to each of these facilities to be abandoned is presented in Chapter 5 of this General Sewer Plan.

The following is a brief description of the existing facilities that will remain in service in 200E.

1.4.10 6607-16
Located in the northeastern portion of 200 East, the 6607-16 LOSS was constructed in 1994 as part of Project C-018H, 200 Area Effluent Treatment Facility. This LOSS is located on Effluent Way and Canton Avenue. It consists of two septic tanks, a dosing tank, and three pressure distribution soil absorption fields. It has a permitted capacity of 5,000 gpd.

1.4.11 6607-17
Located in the western portion of the 200 East, the 6607-17 OSS was constructed in 1995 as part of Project L-044, Hanford Infrastructure Underground Storage Tanks 6291 Building. This OSS is located on 4th Street west of Akron Avenue. It consists of a 1,000 gallon septic tank, diversion box, and a gravity distribution soil absorption field. It has a permitted capacity of 50 gpd.

1.4.12 HWVP Holding Tank
Located in the western portion of 200 East, the HWVP sewage holding tank was constructed in 1993 as part of the Hanford Waste Vitrification Plant Project. The holding tank is located north of 7th Street, west of Akron Avenue, and east of Route 4S. It consists of a 5,400 gallon tank and has a permitted flow of 3,000 gpd.

1.4.13 MO143 Holding Tank
Located in the central part of 200 East, the MO143 sewage holding tank was constructed in 2013 in support of waste tank retrieval operations at C farm. The holding tank is located between 7th and 8th Street. It consists of a 10,000 gallon tank and has a permitted flow of 2,250 gpd.
Chapter 2 – Planning Information

2.1 Planning Area
The sewer collection system for the 200W Treatment Lagoon is generally divided into two basins (200W and 200E) based on topography, configuration, and facilities – see Figure 2-1. This GSP focuses on the collection system for 200E. The description of the existing collection system in 200E and planned improvements are provided in Chapter 5.

2.2 Service Area
The identified Service Area Boundary for 200E is presented on Figure 2-2 and represents the area that the proposed system of interceptor sewers, trunk sewers, collection system, and pumping stations will effectively serve.

2.3 Service Area Characteristics

2.3.1 Topography
The Hanford Site encompasses approximately 580 sq. mi in south-central Washington State. The 200 Area occupies the central part of the site atop the Central Plateau. The Central Plateau contains the Hanford Site’s highest elevations, with the plateau surface approximately 328 feet above the Columbia River. In general, the plateau slopes from the southwest to the northeast. The Columbia River lies approximately 5 and 7 miles to the north and east of the 200 Area, respectively. A shallow valley exists between the 200E Area and Gable Mountain approximately 4 miles to the north. The 200E and 200W Areas are about 3 miles apart.

2.3.2 Climate
The climate of the area is semiarid, characterized by low annual precipitation and large inter-seasonal temperature variations. Strong winds from the west and southwest occur throughout the year and are responsible for localized soil movement and excessive evapotranspiration rates in the summer. Annual precipitation seldom exceeds ten inches, with much of the total arriving with summer thunderstorms, which can cause flooding and severe erosion. The recent (2009 - 2013) climatological information for the area is summarized in Table 2-1.

Table 2-1 – Climatological Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Average Temperature(°F)</th>
<th>High Temperature(°F)</th>
<th>Low Temperature(°F)</th>
<th>Rainfall (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>54</td>
<td>105</td>
<td>-8</td>
<td>10.2</td>
</tr>
<tr>
<td>2011</td>
<td>52</td>
<td>100</td>
<td>2</td>
<td>4.5</td>
</tr>
<tr>
<td>2012</td>
<td>54</td>
<td>108</td>
<td>12</td>
<td>8.2</td>
</tr>
<tr>
<td>2013</td>
<td>54</td>
<td>109</td>
<td>-2</td>
<td>5.4</td>
</tr>
<tr>
<td>2014</td>
<td>56</td>
<td>110</td>
<td>4</td>
<td>6.5</td>
</tr>
<tr>
<td>2015</td>
<td>58</td>
<td>111</td>
<td>11</td>
<td>6.5</td>
</tr>
</tbody>
</table>
2.3.3 Soils

The soils across the Central Plateau are of different types typical to glaciofluvial deposits ranging from clay loams to cobbles. However, soil is generally characterized as sandy loam and fine sand. Often the subsoil is coarse and overlaid on gravel deposits ranging from 15 to 30 inches thick.

2.4 Domestic Water System

The mission of the Mission Support Alliance (MSA) Water & Sewer Utilities’ (W&SU) is to provide potable and raw water services to support the cleanup mission on the Hanford Site. MSA serves the water supply needs for the 100, 200, 300, and 600 Areas.

The water systems, operated by MSA, at Hanford can be categorized into five main areas, each playing a distinct role in the overall water supply: the Export Water system, the Raw Water system, the Potable Water system, the Fire Water system, and the 300 Area Water system.

The Export Water system feeds the Central Plateau and the 100 Areas with Columbia River water. The Raw Water system supplies the Central Plateau with raw water for various process operations, construction/demolition activities, cooling water make-up, fire suppression, and potable water treatment supply. The Potable Water system generates potable water which supports miscellaneous process operations, fire water supply, and domestic usage. The Fire Water system is tied into both potable and raw water distribution grids to satisfy the fire protection demands on the Central Plateau. The City of Richland water department supplies water to the 300 Area.

The source of the potable water supply is a surface water treatment plant that pulls water from the Columbia River. The water is distributed through various pipelines from the treatment plant to the service area.

The main 200E water system features are depicted in Figure 2-3.
2.5 Population
Sanitary sewer service demands are closely related to site population. From the Hanford Site Population Projections 2016-2026 (HNF-59925) report, the 200E population (excluding WTP) is anticipated to grow from 2,893 in 2016 to 3,510 in 2026. The 200E population projections were developed from applicable Hanford Site Contractor and DOE population inquiries and anticipated funding. The WTP is served by an on-site septic system and is not anticipated to be connected to the planned 200E sewer distribution system.

Based on these population projections, the anticipated 200E sewage load is anticipated to grow from an average 29,359 gpd in 2016 to 35,679 gpd in 2026 (HNF-6612).

From the 200 West Area Evaporative Sewer Lagoon Engineering Report (HNF-50995) with proper maintenance, the lagoon service design life including the planned sewer network is approximately 35 years. Although population projections for the Hanford Site beyond 10 years have not been developed, the population served by the sanitary sewer system summarized in this document is anticipated to remain relatively consistent throughout the design life.

As population projections change over time, DOE must continually evaluate its sewer infrastructure to ensure the systems in place provide enough capacity to satisfy demands, and are right-sized for near and long term needs of the Site. In 2015, MSA operated sewer systems, including the 200W Treatment Lagoon, processed an average of 49,738 gallons per day of wastewater. The 49,738 gallons per day number is based on actual measured sewage volumes from 200 East and 200 West septic systems as well as measured volumes trucked to the 200W Treatment Lagoon from sewage holding tanks.

2.6 Existing Wastewater Facilities
There are existing non-sanitary sewage wastewater generating and treatment facilities on the Hanford Site, however none of the non-sanitary sewage wastewater is or will be connected to the sanitary sewer system.
Chapter 3

FLOW AND LOAD ANALYSIS
Chapter 3 – Flow and Load Analysis

3.1 Introduction
Wastewater generated within the study area currently consists primarily of domestic wastewater generated from restrooms, kitchen areas, and shower facilities from various office compounds and work trailers. Non-domestic wastewater is collected and managed by other systems. Data from July 2013 through October 2015 were used for this analysis (MSA-1403639, MSA-1103599.4, & MSA-1103599.5). Definitions and descriptions of the averaging periods used in this analysis are as follows:

- **Average Day**: The average annual flow rate observed at the facility in a given year. (e.g., total flow for a year divided by 365 days). The average rate is used to estimate annual average pumping rates.

- **Peak Day**: The expected flow or load for the peak day in a given year. The peak day condition is used to size processes for peak events occurring over a 24-hour period.

- **Peak Hour**: The expected condition occurring during the peak hour in a given year. The peak hour conditions are used to size processes for peak events (e.g. pump stations).

- **Peaking Factors**: Ratios of maximum events to average events (e.g., a maximum month peaking factor is obtained by dividing the maximum month value for a selected parameter by a baseline value, typically the average day value).

3.2 200E Flows
MSA provided historical flow information for each of the existing onsite sewer facilities in 200E. The measured flows were based upon recorded measurements of number of pump cycles. With a known working volume in each pump chamber, these number of pump cycles were used to determine the total volume of wastewater per week from each facility. Tables in Appendix A provide the historical monthly data for each facility. This data was used to develop design flows for the future pumping stations and pipelines as discussed below and in Chapter 5.

In addition to the existing facilities in 200E, MSA estimated that 3,800 gpd of trucked waste would be delivered to and dumped at the 200E main lift station. This estimate is based on the assumption that approximately one-half of the existing volume of wastewater that is currently trucked to the 200W Treatment Lagoon would be dumped at the 200E main lift station.

Projected future flows from future consolidation projects in 200E were also provided by MSA for the development of design flows. They include four potential future facilities: 1) WRPS 4th Street Trailer Complex, 2) WRPS Construction Trailers, 3) DFLAW Facility, and 4) HWVP Holding Tank. The WRPS 4th Street Trailer Complex is anticipated to be located north of 4th Street and depending on siting location and additional evaluations would be routed to the new gravity line or possibly the existing 2607-E6 lift station. The WRPS Construction Trailers will be located south of 7th Street and will be routed to the new gravity line. The DFLAW facility will be located between 4th Street and Canton Avenue and based on additional evaluations would be routed to the new 2607-E12 or 2607-E10 lift stations. Sewage flows from the existing HWVP holding tank will be rerouted to the 6607-11 lift station.

Based on data from MSA, the Mean Weekly volume to be discharged to the 200W Treatment Lagoon was estimated to be 267,362 gallons per week. As directed by MSA, it was assumed that approximately
90% of this weekly volume occurs during workdays while the remaining 10% occurs on weekends, and a 4 day workweek was assumed. As a result, the Mean Weekend volume was estimated to be 8,912 gpd and the Mean Workday volume to be 60,156 gpd.

To determine values for design, MSA directed using the 95% confidence limit of the mean volumes. As a result, the Design Weekly volume to be discharged to the 200W Treatment Lagoon was estimated to be 294,506 gallons per week. The Design Weekend (3 days per week) volume was estimated to be 9,817 gpd and the Design Workday (4 days per week) volume to be 66,264 gpd. Table 3-1 summarizes the calculated Design Average volumes for each facility.

### Table 3-1 – Design Average Volumes

<table>
<thead>
<tr>
<th>Facility</th>
<th>Design Weekly (gallons per week)</th>
<th>Design Workday – 4 Days (gpd)</th>
<th>Design Weekend – 3 Days (gpd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1A</td>
<td>24,556</td>
<td>5,525</td>
<td>819</td>
</tr>
<tr>
<td>2607-E8A</td>
<td>58,181</td>
<td>13,091</td>
<td>1,939</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>30,806</td>
<td>6,931</td>
<td>1,027</td>
</tr>
<tr>
<td>6607-13</td>
<td>5,870</td>
<td>1,321</td>
<td>196</td>
</tr>
<tr>
<td>2607-EP</td>
<td>54,822</td>
<td>12,335</td>
<td>1,827</td>
</tr>
<tr>
<td>6607-11</td>
<td>30,680</td>
<td>6,903</td>
<td>1,023</td>
</tr>
<tr>
<td>2607-E12</td>
<td>15,829</td>
<td>3,561</td>
<td>528</td>
</tr>
<tr>
<td>2607-E10</td>
<td>6,597</td>
<td>1,484</td>
<td>220</td>
</tr>
<tr>
<td>W-519</td>
<td>457</td>
<td>103</td>
<td>15</td>
</tr>
<tr>
<td>Trucked Flows</td>
<td>26,240</td>
<td>5,904</td>
<td>875</td>
</tr>
<tr>
<td>Future Flows</td>
<td>40,469</td>
<td>9,105</td>
<td>1,349</td>
</tr>
<tr>
<td>TOTAL</td>
<td>294,506</td>
<td>66,264</td>
<td>9,817</td>
</tr>
</tbody>
</table>

- *(a)* Flow is provided from four different existing lift stations – E1, E3, E6, and E11.
- *(b)* Estimated that one-half of flows currently being trucked direct to 200W will be delivered to 200E instead.
- *(c)* Estimated future flows for: WRPS 4th Street Trailer Complex, WRPS Construction Trailers, DFLAW, and HWVP holding tank

To generate Design Peak Day and Design Peak Hour flows used to size pumping and piping facilities, the Design Average volumes were adjusted as follows. Design Peak Day values were calculated by multiplying the Design Average values by a safety factor of 1.2 as directed by MSA. Design Peak Hour values were calculated by multiplying the Design Peak Day values by a peaking factor of 1.4. This factor was based upon typical diurnal curves for office uses as utilized in the 2015 City of Richland General Sewer Plan. Daily volumes in terms of gallons per day were converted to instantaneous flow values in terms of gallons per minute by assuming wastewater would be generated only during 10 workhours of each workday. No seasonal variation was assumed.

Table 3-2 summarizes the calculated Design Flows for each facility. Detailed calculations are provided in Appendix A.
Table 3-2 – Workday Design Flows

<table>
<thead>
<tr>
<th>Facility</th>
<th>Average Workday Flow (gpm)</th>
<th>Peak Daily Flow (gpm)</th>
<th>Peak Hour Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1A</td>
<td>9.2</td>
<td>11.2</td>
<td>15.5</td>
</tr>
<tr>
<td>2607-E8A</td>
<td>21.8</td>
<td>26.2</td>
<td>36.7</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>11.6</td>
<td>13.9</td>
<td>19.4</td>
</tr>
<tr>
<td>6607-13</td>
<td>2.2</td>
<td>2.6</td>
<td>3.7</td>
</tr>
<tr>
<td>2607-EP</td>
<td>20.6</td>
<td>24.7</td>
<td>34.5</td>
</tr>
<tr>
<td>6607-11</td>
<td>11.5</td>
<td>13.8</td>
<td>19.3</td>
</tr>
<tr>
<td>2607-E12</td>
<td>5.9</td>
<td>7.1</td>
<td>10.0</td>
</tr>
<tr>
<td>2607-E10</td>
<td>2.5</td>
<td>3.0</td>
<td>4.2</td>
</tr>
<tr>
<td>W-519</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Trucked Flows(b)</td>
<td>9.9</td>
<td>11.8</td>
<td>16.6</td>
</tr>
<tr>
<td>Future Flows(c)</td>
<td>15.2</td>
<td>18.2</td>
<td>25.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>110.4</td>
<td>132.5</td>
<td>185.5</td>
</tr>
</tbody>
</table>

(a) Flow is provided from four different existing lift stations – E1, E3, E6, and E11.
(b) Estimated that one-half of flows currently being trucked direct to 200W will be delivered to 200E instead
(c) Estimated future flows for: WRPS 4th Street Trailer Complex, WRPS Construction Trailers, DFLAW, and HWVP holding tank

3.3 Infiltration and Inflow

Infiltration is the term for groundwater that enters the system through faulty joints, cracks, and service connections as well as through connections of irrigation overflows and foundation drains. Inflow accounts for water that enters the system during a storm event through manhole lids and miscellaneous connections to roof drains and storm drainage structures. Infiltration and inflow (I/I) affect the sewer system by increasing the volume of flow that must be collected, conveyed, and ultimately treated at the treatment facility. I/I results in reduced efficiency of biological processes and increases the cost of unit processes that are sized based on detention time. Therefore, it is desirable to minimize I/I.

MSA does not have any real-time sewer flow meter data in the existing collection system. However, the monthly volume data presented in Appendix A does not indicate any kind of seasonal variation pattern. Therefore, it is unlikely that I/I is an issue with the existing collection system. The vast majority of the proposed collection system for 200E will be new construction that will be inspected and pressure tested prior to acceptance; therefore, the collection system for 200E is expected to have minimal I/I.

Upon construction and commissioning of the collection system for 200E, the influent flow meter data at the 200W Treatment Lagoon could be evaluated to determine if there are any seasonal variations that may warrant future evaluation of I/I.
Chapter 4

WASTEWATER TREATMENT PLANT
Chapter 4 – Wastewater Treatment Plant

4.1 Introduction
This Chapter of the General Sewer Plan generally evaluates the capacity of the existing facilities at the 200W Treatment Lagoon to adequately treat current and projected flow and loads to meet current State Waste Discharge Permit (SWDP) requirements. A review of the unit processes and capacity was not performed as part of this GSP. Rather, a summary taken from the November 2011 Engineering Report is included below.

The WWTP treats primarily domestic wastewater through an aerated lagoon process. Functional since August 2012, the 200W Treatment Lagoon (shown on Figure 4-1) is an evaporative lagoon facility on the north side of 200W. The 200W Treatment Lagoon is permitted by the Washington State Department of Ecology (Ecology) under permit ST-0045514 for wastewater (see Appendix E) and DE12NWP-001 for air discharge.

Figure 4-1 – 200W Treatment Lagoon WWTP

The 200W Treatment Lagoon is permitted for an influent flow of 55,000 gpd on an annual average basis and influent loading of 105 lbs/day BOD. Current utilization is approximately 7,500 gallons of trucked wastewater per day and 34 lbs/day BOD. Trucked wastewater is off loaded into a truck unloading chamber where it flows through an inlet, grit removal, and grinder chambers. The existing inlet chamber has a 4” diameter pipe stub specifically for connection to the forcemain from the 200E main lift station.

The wastewater flow is measured with a Palmer Bowlus flume before entering one of the two parallel aeration lagoons. According to MSA, the flume can measure a maximum flow of 311 gpm. As discussed in Chapter 5, the peak flow expected from the 200E main lift station will be 264 gpm; therefore, the
flume has adequate capacity for the pumped flows. However, tank dumping operations at the 200W Treatment Lagoon may need to be throttled back to provide adequate capacity when the 200E main lift station is pumping.

The 200W Treatment Lagoon has two primary treatment trains (i.e. aeration lagoon followed by a settling lagoon). Both of the primary treatment trains are each sized to treat 105 lbs/day of BOD loading.

Based on the November 2011 Engineering Report, the evaporative lagoons were sized to support evaporation of 55,000 gpd of flow. Because the existing facility is currently underloaded (approximately 7,500 gpd or 14% of capacity), makeup water (raw water) is added to the evaporative lagoons to maintain water in the lagoons to prevent liner damage from the wind.

The 200W Treatment Lagoon is designed to have zero wastewater discharge. The intermittent sand filters can be used to assist with algae control in the evaporative lagoons. The intermittent sand filters can also be used to filter water prior to release to the soil column in the event that an emergency release of water is necessary.

The Biosolids Handling Facility contains equipment for the dewatering of biosolids removed from the 200W Treatment Lagoon. Currently, this facility has never been used and is maintained in a safe configuration until biosolids processing is necessary.

The facilities at 200W Treatment Lagoon have not been substantially upgraded since original design.

4.2 SWDP Permit
Ecology issued permit ST-0045514 on July 1, 2012. This permit is set to expire June 30, 2017. A renewal application is ongoing. Preliminary discussions with Ecology have indicated that the permit will remain largely unchanged. The current permit and fact sheet are included in Appendix E.

There is no discharge to waters of the State. The only permit limit is the 55,000 gpd average annual loading criteria. The permit does require monitoring of the influent four times per year with grab samples. In order to sample both the trucked waste at the 200W Treatment Lagoon as well as waste pumped from the 200E main lift station, the grab samples should be collected at the flume.

4.3 Existing & Projected Influent WWTP Flow
There is currently no sewer collection system for the 200W Treatment Lagoon and all influent flows are trucked directly to the facility. Current flows that are trucked to the facility are approximately 7,500 gpd. Per the Engineering Report, the design criteria for the WWTP is 55,000 gpd based on an average annual basis. Therefore, the WWTP is currently loaded at approximately 14%. As shown in Table 4-1, the 200E consolidation project will add approximately 38,000 gpd to the 200W Treatment Lagoon. Assuming that in addition to the 200E flows, approximately 3,750 gpd continues to be trucked directly to the WWTP. The average influent flow at the WWTP would be approximately 42,000 gpd – which is 76% of the 55,000 gpd design criteria.
### Table 4-1 – Projected WWTP Influent Flows From 200E

<table>
<thead>
<tr>
<th>System</th>
<th>Average Daily Flow&lt;sup&gt;(a)&lt;/sup&gt; (gpd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1A&lt;sup&gt;(b)&lt;/sup&gt;</td>
<td>3,508</td>
</tr>
<tr>
<td>2607-E8A</td>
<td>8,312</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>4,401</td>
</tr>
<tr>
<td>6607-13</td>
<td>839</td>
</tr>
<tr>
<td>2607-EP</td>
<td>7,832</td>
</tr>
<tr>
<td>6607-11</td>
<td>4,383</td>
</tr>
<tr>
<td>2607-E12</td>
<td>2,261</td>
</tr>
<tr>
<td>2607-E10</td>
<td>942</td>
</tr>
<tr>
<td>W-519</td>
<td>65</td>
</tr>
<tr>
<td>Trucked Flows&lt;sup&gt;(c)&lt;/sup&gt;</td>
<td>3,749</td>
</tr>
<tr>
<td>Future Flows&lt;sup&gt;(d)&lt;/sup&gt;</td>
<td>5,781</td>
</tr>
<tr>
<td>TOTAL</td>
<td>38,073</td>
</tr>
</tbody>
</table>

<sup>(a)</sup> 95% confidence limit of the mean, based on 7 days per week

<sup>(b)</sup> Flow is provided from four different existing lift stations – E1, E3, E6, and E11.

<sup>(c)</sup> Estimated that one-half of flows currently being trucked direct to 200W will be delivered to 200E instead

<sup>(d)</sup> Estimated future flows for: WRPS 4<sup>th</sup> Street Trailer Complex, WRPS Construction Trailers, DFLAW, and HWVP holding tank

Based upon the Engineering Report (HNF – 50995), the 200W Treatment Lagoon has adequate capacity to handle the expected flows from the 200E collection system. Moreover, the additional flow is expected to actually improve operations at the currently underloaded facility and preclude the need to augment flows with fresh water per current practices.

Based upon the available capacity documented in the November 2011 Engineering Report (HNF – 50995), the collection system project identified in this General Sewer Plan will not require any upgrades to the 200W Treatment Lagoon. Therefore, no additional submittals relating to the Permit ST-0045514 are anticipated. The Engineering Report (HNF – 50995) and O & M Manual (HNF – 52451) will be updated as needed.
Chapter 5

COLLECTION SYSTEM
Chapter 5 – Collection System

5.1 Introduction
The following chapter details the evaluation process and recommendations for the proposed 200E sewer collection system. MSA developed a conceptual plan to link the various OSSs with a combination of new and existing lift stations and gravity pipes. Using this conceptual plan as a starting point, a hydraulic model was prepared to develop a master plan that included evaluating portions of the existing system as well as sizing new pipes to complete the master plan.

The general concept for the collection system master plan is to collect flows from the eight drainfields and one storage tank and convey the combined flow to a main lift station. This main lift station will then pump all flows from 200E through a 3.5 mile long forcemain to the 200W Treatment Lagoon. The conceptual plan was developed to use as much existing sewer infrastructure as possible and to minimize potential interferences with existing infrastructure and waste sites.

5.2 No-Action Alternative
In lieu of developing this collection system for 200E, the no-action alternative would be the status quo method of trucking all waste to the 200W Treatment Lagoon WWTP. Currently, approximately 7,500 gpd of wastewater is trucked to the facility. As quantified in Chapter 3, when all of the drainfields in 200E fail, this will represent approximately 38,000 gpd. This would be a significant amount of wastewater to truck on a daily basis. This would not only be a significant expense, but it would also reduce the reliability of the sewer system and would increase the use of fossil fuels. Therefore, this alternative was determined to be infeasible and was dropped from further consideration.

5.3 Hydraulic Model Development
5.3.1 General
The hydraulic model in this study was built using survey records and then analyzed using spreadsheets. The hydraulic model’s primary purposes are to:

- Evaluate capacity of existing gravity sewer pipes
- Size new gravity sewer pipes for the master plan

The hydraulic model consists of two layers – 1) the System Layer and 2) the Flow Generation Layer. Each layer includes multiple parameters and corresponding assumptions that characterize the area and system being modeled. The assumptions are coupled with surveyed pipe inverts, record drawing data, flow data, characteristics learned from the physical system, similar studies done in the region, and general and historical knowledge. Key assumptions used in the existing model are documented in Appendix B.

5.3.2 System Layer
The hydraulic model System Layer consists of existing and proposed manholes, gravity sewer pipes, force mains, and lift stations in the collection system. A schematic identifying the connectivity and hydraulic profile of the system layer is provided on Figure 5-1 and a map of the System Layer for the hydraulic model is found on Figure 5-2.
Figure 5-1
Hydraulic Profile Schematic

Legend

Existing Gravity
New Gravity
Existing Force Main
New Force Main
Existing Lift Station
New Lift Station
Main Collection Manhole
Review For Gravity After Survey Data Collected

FEET OF ELEVATION – NAVD 88
5.3.2.1 Collection System Layer
The existing gravity pipe collection system layer was first developed from a combination of GIS data, record drawings, and survey information. Only those portions of the existing gravity system that could potentially be used for the master plan were modeled. This includes approximately 1,500 linear feet (LF) of pipe upstream from the 2607-E8A drainfield and approximately 2,000 LF of pipe upstream from the 2607-E1A drainfield. The GIS mapping was used as the main source of information for rim elevations, invert elevations, pipe sizes, and pipe lengths. Record drawings were used to fill in any gaps in data. Any missing or questionable data was supplemented with field survey data.

The proposed location for the main lift station is on 12th Street and a new 8-inch diameter gravity interceptor is proposed between 7th Street and 12th Street. This allows the lift station to be located approximately 7,500 LF closer to the 200W Treatment Lagoon. This location also provides improved access for trucks to off-load wastewater at the lift station. The results of the hydraulic model analysis of the gravity pipes are discussed in Section 5.4.

5.3.2.2 Lift Stations
Three existing lift stations are proposed to be utilized in the GSP (2607-E3, 2607-E11, 2607-E6). The fourth existing lift station (2607-E1) will be abandoned. Existing forcemains will be utilized where feasible for 2607-E3 and 2607-E6. Further analysis may be necessary during the design phase as existing forcemain pipe alignments and lengths are adjusted. An additional ten new lift stations and associated forcemains are proposed. For all new lift stations, a minimum force main pipe diameter of 4-inches was used per Ecology guidelines.

As depicted in Figure 5-1, there are several locations where the new lift stations might be replaced by gravity sewer pipe; however, additional survey data is necessary in order to determine if adequate hydraulic grade exists for a minimum 8-inch gravity pipe at a minimum slope of 0.4%. During final design of the collection system, survey data and review of potential utility conflicts will be used to determine if 8-inch gravity pipe would work in lieu of the lift stations.

Per Ecology guidelines, forcemains shall have a minimum diameter of 4 inches. Therefore, the minimum size of pump that can be utilized is 80 gpm to provide a minimum 2 fps cleansing velocity. With the exception of the main lift station, all other lift stations are assumed to have 80 gpm pumps and 4-inch forcemains as the design peak hour influent flows are well below 80 gpm. Wetwell volumes will be designed to accommodate the pumped volume of flow from upstream lift stations. Downstream gravity pipes were evaluated to confirm adequate sizing with all upstream pumps operating simultaneously (worst case condition). During the design phase, the existing pump capacities of the three existing lift stations will need to be analyzed in order to confirm the 80 gpm assumption for each lift station as existing forcemain pipe alignments and lengths are adjusted. The results of the analysis of lift stations are discussed in Section 5.4.

5.3.3 Flow Generation Layer
As described in Section 3.2, design flows were calculated based upon MSA provided flows for each drainfield facility. Factors of safety were utilized in order to account for the fact that the majority of the weekly sewer volume is generated during a 4-day work week with 10 work hours. See Section 3.2 for a detailed explanation.
The flows for drainfield 2607-E1A originate from four different existing lift stations: E1, E3, E6, and E11. MSA provided an estimated proportional split of the peak hour flow among the four lift stations as follows:

**Table 5-1 – Allocation of 2607-E1A Drainfield Flows**

<table>
<thead>
<tr>
<th>Lift Station</th>
<th>Percentage of 2607-E1A Drainfield Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1</td>
<td>61%</td>
</tr>
<tr>
<td>2607-E3</td>
<td>31%</td>
</tr>
<tr>
<td>2607-E6</td>
<td>7%</td>
</tr>
<tr>
<td>2607-E11</td>
<td>1%</td>
</tr>
</tbody>
</table>

The resulting peak hour flows are provided in Table 5-2. Note that these values do not include influent flows pumped to the lift station from upstream lift stations – these are simply the influent gravity flows from the drainfields that they are replacing.

**Table 5-2 – Design Gravity Influent Flows**

<table>
<thead>
<tr>
<th>System</th>
<th>Peak Hour Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1(a)</td>
<td>9.5</td>
</tr>
<tr>
<td>2607-E3(a)</td>
<td>4.8</td>
</tr>
<tr>
<td>2607-E6(a)</td>
<td>1.1</td>
</tr>
<tr>
<td>2607-E11(a)</td>
<td>0.2</td>
</tr>
<tr>
<td>2607-E8A</td>
<td>36.7</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>19.4</td>
</tr>
<tr>
<td>6607-13</td>
<td>3.7</td>
</tr>
<tr>
<td>2607-EP</td>
<td>34.5</td>
</tr>
<tr>
<td>6607-11</td>
<td>19.3</td>
</tr>
<tr>
<td>2607-E12</td>
<td>10.0</td>
</tr>
<tr>
<td>2607-E10</td>
<td>4.2</td>
</tr>
<tr>
<td>W-519</td>
<td>0.3</td>
</tr>
<tr>
<td>Trucked Flows(b)</td>
<td>16.6</td>
</tr>
<tr>
<td>Future Flows(c)</td>
<td>25.5</td>
</tr>
</tbody>
</table>

- (a) Resulting proportional split of 2607-E1A drainfield peak hour flow per Table 5-1
- (b) Estimated that one-half of flows currently being trucked direct to 200W will be delivered to 200E instead
- (c) Estimated future flows for: WRPS 4th Street Trailer Complex, WRPS Construction Trailers, DFLAW, and HWVP holding tank
Figure 5-3 depicts the peak hour flows and the locations where these flows are assumed to originate. The trucked flows were assumed to be injected at the site of the future main lift station. The future 200E flows were assumed to be injected at the upstream end of the main gravity collection pipe. The results of the hydraulic model analysis are discussed in Section 5.4.
Figure 5-3
Hydraulic Flow Generation Layer

Legend
- 200 E
- Manhole
- New Lift Station
- Existing Lift Station

Sewer Pipe
- Existing Gravity
- New Gravity
- Existing Force Main
- New Force Main

Mission Support Alliance
General Sewer Plan

Date: Nov 3, 2016
5.4 Hydraulic Model Analysis

The design flows discussed in Section 5.3.3 were incorporated into the model for analysis of the existing system capacity. In addition, all downstream gravity pipes were evaluated to confirm adequate capacity with all upstream pumps (80 gpm each) operating simultaneously.

The hydraulic model is an Excel spreadsheet that solves the Manning Equation – an open-channel hydraulics equation for one-dimensional steady flow along a conduit. Per Ecology guidelines, the calculations assumed a Manning coefficient of 0.013. The calculations for each gravity pipe are included in Appendix C and include all inputs and outputs for the hydraulic calculations.

Two measures of flow conditions in the collection system were used for evaluation of the gravity pipes in the model: flow depth over pipe diameter \((d/D)\) and reserve capacity of the pipe. Depth over diameter can be used to identify the extents of surcharging, and includes backwater effects from downstream pipe segments; while reserve capacity can be used to identify individual pipes that could be the root cause of the surcharging or limited capacity. For 8-inch pipes, our goal was to keep the pipes half-full at design flow \((d/D \leq 0.5)\). Figure 5-4 and Figure 5-5 depict the \(d/D\) and reserve capacity for the gravity pipes, respectively. Tabular output data from the hydraulic model is included in Appendix C. Figures 5-4 and 5-5 includes unique identification numbers for each pipe to cross reference with the output tables.

Based on the hydraulic analysis, all existing pipes and the proposed new pipe all have \(d/D \leq 0.5\) at design flows. Therefore, the proposed new gravity piping and the portions of the existing collection system that are proposed to be utilized have adequate capacity to convey the design flows. As depicted in the \(d/D\) and reserve capacity figures, no pipes are expected to surcharge and all pipes will have reserve capacity.
Figure 5-4
Depth Over Diameter

Legend
- Planning Boundary
- Manhole
- New Lift Station
- Existing Lift Station
- Force Main

Depth Over Diameter
- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
Mission Support Alliance
General Sewer Plan

Figure 5-5
Reserve Capacity

Legend

- Planning Boundary
- Manhole
- New Lift Station
- Existing Lift Station
- Force Main

Reserve Capacity (cfs)

- > 1.0
- 0.5 - 1.0
- 0.0 - 0.5
- Over Capacity

Date: Jul 12, 2017
5.5 Lift Stations

There are proposed to be a total of 13 lift stations in the 200E collection system. Three existing lift stations will be utilized (2607-E3, 2607-E6, and 2607-E11) and ten new lift stations are proposed. The septic tanks and drainfields for 2607-E3, 2607-E6, and 2607-E11 are abandoned. The existing forcemains will be utilized where feasible for these existing lift stations, although the lengths of forcemain and pumping elevations will change considerably with the new system. Because the system curves will change significantly for these existing lift stations, further analysis of the actual pumping rates will be determined during the design phase.

Each of the proposed new 10 lift stations will be based upon a typical design for a duplex submersible lift station. Several of these lift stations will receive very low flows which will result in long cycle times and potentially septic conditions. Therefore, specialized coatings will be used to minimize corrosion and odor control features will be added. A typical drawing for the proposed new lift station concept is provided in Appendix F. All new lift stations are proposed to consist of:

- pre-cast concrete wetwells with duplex submersible pumps
- a separate valve vault will house isolation valves and check valves
- all fasteners will be stainless steel
- hatches will be gasketed and carbon filters added to wetwell vent risers

Table 5-3 provides a summary of the key design criteria for each lift station. Note that the majority of the lift stations are proposed to have an 80 gpm pumping capacity. However, as noted in Table 5-3, several of the lift stations could receive peak instantaneous flows in excess of 80 gpm if all upstream lift stations are pumping simultaneously. Because these lift stations will pump infrequently, sizing the pumping capacity for maximum potential peak influent is excessive. Therefore, during design phase, the working volume will be evaluated so as to provide adequate available storage for the rare events when influent flows exceed pumping capacity.
Table 5-3 – Lift Station Preliminary Design Criteria

<table>
<thead>
<tr>
<th>Lift Station</th>
<th>Average Workday Flow (^a) (gpm)</th>
<th>Instantaneous Peak Flow (^b) (gpm)</th>
<th>Design Flow (^d) (gpm)</th>
<th>Wetwell Dimension (feet)</th>
<th>Working Volume (gallons)</th>
<th>Starts Per Hour(^f)</th>
<th>Cycle Time (^g) (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1</td>
<td>61.8</td>
<td>169.5 (^b)</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>22.6</td>
</tr>
<tr>
<td>2607-E3</td>
<td>14.4</td>
<td>84.8 (^a)</td>
<td>80 (^e)</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>26.9</td>
</tr>
<tr>
<td>2607-E6</td>
<td>9.2</td>
<td>81.1 (^a)</td>
<td>80 (^e)</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>38.9</td>
</tr>
<tr>
<td>2607-E11</td>
<td>0.1</td>
<td>0.2</td>
<td>80 (^e)</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>3,174.7</td>
</tr>
<tr>
<td>2607-E8A</td>
<td>35.6</td>
<td>116.7 (^a)</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>16.0</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>13.8</td>
<td>99.4 (^a)</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>27.8</td>
</tr>
<tr>
<td>6607-13</td>
<td>2.2</td>
<td>3.7</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>148.2</td>
</tr>
<tr>
<td>2607-EP</td>
<td>20.6</td>
<td>34.5</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>20.7</td>
</tr>
<tr>
<td>6607-11</td>
<td>11.5</td>
<td>19.3</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>32.2</td>
</tr>
<tr>
<td>2607-E12</td>
<td>8.6</td>
<td>170.0 (^b)</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>41.3</td>
</tr>
<tr>
<td>2607-E10</td>
<td>2.5</td>
<td>4.2</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>130.9</td>
</tr>
<tr>
<td>W-519</td>
<td>0.2</td>
<td>0.3</td>
<td>80</td>
<td>6</td>
<td>317</td>
<td>1.9</td>
<td>1,589.4</td>
</tr>
<tr>
<td>Main LS</td>
<td>110.0</td>
<td>362.1 (^c)</td>
<td>264 (^i)</td>
<td>8</td>
<td>564</td>
<td>3.5</td>
<td>9.2</td>
</tr>
</tbody>
</table>

\(^a\) Includes local peak hour flow plus 80 gpm from upstream lift station
\(^b\) Includes local peak hour flow plus 160 gpm from upstream lift stations
\(^c\) Includes local peak hour flow plus 320 gpm from upstream lift stations
\(^d\) For one pump only
\(^e\) Existing pumps shall be evaluated with new system curve during design phase to verify pumping rate
\(^f\) Per pump at minimum cycle time (when influent flow is 50% of pump capacity)
\(^g\) With one pump running at average flow
\(^i\) Cumulative total of upstream average workday flows
\(^i\) Based on preliminary pump research – to be further refined during design phase

5.5.1 6607-13

This lift station will intercept flows just upstream from the existing septic for the OSS. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into the proposed 2607-EQ lift station wetwell. This lift station will receive a Design Peak Hourly gravity influent flow of 3.7 gpm.

This lift station is a candidate for replacement with a gravity sewer pipe. During final design of the collection system, survey data will be used to determine if there is adequate grade for an 8-inch gravity pipe at a minimum slope of 0.4% in lieu of the lift station and forcemain.
5.5.2 2607-EQ
This lift station will intercept flows just upstream from the existing septic tank for the OSS and will receive pumped flows from the 6607-13 lift station. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into an existing gravity collection system just upstream from the 2607-E8A lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 19.4 gpm in addition to the periodic pumped flow of 80 gpm from the 6607-13 lift station. The existing septic tank will be repurposed for use as emergency backup storage for the lift station.

5.5.3 2607-E8A
This lift station will intercept flows just upstream from the existing septic tank for the OSS and will receive pumped flows from the 2607-EQ lift station. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into an existing gravity collection system just upstream from the 2607-E1 lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 36.7 gpm in addition to the periodic pumped flow of 80 gpm from the 2607-EQ lift station.

This lift station is a candidate for replacement with a gravity sewer pipe. During final design of the collection system, survey data will be used to determine if there is adequate grade for an 8-inch gravity pipe at a minimum slope of 0.4% in lieu of the lift station and forcemain. The existing septic tank will be repurposed for emergency backup storage.

5.5.4 2607-EP
This lift station will intercept flows just upstream from the existing septic tank for the OSS. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into an existing gravity collection system just upstream from the 2607-E1 lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 34.5 gpm.

This lift station is a candidate for replacement with a gravity sewer pipe. During final design of the collection system, survey data will be used to determine if there is adequate grade for an 8-inch gravity pipe at a minimum slope of 0.4% in lieu of the lift station and forcemain. The existing septic tank will be repurposed for emergency backup storage.

5.5.5 2607-E1
This lift station will intercept flows just upstream from the series of existing septic tank for the OSS and will also receive flows from both the 2607-EP and 2607-E8A lift stations. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into the manhole at the head end of the main gravity interceptor. This lift station will receive a Design Peak Hourly gravity influent flow 9.5 gpm in addition to the periodic pumped flows of 80 gpm each from lift stations 2607-EP and 2607-E8A.

This lift station is a candidate for replacement with a gravity sewer pipe. During final design of the collection system, survey data will be used to determine if there is adequate grade for an 8-inch gravity pipe at a minimum slope of 0.4% in lieu of the lift station and forcemain.
5.5.6 6607-11
This lift station will intercept flows just upstream from the existing septic for the OSS. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into the proposed 2607-E3 lift station wetwell. This lift station will receive a Design Peak Hourly gravity influent flow of 19.3 gpm.

This lift station is a candidate for replacement with a gravity sewer pipe. During final design of the collection system, survey data will be used to determine if there is adequate grade for an 8-inch gravity pipe at a minimum slope of 0.4% in lieu of the lift station and forcemain. The existing septic tank will be repurposed for emergency backup storage.

5.5.7 2607-E3
This existing lift station currently intercepts flows just upstream from the existing septic tank for the OSS and will in addition receive pumped flows from the 6607-11 lift station. The existing 6-foot diameter wetwell will be utilized. The existing 4-inch diameter forcemain will be modified to discharge flows into the manhole at the head end of the main gravity interceptor. Because the system curve is expected to change, the existing pump curves should be evaluated during design phase to determine the resulting pumping rate for this existing lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 4.8 gpm in addition to the periodic pumped flow of 80 gpm from the 6607-11 lift station.

5.5.8 2607-E11
This existing lift station currently intercepts flows just upstream from the existing septic for the OSS. The existing 6-foot diameter wetwell will be utilized. The existing 3-inch diameter forcemain will be modified to discharge flows into the manhole at the head end of the main gravity interceptor. Because the system curve is expected to change, the existing pump curves should be evaluated during design phase to determine the resulting pumping rate for this existing lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 0.2 gpm.

5.5.9 2607-E10
This lift station will intercept flows just upstream from the series of existing septic tanks for the OSS. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into the proposed 2607-E12 lift station wetwell. This lift station will receive a Design Peak Hourly gravity influent flow of 4.2 gpm. The existing septic tank will be repurposed for emergency backup storage.

5.5.10 W-519
This lift station will intercept flows just upstream from the series of the existing storage tank. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into the proposed 2607-E12 lift station wetwell. This lift station will receive a Design Peak Hourly gravity influent flow of 0.3 gpm.

This lift station is a candidate for replacement with a gravity sewer pipe. The gravity pipe could flow to either the 2607-E12 or 2607-E10 lift stations. During final design of the collection system, survey data will be used to determine if there is adequate grade for an 8-inch gravity pipe at a minimum slope of 0.4% in lieu of the lift station and forcemain.
5.5.11  2607-E12
This lift station will intercept flows just upstream from the existing septic tank for the OSS and will receive pumped flows from the 2607-E10 and W-519 lift stations. The wetwell will be a 6-ft diameter precast manhole with a depth of approximately 8 feet. A 4-inch diameter forcemain will discharge flows into the wetwell of the proposed 2607-E6 lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 10.0 gpm in addition to the periodic pumped flows of 80 gpm from lift stations W-519 and 2607-E10. The existing septic tank will be repurposed for emergency backup storage.

5.5.12  2607-E6
This existing lift station currently intercept flows just upstream from the existing septic tank for the OSS and will in addition receive flows from the 2607-E12 lift station. The existing 6-foot diameter wetwell will be utilized. The existing 4-inch diameter forcemain will be modified to discharge flows into the manhole at the head end of the main gravity interceptor. Because the system curve is expected to change, the existing pump curves should be evaluated during design phase to determine the resulting pumping rate for this existing lift station. This lift station will receive a Design Peak Hourly gravity influent flow of 1.1 gpm in addition to the periodic pumping of 80 gpm from the 2607-E12 lift station.

5.5.13  Main Regional Lift Station
This lift station will receive flows from the main gravity trunk line – which is fed by four different lift stations each with a pumping capacity of 80 gpm. As previously noted, the actual pumping capacities from the existing lift stations (2607-E3, 2607-E6, and 2607-E11) must be evaluated given the proposed change in system curves – which may impact worst case planning considerations for this lift station. In addition, this lift station is sized for future flows (25.5 gpm peak) as well as truck dumping (16.6 gpm peak). Overall design average flows to this station are as follows:

- Workday (4 days per week): 66,264 gallons/day
- Weekend (3 days per week): 9,817 gallons/day

The wetwell will be an 8-ft diameter precast manhole. Backup power is recommended, either portable or permanent, because this is a key pumping facility for the 200E collection system.

A 3.6-mile-long 6-inch diameter forcemain will discharge flows into a new manhole that will be situated near the existing inlet chamber at the 200W Treatment Lagoon. This manhole will connect to the existing 4-inch pipe that is stubbed out of the existing inlet chamber. As the pump cycles, each working volume from the main lift station will discharge to this manhole, flow to the existing inlet chamber through the existing 4-inch diameter pipe, and then travel through the existing downstream grit chamber, grinder chamber and flume metering manhole.

The main challenges for this lift station and forcemain are discussed below:

Forcemain Velocity
Because the pipeline is several miles in length, maintaining high enough velocity to scour the pipe and re-suspend settled solids between pump cycles especially during the weekend low flows will be important. A design velocity of 3.0 to 3.5 fps minimum was selected to re-suspend and move solids and scour air pockets to the discharge based on the following general guidelines obtained from literature:

- Sanks et. al. (3rd Ed):
  i.  ≥2 fps to keep grit moving and peak daily > 3.5 fps to re-suspend settled solids
  ii. > 1.6 fps OK with 2 daily flushes
iii. If < 2.5 fps, daily flush >4 fps long enough to completely flush the force main
iv. > 3.3 fps required to scour air pockets in 6” main at 0% slope;

- 10 States Recommended Standards for Wastewater Facilities: > 2 fps
- USEPA Wastewater Technology Fact Sheet for Sewers, Force Mains: 2 to 8 fps; for short force mains, use 6 to 9 fps; max should be 10 fps
- Sanitary and Industrial Wastewater Collection – Pumping Station and Force Mains, Dept. of Army and Air Force: >2 fps to keep solids in suspension; 2.5 to 3.5 fps required to re-suspend and flush solids

**Forcemain Gas Accumulation**
The long forcemain could accumulate gas pockets. Air/Vacuum release valves can be implemented at high points but can be a maintenance and freezing concern. Applying a continuous slope from the lift station to the discharge manhole is preferred.

**Forcemain Cleaning**
A “pigging” station should be considered to periodically clean the forcemain to remove accumulated grit and biofilm.

**Pump Selection**
The long forcemain has inherent friction losses adding to the overall total dynamic head for the submersible pumps to overcome. Finding submersible pumps for high-head applications is challenging. Preliminary investigations have identified 3 pumps that can meet the minimum flows to maintain velocity above 3 feet per second.

**Wetwell Volume**
The worst case flow entering the main lift station wetwell will be a peak flow of approximately 362 gpm if all four pumps stations happen to be pumping simultaneously (to be verified during design phase). The 8-foot diameter wetwell will have adequate storage capacity for this rare condition.

**Odor Control Considerations**
The force main is approximately 19,200 feet long and will hold about 28,200 gallons of wastewater. The force main’s hydraulic detention time will be about 14 hours between Monday at 6 a.m. and Thursday at 4 p.m. and 90 hours between Thursday at 4 p.m. and Monday at 6 a.m. Due to the long detention time in the forcemain, hydrogen sulfide (H₂S) production is likely.

It is difficult to quantify the amount of H₂S that will be produced at the forcemain discharge location. A Technical Memorandum was prepared in Appendix G which attempts to quantify the expected H₂S levels using typical literature values. However, because actual levels vary from project to project and site to site, it is suggested that the actual levels should be measured post-construction and if necessary, corrective actions could be taken. Some potential solutions are provided in Appendix G.

### 5.6 Pipe Joints and Locations of Manholes and Lift Stations
To limit potential impacts associated with waste site crossings, new sewers will have gasket joints or heat fused joints designed to maintain a seal. All piping will be subject to pressure or exfiltration testing prior to acceptance for use. To the extent feasible new manholes and lift stations are located outside of known waste site boundaries to minimize waste site interferences and impacts.
Chapter 6 – Capital Improvement Plan

The Capital Improvement Plan (CIP) presents the proposed design for the sewer collection system to serve the 200E area. Figure 6-1 depicts the locations and sizes of the pipelines and the locations of the lift stations.

As part of the project, the eight onsite sewer system drain fields will simply be abandoned in place per Department of Health guidelines.

Upon review and approval of this GSP, MSA will proceed with the design and construction phases of the project. Per WAC 173-240-030(5), it is assumed that the construction plans and specifications for this collection system will not require Ecology approval.

A National Environmental Policy Act (NEPA) screening (DOE/CX-00155) determined the impacts from the proposed sewer system upgrade actions are evaluated in DOE/EA-0391 Tank Closure & Waste Management Environmental Impact Statement (TC&WM EIS). The level of new infrastructure work:

- Is a reasonably associated activity to the described current and selected future operations/Facilities in the TC&WM EIS
- The new lines and lift stations are located within the CLUP Industrial Zone (incorporated by reference into the EIS) and are also within the described Area of Potential Effect (APE) of the reviews done for the EIS

The NEPA review screening form (DOE/CX-00155) is included in Appendix D.

The Washington State Environmental Policy Act (SEPA) checklist prepared for the Hanford Site 200 West Area Evaporative Sewer Lagoon included future projects to the existing sewage flows into the new lagoon system in the description of further activity related to construction of the Sewer Lagoon.

Because this is not a public utility that charges fees to users of the system, a discussion on the project cost and effect on debt and user rates is not included.
Figure 6-1
200E Collection System Master Plan

Legend
- Planning Boundary
- New Lift Station
- Existing Lift Station
- Existing Drain Field
- Existing Storage Tank

Sewer Pipe
- Existing Gravity
- New Gravity
- Existing Force Main
- New Force Main
- Topographic Contours (NAVD 88)

Date: Jul 12, 2017
Works Cited

City of Richland 2015 General Sewer Plan Update, July 2016, J-U-B Engineers, Inc.


EPA 832-F-00-071 Wastewater Technology Fact Sheet: Sewers, Force Mains, September 2000, United States Environmental Protection Agency.

HNF-6612 Hanford Site Sewer System Master Plan HNF-6612 Revision 4, June 2014, Mission Support Alliance.

HNF-6612 Hanford Site Sewer System Master Plan HNF-6612 Revision 5, September 2016, Mission Support Alliance.


http://www.hanford.gov/page.cfm/hms/weatherCharts/Historical


Appendices
Appendix A – Flow Data
Appendix B – Model Assumptions
Appendix C – Model Results
Appendix D – Environmental Documents
Appendix E – State Waste Discharge Permit
Appendix F – Standard Lift Station Design
Appendix G – Technical Memorandum – Hydrogen Sulfide
Appendix H – Ecology Review Comments
Appendix A

Flow Data
### MSA - 2016 General Sewer Plan

Appendix A - Historical Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1A</td>
<td>879</td>
<td>940</td>
<td>3,329</td>
<td>1,119</td>
<td>976</td>
<td>1,652</td>
<td>1,085</td>
<td>1,409</td>
<td>1,439</td>
<td>2,174</td>
<td>3,545</td>
<td>8,712</td>
</tr>
<tr>
<td>2607-E8-A</td>
<td>4,691</td>
<td>8,804</td>
<td>6,981</td>
<td>8,079</td>
<td>7,000</td>
<td>4,677</td>
<td>18,992</td>
<td>7,830</td>
<td>5,712</td>
<td>5,800</td>
<td>6,042</td>
<td>9,516</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>5,570</td>
<td>9,744</td>
<td>8,310</td>
<td>9,198</td>
<td>7,976</td>
<td>6,329</td>
<td>18,027</td>
<td>9,239</td>
<td>7,151</td>
<td>7,974</td>
<td>9,587</td>
<td>18,228</td>
</tr>
<tr>
<td>BOD (avg. lb/day)</td>
<td>11</td>
<td>19</td>
<td>16</td>
<td>18</td>
<td>15</td>
<td>12</td>
<td>35</td>
<td>18</td>
<td>14</td>
<td>15</td>
<td>18</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-11</td>
<td>3,035</td>
<td>3,556</td>
<td>3,517</td>
<td>4,003</td>
<td>4,096</td>
<td>3,473</td>
<td>2,737</td>
<td>2,972</td>
<td>2,836</td>
<td>3,048</td>
<td>3,165</td>
<td>5,172</td>
</tr>
<tr>
<td>2607-EP</td>
<td>9,742</td>
<td>8,700</td>
<td>6,847</td>
<td>8,239</td>
<td>8,609</td>
<td>10,080</td>
<td>6,243</td>
<td>7,000</td>
<td>7,250</td>
<td>10,204</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2607-13</td>
<td>657</td>
<td>280</td>
<td>255</td>
<td>316</td>
<td>400</td>
<td>657</td>
<td>657</td>
<td>657</td>
<td>657</td>
<td>657</td>
<td>657</td>
<td>657</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>1,826</td>
<td>2,300</td>
<td>1,736</td>
<td>3,225</td>
<td>3,351</td>
<td>3,038</td>
<td>2,793</td>
<td>3,323</td>
<td>3,544</td>
<td>3,122</td>
<td>3,436</td>
<td>3,256</td>
</tr>
<tr>
<td>2607-E12</td>
<td>1,955</td>
<td>1,995</td>
<td>1,955</td>
<td>1,955</td>
<td>1,955</td>
<td>1,955</td>
<td>1,955</td>
<td>1,955</td>
<td>1,955</td>
<td>4,935</td>
<td>1,080</td>
<td>502</td>
</tr>
<tr>
<td>2607-E10</td>
<td>840</td>
<td>882</td>
<td>899</td>
<td>406</td>
<td>493</td>
<td>243</td>
<td>471</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
</tr>
<tr>
<td>W-519</td>
<td>23</td>
<td>48</td>
<td>61</td>
<td>34</td>
<td>52</td>
<td>10</td>
<td>42</td>
<td>54</td>
<td>29</td>
<td>76</td>
<td>39</td>
<td>83</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>18,086</td>
<td>17,721</td>
<td>15,270</td>
<td>18,119</td>
<td>18,763</td>
<td>17,728</td>
<td>16,151</td>
<td>16,366</td>
<td>19,936</td>
<td>16,727</td>
<td>20,974</td>
<td></td>
</tr>
<tr>
<td>BOD (avg. lb/day)</td>
<td>35</td>
<td>34</td>
<td>29</td>
<td>35</td>
<td>36</td>
<td>34</td>
<td>36</td>
<td>31</td>
<td>31</td>
<td>36</td>
<td>32</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WRPS 4th St. Trailer Complex</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>WRPS Construction Trailers</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
</tr>
<tr>
<td>DFLAW Facility</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
</tr>
<tr>
<td>HWIP holding tank (to flow to 2704 HV)</td>
<td>149</td>
<td>151</td>
<td>251</td>
<td>135</td>
<td>135</td>
<td>127</td>
<td>101</td>
<td>118</td>
<td>199</td>
<td>210</td>
<td>158</td>
<td>168</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>5,759</td>
<td>5,761</td>
<td>5,801</td>
<td>5,745</td>
<td>5,723</td>
<td>5,732</td>
<td>5,711</td>
<td>5,728</td>
<td>5,809</td>
<td>5,820</td>
<td>5,768</td>
<td>5,778</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Future 200E Consolidation</td>
<td>5,759</td>
<td>5,761</td>
<td>5,801</td>
<td>5,745</td>
<td>5,723</td>
<td>5,732</td>
<td>5,711</td>
<td>5,728</td>
<td>5,809</td>
<td>5,820</td>
<td>5,768</td>
<td>5,778</td>
</tr>
<tr>
<td>Actual Lagoon Flows (truck from offsite HT's)</td>
<td>5,717</td>
<td>7,784</td>
<td>7,743</td>
<td>7,873</td>
<td>8,457</td>
<td>8,718</td>
<td>7,519</td>
<td>7,620</td>
<td>7,716</td>
<td>6,818</td>
<td>4,317</td>
<td>4,967</td>
</tr>
<tr>
<td>Total flows that would be collected at the 200E Main LS</td>
<td>32,374</td>
<td>37,118</td>
<td>33,313</td>
<td>36,895</td>
<td>36,691</td>
<td>34,148</td>
<td>46,151</td>
<td>34,528</td>
<td>33,164</td>
<td>37,139</td>
<td>34,241</td>
<td>47,464</td>
</tr>
</tbody>
</table>

Appendix A - Historical Data

- **HNF-55909, Rev 1. | Page |56**

Page 1 of 3
### MSA - 2016 General Sewer Plan

#### Appendix A - Historical Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-E1A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7,123</td>
<td>4,193</td>
<td>3,986</td>
<td>5,271</td>
<td>1,993</td>
<td>796</td>
<td>5,312</td>
<td>2,157</td>
<td>2,934</td>
<td>3,171</td>
<td>1,652</td>
<td>3,106</td>
</tr>
<tr>
<td>2607-E8-A</td>
<td>12,000</td>
<td>8,079</td>
<td>7,975</td>
<td>7,524</td>
<td>6,591</td>
<td>5,696</td>
<td>6,444</td>
<td>6,824</td>
<td>4,934</td>
<td>5,950</td>
<td>5,626</td>
<td>6,105</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>19,123</td>
<td>12,272</td>
<td>11,061</td>
<td>12,795</td>
<td>8,594</td>
<td>6,492</td>
<td>9,657</td>
<td>8,981</td>
<td>7,827</td>
<td>9,126</td>
<td>7,451</td>
<td>9,212</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td>37</td>
<td>24</td>
<td>23</td>
<td>25</td>
<td>16</td>
<td>12</td>
<td>19</td>
<td>17</td>
<td>15</td>
<td>18</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5,877</td>
<td>4,946</td>
<td>6,064</td>
<td>5,878</td>
<td>4,758</td>
<td>4,493</td>
<td>3,986</td>
<td>5,176</td>
<td>4,679</td>
<td>2,969</td>
<td>107</td>
<td>3,934</td>
</tr>
<tr>
<td>2607-EP</td>
<td>9,500</td>
<td>9,943</td>
<td>8,942</td>
<td>6,862</td>
<td>7,250</td>
<td>6,896</td>
<td>7,250</td>
<td>4,305</td>
<td>5,800</td>
<td>5,053</td>
<td>5,096</td>
<td>4,486</td>
</tr>
<tr>
<td>2607-13</td>
<td>657</td>
<td>657</td>
<td>657</td>
<td>573</td>
<td>573</td>
<td>900</td>
<td>480</td>
<td>415</td>
<td>348</td>
<td>2,046</td>
<td>383</td>
<td></td>
</tr>
<tr>
<td>2607-EQ</td>
<td>4,747</td>
<td>4,942</td>
<td>6,589</td>
<td>5,841</td>
<td>6,579</td>
<td>5,825</td>
<td>4,539</td>
<td>5,295</td>
<td>5,087</td>
<td>5,442</td>
<td>3,824</td>
<td>3,922</td>
</tr>
<tr>
<td>2607-E12</td>
<td>1,906</td>
<td>1,579</td>
<td>1,954</td>
<td>2,673</td>
<td>3,152</td>
<td>1,962</td>
<td>1,165</td>
<td>1,196</td>
<td>1,173</td>
<td>1,675</td>
<td>2,313</td>
<td>2,706</td>
</tr>
<tr>
<td>2607-E10</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
<td>1,100</td>
</tr>
<tr>
<td>W-519</td>
<td>48</td>
<td>48</td>
<td>60</td>
<td>56</td>
<td>42</td>
<td>361</td>
<td>55</td>
<td>55</td>
<td>42</td>
<td>78</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>23,835</td>
<td>23,211</td>
<td>25,386</td>
<td>23,066</td>
<td>23,538</td>
<td>21,010</td>
<td>18,905</td>
<td>17,329</td>
<td>18,018</td>
<td>16,385</td>
<td>14,241</td>
<td>15,514</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td>46</td>
<td>46</td>
<td>49</td>
<td>44</td>
<td>45</td>
<td>40</td>
<td>36</td>
<td>33</td>
<td>35</td>
<td>31</td>
<td>27</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>WRPS 4th St. Trailer Complex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WRPS Construction Trailers</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>DFLAW Facility</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
</tr>
<tr>
<td>HWVP holding tank (to flow to 2704 HV)</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>5,781</td>
<td>5,744</td>
<td>5,632</td>
<td>5,765</td>
<td>5,712</td>
<td>5,795</td>
<td>5,723</td>
<td>5,760</td>
<td>5,778</td>
<td>5,865</td>
<td>5,742</td>
<td>5,812</td>
</tr>
</tbody>
</table>

#### Total Flows

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Future 200E Consolidation</td>
<td>5,781</td>
<td>5,744</td>
<td>5,632</td>
<td>5,765</td>
<td>5,712</td>
<td>5,795</td>
<td>5,723</td>
<td>5,760</td>
<td>5,778</td>
<td>5,865</td>
<td>5,742</td>
<td>5,812</td>
</tr>
<tr>
<td>Actual Lagoon Flows (trucked from offsite HTs):</td>
<td>5,191</td>
<td>7,467</td>
<td>10,794</td>
<td>8,582</td>
<td>5,943</td>
<td>7,112</td>
<td>9,092</td>
<td>8,861</td>
<td>10,286</td>
<td>8,902</td>
<td>7,108</td>
<td>5,183</td>
</tr>
<tr>
<td>Total flows that would be collected at the 200E Main LS</td>
<td>51,334</td>
<td>44,460</td>
<td>48,577</td>
<td>46,917</td>
<td>40,806</td>
<td>36,863</td>
<td>36,830</td>
<td>36,475</td>
<td>36,757</td>
<td>35,828</td>
<td>30,983</td>
<td>33,129</td>
</tr>
</tbody>
</table>
### Appendix A - Historical Data

#### MSA - 2016 General Sewer Plan

#### Project L-853

<table>
<thead>
<tr>
<th>Project</th>
<th>Jul-15</th>
<th>Aug-15</th>
<th>Sep-15</th>
<th>Oct-15</th>
<th>Total Gallons (Cumulative)</th>
<th>Mean</th>
<th>Std Dev</th>
<th>95% Margin of Error</th>
<th>Design Average Day (95% confidence limit)</th>
<th>Design Peak Day (Safety Factor of 1.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-853</td>
<td>2,825</td>
<td>3,520</td>
<td>3,569</td>
<td>3,773</td>
<td>78,644</td>
<td>28</td>
<td>1,888</td>
<td>699</td>
<td>3,508</td>
<td>4,210</td>
</tr>
<tr>
<td>2607-E8 A</td>
<td>6,856</td>
<td>7,653</td>
<td>6,713</td>
<td>9,768</td>
<td>206,862</td>
<td>28</td>
<td>2,494</td>
<td>924</td>
<td>8,312</td>
<td>9,974</td>
</tr>
<tr>
<td>Sum</td>
<td>9,683</td>
<td>11,173</td>
<td>10,272</td>
<td>13,563</td>
<td>271,942</td>
<td>28</td>
<td>10,197</td>
<td>699</td>
<td>11,820</td>
<td>14,184</td>
</tr>
</tbody>
</table>

#### Project L-854

<table>
<thead>
<tr>
<th>Project</th>
<th>Jul-15</th>
<th>Aug-15</th>
<th>Sep-15</th>
<th>Oct-15</th>
<th>Total Gallons (Cumulative)</th>
<th>Mean</th>
<th>Std Dev</th>
<th>95% Margin of Error</th>
<th>Design Average Day (95% confidence limit)</th>
<th>Design Peak Day (Safety Factor of 1.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-854</td>
<td>3,934</td>
<td>3,934</td>
<td>3,934</td>
<td>3,934</td>
<td>110,143</td>
<td>28</td>
<td>1,213</td>
<td>449</td>
<td>4,303</td>
<td>5,259</td>
</tr>
<tr>
<td>2607-EP</td>
<td>5,724</td>
<td>6,315</td>
<td>5,102</td>
<td>4,265</td>
<td>200,212</td>
<td>28</td>
<td>1,839</td>
<td>681</td>
<td>7,032</td>
<td>9,358</td>
</tr>
<tr>
<td>2607-13</td>
<td>400</td>
<td>2,520</td>
<td>455</td>
<td>508</td>
<td>18,393</td>
<td>28</td>
<td>491</td>
<td>182</td>
<td>839</td>
<td>1,006</td>
</tr>
<tr>
<td>2607-EQ</td>
<td>2,803</td>
<td>2,800</td>
<td>3,102</td>
<td>2,824</td>
<td>109,111</td>
<td>28</td>
<td>1,361</td>
<td>504</td>
<td>4,401</td>
<td>5,281</td>
</tr>
<tr>
<td>2607-E12</td>
<td>1,403</td>
<td>869</td>
<td>2,089</td>
<td>2,611</td>
<td>54,740</td>
<td>28</td>
<td>827</td>
<td>306</td>
<td>2,261</td>
<td>2,713</td>
</tr>
<tr>
<td>W-519</td>
<td>55</td>
<td>56</td>
<td>91</td>
<td>31</td>
<td>1,642</td>
<td>28</td>
<td>52</td>
<td>10</td>
<td>71</td>
<td>76</td>
</tr>
<tr>
<td>Sum</td>
<td>15,141</td>
<td>17,315</td>
<td>15,356</td>
<td>14,404</td>
<td>517,151</td>
<td>28</td>
<td>18,470</td>
<td>715</td>
<td>20,723</td>
<td>24,868</td>
</tr>
</tbody>
</table>

#### Future 200E Consolidation

<table>
<thead>
<tr>
<th>Future 200E</th>
<th>Jul-15</th>
<th>Aug-15</th>
<th>Sep-15</th>
<th>Oct-15</th>
<th>Total Gallons (Cumulative)</th>
<th>Mean</th>
<th>Std Dev</th>
<th>95% Margin of Error</th>
<th>Design Average Day (95% confidence limit)</th>
<th>Design Peak Day (Safety Factor of 1.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRPS 4th St. Trailer Complex</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>42,000</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>1,500</td>
<td>1,800</td>
</tr>
<tr>
<td>WRPS Construction Trailers</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>100,800</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>3,600</td>
<td>4,320</td>
</tr>
<tr>
<td>DFLAW Facility</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>510</td>
<td>14,280</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>510</td>
<td>612</td>
</tr>
<tr>
<td>HWVP holding tank (to flow to 2704 HV)</td>
<td>171</td>
<td>208</td>
<td>221</td>
<td>303</td>
<td>4,767</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>171</td>
<td>206</td>
</tr>
<tr>
<td>Sum</td>
<td>5,781</td>
<td>5,818</td>
<td>5,831</td>
<td>5,913</td>
<td>161,847</td>
<td>28</td>
<td>-</td>
<td>-</td>
<td>5,781</td>
<td>6,938</td>
</tr>
</tbody>
</table>

#### Total Flows

<table>
<thead>
<tr>
<th>Total Flows</th>
<th>Jul-15</th>
<th>Aug-15</th>
<th>Sep-15</th>
<th>Oct-15</th>
<th>Total Gallons (Cumulative)</th>
<th>Mean</th>
<th>Std Dev</th>
<th>95% Margin of Error</th>
<th>Design Average Day (95% confidence limit)</th>
<th>Design Peak Day (Safety Factor of 1.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future 200E</td>
<td>24,824</td>
<td>28,488</td>
<td>25,629</td>
<td>27,967</td>
<td>802,856</td>
<td>28</td>
<td>32,543</td>
<td>39,051</td>
<td>39,051</td>
<td>32,543</td>
</tr>
<tr>
<td>Total Near-Term Consolidation</td>
<td>2607-853</td>
<td>2607-854</td>
<td>25,637</td>
<td>27,967</td>
<td>802,856</td>
<td>28</td>
<td>32,543</td>
<td>39,051</td>
<td>39,051</td>
<td>32,543</td>
</tr>
<tr>
<td>Design Average Day (95% confidence limit)</td>
<td>161,847</td>
<td>161,847</td>
<td>161,847</td>
<td>161,847</td>
<td>161,847</td>
<td>28</td>
<td>5,781</td>
<td>6,938</td>
<td>6,938</td>
<td>5,781</td>
</tr>
<tr>
<td>Design Peak Day (Safety Factor of 1.2)</td>
<td>5,781</td>
<td>5,781</td>
<td>5,781</td>
<td>5,781</td>
<td>5,781</td>
<td>28</td>
<td>7,496</td>
<td>8,996</td>
<td>8,996</td>
<td>7,496</td>
</tr>
<tr>
<td>Total flows that would be collected at the 200E Main LS</td>
<td>35,414</td>
<td>37,967</td>
<td>34,269</td>
<td>37,771</td>
<td>1,069,448</td>
<td>28</td>
<td>38,195</td>
<td>50,487</td>
<td>50,487</td>
<td>38,195</td>
</tr>
</tbody>
</table>
% of weekly flow on workdays = 90%
% of weekly flow on weekends = 10%
hours per workday = 10
peak hour to peak day peaking factor = 1.4

### Estimated Total Mean

<table>
<thead>
<tr>
<th>Project</th>
<th>gal/s (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/s (weekend)</th>
<th>gpm (weekend)</th>
<th>gals/week</th>
<th>gal/d (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/d (weekend)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-853</td>
<td>19,661</td>
<td>4,244</td>
<td>7.4</td>
<td>855</td>
<td>0.46</td>
<td>24,556</td>
<td>5,525</td>
<td>9.2</td>
<td>829</td>
<td>0.57</td>
<td></td>
</tr>
<tr>
<td>2607-E2A</td>
<td>51,715</td>
<td>11,636</td>
<td>19.4</td>
<td>1,724</td>
<td>0.20</td>
<td>58,181</td>
<td>10,091</td>
<td>21.8</td>
<td>1,939</td>
<td>1.35</td>
<td></td>
</tr>
<tr>
<td>2607-E8B</td>
<td>71,376</td>
<td>16,060</td>
<td>26.8</td>
<td>2,379</td>
<td>1.65</td>
<td>82,737</td>
<td>18,616</td>
<td>31.0</td>
<td>2,758</td>
<td>1.92</td>
<td></td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>129,288</td>
<td>29,090</td>
<td>48.5</td>
<td>4,310</td>
<td>2.99</td>
<td>145,061</td>
<td>32,639</td>
<td>54.4</td>
<td>4,835</td>
<td>3.36</td>
<td></td>
</tr>
<tr>
<td>BOD (avg. lbi/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Project L-354

<table>
<thead>
<tr>
<th>Project</th>
<th>gal/s (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/s (weekend)</th>
<th>gpm (weekend)</th>
<th>gals/week</th>
<th>gal/d (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/d (weekend)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2607-11</td>
<td>27,336</td>
<td>6,196</td>
<td>10.3</td>
<td>918</td>
<td>0.64</td>
<td>30,680</td>
<td>6,903</td>
<td>11.5</td>
<td>1,023</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>2607-EP</td>
<td>50,053</td>
<td>11,262</td>
<td>18.8</td>
<td>1,668</td>
<td>1.16</td>
<td>54,822</td>
<td>12,335</td>
<td>20.6</td>
<td>1,827</td>
<td>1.27</td>
<td></td>
</tr>
<tr>
<td>2607-13</td>
<td>4,598</td>
<td>1,035</td>
<td>1.7</td>
<td>153</td>
<td>0.11</td>
<td>5,870</td>
<td>1,321</td>
<td>2.2</td>
<td>196</td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td>2607-EQ</td>
<td>27,278</td>
<td>6,137</td>
<td>10.2</td>
<td>909</td>
<td>0.63</td>
<td>30,806</td>
<td>6,931</td>
<td>11.6</td>
<td>1,027</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>2607-E12</td>
<td>19,685</td>
<td>4,079</td>
<td>5.1</td>
<td>456</td>
<td>0.32</td>
<td>15,829</td>
<td>3,561</td>
<td>5.9</td>
<td>528</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>2607-E10</td>
<td>5,753</td>
<td>1,294</td>
<td>2.2</td>
<td>192</td>
<td>0.13</td>
<td>6,597</td>
<td>1,484</td>
<td>2.5</td>
<td>220</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>WS19</td>
<td>385</td>
<td>87</td>
<td>0.1</td>
<td>13</td>
<td>0.01</td>
<td>457</td>
<td>103</td>
<td>0.2</td>
<td>15</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>129,288</td>
<td>29,090</td>
<td>48.5</td>
<td>4,310</td>
<td>2.99</td>
<td>145,061</td>
<td>32,639</td>
<td>54.4</td>
<td>4,835</td>
<td>3.36</td>
<td></td>
</tr>
<tr>
<td>BOD (avg. lbi/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Future 200E Consolidation

<table>
<thead>
<tr>
<th>Project</th>
<th>gal/s (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/s (weekend)</th>
<th>gpm (weekend)</th>
<th>gals/week</th>
<th>gal/d (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/d (weekend)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRPS 4th St. Trailer Complex</td>
<td>10,500</td>
<td>2,363</td>
<td>3.9</td>
<td>350</td>
<td>0.24</td>
<td>10,500</td>
<td>2,363</td>
<td>3.9</td>
<td>350</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>WRPS Construction Trailers</td>
<td>25,200</td>
<td>5,670</td>
<td>9.5</td>
<td>840</td>
<td>0.58</td>
<td>25,200</td>
<td>5,670</td>
<td>9.5</td>
<td>840</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>DFLAW Facility</td>
<td>3,570</td>
<td>803</td>
<td>1.3</td>
<td>119</td>
<td>0.08</td>
<td>3,570</td>
<td>803</td>
<td>1.3</td>
<td>119</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>HWVP holding tank (to flow to 2704 HV)</td>
<td>1,192</td>
<td>268</td>
<td>0.4</td>
<td>40</td>
<td>0.03</td>
<td>1,192</td>
<td>270</td>
<td>0.4</td>
<td>40</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40,462</td>
<td>9,104</td>
<td>15.2</td>
<td>1,349</td>
<td>0.94</td>
<td>40,469</td>
<td>9,105</td>
<td>15.2</td>
<td>1,349</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>BOD (avg. lbi/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Total Flows

<table>
<thead>
<tr>
<th>Project</th>
<th>gal/s (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/s (weekend)</th>
<th>gpm (weekend)</th>
<th>gals/week</th>
<th>gal/d (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gal/d (weekend)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-853</td>
<td>200,664</td>
<td>45,149</td>
<td>75.2</td>
<td>6,689</td>
<td>4.65</td>
<td>227,798</td>
<td>51,255</td>
<td>85.4</td>
<td>7,593</td>
<td>5.27</td>
<td></td>
</tr>
<tr>
<td>L-854</td>
<td>40,462</td>
<td>9,104</td>
<td>15.2</td>
<td>1,349</td>
<td>0.94</td>
<td>40,469</td>
<td>9,105</td>
<td>15.2</td>
<td>1,349</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>247,126</td>
<td>54,253</td>
<td>100.3</td>
<td>8,032</td>
<td>6.60</td>
<td>269,206</td>
<td>59,364</td>
<td>110.4</td>
<td>9,942</td>
<td>6.82</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix A - Design Flow Data

#### Design Peak Day

<table>
<thead>
<tr>
<th>Project</th>
<th>gals/week</th>
<th>gal/d (workday)</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gpm (weekend)</th>
<th>gal/d (weekend)</th>
<th>gpm (weekend)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-853</td>
<td>29,468</td>
<td>6,630</td>
<td>11.1</td>
<td>0.68</td>
<td>982</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>69,817</td>
<td>15,709</td>
<td>26.2</td>
<td>1.62</td>
<td>2,327</td>
<td>36.7</td>
</tr>
<tr>
<td>Sum</td>
<td>99,285</td>
<td>22,339</td>
<td>37.2</td>
<td>2.30</td>
<td>3,309</td>
<td>52.1</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-854</td>
<td>36,816</td>
<td>8,284</td>
<td>13.8</td>
<td>0.85</td>
<td>1,227</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>65,787</td>
<td>14,802</td>
<td>24.7</td>
<td>1.52</td>
<td>2,193</td>
<td>34.5</td>
</tr>
<tr>
<td>Sum</td>
<td>102,603</td>
<td>23,086</td>
<td>40.8</td>
<td>2.37</td>
<td>3,416</td>
<td>53.8</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Design Peak Hour

<table>
<thead>
<tr>
<th>Project</th>
<th>gals/week</th>
<th>gal/d</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm (weekend)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-853</td>
<td>29,468</td>
<td>6,630</td>
<td>11.1</td>
<td>0.68</td>
<td>982</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>69,817</td>
<td>15,709</td>
<td>26.2</td>
<td>1.62</td>
<td>2,327</td>
<td>36.7</td>
</tr>
<tr>
<td></td>
<td>6607-11</td>
<td>36,816</td>
<td>8,284</td>
<td>13.8</td>
<td>1,227</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>65,787</td>
<td>14,802</td>
<td>24.7</td>
<td>1.52</td>
<td>2,193</td>
<td>34.5</td>
</tr>
<tr>
<td></td>
<td>36,816</td>
<td>8,284</td>
<td>13.8</td>
<td>0.85</td>
<td>1,227</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>65,787</td>
<td>14,802</td>
<td>24.7</td>
<td>1.52</td>
<td>2,193</td>
<td>34.5</td>
</tr>
<tr>
<td>Sum</td>
<td>99,285</td>
<td>22,339</td>
<td>37.2</td>
<td>2.30</td>
<td>3,309</td>
<td>52.1</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-854</td>
<td>36,816</td>
<td>8,284</td>
<td>13.8</td>
<td>0.85</td>
<td>1,227</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>65,787</td>
<td>14,802</td>
<td>24.7</td>
<td>1.52</td>
<td>2,193</td>
<td>34.5</td>
</tr>
<tr>
<td></td>
<td>36,816</td>
<td>8,284</td>
<td>13.8</td>
<td>0.85</td>
<td>1,227</td>
<td>19.3</td>
</tr>
<tr>
<td></td>
<td>65,787</td>
<td>14,802</td>
<td>24.7</td>
<td>1.52</td>
<td>2,193</td>
<td>34.5</td>
</tr>
<tr>
<td>Sum</td>
<td>99,285</td>
<td>22,339</td>
<td>37.2</td>
<td>2.30</td>
<td>3,309</td>
<td>52.1</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Future 200E Consolidation

<table>
<thead>
<tr>
<th>Project</th>
<th>gals/week</th>
<th>gal/d</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm (weekend)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRPS 4th St. Trailer Complex</td>
<td>12,600</td>
<td>2,835</td>
<td>4.7</td>
<td>0.29</td>
<td>420</td>
<td>6.6</td>
</tr>
<tr>
<td>WRPS Construction Trailers</td>
<td>30,240</td>
<td>6,034</td>
<td>11.3</td>
<td>1.08</td>
<td>1,008</td>
<td>15.9</td>
</tr>
<tr>
<td>DFLAW Facility</td>
<td>4,284</td>
<td>964</td>
<td>1.6</td>
<td>0.10</td>
<td>143</td>
<td>2.2</td>
</tr>
<tr>
<td>HWVP holding tank (to flow to 2704 HV)</td>
<td>1,439</td>
<td>324</td>
<td>0.5</td>
<td>0.03</td>
<td>48</td>
<td>0.8</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>48,563</td>
<td>10,927</td>
<td>18.2</td>
<td>1.12</td>
<td>1,619</td>
<td>25.3</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Total Near-Term Consolidation (L-853 + L-854)

<table>
<thead>
<tr>
<th>Total Flows</th>
<th>gals/week</th>
<th>gal/d</th>
<th>gpm (workday, 10 hr/d)</th>
<th>gpm (weekend)</th>
<th>gal/d</th>
<th>gpm (weekend)</th>
</tr>
</thead>
<tbody>
<tr>
<td>273,358</td>
<td>61,505</td>
<td>102.5</td>
<td>9,112</td>
<td>6.33</td>
<td>11,780</td>
<td>143.5</td>
</tr>
<tr>
<td>48,563</td>
<td>10,927</td>
<td>18.2</td>
<td>1,619</td>
<td>1.12</td>
<td>25.5</td>
<td>15.7</td>
</tr>
<tr>
<td>48,563</td>
<td>10,927</td>
<td>18.2</td>
<td>1,619</td>
<td>1.12</td>
<td>25.5</td>
<td>15.7</td>
</tr>
<tr>
<td>48,563</td>
<td>10,927</td>
<td>18.2</td>
<td>1,619</td>
<td>1.12</td>
<td>25.5</td>
<td>15.7</td>
</tr>
<tr>
<td>Sum (avg. gpd)</td>
<td>353,408</td>
<td>79,917</td>
<td>132.5</td>
<td>11,780</td>
<td>185.5</td>
<td>11.45</td>
</tr>
<tr>
<td>BOD (avg. lbs/day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B

Model Assumptions
Contents

Appendix B  Model Assumptions ............................................................................................................. B-1
  B.1  Introduction .................................................................................................................................................. B-1
  B.2  Model Assumptions ................................................................................................................................. B-1
      B.2.1  System Layer ........................................................................................................................................... B-1
      B.2.2  Elevation and Datum Assumptions .................................................................................................... B-3
Appendix B  Model Assumptions

B.1 Introduction

An important part of the developing the design of the 200 East Facilities sewer system was to create a sewer model. The assumptions used in the model were based on information provided from MSA, learned characteristics of the system, and a general knowledge of sewer flow characteristics gained through past experience modeling other sewer systems.

B.2 Model Assumptions

This section summarizes the assumptions and changes made to the original model.

B.2.1 System Layer

Parameter: Manning’s “n”

Discussion: The roughness factor used in the Manning's formula $Q = (1.49/n)AR^{5/3}S_0^{1/2}$. The Manning's formula relates flow in a pipe with the depth of flow, diameter of the pipe, and the slope of the pipe. Typical “n” values range from 0.009 for very smooth glass or new plastic to greater than 0.016 for unfinished concrete. For sewer pipes, however, a slime layer develops on any sewer material in contact with sewage and provides relatively consistent roughness regardless of material.

ASCE Manual No. 60 “Gravity Sanitary Sewer: Design and Construction” provides a table of recommended Manning’s “n” values based on size and condition. For pipes installed and maintained with “extra care” they suggest a Manning’s “n” range from 0.0092 to 0.0107 for sizes 6” to 60” respectively. For ‘typical’ installations Manning’s “n” ranging from 0.0106 to 0.0123 for sizes 6” to 60” respectively. For “substandard” installations Manning’s “n” range from 0.0120 to 0.0139 for sizes 6” to 60” respectively.

The WDOE Criteria for Sewage Works Design (C1-4.3) suggests using a Manning’s “n” value of 0.013 for the design of all sewer facilities regardless of pipe material.

Model Assumption: Use a Manning’s “n” of 0.013 regardless of material, size and age.

Parameter: Design Pipe Slope Determination

Discussion: The Ten State Standards list the minimum pipe slope for sizes 8” to 21”. For pipes larger than 21”, a slope of 0.10% is typically maintained because with slopes smaller than 0.10%, constructability becomes difficult.

Model Assumption: Use Ten State Standards minimum slopes as modified and shown below in Table B-1.
Table B-1 – Minimum Slopes for Design Pipes

<table>
<thead>
<tr>
<th>Size</th>
<th>Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>8”</td>
<td>0.40%</td>
</tr>
<tr>
<td>10”</td>
<td>0.28%</td>
</tr>
<tr>
<td>12”</td>
<td>0.22%</td>
</tr>
<tr>
<td>15”</td>
<td>0.15%</td>
</tr>
<tr>
<td>18”</td>
<td>0.12%</td>
</tr>
<tr>
<td>≥21”</td>
<td>0.10%</td>
</tr>
</tbody>
</table>

Parameter: Design Pipe Sewer Match Point

Discussion: When two sewer pipes of different sizes meet at a manhole, the match point can affect pipe hydraulics. Convention and some sewer standards require the design to match the pipe crowns or to match the design depths of the sewers to keep from surcharging the smaller pipe.

Model Assumption: The size of pipes carrying gravity flow remain constant throughout the model. Therefore, the hydraulics should not be affected by match point.

Parameter: Allowable Decreases

Discussion: This allows for smaller diameter pipes to be constructed downstream of larger diameter pipes where additional capacity is gained in the smaller pipe due to an increased pipe slope.

Decreases are not recommended in smaller pipes (< 24 inches) due to the tendency of upstream obstructions to lodge at locations where trunk pipes decrease in size. Decreases may be necessary when connecting a master planned pipe into an existing trunk line, but should be avoided for future pipes.

Model Assumption: Decreases in diameter not allowed.

Parameter: Design Pipe Distance Between Manholes

Discussion: The distances between manholes may vary but, according to the 10 State Standards, should be limited to 400 feet for pipes less than 18 inches in diameter and 500 feet for pipes 18 inches and larger.

Model Assumption: Use 400 foot spacing between manholes. The Model does not currently show manholes in the 5,700 feet of gravity pipe leading to the Main Lift Station.
B.2.2 Elevation and Datum Assumptions

Parameter: Vertical Datum
Discussion: A different vertical datum can cause differences in elevations at the same point by many feet. The majority of the 200 East facilities record drawings and existing model data used the NAD 88 datum.

Model Assumption: A new survey was completed for the gravity sewer lines where rim and invert elevations were obtained in the same survey, which should ensure a consistent datum.

Parameter: Coordinate System
Discussion: The North American Datum of 1983 (NAD 83) is the basis for many coordinate systems. The NAD 83 State Plane system consists of several coordinate systems for each state. The 200 East Facility uses the NAD 1983 State Plane Washington South Zone coordinate system.

Model Assumption: NAD 1983 State Plane Washington South Zone
Appendix C

Model Results
## MSA - General Sewer Plan

### Appendix C - Hydraulic Model Results

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P-4</td>
<td>Exist</td>
<td>87</td>
<td>8</td>
<td>721.82</td>
<td>717.71</td>
<td>4.7%</td>
<td>80.0</td>
<td>1.4</td>
<td>4.3</td>
<td>0.18</td>
<td>1175.9</td>
<td>2.4</td>
</tr>
<tr>
<td>P-5</td>
<td>Exist</td>
<td>183</td>
<td>8</td>
<td>719.15</td>
<td>717.71</td>
<td>0.8%</td>
<td>80.0</td>
<td>2.2</td>
<td>2.3</td>
<td>0.27</td>
<td>484.7</td>
<td>0.9</td>
</tr>
<tr>
<td>P-6</td>
<td>Exist</td>
<td>295</td>
<td>8</td>
<td>719.15</td>
<td>717.12</td>
<td>0.7%</td>
<td>116.0</td>
<td>2.8</td>
<td>2.4</td>
<td>0.34</td>
<td>453.3</td>
<td>0.8</td>
</tr>
<tr>
<td>P-8</td>
<td>Exist</td>
<td>273</td>
<td>8</td>
<td>708.39</td>
<td>706.48</td>
<td>0.7%</td>
<td>116.0</td>
<td>2.8</td>
<td>2.4</td>
<td>0.34</td>
<td>453.3</td>
<td>0.8</td>
</tr>
<tr>
<td>P-10</td>
<td>Exist</td>
<td>202</td>
<td>8</td>
<td>713.33</td>
<td>712.77</td>
<td>0.3%</td>
<td>80.0</td>
<td>2.8</td>
<td>1.6</td>
<td>0.35</td>
<td>296.2</td>
<td>0.5</td>
</tr>
<tr>
<td>P-11</td>
<td>Exist</td>
<td>253</td>
<td>8</td>
<td>712.77</td>
<td>711.55</td>
<td>0.5%</td>
<td>80.0</td>
<td>2.5</td>
<td>1.9</td>
<td>0.31</td>
<td>381.5</td>
<td>0.7</td>
</tr>
<tr>
<td>P-12</td>
<td>Exist</td>
<td>262</td>
<td>8</td>
<td>711.55</td>
<td>710.58</td>
<td>0.4%</td>
<td>80.0</td>
<td>2.6</td>
<td>1.8</td>
<td>0.33</td>
<td>341.1</td>
<td>0.6</td>
</tr>
<tr>
<td>P-13</td>
<td>Exist</td>
<td>196</td>
<td>8</td>
<td>710.58</td>
<td>709.76</td>
<td>0.4%</td>
<td>160.0</td>
<td>3.8</td>
<td>2.2</td>
<td>0.48</td>
<td>341.1</td>
<td>0.4</td>
</tr>
<tr>
<td>P-14</td>
<td>Exist</td>
<td>49</td>
<td>8</td>
<td>709.76</td>
<td>705.60</td>
<td>8.5%</td>
<td>160.0</td>
<td>1.7</td>
<td>6.5</td>
<td>0.21</td>
<td>1579.8</td>
<td>3.2</td>
</tr>
<tr>
<td>P-15</td>
<td>Exist</td>
<td>308</td>
<td>8</td>
<td>711.76</td>
<td>710.58</td>
<td>0.4%</td>
<td>80.0</td>
<td>2.6</td>
<td>1.8</td>
<td>0.33</td>
<td>341.1</td>
<td>0.6</td>
</tr>
<tr>
<td>P-16</td>
<td>Exist</td>
<td>285</td>
<td>8</td>
<td>712.90</td>
<td>711.76</td>
<td>0.4%</td>
<td>80.0</td>
<td>2.6</td>
<td>1.8</td>
<td>0.33</td>
<td>341.1</td>
<td>0.6</td>
</tr>
<tr>
<td>P-17</td>
<td>Exist</td>
<td>71</td>
<td>8</td>
<td>714.40</td>
<td>712.90</td>
<td>2.1%</td>
<td>80.0</td>
<td>1.7</td>
<td>3.2</td>
<td>0.22</td>
<td>785.4</td>
<td>1.6</td>
</tr>
<tr>
<td>P-27</td>
<td>Design</td>
<td>5697</td>
<td>8</td>
<td>705.88</td>
<td>596.94</td>
<td>1.9%</td>
<td>345.5</td>
<td>3.8</td>
<td>4.7</td>
<td>0.48</td>
<td>749.5</td>
<td>0.9</td>
</tr>
</tbody>
</table>
**Known Flow and Slope**

**Input**
- \( Q = 0.18 \text{ cfs} \)
- \( Q = 115200 \text{ MGD} \)
- \( D = 8.0 \text{ in} \)
- \( S = 0.047 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculations**
- \( \beta = 0.87 \)
- \( A_0 = 0.04 \text{ ft}^2 \)
- \( P = 0.58 \text{ ft} \)
- \( R_h = 0.07 \text{ ft} \)
- \( T_w = 0.51 \text{ ft} \)
- \( Q_{\text{difference}} = 0.0000 \)

**Results**
- \( y = 1.4 \text{ in} \)
- \( V = 4.29 \text{ fps} \)
- \( d/D = 0.18 \)
- \( Fr = 2.64 \text{ Supercritical} \)
- \( E = 0.40 \text{ ft} \)
- \( \text{Rem Cap.} = 2.44 \text{ cfs} \)

*Use solver or goal seek to set \( Q_{\text{difference}} \) to 0.0 by changing \( y \)

**Full Pipe**

**Input**
- \( Q = 2.62 \text{ cfs} \)
- \( Q = 0 \text{ MGD} \)
- \( D = 8 \text{ in} \)
- \( S = 0.047 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculations**
- \( \beta = 0.35 \text{ ft}^2 \)
- \( P = 2.09 \text{ ft} \)
- \( R_h = 0.17 \text{ ft} \)
- \( T_w = 0.00 \text{ ft} \)

\[ \beta = \alpha \cos \left( 1 - \frac{Y}{R} \right) \text{ in radians} \]

\[ A = R^2 \cdot \left( \beta - \cos(\beta) \cdot \sin(\beta) \right) \]

\[ P = 2 \cdot R \cdot \beta \]

\[ T_w = 2 \cdot R \cdot \sin(\beta) \]

\[ A \cdot h_v = R \left( \frac{2}{3} R^3 \cdot \sin(\beta)^3 - A \cdot \cos(\beta) \right) \]

\[ R_h = \frac{A}{P} \quad E = Y + \frac{Q^2}{2 g \cdot A^2} + \Delta z \]

\[ F_r = \frac{Q}{\sqrt{g \cdot \frac{A}{E}}} = \sqrt{\frac{A}{E}} \]
Known Flow and Slope

Input

<table>
<thead>
<tr>
<th>Q</th>
<th>0.18</th>
<th>cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>115200</td>
<td>MGD</td>
</tr>
<tr>
<td>D</td>
<td>8.0</td>
<td>in</td>
</tr>
<tr>
<td>S</td>
<td>0.008</td>
<td>ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
<td></td>
</tr>
</tbody>
</table>

Calculations

Beta 1.10
A 0.08 ft²
P 0.74 ft
R_h 0.11 ft
T_w 0.60 ft
Q_difference 0.0000

Results

y 2.2 in
V 2.29 fps
d/D 0.27
Fr 1.11 Supercritical
E 0.26 ft
Rem Cap. 0.90 cfs

Full Pipe

Input

<table>
<thead>
<tr>
<th>Q</th>
<th>1.08</th>
<th>cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0</td>
<td>MGD</td>
</tr>
<tr>
<td>D</td>
<td>8</td>
<td>in</td>
</tr>
<tr>
<td>S</td>
<td>0.008</td>
<td>ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
<td></td>
</tr>
</tbody>
</table>

Calculations

Beta
A 0.35 ft²
P 2.09 ft
R_h 0.17 ft
T_w 0.00 ft

β = α cos \left(1 - \frac{Y}{R}\right) \text{ in radians}

A = R^2 \cdot (β - \cos(β) \cdot \sin(β))

P = 2 \cdot R \cdot β

T_w = 2 \cdot R \cdot \sin(β)

R_h = \frac{A}{P}

E = Y + \frac{Q^2}{2g \cdot A^2 + Δz}

Fr = \frac{Q}{\sqrt{g \cdot (A_w)}} = \sqrt{g \cdot (A_w)}
Known Flow and Slope

Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0.26 cfs</td>
</tr>
<tr>
<td>Q</td>
<td>167040 MGD</td>
</tr>
<tr>
<td>D</td>
<td>8.0 in</td>
</tr>
<tr>
<td>S</td>
<td>0.007 ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
</tr>
</tbody>
</table>

Calculations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td>1.26</td>
</tr>
<tr>
<td>A0</td>
<td>0.11 ft²</td>
</tr>
<tr>
<td>P0</td>
<td>0.84 ft</td>
</tr>
<tr>
<td>Rh</td>
<td>0.13 ft</td>
</tr>
<tr>
<td>Tw</td>
<td>0.63 ft</td>
</tr>
<tr>
<td>Q_difference</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>2.8 in</td>
</tr>
<tr>
<td>V</td>
<td>2.42 fps</td>
</tr>
<tr>
<td>d/D</td>
<td>0.34</td>
</tr>
<tr>
<td>Fr</td>
<td>1.04</td>
</tr>
<tr>
<td>E</td>
<td>0.32 ft</td>
</tr>
<tr>
<td>Rem Cap.</td>
<td>0.75 cfs</td>
</tr>
</tbody>
</table>

*Use solver or goal seek to set Q_difference to 0.0 by changing y

Full Pipe

Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>1.01 cfs</td>
</tr>
<tr>
<td>Q</td>
<td>0 MGD</td>
</tr>
<tr>
<td>D</td>
<td>8 in</td>
</tr>
<tr>
<td>S</td>
<td>0.007 ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
</tr>
</tbody>
</table>

Calculations

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td>1.35</td>
</tr>
<tr>
<td>A</td>
<td>0.35 ft²</td>
</tr>
<tr>
<td>P</td>
<td>2.09 ft</td>
</tr>
<tr>
<td>Rh</td>
<td>0.17 ft</td>
</tr>
<tr>
<td>Tw</td>
<td>0.00 ft</td>
</tr>
</tbody>
</table>

\[ \beta = \alpha \cos \left( 1 - \frac{Y}{R} \right) \text{ in radians} \]
\[ A = R^2 \cdot (\beta - \cos(\beta) \cdot \sin(\beta)) \]
\[ P = 2 \cdot R \cdot \beta \]
\[ T_w = 2 \cdot R \cdot \sin(\beta) \]
\[ A \cdot h_v = R \cdot \left( \frac{2}{3} \cdot R^2 \cdot \sin(\beta) \right)^3 - A \cdot \cos(\beta) \]
\[ R_h = \frac{A}{P} \]
\[ E = \left( Y + \frac{Q^2}{2g \cdot A^2 + \Delta z} \right) \]
\[ F_{\text{fr}} = \frac{Q}{\sqrt{g \cdot \left( \frac{A}{h_v} \right)}} = \frac{V}{\sqrt{g \cdot \left( \frac{A}{h_v} \right)}} \]
**Known Flow and Slope**

**Input**
- \( Q = 0.26 \text{ cfs} \)
- \( Q = 167040 \text{ MGD} = 0.25845 \text{ cfs} \)
- \( D = 8.0 \text{ in} = 167040 \text{ MGD} \)
- \( S = 0.007 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculations**
- \( \beta = 1.26 \)
- \( A = 0.11 \text{ ft}^2 \)
- \( P = 0.84 \text{ ft} \)
- \( R_h = 0.13 \text{ ft} \)
- \( T_w = 0.63 \text{ ft} \)
- \( Q_{\text{difference}} = 0.0000 \)

**Results**
- \( y = 2.8 \text{ in} \)
- \( V = 2.42 \text{ fps} \)
- \( d/D = 0.34 \)
- \( Fr = 1.04 \text{ Supercritical} \)
- \( E = 0.32 \text{ ft} \)
- \( \text{Rem Cap.} = 0.75 \text{ cfs} \)

*Use solver or goal seek to set \( Q_{\text{difference}} \) to 0.0 by changing \( y \)*

**Full Pipe**

**Input**
- \( Q = 1.01 \text{ cfs} \)
- \( Q = 0 \text{ MGD} \)
- \( D = 8 \text{ in} \)
- \( S = 0.007 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculations**
- \( \beta = \frac{a}{\cos\left(1 - \frac{y}{R}\right)} \text{ in radians} \)
- \( A = \frac{R^3 \cdot \left(\beta - \cos(\beta) \cdot \sin(\beta)\right)}{2} \)
- \( P = 2 \cdot R \cdot \beta \)
- \( T_w = 2 \cdot R \cdot \sin(\beta) \)
- \( A \cdot h_c = R \cdot \left(\frac{2}{3} R^3 \cdot \sin(\beta) - A \cdot \cos(\beta)\right) \)
- \( R_h = \frac{A}{P} \)
- \( E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z} \)
- \( F_r = \frac{Q}{\sqrt{g \cdot A_w}} = \sqrt{\frac{A}{A_w}} \)
Known Flow and Slope

Input

<table>
<thead>
<tr>
<th>Q</th>
<th>0.18 cfs</th>
<th>115200 MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 gpm</td>
<td>0.178241 cfs</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>8.0 in</td>
<td>115200 MGD</td>
</tr>
<tr>
<td>S</td>
<td>0.003 ft/ft</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
<td></td>
</tr>
</tbody>
</table>

Calculations

Beta 1.28
A 0.11 ft²
P 0.85 ft
Rₚ 0.13 ft
Tₜ 0.64 ft
Q_difference 0.0000

Results

y 2.8 in
V 1.61 fps
d/D 0.35
Fr 0.68 Subcritical
E 0.28 ft
Rem Cap. 0.48 cfs

*Use solver or goal seek to set Q_difference to 0.0 by changing y

Full Pipe

Input

<table>
<thead>
<tr>
<th>Q</th>
<th>0.66 cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0 MGD</td>
</tr>
<tr>
<td>D</td>
<td>8 in</td>
</tr>
<tr>
<td>S</td>
<td>0.003 ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
</tr>
</tbody>
</table>

Calculations

Beta
A 0.35 ft²
P 2.09 ft
Rₚ 0.17 ft
Tₜ 0.00 ft

\[ \beta = a \cos \left(1 - \frac{Y}{R}\right) \text{ in radians} \]
\[ A = R^2 \cdot \left(\beta - \cos(\beta) \cdot \sin(\beta)\right) \]
\[ P = 2 \cdot R \cdot \beta \]
\[ Tₜ = 2 \cdot R \cdot \sin(\beta) \]
\[ A \cdot hₚ = R \cdot \left(\frac{2}{3} R^3 \cdot \sin(\beta) - A \cdot \cos(\beta)\right) \]
\[ Rₚ = \frac{A}{P} \]
\[ E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z} \]
\[ Fₚ = \frac{Q}{\sqrt{g \left(\frac{A}{w}\right)}} = \sqrt{\frac{Q}{g \left(\frac{A}{w}\right)}} \]
Known Flow and Slope

Input

| Q   | 0.18 cfs | 80 gpm  |
| Q   | 115200 MGD | 0.178241 cfs |
| D   | 8.0 in | 115200 MGD |
| S   | 0.005 ft/ft |
| n   | 0.013 |
| k   | 1.486 |

Calculations

Beta 1.18
A 0.09 ft²
P 0.79 ft
R_h 0.12 ft
T_w 0.62 ft
Q_difference 0.0000

Results

y 2.5 in
V 1.93 fps
d/D 0.31
Fr 0.88 Subcritical
E 0.26 ft
Rem Cap. 0.68 cfs

*Use solver or goal seek to set Q_difference to 0.0 by changing y

Full Pipe

Input

| Q   | 0.85 cfs |
| Q   | 0 MGD |
| D   | 8 in |
| S   | 0.005 ft/ft |
| n   | 0.013 |
| k   | 1.486 |

Calculations

Beta
A 0.35 ft²
P 2.09 ft
R_h 0.17 ft

\[ \beta = \alpha \cos \left(1 - \frac{Y}{R}\right) \text{ in radians} \]

\[ A = R^2 \cdot \left(\beta - \cos(\beta) \cdot \sin(\beta)\right) \]

\[ P = 2 \cdot R \cdot \beta \]

\[ T_w = 2 \cdot R \cdot \sin(\beta) \]

\[ A \cdot h_v = R \cdot \left(\frac{2}{3} R^2 \cdot \sin(\beta) - A \cdot \cos(\beta)\right) \]

\[ R_h = \frac{A}{P} \]

\[ E = y + \frac{Q^2}{2g \cdot A^2} + \Delta z \]

\[ F_r = \frac{Q}{\sqrt{g \cdot \frac{A}{f}}} \]

\[ Fr = \frac{Q}{\sqrt{g \left(\frac{A}{f}\right)}} = \sqrt{g \left(\frac{A}{f}\right)} \]
Known Flow and Slope

**Input**
- \( Q = 0.18 \text{ cfs} \)
- \( Q = 115200 \text{ MGD} \)
- \( D = 8.0 \text{ in} \)
- \( S = 0.004 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Full Pipe**

**Input**
- \( Q = 0.76 \text{ cfs} \)
- \( Q = 0 \text{ MGD} \)
- \( D = 8 \text{ in} \)
- \( S = 0.004 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculations**
- \( \beta = 1.22 \)  
- \( A = 0.10 \text{ ft}^2 \)
- \( P = 0.81 \text{ ft} \)
- \( R_h = 0.12 \text{ ft} \)
- \( T_w = 0.63 \text{ ft} \)
- \( Q_{\text{difference}} = 0.0000 \)

**Results**
- \( y = 2.6 \text{ in} \)
- \( V = 1.79 \text{ fps} \)
- \( d/D = 0.33 \)
- \( F_r = 0.79 \text{ Subcritical} \)
- \( E = 0.27 \text{ ft} \)
- Rem Cap. = 0.59 cfs

*Use solver or goal seek to set \( Q_{\text{difference}} \) to 0.0 by changing \( y \)

\[
\beta = \alpha \cos\left(1 - \frac{Y}{R}\right) \quad \text{in radians}
\]
\[
A = R^2 \cdot \left(\beta - \cos(\beta) \cdot \sin(\beta)\right)
\]
\[
P = 2 \cdot R \cdot \beta
\]
\[
T_w = 2 \cdot R \cdot \sin(\beta)
\]
\[
A \cdot h_v = R \left(\frac{2}{3} R^2 \cdot \sin(\beta)^3 - A \cdot \cos(\beta)\right)
\]
\[
R_h = \frac{A}{P}
\]
\[
E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z}
\]
\[
F_r = \sqrt{\frac{Q}{\sqrt{g \cdot A^3}}}
\]
\[
\sqrt{\frac{Q}{\sqrt{g \cdot A^3}}}
\]
Known Flow and Slope

**Input**

- **Q**: 0.36 cfs
- **Q**: 230400 MGD
- **D**: 8 in
- **S**: 0.004 ft/ft
- **n**: 0.013
- **k**: 1.486

**Calculations**

- Beta: 1.53
- **A**: 0.17 ft²
- **P**: 1.02 ft
- **Rₜ**: 0.16 ft
- **Tₜ**: 0.67 ft
- **Q_difference**: 0.0000

**Results**

- **y**: 3.8 in
- **V**: 2.15 fps
- **d/D**: 0.48
- **Fr**: 0.76 Subcritical
- **E**: 0.39 ft
- **Rem Cap.**: 0.41 cfs

Full Pipe

**Input**

- **Q**: 0.76 cfs
- **Q**: 0 MGD
- **D**: 8 in
- **S**: 0.004 ft/ft
- **n**: 0.013
- **k**: 1.486

**Calculations**

- Beta
- **A**: 0.35 ft²
- **P**: 2.09 ft
- **Rₜ**: 0.17 ft

Formulae:

\[ \beta = \alpha \cos \left( 1 - \frac{Y}{R} \right) \quad \text{in radians} \]

\[ A = R^2 \cdot \left( \beta + \cos(\beta) \cdot \sin(\beta) \right) \]

\[ P = 2 \cdot R \cdot \beta \]

\[ Tₜ = 2 \cdot R \cdot \sin(\beta) \]

\[ A \cdot R_{h} = R \cdot \left( \frac{2}{3} R^3 \cdot \sin(\beta)^3 - A \cdot \cos(\beta) \right) \]

\[ R_{h} = \frac{A}{P} \]

\[ E = Y + \frac{Q^2}{2g \cdot A^2} + \Delta z \]

\[ F_r = \frac{Q}{\sqrt{g \cdot (A/\lambda)}} = \sqrt{g \cdot (A/\lambda)} \]
### Known Flow and Slope

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0.36  cfs</td>
</tr>
<tr>
<td>Q</td>
<td>230400 MGD</td>
</tr>
<tr>
<td>D</td>
<td>8.0 in</td>
</tr>
<tr>
<td>S</td>
<td>0.085 ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td>0.96</td>
</tr>
<tr>
<td>A</td>
<td>0.06  ft²</td>
</tr>
<tr>
<td>P</td>
<td>0.64  ft</td>
</tr>
<tr>
<td>Rₜ</td>
<td>0.09  ft</td>
</tr>
<tr>
<td>T₠</td>
<td>0.55  ft</td>
</tr>
<tr>
<td>Q_difference</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Results</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>1.7 in</td>
</tr>
<tr>
<td>V</td>
<td>6.48 fps</td>
</tr>
<tr>
<td>d/D</td>
<td>0.21</td>
</tr>
<tr>
<td>Fr</td>
<td>3.60  Supercritical</td>
</tr>
<tr>
<td>E</td>
<td>0.79  ft</td>
</tr>
<tr>
<td>Rem Cap.</td>
<td>3.17 cfs</td>
</tr>
</tbody>
</table>

*Use solver or goal seek to set Q_difference to 0.0 by changing y*

### Full Pipe

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>3.52  cfs</td>
</tr>
<tr>
<td>Q</td>
<td>0  MGD</td>
</tr>
<tr>
<td>D</td>
<td>8  in</td>
</tr>
<tr>
<td>S</td>
<td>0.085 ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calculations</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>0.35  ft²</td>
</tr>
<tr>
<td>P</td>
<td>2.09  ft</td>
</tr>
<tr>
<td>Rₜ</td>
<td>0.17  ft</td>
</tr>
</tbody>
</table>

\[ \beta = \alpha \cos \left(1 - \frac{Y}{R}\right) \text{ in radians} \]

\[ A = R^2 \cdot \left(\beta - \cos(\beta) \cdot \sin(\beta)\right) \]

\[ P = 2 \cdot R \cdot \beta \]

\[ T_w = 2 \cdot R \cdot \sin(\beta) \]

\[ A \cdot h_v = R \cdot \left(\frac{2}{3} R^2 \cdot \sin(\beta)^3 - A \cdot \cos(\beta)\right) \]

\[ R_h = \frac{A}{P} \]

\[ E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z} \]

\[ F_p = \frac{Q}{\sqrt{g \frac{A}{h_v}}} = \sqrt{\frac{Q}{g \frac{A}{h_v}}} \]
Known Flow and Slope

**Input**

<table>
<thead>
<tr>
<th>Q</th>
<th>0.18 cfs</th>
<th>80 gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0.178241 cfs</td>
<td>115200 MGD</td>
</tr>
<tr>
<td>D</td>
<td>8.0 in</td>
<td>115200 MGD</td>
</tr>
<tr>
<td>S</td>
<td>0.004 ft/ft</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
<td></td>
</tr>
</tbody>
</table>

**Calculations**

| Beta     | 1.22 |
| A        | 0.10 ft² |
| P        | 0.81 ft |
| Rₜ       | 0.12 ft |
| Tₜ       | 0.63 ft |
| Q_difference | 0.0000 |

**Results**

| y        | 2.6 in |
| V        | 1.79 fps |
| d/D      | 0.33 |
| Fr       | 0.79 *Subcritical* |
| E        | 0.27 ft |
| Rem Cap. | 0.59 cfs |

*Use solver or goal seek to set Q_difference to 0.0 by changing y*

Full Pipe

**Input**

<table>
<thead>
<tr>
<th>Q</th>
<th>0.76 cfs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0 MGD</td>
</tr>
<tr>
<td>D</td>
<td>8 in</td>
</tr>
<tr>
<td>S</td>
<td>0.004 ft/ft</td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
</tr>
</tbody>
</table>

**Calculations**

| Beta     | 1.22 |
| A        | 0.35 ft² |
| P        | 2.09 ft |
| Rₜ       | 0.17 ft |

\[ \beta = \alpha \cos \left( 1 - \frac{Y}{R} \right) \text{ in radians} \]

\[ A = R^2 \cdot \left( \beta - \cos(\beta) \cdot \sin(\beta) \right) \]

\[ P = 2 \cdot R \cdot \beta \]

\[ Tₜ = 2 \cdot R \cdot \sin(\beta) \]

\[ A \cdot hₜ = R \left( \frac{2}{3} R^3 \cdot \sin(\beta)^3 - A \cdot \cos(\beta) \right) \]

\[ Rₜ = \frac{A}{P} \]

\[ E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z} \]

\[ F_{Fr} = \sqrt{\frac{Q}{\sqrt{g \cdot A}}} = \sqrt{g \cdot \left( \frac{A}{A} \right)} \]
**Known Flow and Slope**

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0.18 cfs</td>
<td>80 gpm</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>115200 MGD</td>
<td>0.178241 cfs</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>8.0 in</td>
<td>115200 MGD</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>0.004 ft/ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Calculations**

- Beta: 1.22
- $A = 0.10 \text{ ft}^2$
- $P = 0.81 \text{ ft}$
- $R_h = 0.12 \text{ ft}$
- $T_w = 0.63 \text{ ft}$
- $Q_{\text{difference}} = 0.0000$

**Results**

- $y = 2.6 \text{ in}$
- $V = 1.79 \text{ fps}$
- $d/D = 0.33$
- $F_r = 0.79$, **Subcritical**
- $E = 0.27 \text{ ft}$
- Rem Cap. = 0.59 cfs

*Use solver or goal seek to set $Q_{\text{difference}}$ to 0.0 by changing $y$*

**Full Pipe**

<table>
<thead>
<tr>
<th>Input</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>0.76 cfs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>0 MGD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>8 in</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>0.004 ft/ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>0.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>1.486</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Calculations**

- Beta
- $A = 0.35 \text{ ft}^2$
- $P = 2.09 \text{ ft}$
- $R_h = 0.17 \text{ ft}$

**Beta**

$$\beta = a \cos \left(1 - \frac{Y}{R}\right) \text{ in radians}$$

$$A = R^2 \cdot \left(\beta - \cos(\beta) \cdot \sin(\beta)\right)$$

$$P = 2 \cdot R \cdot \beta$$

$$T_w = 2 \cdot R \cdot \sin(\beta)$$

$$A \cdot h_v = R \left(\frac{2}{3} R^2 \cdot \sin(\beta)^3 - A \cdot \cos(\beta)\right)$$

$$R_h = \frac{A}{P}$$

$$E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z}$$

$$F_r = \sqrt{\frac{Q}{\sqrt[3]{g \left(\frac{A^2}{2}\right)}}} = \sqrt{\frac{V}{g \left(\frac{A^2}{2}\right)}}$$
### Known Flow and Slope

**Input**
- \( Q \): 0.18 cfs
- \( Q \): 115200 MGD (0.178241 cfs)
- \( D \): 8.0 in
- \( S \): 0.021 ft/ft
- \( n \): 0.013
- \( k \): 1.486

**Calculations**
- \( \beta \): 0.97
- \( A \): 0.06 ft\(^2\)
- \( P \): 0.64 ft
- \( R_h \): 0.09 ft
- \( T_w \): 0.55 ft

\[
\text{Q}_{\text{difference}} = 0.0000
\]

**Results**
- \( y \): 1.7 in
- \( V \): 3.22 fps
- \( \frac{d}{D} \): 0.22
- \( Fr \): 1.79 (Supercritical)
- \( E \): 0.31 ft

Rem Cap. 1.57 cfs

*Use solver or goal seek to set \( Q_{\text{difference}} \) to 0.0 by changing \( y \).

### Full Pipe

**Input**
- \( Q \): 1.75 cfs
- \( Q \): 0 MGD
- \( D \): 8 in
- \( S \): 0.021 ft/ft
- \( n \): 0.013
- \( k \): 1.486

**Calculations**
- \( \beta \)
- \( A \): 0.35 ft\(^2\)
- \( P \): 2.09 ft
- \( R_h \): 0.17 ft

\[
\beta = \alpha \cos \left( 1 - \frac{Y}{R} \right) \quad \text{in radians}
\]

\[
A = R^2 \cdot \left( \beta - \cos(\beta) \cdot \sin(\beta) \right)
\]

\[
P = 2 \cdot R \cdot \beta
\]

\[
T_w = 2 \cdot R \cdot \sin(\beta)
\]

\[
A \cdot h_v = R \cdot \left( \frac{2}{3} R^3 \cdot \sin(\beta)^2 - A \cdot \cos(\beta) \right)
\]

\[
R_h = \frac{A}{P}
\]

\[
E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z}
\]

\[
F_r = \sqrt{\frac{Q}{\sqrt{g \cdot A_w}}} = \sqrt{\frac{Q}{g \cdot A_w}}
\]
Known Flow and Slope

**Input**
- \( Q = 0.77 \text{ cfs} \)
- \( Q = 497520 \text{ MGD} \)
- \( D = 8.0 \text{ in} \)
- \( S = 0.019 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculated Inputs**
- \( Q = 345.5 \text{ gpm} \)
- \( Q = 0.769779 \text{ cfs} \)

**Results**
- \( y = 3.8 \text{ in} \)
- \( V = 4.68 \text{ fps} \)
- \( d/D = 0.48 \)
- \( Fr = 1.66 \text{ (Supercritical)} \)
- \( E = 0.66 \text{ ft} \)
- Rem Cap. = \( 0.90 \text{ cfs} \)

*Use solver or goal seek to set \( Q_{\text{difference}} \) to 0.0 by changing \( y \)

**Full Pipe**

**Input**
- \( Q = 1.67 \text{ cfs} \)
- \( Q = 0 \text{ MGD} \)
- \( D = 8 \text{ in} \)
- \( S = 0.019 \text{ ft/ft} \)
- \( n = 0.013 \)
- \( k = 1.486 \)

**Calculated Inputs**
- \( A = 0.35 \text{ ft}^2 \)
- \( P = 2.09 \text{ ft} \)
- \( R_h = 0.17 \text{ ft} \)

\[
\beta = a \cos \left( 1 - \frac{Y}{R} \right) \text{ in radians}
\]

\[
A = R^3 \cdot \left( \beta - \cos(\beta) \cdot \sin(\beta) \right)
\]

\[
P = 2 \cdot R \cdot \beta
\]

\[
T_w = 2 \cdot R \cdot \sin(\beta)
\]

\[
A \cdot h_v = R \cdot \left( \frac{2}{3} R^2 \cdot \sin(\beta)^3 - A \cdot \cos(\beta) \right)
\]

\[
R_h = \frac{A}{P}
\]

\[
E = Y + \frac{Q^2}{2g \cdot A^2 + \Delta z}
\]

\[
Fr = \frac{Q}{\sqrt{g \cdot (A_w)}} = \sqrt{g \cdot (A_w)}
\]
Appendix D

Environmental Documents
NEPA REVIEW SCREENING FORM
for Actions Adequately Evaluated in NEPA or CERLCA Document

I. Project Title:
Projects L-853 and L-854, 200 East Sewer Consolidation and Sewer Forcemain Lagoon connection.

II. Describe the proposed action, including: location, time period over which proposed action will occur, project dimension (e.g., acres displaced/disturbed, excavation length/depth), area/location/number of buildings. Attach maps and drawings, as applicable. If the proposed action is not a project, describe the action or plan.

Mission Support Alliance (MSA) Water & Sewer Utilities’ (WaSU) Mission is to provide sanitary sewer services to support the cleanup mission on the Hanford Site. In 2012, the 200 West Area Evaporative Sewage Lagoon (200W Lagoon) was constructed as the long-term wastewater treatment and disposal option. Currently, all wastewater is trucked to the facility.

Sewer demands are anticipated to increase in the 200E Area in preparation for the Waste Treatment Plant operations. Accordingly, MSA WaSU’s near term focus is the consolidation of many of the 200E drainfields. The sewer consolidation projects will consist of a series of new lift stations, a gravity interceptor, and a regional lift station and forcemain to pump sewage collected in 200E over to the 200W Treatment Lagoon. Proposed Project L-853, Sewage System Upgrades in 200E Area, and Project L-854, Installation of Force Sewer Lines in 200E, scheduled for construction in FY17 represent the first steps toward achieving the consolidated sewer collection system across the Hanford Site.

The sewage system upgrade proposal is to install a network of lift stations and force sewer lines from numerous Large On-Site Sewage Systems (LOSS) around the 200E Area to a proposed main collection manhole located near the center of the 200E Area. Then, approximately 1 mile of new gravity sewer pipe is proposed to convey the wastewater from the main collection manhole north to a main lift station located in 12th Street. From the main lift station in 12th Street, approximately 3.7 miles of new forcemain is proposed to convey the wastewater west to the 200W Lagoon. The location of the Main Lift Station in 12th Street also provides improved access for trucks to off-load wastewater to the lift station. The installation of approximately 8 miles of 4 to 8 inch sewer lines will be located, where possible, along existing roads or within utility corridors and no new staging areas or laydown yards will be established. Excavation depths may reach a maximum of 15 ft., but the line will primarily be installed up to 6 ft. in depth to prevent freezing. Subsequent abandonment of the LOSS drainfields in the 200E Area will be accomplished in accordance with WAC 246-272A-0300 Guidance for Abandonment of septic systems and this abandonment will reduce discharge of approximately 9.7 million gallons of wastewater into the ground.

The 200 East Sewer Consolidation and Sewer Forcemain Lagoon connection projects represent the first steps toward achieving a consolidated sewer collection system across the Hanford Site.

Mission Support Alliance (MSA) Environmental Compliance staff performed an Ecological Resources pedestrian survey of the project area on May 17 and 18, 2016. No plant or animal species protected under the Endangered Species Act, candidates for such protection, or species listed by the Washington State government as threatened or endangered were observed in the vicinity of the proposed project site. The ecological resources map attached to ECR-2016-214 provides the locations of sensitive species and habitats along the proposed sewer line route. The map should be used as the project determines the exact location of the sewer line. Once the final route is fixed and the exact area of impact is determined, a final calculation of required compensatory mitigation will be calculated. Per the Biological Resource Management Plan (BMP), compensatory habitat mitigation is set at a ratio of 5:1 for Level 4 resources, 3:1 for Level 3 resources, and 1:1 for Level 2 resources. Please contact Judith Pottmeyer to
II. Describe the proposed action, including: location, time period over which proposed action will occur, project dimension (e.g., acres displaced/disturbed, excavation length/depth), area/location/number of buildings. Attach maps and drawings, as applicable. If the proposed action is not a project, describe the action or plan.

aid in determining the required compensatory mitigation area and planning when the routing is established. In addition to compensatory mitigation, all land areas disturbed by this project that are not needed for continued project use, access, or safety considerations must be replanted using locally derived, native plant species.

Personnel working on this project must be instructed to watch for nesting birds. A nesting bird survey is required if the project is to begin ground clearing activities during the nesting season. No adverse impacts are anticipated from the proposed projects if the recommendations in ECR-2016-214 are followed.

A Cultural Resources Review (CRR), with a finding of No Adverse Effects, was prepared and submitted to the State Historic Preservation Officer (SHPO) and Area Tribes for a 30 day comment period on August 15, 2016. The SHPO concurred with the findings of the CRR on August 16, 2016. The U.S. Department of Energy Richland Operations Office provide a notice of compliance with Section 106 of the National Historic Preservation Act for the project on September 16, 2016.

In order to comply with the CRR finding of No Adverse Effect:

- All work will occur within the APE.
- A flagged avoidance area of 20 ft. will be placed around archaeological site 45BN1951. Work may not occur in this area and no project personnel or equipment can enter this flagged avoidance area.
- After work has been completed, portions of the Hanford Site Railroad in the project area will be graded to its original height and width to 95 percent compaction. The rails, ties, and ballast will not be reinstalled.
- Intermittent archaeological monitoring is required for the open pipeline trench sidewalks and spoils piles.

Please notify KM Mendez (376-1013) at least 7 days prior to the beginning of excavation to schedule a time for an archaeological monitor to observe excavation activities.

III. Applicable Reviews (attach to NRSF):

Biological Review Report #: ECR-2016-214, ECR-2016-232
Cultural Review Report #: HCRC-2016-200-005, HCRC-2016-200-012

Additional Attachments:

Project Area Site Plan Map
Washington River Protection Solutions Staff email

IV: Existing Documentation:

Are the impacts of the proposed action evaluated in a previous EA, EIS, or CERCLA document?  
☐ Yes  ☐ No

List EA, EIS, or CERCLA Document(s) Title and Number and describe how the action is covered by the existing documentation:

The impacts from the proposed sewer system upgrade action are evaluated in DOE/EA-0391 Tank Closure & Waste Management Environmental Impact Statement (TC&W). The level of new infrastructure work:
- is a reasonably associated activity to the described current and selected future operations/Facilities in the TC&W EIS,
- the new lines and lift stations are located within the CLUF Industrial Zone (incorporated by reference into the EIS) and are also within the described Area of Potential Effect (APE) of the reviews done for the EIS,
NEPA REVIEW SCREENING FORM
for Actions Adequately Evaluated in NEPA or CERCLA Document (Continued)

the proposal will not trigger adverse impacts per the referenced Ecological and Cultural Review Clearances if the recommendations are followed, and
- it will serve as a long-term means for keeping sewage activities & discharges current with applicable State regulations and permits as the old, grandfathered in septic systems fail. (EIS Appendix E states how baseline activities and operations would be modified as or when needed to stay compliant with applicable regulations and permits).

Complete Section V. Provide electronic copy of Initiator/ECO signed NRSF to DOE NCO for information only. DOE NCO signature is not required.

<table>
<thead>
<tr>
<th>V. Responsible Contractor Signatures:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiator:</td>
</tr>
<tr>
<td>Eric S. Pennala, MSA NEPA-SME</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cognizant Environmental Compliance Officer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael E. Carlson, MSA ECO</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Date</td>
</tr>
</tbody>
</table>
Appendix E

State Waste Discharge Permit
Effective Date: July 1, 2012  
Expiration Date: June 30, 2017

State Waste Discharge Permit Number ST0045514

State of Washington  
Department Of Ecology  
Olympia, Washington 98504-7600  
Nuclear Waste Program  
3100 Port of Benton Boulevard  
Richland, Washington 99354

In compliance with the provisions of the  
State of Washington Water Pollution Control Law  
Chapter 90.48 Revised Code of Washington, as amended,

United States Department of Energy  
Richland Operations Office  
P.O. Box 550  
Richland, Washington 99352

is authorized to discharge wastewater in accordance with the special and general conditions which follow.

<table>
<thead>
<tr>
<th>Plant Location:</th>
<th>Discharge Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanford Site, northeast of the 200 West Area</td>
<td>Section 31, Range 26EWM, Township 13N</td>
</tr>
</tbody>
</table>

Treatment Type:  
Non-discharging, lined evaporative lagoon

Jane A. Hedges  
Program Manager  
Nuclear Waste Program
TABLE OF CONTENTS

Summary of Permit Report Submittals ................................................................. 4

SPECIAL CONDITIONS

S1. Discharge Limits ............................................................................................. 5
   S1.A. Effluent Limits .......................................................................................... 5

S2. Monitoring Requirements .............................................................................. 5
   S2.A. Wastewater Monitoring .......................................................................... 5
   S2.B. Sampling and Analytical Procedures ...................................................... 7
   S2.C. Flow Measurement .................................................................................. 7
   S2.D. Laboratory Accreditation ....................................................................... 7
   S2.E. Request for Reduction in Monitoring ..................................................... 7

S3. Reporting and Recordkeeping Requirements .............................................. 8
   S3.A. Reporting .................................................................................................. 8
   S3.B. Records Retention ................................................................................... 9
   S3.C. Recording of Results ............................................................................... 9
   S3.D. Additional Monitoring by the Permittee ................................................. 9
   S3.E. Reporting Permit Violations ..................................................................... 9
   S3.F. Other Reporting ....................................................................................... 11
   S3.G. Maintaining a Copy of this Permit ......................................................... 11

S4. Facility Loading ............................................................................................. 11
   S4.A. Design Criteria ....................................................................................... 11
   S4.B. Plans for Maintaining Adequate Capacity ............................................. 11
   S4.C. Duty to Mitigate ..................................................................................... 12
   S4.D. Notification of New or Altered Sources ................................................. 12
   S4.E. Wasteload Assessment .......................................................................... 12

S5. Operation and Maintenance ......................................................................... 13
   S5.A. Certified Operator .................................................................................. 13
   S5.B. O & M Program ...................................................................................... 13
   S5.C. Short-term Reduction ............................................................................ 14
   S5.D. Electrical Power Failure ........................................................................ 14
   S5.E. Prevent Connection of Inflow ................................................................. 14
   S5.F. Bypass Procedures ............................................................................... 14
   S5.G. Operations and Maintenance Manual ................................................ 16
   S5.H. Best Management Practices/Pollution Prevention Program ............... 17

S6. Solid Wastes .................................................................................................. 17
   S6.A. Solid Waste Handling ............................................................................ 17
   S6.B. Leachate ................................................................................................. 17

S7. Application for Permit Renewal or Modification for Facility Changes ......... 18
GENERAL CONDITIONS

G1. Signatory Requirements

G2. Right of Entry

G3. Permit Actions

G4. Reporting a Cause for Modification

G5. Plan Review Required

G6. Compliance with Other Laws and Statutes

G7. Transfer of this Permit

G8. Payment of Fees

G9. Penalties for Violating Permit Conditions

G10. Duty to provide information

G11. Duty to comply
Summary of Permit Report Submittals

Refer to the Special and General Conditions of this permit for additional submittal requirements.

<table>
<thead>
<tr>
<th>Permit Section</th>
<th>Submittal</th>
<th>Frequency</th>
<th>First Submittal Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3.A</td>
<td>Discharge Monitoring Report</td>
<td>Quarterly</td>
<td>October 15, 2012</td>
</tr>
<tr>
<td>S3.A</td>
<td>Lagoon Sludge Depth</td>
<td>1/permit cycle</td>
<td>June 30, 2017</td>
</tr>
<tr>
<td>S3.E</td>
<td>Reporting Permit Violations</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>S3.F</td>
<td>Other Reporting</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>S4.B</td>
<td>Plans for Maintaining Adequate Capacity</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>S4.D</td>
<td>Notification of New or Altered Sources</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>S4.E</td>
<td>Wasteload Assessment</td>
<td>1/permit cycle</td>
<td>By June 30, 2017</td>
</tr>
<tr>
<td>S5.F</td>
<td>Reporting Bypasses</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>S5.G</td>
<td>Operations and Maintenance Manual Update or Review Confirmation Letter</td>
<td>Annually</td>
<td>September 1</td>
</tr>
<tr>
<td>S7</td>
<td>Application for Permit renewal</td>
<td>1/permit cycle</td>
<td>By April 30, 2017</td>
</tr>
<tr>
<td>G1</td>
<td>Notice of Change in Authorization</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>G4</td>
<td>Permit Application for Substantive Changes to the Discharge</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>G5</td>
<td>Engineering Report for Construction or Modification Activities</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>G7</td>
<td>Notice of Permit Transfer</td>
<td>As necessary</td>
<td></td>
</tr>
<tr>
<td>G8</td>
<td>Payment of Fees</td>
<td>As assessed</td>
<td></td>
</tr>
<tr>
<td>G10</td>
<td>Duty to Provide Information</td>
<td>As necessary</td>
<td></td>
</tr>
</tbody>
</table>
Special Conditions

S1. Discharge Limits

S1.A. Effluent Limits

All discharges and activities authorized by this permit must comply with the terms and conditions of this permit. The discharge of any of the following pollutants more frequently than, or at a concentration in excess of, that authorized by this permit violates the terms and conditions of this permit. Wastewater flows and loadings must not exceed the Design Criteria specified in Section S4.

Beginning on July 1, 2012 and lasting through June 30, 2017, the Permittee is authorized to discharge domestic wastewater to double-lined evaporation ponds at the permitted location subject to the following limits:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Annual Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow</td>
<td>55,000 gallons per day (gpd)</td>
</tr>
</tbody>
</table>

S2. Monitoring Requirements

S2.A. Wastewater Monitoring

The Permittee must monitor the wastewater according to the schedule in Table 1 (see page 6). The Permittee must use the specified analytical methods unless the method used produces measurable results in the sample and the United States Environmental Protection Agency (EPA) has listed it as an EPA-approved method in 40 Code of Federal Regulations (CFR) Part 136.

If the Permittee uses an alternative method, not specified in the permit and as allowed above, it must report the test method, Detection Limit (DL), and Quantitation Level (QL) on the discharge monitoring report or in the Discharge Monitoring Report.
### Table 1. Wastewater Monitoring Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Laboratory Method</th>
<th>Minimum Sampling Frequency</th>
<th>Sample Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(1) Wastewater Influent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow</td>
<td>55,000 gallons a day (gpd)</td>
<td>Continuous</td>
<td>4/year</td>
<td>8-Hour Composite</td>
</tr>
<tr>
<td>Biochemical Oxygen Demand (BOD₅)</td>
<td>Milligrams/Liter</td>
<td>SM 5210 B</td>
<td></td>
<td>8-Hour Composite</td>
</tr>
<tr>
<td>BOD₅</td>
<td>Pounds/day</td>
<td>Not applicable</td>
<td>4/year</td>
<td>Calculated</td>
</tr>
<tr>
<td>Total Suspended Solids (TSS)</td>
<td>Milligrams/Liter</td>
<td>SM 2540 D</td>
<td></td>
<td>8-Hour Composite</td>
</tr>
<tr>
<td>TSS</td>
<td>Pounds/day</td>
<td>NA</td>
<td>4/year</td>
<td>Calculated</td>
</tr>
<tr>
<td><strong>(2) Final Wastewater Effluent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaporative Lagoon Depth</td>
<td>0.1 feet</td>
<td>NA</td>
<td>Monthly</td>
<td>Measured</td>
</tr>
<tr>
<td>Evaporative Lagoon Sludge Depth</td>
<td>0.1 inches</td>
<td>NA</td>
<td>1/Permit Cycle</td>
<td>Measured</td>
</tr>
<tr>
<td>Leaked Water</td>
<td>Yes/No</td>
<td>NA</td>
<td>Daily, if present</td>
<td>Measured</td>
</tr>
<tr>
<td>Volume of Leaked Water</td>
<td>gpd</td>
<td>NA</td>
<td>Weekly, or as measured</td>
<td>Measured</td>
</tr>
</tbody>
</table>

**Parameter Notes:**

- **a** Continuous means uninterrupted except for brief lengths of time for calibration, for power failure, or for unanticipated equipment repair or maintenance. Flow must be measured hourly during influent flows when continuous monitoring is not possible.

- **b** 4/year means 4 times per year. The Permittee must report data on the discharge monitoring report.

- **c** 8-hour composite means a manual composite collected over an 8 hour period. The composite shall be composed of at least four separate grab samples of equal volume, collected at two to three hour intervals during a normal work day which is at least 8 hours long. All attempts should be made to keep sample timing and methodology consistent over all sample events.

- **d** Pounds/day = Concentration (mg/L) x Flow (in MGD) x 8.34

- **e** Calculated means figured concurrently with the respective sample, using the following formula: Concentration (in mg/L) X Flow (in MGD) X Conversion Factor (8.34) = lbs/day

- **f** If leaked water is observed report yes, if not report no.
In the event of an emergency discharge to the ditch east of the lagoons, the Permittee will be required to sample the effluent and measure the flow rate. Contact the Department of Ecology for sampling requirements in the event of an emergency discharge.

S2.B. Sampling and Analytical Procedures

Samples and measurements taken to meet the requirements of this permit must represent the volume and nature of the monitored parameters, including representative sampling of any unusual discharge or discharge condition. Those conditions include bypasses, upsets, and maintenance-related conditions affecting effluent quality.

Sampling and analytical methods used to meet the water and wastewater monitoring requirements specified in this permit must conform to the latest revision of the following rules and documents unless otherwise specified in this permit or approved in writing by the Department of Ecology (Ecology):

- Standard Methods for the Examination of Water and Wastewater (American Public Health Association).

S2.C. Flow Measurement

The Permittee must:

1. Select and use appropriate flow measurement devices and methods consistent with accepted scientific practices.
2. Install, calibrate, and maintain these devices to ensure the accuracy of the measurements is consistent with the accepted industry standard and the manufacturer’s recommendation for that type of device.
3. Calibrate these devices at the frequency recommended by the manufacturer.
4. Maintain calibration records for at least three years.

S2.D. Laboratory Accreditation

The Permittee must ensure that all monitoring data required by Ecology is prepared by a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories. Flow and internal process control parameters are exempt from this requirement.

S2.E. Request for Reduction in Monitoring

After twelve (12) months of monitoring, the Permittee may request a reduction of the sampling frequency. Ecology will review each request and at its discretion grant the request when it reissues the permit or by a permit modification.
To request a reduction in monitoring, the Permittee must:
1. Provide a written request.
2. Clearly state the parameters for which it is requesting reduced monitoring.
3. Clearly state the justification for the reduction.

S3. Reporting and Recordkeeping Requirements

The Permittee must monitor and report in accordance with the following conditions. The falsification of information submitted to Ecology constitutes a violation of the terms and conditions of this permit.

S3.A. Reporting

The first monitoring period begins on the effective date of the permit. The Permittee must:

1. Summarize, report, and submit monitoring data obtained during each monitoring period on a Discharge Monitoring Report (DMR) form provided, or otherwise approved, by Ecology. Include a summary listing daily results for influent flow and volume of water leaked (if applicable). If submitting DMRs electronically, report a value for each day sampling occurred and for the summary values (when applicable) included on the form.

2. Submit the form as required with the words "no discharge" entered in place of the monitoring results, if the facility did not discharge during a given monitoring period. If submitting DMRs electronically, you must enter “no discharge” for an entire DMR, for a specific monitoring point, or for a specific parameter as appropriate.

3. Ensure that DMR forms are postmarked or received by Ecology no later than the dates specified in S3.A.4, unless otherwise specified in this permit. If submitting DMRs electronically, submit the DMR no later than the dates specified, unless otherwise specified in this permit.

4. Submit DMRs for parameters with the monitoring frequencies specified in Condition S2 (monthly, quarterly, annual, etc.) at the reporting schedule identified below. The Permittee must:
   a. Submit quarterly DMRs by the 15th day of the month following the completed monitoring period.
   b. Submit the measured sludge depth in the evaporative lagoons no later than June 30, 2017.

5. Submit reports to Ecology online using Ecology’s electronic DMR submittal forms or send reports to Ecology at:

   Water Quality Permit Coordinator
   Department of Ecology
   Nuclear Waste Program
   3100 Port of Benton Boulevard
   Richland, WA  99354
S3.B. Records Retention

The Permittee must retain records of all monitoring information for a minimum of three (3) years. Such information must include:

1. All calibration and maintenance records and all original recordings for continuous monitoring instrumentation.
2. Copies of all reports required by this permit.
3. Records of all data used to complete the application for this permit.

The Permittee must extend this period of retention during the course of any unresolved litigation regarding the discharge of pollutants by the Permittee or when requested by Ecology.

The Permittee must retain all records pertaining to the monitoring of sludge for a minimum of five (5) years.

S3.C. Recording of Results

For each measurement or sample taken, the Permittee must record the following information:

1. The date, exact place, and time of sampling.
2. The individual who performed the sampling or measurement.
3. The dates the analyses were performed.
4. The individual who performed the analyses.
5. The analytical techniques or methods used.
6. The results of all analyses.

S3.D. Additional Monitoring by the Permittee

If the Permittee monitors any pollutant more frequently than required by Condition S2 of this permit, then the Permittee must include the results of such monitoring in the calculation and reporting of the data submitted in the Permittee's DMR.

S3.E. Reporting Permit Violations

The Permittee must take the following actions when it violates or is unable to comply with any permit condition:

1. Immediately take action to stop, contain, and clean up unauthorized discharges or otherwise stop the noncompliance and correct the problem.
2. If applicable, immediately repeat sampling and analysis. Submit the results of any repeat sampling to Ecology within thirty (30) days of sampling.

a. Immediate reporting

The Permittee must immediately report to Ecology (at the number listed below):

- Emergency discharge of the lagoons, or any overtopping or catastrophic failure of the lagoons.
- Collection system overflows.
- Plant bypasses resulting in a discharge.
- Any other failures of this sewage system (pipe breaks, etc.)

**Nuclear Waste Program**

509-372-7950

### b. Twenty-four hour reporting

The Permittee must report the following occurrences of noncompliance by telephone to Ecology at the telephone number listed above, within 24 hours from the time the Permittee becomes aware of any of the following circumstances:

1. Any noncompliance that may endanger health or the environment, unless previously reported under immediate reporting requirements.
2. Any unanticipated bypass that causes an exceedance of an effluent limit in the permit (See Part S5.F., “Bypass Procedures”).
3. Any upset that causes an exceedance of an effluent limit in the permit. Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
4. Any violation of a discharge limit for any of the parameters in Section S1.A of this permit.
5. Any overflow prior to the treatment works, whether or not such overflow endangers health or the environment or exceeds any effluent limit in the permit.

### c. Report within five or ten days

The Permittee must also provide an electronic submission within five days, or a written submission within 10 days, of the time that the Permittee becomes aware of any reportable event under S3.E.a or b. The submission must contain:

1. A description of the noncompliance and its cause.
2. Maps, drawings, aerial photographs, or pictures to show the location and cause(s) of the non-compliance.
3. The period of noncompliance, including exact dates and times.
4. The estimated time the Permittee expects the noncompliance to continue if not yet corrected.
5. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.
6. If the noncompliance involves an overflow prior to the treatment works, an estimate of the quantity (in gallons) of untreated overflow.
d. Waiver of written reports

Ecology may waive the written report required in S3.E.c, upon request and on a case-by-case basis, if the Permittee has submitted a timely oral report.

e. All other permit violation reporting

All permit violations not requiring immediate or within 24 hours reporting must be reported when the Permittee submits monitoring reports for S3.A ("Reporting").

The reports must contain the information listed in S3.E.c. Compliance with these requirements does not relieve the Permittee from responsibility to maintain continuous compliance with the terms and conditions of this permit or the resulting liability for failure to comply.

f. Report submittal

The Permittee must submit reports to the address listed in S3.A.

S3.F. Other Reporting

Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to Ecology, it must submit such facts or information promptly.

S3.G. Maintaining a Copy of this Permit

The Permittee must keep a copy of this permit at the facility and make it available upon request to Ecology inspectors.

S4. Facility Loading

S4.A. Design Criteria

The flows or waste loads for the permitted facility must not exceed the following design criteria:

- Annual Average Flow: 55,000 gpd
- BOD₅ Influent Loading for Maximum Month: 105 lb/day

S4.B. Plans for Maintaining Adequate Capacity

a. Conditions triggering plan submittal

The Permittee must submit a plan and a schedule for continuing to maintain capacity to Ecology when:

1. The actual flow or waste load reaches 85 percent of any one of the design criteria in S4.A for three consecutive months.
2. The projected plant flow or loading would reach design capacity within five years.
b. Plan and schedule content

The plan and schedule must identify the actions necessary to maintain adequate capacity for the expected population growth and to meet the limits and requirements of the permit. The Permittee must consider the following topics and actions in its plan.

1. Analysis of the present design and proposed process modifications.
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limits on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities.
5. Reduction of industrial or commercial flows or waste loads.

Engineering documents associated with the plan must meet the requirements of WAC 173-240-060, "Engineering Report," and be approved by Ecology prior to any construction.

S4.C. Duty to Mitigate

The Permittee must take all reasonable steps to minimize or prevent any discharge, sludge use, or disposal in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

S4.D. Notification of New or Altered Sources

1. The Permittee must submit written notice to Ecology whenever any new discharge or a substantial change in volume or character of an existing discharge into the wastewater treatment plant is proposed which:
   a. Would interfere with the operation of, or exceed the design capacity of, any portion of the wastewater treatment plant.
   b. Is not part of an approved general sewer plan or approved plans and specifications.
   c. Is subject to pretreatment standards under 40 CFR Part 403 and Section 307(b) of the Clean Water Act.

2. This notice must include an evaluation of:
   a. The wastewater treatment plant’s ability to adequately transport and treat the added flow and/or waste load.
   b. The quality and volume of effluent to be discharged to the treatment plant.
   c. The anticipated impact on the Permittee’s effluent (40 CFR 122.42[b]).

S4.E. Wasteload Assessment

The Permittee must conduct an assessment of its influent flow and waste load and submit a report to Ecology by May 31, 2017. The Permittee must submit a paper copy and an electronic copy (preferably in a portable document format [PDF]).

The report must contain:
1. A description of compliance or noncompliance with the permit effluent limits.

2. A comparison between the existing and design:
   a. Monthly average dry weather and wet weather flows.
   b. Peak flows.
   c. BOD$_5$ loading.

3. The percent change in the above parameters since the previous report (except for the first report).

4. The present and design population or population equivalent.

5. The projected population growth rate.

6. The estimated date the Permittee expects the wastewater treatment plant to reach design capacity, according to the most restrictive of the parameters above.

Ecology may modify the interval for review and reporting if it determines that a different frequency is sufficient.

S5. Operation and Maintenance

The Permittee must, at all times, properly operate and maintain all facilities or systems of treatment and control (and related appurtenances), which are installed to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes keeping a daily operation logbook (paper or electronic), adequate laboratory controls, and appropriate quality assurance procedures.

This provision of the permit requires the Permittee to operate backup or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of this permit.

S5.A. Certified Operator

An operator certified for at least a Class I plant by the State of Washington must be in charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant must be in charge during all regularly scheduled shifts.

S5.B. O & M Program

The Permittee must:

1. Institute an adequate operation and maintenance program for this facility.

2. Keep maintenance records on all major electrical and mechanical components of the treatment plant. Such records must clearly specify the frequency and type of maintenance recommended by the manufacturer and must show the frequency and type of maintenance performed.

3. Make maintenance records available for inspection at all times.
S5.C. Short-term Reduction

Any facility maintenance that might require interruption of wastewater treatment and degrade effluent quality must be scheduled during non-critical water quality periods. This maintenance must be carried out in a manner approved by Ecology.

If a Permittee contemplates a reduction in the level of treatment that would cause a violation of permit discharge limits on a short-term basis for any reason, and such reduction cannot be avoided, the Permittee must:

1. Give written notification to Ecology, if possible, thirty (30) days prior to such activities.
2. Detail the reasons for, length of time of, and the potential effects of the reduced level of treatment.

This notification does not relieve the Permittee of its obligations under this permit.

S5.D. Electrical Power Failure

The Permittee must ensure that adequate safeguards prevent the discharge of untreated wastes or wastes not treated in accordance with the requirements of this permit during electrical power failure at the treatment plant and/or sewage lift stations. Adequate safeguards include, but are not limited to, alternate power sources, standby generator(s), or retention of inadequately treated wastes.

S5.E. Prevent Connection of Inflow

The Permittee must not allow the connection of inflow (roof drains, foundation drains, etc.) to the sanitary sewer system.

S5.F. Bypass Procedures

This permit prohibits a bypass, which is the intentional diversion of waste streams from any portion of a treatment facility. Ecology may take enforcement action against a Permittee for a bypass unless one of the following circumstances (1, 2, or 3) applies.

1. Bypass for essential maintenance without the potential to cause violation of permit limits or conditions.
   
   This permit authorizes a bypass if it allows for essential maintenance and does not have the potential to cause violations of limits or other conditions of this permit, or adversely impact public health as determined by Ecology prior to the bypass.
   
   The Permittee must submit prior notice, if possible, at least ten (10) days before the date of the bypass.

2. Bypass which is unavoidable, unanticipated, and results in noncompliance of this permit.
This permit authorizes such a bypass only if:

a. Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. “Severe property damage” means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass.

b. No feasible alternatives to the bypass exist, such as:
   - The use of auxiliary treatment facilities.
   - Retention of untreated wastes.
   - Maintenance during normal periods of equipment downtime, but not if the Permittee should have installed adequate backup equipment in the exercise of reasonable engineering judgment to prevent a bypass.
   - Transport of untreated wastes to another treatment facility or preventative maintenance, or transport of untreated wastes to another treatment facility.

c. Ecology is properly notified of the bypass as required in Condition S3.E of this permit.

3. If bypass is anticipated and has the potential to result in noncompliance of this permit.

a. The Permittee must notify Ecology at least thirty (30) days before the planned date of bypass. The notice must contain:
   - A description of the bypass and its cause.
   - An analysis of all known alternatives which would eliminate, reduce, or mitigate the need for bypassing.
   - A cost-effectiveness analysis of alternatives including comparative resource damage assessment.
   - The minimum and maximum duration of bypass under each alternative.
   - A recommendation as to the preferred alternative for conducting the bypass.
   - The projected date of bypass initiation.
   - A statement of compliance with the State Environmental Policy Act.
   - A request for modification of water quality standards as provided for in WAC 173-201A-410, if an exceedance of any water quality standard is anticipated.
   - Details of the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass.
b. For probable construction bypasses, the Permittee must notify Ecology of the need to bypass as early in the planning process as possible. The Permittee must consider the analysis required above during preparation of the engineering report or facilities plan and plans and specifications and must include these to the extent practical.

In cases where the Permittee determines the probable need to bypass early, the Permittee must continue to analyze conditions up to and including the construction period in an effort to minimize or eliminate the bypass.

c. Ecology will consider the following prior to issuing an administrative order for this type of bypass:

- If the bypass is necessary to perform construction or maintenance-related activities essential to meet the requirements of this permit.
- If feasible alternatives to bypass exist, such as the use of auxiliary treatment facilities, retention of untreated wastes, stopping production, maintenance during normal periods of equipment down time, or transport of untreated wastes to another treatment facility.
- If the Permittee planned and scheduled the bypass to minimize adverse effects on the public and the environment.
- The adverse effects of the proposed bypass.
- Any other relevant factors.

After consideration of the above, Ecology will approve or deny the request. Ecology will, to the extent feasible, give the public an opportunity to comment on bypass incidents of significant duration.

Ecology will approve a request to bypass by issuing an administrative order under RCW 90.48.120.

**S5.G. Operations and Maintenance Manual**

a. **O&M Manual submittal and requirements**

The Permittee must:


2. Review the O&M Manual at least annually and confirm this review by letter to Ecology by September 1 of each year. This confirmation may be attached to the Discharge Monitoring Report cover letter. If electronic DMRs are being submitted, an electronic confirmation of the O&M Manual review is acceptable.
3. Submit to Ecology for review substantial changes or updates to the O&M Manual whenever it incorporates them into the manual. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).

4. Keep the approved O&M Manual at the permitted facility.

5. Follow the instructions and procedures of the manual.

b. O&M Manual components

At a minimum, the O&M Manual should include the following information to satisfy the specific elements listed in WAC 173-240-150(2):

1. Emergency procedures for plant shutdown and cleanup in the event of wastewater system upset or failure or collection system leak.

2. Wastewater system maintenance procedures that contribute to the generation of wastewater.

3. Any directions to maintenance staff when cleaning, or maintaining other equipment or performing other tasks which are necessary to protect the operation of the wastewater system (for example, defining maximum allowable discharge rate for draining a tank).

4. Treatment plant process control monitoring schedule.

5. Wastewater sampling protocols and procedures for compliance with the sampling and reporting requirements in the wastewater discharge permit.

6. Protocols and procedures for double-lined evaporation pond leak system sampling and testing.

7. Emergency procedures for lagoon overtopping or failure.

S5.H. Best Management Practices/Pollution Prevention Program

The Permittee must utilize Best Management Practices (BMPs) at the facility. The discharges to be controlled by BMPs are plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage.

S6. Solid Wastes

S6.A. Solid Waste Handling

The Permittee must handle and dispose of all solid waste material in such a manner as to prevent its entry into state ground or surface water.

S6.B. Leachate

The Permittee must not allow leachate from its solid waste material to enter state waters without providing all known, available, and reasonable methods of treatment. The Permittee must not allow such leachate to cause violations of the State Surface Water Quality Standards, Chapter 173-201A WAC, or the State Ground Water Quality Standards, Chapter 173-200 WAC.
S7. Application for Permit Renewal or Modification for Facility Changes

The Permittee must submit an application for renewal of this permit no later than 60 days prior to the expiration date of this permit. The Permittee must submit a paper copy and an electronic copy (preferably as a PDF).

The Permittee must also submit a new application or supplement at least 60 days prior to commencement of discharges which may result in permit violations. These discharges may result from activities such as facility expansions, production increases, or other planned changes in the permitted facility.

GENERAL CONDITIONS

G1. Signatory Requirements

All applications, reports, or information submitted to Ecology must be signed as follows:

1. All permit applications must be signed by either a principal executive officer or ranking elected official.

2. All reports required by this permit and other information requested by Ecology must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a. The authorization is made in writing by the person described above and is submitted to Ecology at the time of authorization, and
   b. The authorization specifies either a named individual or any individual occupying a named position.

3. Changes to authorization. If an authorization under G1.2.b is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization must be submitted to Ecology prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

"I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted.

Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

G2. Right of Entry

Representatives of Ecology have the right to enter at all reasonable times in or upon any property, public or private, for the purpose of inspecting and investigating conditions relating to the pollution or the possible pollution of any waters of the state.
Reasonable times include:

- Normal business hours.
- Hours during which production, treatment, or discharge occurs.
- Times when Ecology suspects a violation requiring immediate inspection.

Representatives of Ecology must be allowed to:

- Have access to, and copy at reasonable cost, any records required to be kept under terms and conditions of the permit.
- Inspect any monitoring equipment or method required in the permit.
- Sample the discharge, waste treatment processes, or internal waste streams.

G3. Permit Actions

This permit is subject to modification, suspension, or termination, in whole or in part by Ecology for any of the following causes:

1. Violation of any permit term or condition.
2. Obtaining a permit by misrepresentation or failure to disclose all relevant facts.
3. A material change in quantity or type of waste disposal.
4. A material change in the condition of the waters of the state.
5. Nonpayment of fees assessed pursuant to RCW 90.48.465.

Ecology may also modify this permit, including the schedule of compliance or other conditions, if it determines good and valid cause exists. Good and valid cause includes promulgation or revisions of regulations or new information.

G4. Reporting a Cause for Modification

The Permittee must submit a new application at least 60 days before it wants to discharge more of any pollutant, a new pollutant, or more flow than allowed under this permit. The Permittee should use the State Waste Discharge Permit application, and submit required plans at the same time.

The Permittee must continue to comply with the existing permit until it is modified or reissued. Submitting a notice of dangerous waste discharge (to comply with Pretreatment or Dangerous Waste rules) triggers this requirement as well.

G5. Plan Review Required

Prior to constructing or modifying any wastewater control facilities, an engineering report and detailed plans and specifications must be submitted to Ecology for approval in accordance with Chapter 173-240 WAC. Engineering reports, plans, and specifications should be submitted at least 60 days prior to the planned start of construction. Facilities must be constructed and operated in accordance with the approved plans.
G6. **Compliance with Other Laws and Statutes**

Nothing in this permit excuses the Permittee from compliance with any applicable federal, state, or local statutes, ordinances, or regulations.

G7. **Transfer of this Permit**

This permit is automatically transferred to a new owner or operator if:

1. A written agreement between the old and new owner or operator containing a specific date for transfer of permit responsibility, coverage, and liability is submitted to Ecology;
2. A copy of the permit is provided to the new owner and;
3. Ecology does not notify the Permittee of the need to modify the permit.

Unless this permit is automatically transferred according to Section G7.1 above, this permit may be transferred only if it is modified to identify the new Permittee and to incorporate such other requirements as determined necessary by Ecology.

G8. **Payment of Fees**

The Permittee must submit payment of fees associated with this permit as assessed by Ecology. Ecology may revoke this permit if the permit fees established under Chapter 173-224 WAC are not paid.

G9. **Penalties for Violating Permit Conditions**

Any person who is found guilty of willfully violating the terms and conditions of this permit is guilty of a crime, and upon conviction thereof may be punished by a fine of up to $10,000 and costs of prosecution, or by imprisonment at the discretion of the court. Each day in which a willful violation occurs may be deemed a separate and additional violation.

Any person who violates the terms and conditions of a waste discharge permit incurs, in addition to any other penalty as provided by law, a civil penalty in the amount of up to $10,000 for every such violation. Each and every such violation is a separate and distinct offense, and in case of a continuing violation, every day's continuance is considered a separate and distinct violation.

G10. **Duty to provide information**

The Permittee must submit to Ecology, within a reasonable time, all information which Ecology may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The Permittee must also submit to Ecology, upon request, copies of records required to be kept by this permit.

G11. **Duty to comply**

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of chapter 90.48 RCW and is grounds for:

- Enforcement action.
- Permit termination, revocation and reissuance, or modification.
- Denial of a permit renewal application.
Fact Sheet for State Waste Discharge Permit ST0045514
200 West Area Evaporative Sewage Lagoon
(May 1, 2012)

Purpose of this fact sheet
This fact sheet explains and documents the decisions that the Department of Ecology (Ecology) made in drafting the proposed State Waste Discharge Permit for the 200 West Area Evaporative Sewage Lagoon. This permit will allow discharge of wastewater to two double-lined evaporative lagoons located near the 200 West Area of the Hanford Site.

State law requires any domestic wastewater facility to obtain a permit before discharging waste or chemicals to waters of the state, which includes groundwater. Although this facility is not permitted to discharge, except in the case of emergencies, a permit is being issued to oversee the operation and maintenance of the facility.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before it issues the final permit to the facility operator. Copies of the fact sheet and draft permit for 200 West Area Evaporative Sewage Lagoon, State Waste Discharge Permit ST0045514, are available for public review and comment from May 14, 2012 until the close of business June 15, 2012. For more details on preparing and filing comments about these documents, please see Appendix A - Public Involvement Information.

The Permittee, the United States Department of Energy-Richland Operations Office (USDOE-RL) reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility’s location, history, wastewater discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closes, Ecology will summarize substantive comments and our responses to them. Ecology will include our summary and responses to comments to this fact sheet as Appendix E - Response to Comments, and publish it when we issue the final State Waste Discharge permit. Ecology will not revise the rest of the fact sheet, but the full document including all appendices will become part of the legal history contained in the facility’s permit file.

Summary
The 200 West Area Evaporative Sewage Lagoon is a new domestic wastewater treatment facility located northeast of the 200 West Area of the Hanford Site. The facility consists of double-lined evaporative lagoons and is designed to have no liquid discharge to the ground. The system will provide domestic wastewater treatment for the 200 West and 600 Areas, as well as provide treatment for domestic wastewater hauled from the 200 East Area and other locations within the Hanford Site. Initially, the United States Department of Energy (USDOE) will only truck wastewater to the facility. As existing on-site systems fail and new infrastructure is needed, USDOE may consider constructing a collection system within the 200 West and 600 Areas.

USDOE constructed the 200 West Area Evaporative Sewage Lagoon, in part, to replace the existing 100-N Sewage Lagoon (State Waste Discharge Permit ST0004507) which is nearing the end of its service life. In addition, the majority of future Hanford Site cleanup activities will be centered around the 200 Area. The location of this new wastewater treatment facility will be centrally located to serve this growing population of workers.
Table of Contents

I. Introduction ............................................................................................................. 4
II. Background Information ......................................................................................... 4
   A. Facility description ................................................................................................ 6
      History ..................................................................................................................... 7
      Collection System Status ...................................................................................... 7
      Wastewater Treatment Process ............................................................................ 7
      Emergency Drainfield ........................................................................................... 8
      Solid Wastes ......................................................................................................... 8
   B. Description of the Ground Water ........................................................................ 8
   C. Wastewater influent characterization ................................................................ 8
   D. Wastewater effluent characterization ................................................................ 9
   E. State Environmental Policy Act (SEPA) Compliance ....................................... 9
III. Proposed Permit Limits ........................................................................................ 10
   A. Design Criteria .................................................................................................... 10
   B. Technology-based effluent limits ....................................................................... 11
   C. Ground water quality based effluent limits ...................................................... 11
      Antidegradation Policy ........................................................................................... 12
      Antidegradation .................................................................................................... 12
      Non-degradation .................................................................................................. 12
      Background Water Quality .................................................................................... 13
IV. Monitoring Requirements ...................................................................................... 13
   A. Lab accreditation ................................................................................................ 13
   B. Wastewater monitoring ...................................................................................... 13
   C. Sludge monitoring ............................................................................................... 13
V. Other Permit Conditions ......................................................................................... 14
   A. Reporting and recordkeeping ............................................................................ 14
   B. Prevention of facility overloading ..................................................................... 14
   C. Operations and maintenance ............................................................................. 14
   D. Solid wastes ....................................................................................................... 14
   E. General conditions .............................................................................................. 14
VI. Permit Issuance Procedures .................................................................................. 15
   A. Permit modifications ........................................................................................... 15
Fact Sheet for State Permit ST0045514
Page 3 of 25

B. Proposed permit issuance........................................................................................................15

VII. References for Text and Appendices.................................................................................. 16

Appendix A--Public Involvement Information.......................................................................... 17
Appendix B--Your Right to Appeal ............................................................................................ 18
Appendix C--Glossary.................................................................................................................. 19
Appendix D--Technical Calculations ....................................................................................... 23
Appendix E--Response to Comments ....................................................................................... 25

Table 1 General Facility Information .......................................................................................... 5
Table 2 Wastewater Influent Characterization .......................................................................... 9
Table 3 Design Criteria for Wastewater Treatment Facility....................................................... 12

Figure 1 Facility Location Map ................................................................................................ 7
I. Introduction

The legislature defined Ecology's authority and obligations for the wastewater discharge permit program in the Water Pollution Control law, chapter 90.48 RCW (Revised Code of Washington). Ecology adopted rules describing how it exercises its authority:

- State waste discharge program (chapter 173-216 WAC)
- Water quality standards for ground waters of the state of Washington (chapter 173-200 WAC)
- Discharge standards and effluent limits for domestic wastewater facilities (chapter 173–221 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

These rules require an operator of a domestic wastewater facility to obtain a State Waste Discharge permit before discharging wastewater to state waters. Although this facility is not permitted to discharge, except in the case of emergencies, Ecology is issuing a permit to oversee the operation and maintenance of the facility. The rules also help to define the basis for limits on each discharge and for performance requirements imposed by the permit.

Under the State Waste Discharge permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make it available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days. (See Appendix A-Public Involvement Information for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft State Waste Discharge permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in Appendix E.

II. Background Information

Table 1 General Facility Information

<table>
<thead>
<tr>
<th>Facility Information</th>
<th>United States Department of Energy-Richland Operations Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant:</td>
<td>P.O. Box 550</td>
</tr>
<tr>
<td></td>
<td>Richland, Washington 99352</td>
</tr>
<tr>
<td>Facility Name and Address:</td>
<td>200 West Area Evaporative Sewage Lagoon</td>
</tr>
<tr>
<td>Contact at Facility</td>
<td>Name: Roy E. Hammond</td>
</tr>
<tr>
<td></td>
<td>Telephone #: 509-539-3289</td>
</tr>
</tbody>
</table>
**Facility Information**

| Responsible Official | Name: Dale Jackson  
Clean Water Act Program Manager  
USDOE-RL  
825 Jadwin Avenue  
Richland, WA 99352  
Telephone #: 509-376-8086 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Treatment:</td>
<td>Aerated Lagoons with Evaporative Disposal</td>
</tr>
<tr>
<td>SIC Codes</td>
<td>9511</td>
</tr>
<tr>
<td>NAIC Codes</td>
<td>924110</td>
</tr>
<tr>
<td>Legal Description of Application Area</td>
<td>Section 31, Township 13N, Range 26EWM</td>
</tr>
</tbody>
</table>

**Permit Status**

<table>
<thead>
<tr>
<th>Issuance Date of Previous Permit</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application for Permit Submittal Date</td>
<td>March 6, 2012</td>
</tr>
<tr>
<td>Date of Ecology Acceptance of Application</td>
<td>March 15, 2012</td>
</tr>
</tbody>
</table>

**Inspection Status**

<table>
<thead>
<tr>
<th>Date of Last Sampling Inspection</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Last Non-sampling Inspection Date</td>
<td>December 29, 2011</td>
</tr>
</tbody>
</table>
Figure 1  Facility Location Map
Fact Sheet for State Permit ST0045514
Page 7 of 25

A. Facility description

History

USDOE plans to complete the construction of the 200 Area Evaporative Sewage Lagoon in May 2012. The facility is located on the Hanford Nuclear Reservation, northeast of the 200 West Area. The Hanford site occupies approximately 586 square miles north of the city of Richland and consists of the 100, 200, 300, 400, and 600 Areas. In the past, the site was used for nuclear material production, waste storage, and waste disposal. Currently USDOE is conducting a large cleanup operation, and public access is restricted to much of the site.

Collection System Status

During initial operations, USDOE will only truck domestic waste from septic systems and holding tanks from various locations on the Hanford site. As existing on-site systems fail and new infrastructure is needed, it may construct a collection system within the 200 West and 600 Areas.

Wastewater Treatment Process

The 200 Area Evaporative Sewage Lagoon consists of preliminary and secondary treatment, a lime stabilization unit, and an evaporative lagoon in a dual train configuration. The treatment systems and evaporative lagoons are double-lined with high density polyethylene flexible membranes to provide watertight barriers with minimal potential for the migration of pollutants. The system is designed to treat 55,000 gallons per day of wastewater.

Currently, the preliminary treatment unit receives wastewater hauled from onsite systems. These hauled wastes discharge into an inlet chamber located on the unloading pad. Bar screens are used to remove solids from the influent flow. Flow then passes through a grit chamber to remove inorganic solids. A grinder, located in the flow channel, grinds inorganic solids into ¼ inch or smaller pieces.

Secondary treatment consists of biological treatment of the wastewater in aerated and settling lagoons. The aerated lagoons are designed to keep solids in suspension using mechanical aerators. The settling basins are designed to separate, stabilize, and store the solids at the floor of the basins. The floors of the settling basins are sloped to accumulate sludge. This sludge will be pumped to a mixing tank at the lime stabilization system periodically.

Waste solids received at the facility, as well as sludge from the settling basins, passes through a lime stabilization unit. Stabilization using lime helps to immobilize metallic ions, reduce odors, and kill pathogens. The lime stabilization unit consists of a liquid feed system, inline grinder pump, sludge recirculation pump, and a mixing tank. Pumps, feed controls, and pH instruments are built into the system.

After passing through the lime stabilization unit, sludge or septage from the mixing tank is pumped to a polymer addition unit. The liquid emulsion polymer injection system aids in the dewatering of sludge and septage. Dewatering occurs through the use of geotextile tubes. These tubes are filled with septage or sludge, and all water permeating through the geotextile walls is collected and returned to the diversion box at the headworks of the plant. Once the geotextile tubes are filled, the solids are allowed to dry and are disposed at Mixed Waste Trenches 31/34 on the Hanford site.
Effluent from the settling basins is discharged and stored in the evaporative lagoons, which are designed to have zero discharge. The evaporative lagoons are double-lined with high density polyethylene and equipped with a leak detection system. Surface aerators are present to promote evaporation. Aerators also help mix the liquid and prevent carbon dioxide buildup in the water, which reduces algae growth.

An operator certified for at least a Class I plant by the State of Washington is in charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at least a Class I plant will be in charge during all regularly scheduled shifts.

The 200 West Area Evaporative Sewer Lagoon Engineering Report dated November 2011 was approved by the Department of Ecology on February 1, 2012.

**Emergency Drainfield**

The treatment system includes an intermittent sand filter, which it will use to filter any emergency discharge from the evaporative lagoon. The sand filter has a double membrane liner and may be valved off to collect any emergency discharge and route it back to the headworks of the plant.

**Solid Wastes**

The treatment facility removes solids during the treatment of the wastewater at the headworks of the plant through grit chambers and bar screens. The facility drains grit, rags, scum, and screenings and disposes this solid waste at the Mixed Waste Trenches 31-34 or at other approved on-site disposal facilities.

**B. Description of the groundwater**

The past industrial activities at the Hanford site have affected groundwater. Currently, contaminant levels for some parameters in groundwater beneath the site are higher than drinking water standards (PNNL-19962, *Cultural Resources Review for the Installation of a New Sewage Lagoon North of the 200 West Area, Hanford Site, Benton County, Washington – HCRC# 2010-200-054*).

**C. Wastewater influent characterization**

USDOE-RL reported the concentration of influent pollutants in the 200 West Area Evaporative Sewer Lagoon Engineering Report (11-EMD-0088, dated July 2011). Samples were collected from the access ports of several existing onsite systems on the Hanford Site. The influent wastewater is characterized in Table 2:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>No. of Samples</th>
<th>Average Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD₅</td>
<td>mg/l</td>
<td>5</td>
<td>230</td>
<td>388</td>
</tr>
<tr>
<td>TDS</td>
<td>mg/l</td>
<td>5</td>
<td>408</td>
<td>455</td>
</tr>
<tr>
<td>TSS</td>
<td>mg/l</td>
<td>5</td>
<td>391</td>
<td>652</td>
</tr>
</tbody>
</table>
**Fact Sheet for State Permit ST0045514**

**Page 9 of 25**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>No. of Samples</th>
<th>Average Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen (as N)</td>
<td>mg/l</td>
<td>5</td>
<td>116</td>
<td>126</td>
</tr>
<tr>
<td>Phosphorus (as P)</td>
<td>mg/l</td>
<td>5</td>
<td>13.11</td>
<td>24.00</td>
</tr>
<tr>
<td>Chlorides</td>
<td>mg/l</td>
<td>5</td>
<td>72</td>
<td>79</td>
</tr>
<tr>
<td>Sulfate</td>
<td>mg/l</td>
<td>5</td>
<td>52</td>
<td>63</td>
</tr>
<tr>
<td>Alkalinity (as CaCO₃)</td>
<td>mg/l</td>
<td>5</td>
<td>468</td>
<td>603</td>
</tr>
<tr>
<td>Oil &amp; Grease</td>
<td>mg/l</td>
<td>5</td>
<td>25.8</td>
<td>44.4</td>
</tr>
<tr>
<td>Chloroform</td>
<td>µg/l</td>
<td>5</td>
<td>6.1</td>
<td>9.7</td>
</tr>
<tr>
<td>Gross Alpha Radiation</td>
<td>pci/l</td>
<td>5</td>
<td>Non-Detect</td>
<td>Non-Detect</td>
</tr>
<tr>
<td>Gross Beta Radiation</td>
<td>mrem/yr</td>
<td>5</td>
<td>10.06</td>
<td>13.30</td>
</tr>
<tr>
<td>Uranium</td>
<td>µg/l</td>
<td>5</td>
<td>Non-Detect</td>
<td>Non-Detect</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>No. of Samples</th>
<th>Monthly Geometric Mean</th>
<th>7-Day Geometric Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fecal Coliforms</td>
<td>Number/100 ml</td>
<td>5</td>
<td>&gt;2400</td>
<td>&gt;2400</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>No. of Samples</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>standard units</td>
<td>5</td>
<td>8.29</td>
<td>8.77</td>
</tr>
</tbody>
</table>

**D. Wastewater effluent characterization**

This is a new facility and no data exists for water treated and stored in the evaporative lagoons. Therefore, USDOE-RL is unable to report the concentration of pollutants in any potential discharges at this time. USDOE has designed the facility to meet secondary treatment standards.

**E. State Environmental Policy Act (SEPA) Compliance**

To meet the intent of SEPA, an existing, unpermitted discharge must undergo SEPA review during the permitting process. The facility filed a SEPA checklist with the Department of Ecology on July 20, 2011, and Ecology issued a determination of non-significance for the project on April 24, 2012. An Ecological Resources Review was completed on September 3, 2010. This review found no plant or animal species protected under the Endangered Species Act, candidates for such protection, or species listed by Washington State as threatened or endangered. The Hanford Cultural Resources Review was completed on January 4, 2011.
Based on an archaeological survey and subsurface testing performed in the area, the presence of cultural resources is not anticipated.

### III. Proposed Permit Limits

State regulations require that Ecology base limits in a State Waste Discharge permit on the:

- Technology and treatment methods available to treat specific pollutants (technology-based). Dischargers must treat wastewater using all known, available, reasonable methods of prevention, control, and treatment (AKART). Ecology and the State Department of Health have adopted technology-based (AKART) criteria for municipal systems that discharge to ground; (WA. Dept. of Health, 1994).

- Operations and best management practices necessary to meet applicable water quality standards to preserve or protect beneficial uses for ground waters.


- Applicable requirements of other local, state, and federal laws.

Ecology applies the most stringent of technology and water quality-based limits to each parameter of concern and further describes the proposed limits below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, monitoring, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, and are not listed in regulation.

Ecology does not usually develop permit limits for pollutants not reported in the permit application but that may be present in the discharge. The permit does not authorize the discharge of the non-reported pollutants. During the five-year permit term, the facility’s effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent. Until Ecology modifies the permit to reflect additional discharges of pollutants, a permitted facility could be violating its permit.

### A. Design Criteria

Under WAC 173-216-110 (4), flows and waste loadings must not exceed approved design criteria. Ecology approved the design criteria for this treatment plant in the 200 West Area Evaporative Sewer Lagoon Engineering Report dated November 2011 and in the plans and specifications dated November 2011. These documents were prepared by Jacobs Engineering. Table 3 below includes design criteria from the referenced reports.
### Table 3  Design Criteria for Wastewater Treatment Facility

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Design Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Average Design Flow</td>
<td>55,000 GPD</td>
</tr>
<tr>
<td>BOD\textsubscript{5} Loading for Maximum Month</td>
<td>105 lb/day</td>
</tr>
</tbody>
</table>

### B. Technology-based effluent limits

Waste discharge permits issued by Ecology specify conditions requiring the facility to use AKART before discharging to waters of the state (RCW 90.48). Ecology defines AKART for domestic wastewater facilities in chapter 173-221 WAC, Discharge Standards and Effluent Limits for Domestic Wastewater Facilities and in the Department of Health’s design criteria (1994).

Ecology approved the engineering report titled *200 West Area Evaporative Sewer Lagoon Engineering Report*, dated November 2011. This document was prepared by Jacobs Engineering.

Ecology evaluated the report using the:

- Discharge standards and effluent limits for domestic wastewater facilities.

Ecology determined that the facility meets the minimum requirements demonstrating compliance with the AKART standard if the Permittee operates the treatment and disposal system as described in the approved engineering report and any subsequent Ecology approved reports. The following permit limitations are necessary to satisfy the requirements for AKART:

There shall be no discharge to ground or surface waters of the state, except in emergency situations.

### C. Ground water quality based effluent limits

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the ground water quality standards. The goal of the ground water quality standards is to maintain the highest quality of the State’s ground waters and to protect existing and future beneficial uses of the ground water through the reduction or
elimination of the discharge of contaminants to groundwater [WAC 173-200-010(4)]. Ecology achieves this goal by:

- Applying all known available and reasonable methods of prevention, control and treatment (AKART) to any discharge.
- Applying the antidegradation policy of the groundwater standards.
- Establishing numeric and narrative criteria for the protection of human health and the environment in the groundwater quality standards.

**Antidegradation Policy**

The state of Washington's Ground Water Quality Standards (GWQS) require preservation of existing and future beneficial uses of groundwater through the antidegradation policy, which includes the two concepts of antidegradation and non-degradation.

**Antidegradation**

Antidegradation is not the same as non-degradation (see below). Antidegradation applies to calculation of permit limits in ground water when background (see below) contaminant concentrations are less than criteria in the GWQS. Ecology has discretion to allow the concentrations of contaminants at the point of compliance to exceed background concentrations but not exceed criteria in the GWQS. Ecology grants discretion through an approved AKART engineering analysis of treatment alternatives. If the preferred treatment alternative predicts that discharges to groundwater will result in contaminant concentrations that fall between background concentrations and the criteria, then the preferred treatment alternative should protect beneficial uses and meet the antidegradation policy. In this case, the predicted concentrations become the permit limits. If the preferred alternative will meet background contaminant concentrations, background concentrations become the permit limits. Permit limits must protect ground water quality by preventing degradation beyond the GWQS criteria. If discharges will result in exceedance of the criteria, facilities must apply additional treatment before Ecology can permit the discharge.

**Non-degradation**

Non-degradation applies to permit limits in ground water when background contaminant concentrations exceed criteria in the GWQS. Non-degradation means that discharges to ground water must not further degrade existing water quality. In this case, Ecology considers the background concentrations as the water quality criteria and imposes the criteria as permit limits. To meet the antidegradation policy, the facility must prepare an AKART engineering analysis that demonstrates that discharges to ground water will not result in increasing background concentrations. Ecology must review and approve the AKART engineering analysis.

You can obtain more information on antidegradation and non-degradation by referring to the *Implementation Guidance for the Ground Water Quality Standards (Implementation Guidance)*, Ecology Publication #96-02 (available at [http://www.ecy.wa.gov/biblio/9602.html](http://www.ecy.wa.gov/biblio/9602.html)).
Background Water Quality

Background water quality is determined by a statistical calculation of contaminant concentrations without the impacts of the proposed activity. The calculation requires an adequate amount of groundwater quality data and determining the mean and standard deviation of the data, as described in the Implementation Guidance. Following the procedure in the Implementation Guidance, Ecology then defines background water quality for most contaminants as the 95 percent upper tolerance limit. This means that Ecology is 95 percent confident that 95 percent of future measurements will be less than the upper tolerance limit. There are a few exceptions to the use of the upper tolerance limit. For pH, Ecology will calculate both an upper and a lower tolerance limit resulting in an upper and lower bound to the background water quality. If dissolved oxygen is of interest, Ecology will calculate a lower tolerance limit without an upper tolerance limit.

The following permit limits are necessary to satisfy Ground Water Quality Criteria requirements:

- There must be no discharge to groundwaters of the state.

IV. Monitoring Requirements

Ecology requires monitoring, recording, and reporting (WAC 173-216-110) to verify that the treatment process functions correctly, the discharge meets ground water criteria and that the discharge complies with the permit’s effluent limits.

A. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters). Ecology accredited the laboratory at this facility for Biochemical Oxygen Demand\(_5\) (BOD\(_5\)).

B. Wastewater monitoring

Ecology details the proposed monitoring schedule under Permit Special Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, significance of pollutants, and cost of monitoring. Since this treatment facility is designed to have zero discharge, only influent monitoring will be required. However, in the event of an emergency discharge to groundwater, Ecology will require the Permittee to measure the flow and sample the effluent for parameters specified at the time of the emergency discharge.

C. Sludge monitoring

Monitoring of sludge quantity and quality is necessary to determine the appropriate uses of the sludge. Biosolids monitoring is required by the current state and local solid waste management program and also by EPA under 40 CFR 503. Currently, the facility plans to dispose dried solids as a solid waste at the Mixed Waste Trenches 31/34 located in the 200 East Area of the Hanford Site.
V. Other Permit Conditions

A. Reporting and recordkeeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-216-110).

B. Prevention of facility overloading

Overloading of the treatment plant is a violation of the terms and conditions of the permit. To prevent this from occurring, RCW 90.48.110 and WAC 173-216-110 require USDOE-RL to:

• Take the actions detailed in proposed permit Special Condition S4. Special Condition S4 restricts the amount of flow.
• Implement plant expansions or modifications before the treatment plant reaches existing capacity.
• Report and correct conditions that could result in new or increased discharges of pollutants.

C. Operations and maintenance

Ecology requires dischargers to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state regulations (WAC 173-240-080 and WAC 173-216-110). The facility must prepare and submit an Operation and Maintenance (O&M) Manual for the wastewater facility.

Implementation of the procedures in the Operation and Maintenance Manual ensures the facility’s compliance with the terms and limits in the permit and ensures the facility provides AKART to the waste stream.

D. Solid wastes

To prevent water quality problems the facility is required in Special Condition S7 to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and state water quality standards.

The final use and disposal of sewage sludge from this facility is regulated by Ecology under chapter 70.95J RCW, chapter 173-308 WAC “Biosolids Management,” and chapter 173-350 WAC “Solid Waste Handling Standards.” The disposal of other solid waste is under the jurisdiction of the Benton County Health Department.

E. General conditions

Ecology bases the standardized general conditions on state law and regulations. They are included in all state waste discharge permits issued by Ecology.
VI. Permit Issuance Procedures

A. Permit modifications

Ecology may modify this permit to impose numerical limits, if necessary to comply with water quality standards for groundwaters, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state regulations.

B. Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of five years.
VII. References for Text and Appendices

Gavlak, R., D. Horneck, R.O. Miller, and J. Kotuby-Amacher
http://cropandsoil.oregonstate.edu/wera103/soil_methods

Pacific Northwest National Laboratory

Washington State Department of Ecology
September 2010. *State Waste Discharge Permit ST 5383, City of Sprague.*

February 2000. *Fact Sheet for State Waste Discharge Permit ST-5383, City of Sprague.*

July 2010. *Addendum to the Fact Sheet for State Waste Discharge Permit No. ST-5383.*


Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html )


(http://www.ecy.wa.gov/biblio/92109.html)


Washington State Department of Health


United States Department of Energy

July 2011. *200 West Area Evaporative Sewer Lagoon Engineering Report (11-EMD-0088).*

November 2011. *200 West Area Evaporative Sewer Lagoon Engineering Report, REV.0 (HNF-50995).*
Appendix A--Public Involvement Information

Ecology proposes to issue a permit to the United States Department of Energy-Richland Operations Office. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology’s reasons for requiring permit conditions.

Ecology placed a Public Notice of Application on April 3, 2012 and April 8, 2012 in the Tri-City Herald to inform the public about the submitted application and to invite comment on the issuance of this permit.

Ecology will place a Public Notice of Draft on May 13, 2012 in the Tri-City Herald to inform the public and to invite comment on the proposed draft State Waste Discharge permit and fact sheet.

The notice:

• Tells where copies of the draft Permit and Fact Sheet are available for public evaluation (a local public library, the closest Regional or Field Office, posted on Ecology’s website).
• Offers to provide the documents in an alternate format to accommodate special needs.
• Urges people to submit their comments, in writing, before the end of the comment period
• Tells how to request a public hearing of comments about the proposed state waste discharge permit.
• Explains the next step(s) in the permitting process.


You may obtain further information from Ecology by telephone, (509) 372-7950 or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Nuclear Waste Program
3100 Port of Benton Blvd.
Richland, WA  99354

The primary author of this permit and fact sheet is Stacy Nichols.
Appendix B--Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within 30 days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. “Date of receipt” is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

<table>
<thead>
<tr>
<th>Street Addresses</th>
<th>Mailing Addresses</th>
</tr>
</thead>
</table>
| **Department of Ecology**  
Attn: Appeals Processing Desk  
300 Desmond Drive SE  
Lacey, WA 98503 | **Department of Ecology**  
Attn: Appeals Processing Desk  
PO Box 47608  
Olympia, WA 98504-7608 |
| **Pollution Control Hearings Board**  
1111 Israel Road SW  
Suite 301  
Tumwater, WA 98501 | **Pollution Control Hearings Board**  
PO Box 40903  
Olympia, WA 98504-0903 |
Appendix C--Glossary

AKART -- The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Annual average design flow (AADF) -- average of the daily flow volumes anticipated to occur over a calendar year.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity, [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural, and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD$_5$ -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD$_5$ is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD$_5$ is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Clean water act (CWA -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for
municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Date of receipt – This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed 45 days from the date of mailing.

Detection limit -- See Method Detection Level.

Enforcement limit -- The concentration assigned to a contaminant in the ground water at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Ground water -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user -- A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) -- The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.
Maximum month design flow (MMDF) -- The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) -- The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection level (MDL) -- The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Peak hour design flow (PHDF) -- The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) -- The maximum anticipated instantaneous flow.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) -- The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1,2, or 5) \times 10^n, where n is an integer. (64 FR 30417).

Also given as:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency December 2007).

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.
**Fact Sheet for State Permit ST0045514**

**Page 22 of 25**

**Stormwater** -- That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

**Technology-based effluent limit** -- A permit limit based on the ability of a treatment method to reduce the pollutant.

**Upset** -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

**Water quality-based effluent limit** -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.
Appendix D--Technical Calculations

The Biological Oxygen Demand (BOD) on the plant will be 105 lbs/day as determined using the equation below:

\[
\text{Flow} \frac{MG}{\text{day}} \times BOD \frac{mg}{l} \times 8.34 = BOD \frac{lbs}{\text{day}} \text{ Loading on the Plant}
\]

Where MG/day is million gallons per day, mg/l is milligrams per liter, and lbs/day is pounds per day.

The number 8.34 in the formula above is a conversion factor to get from pounds per million gallons to milligrams per liter.

Population Estimates for Wastewater Service Area

<table>
<thead>
<tr>
<th>YEAR</th>
<th>200 East</th>
<th>200 West</th>
<th>600</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>2,109</td>
<td>2,184</td>
<td>647</td>
<td>4,940</td>
</tr>
<tr>
<td>2011</td>
<td>2,298</td>
<td>2,308</td>
<td>614</td>
<td>5,220</td>
</tr>
<tr>
<td>2012</td>
<td>2,171</td>
<td>2,047</td>
<td>540</td>
<td>4,758</td>
</tr>
<tr>
<td>2013</td>
<td>2,298</td>
<td>1,358</td>
<td>393</td>
<td>4,049</td>
</tr>
<tr>
<td>2014</td>
<td>2,273</td>
<td>1,149</td>
<td>325</td>
<td>3,747</td>
</tr>
<tr>
<td>2015</td>
<td>2,470</td>
<td>1,065</td>
<td>325</td>
<td>3,860</td>
</tr>
<tr>
<td>2016</td>
<td>2,746</td>
<td>1,004</td>
<td>325</td>
<td>4,075</td>
</tr>
<tr>
<td>2017</td>
<td>2,925</td>
<td>938</td>
<td>325</td>
<td>4,188</td>
</tr>
<tr>
<td>2018</td>
<td>3,126</td>
<td>874</td>
<td>325</td>
<td>4,325</td>
</tr>
<tr>
<td>2019</td>
<td>3,799</td>
<td>827</td>
<td>325</td>
<td>4,951</td>
</tr>
<tr>
<td>2020</td>
<td>3,436</td>
<td>812</td>
<td>325</td>
<td>4,573</td>
</tr>
</tbody>
</table>

From 200 West Area Evaporative Sewer Lagoon Engineering Report (11-EMD-0088, July 2011).
### Estimate of Wastewater Flows in Sanitary Sewer System

<table>
<thead>
<tr>
<th>Year</th>
<th>Area</th>
<th>200W and 600 Area Totals</th>
<th>All Areas Total&lt;sup&gt;3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200 East&lt;sup&gt;1&lt;/sup&gt;</td>
<td>200 West</td>
<td>600</td>
</tr>
<tr>
<td>2010</td>
<td>44,300</td>
<td>45,850</td>
<td>13,600</td>
</tr>
<tr>
<td>2011</td>
<td>48,250</td>
<td>48,500</td>
<td>12,900</td>
</tr>
<tr>
<td>2012</td>
<td>45,600</td>
<td>43,000</td>
<td>11,350</td>
</tr>
<tr>
<td>2013</td>
<td>48,250</td>
<td>28,500</td>
<td>8,250</td>
</tr>
<tr>
<td>2014</td>
<td>47,700</td>
<td>24,150</td>
<td>6,850</td>
</tr>
<tr>
<td>2015</td>
<td>51,900</td>
<td>22,400</td>
<td>6,850</td>
</tr>
<tr>
<td>2016</td>
<td>57,700</td>
<td>21,100</td>
<td>6,850</td>
</tr>
<tr>
<td>2017</td>
<td>61,400</td>
<td>19,700</td>
<td>6,850</td>
</tr>
<tr>
<td>2018</td>
<td>65,650</td>
<td>18,350</td>
<td>6,850</td>
</tr>
<tr>
<td>2019</td>
<td>79,800</td>
<td>17,400</td>
<td>6,850</td>
</tr>
<tr>
<td>2020</td>
<td>72,150</td>
<td>17,050</td>
<td>6,850</td>
</tr>
</tbody>
</table>

Flow estimates are based on 21 gallons per day per person.

<sup>1</sup> Excluding construction personnel at Waste Treatment Plant

<sup>2</sup> Service Area included in the current planning report

<sup>3</sup> All numbers (excluding the Year column) represent gallons per day

From *200 West Area Evaporative Sewer Lagoon Engineering Report (11-EMD-0088, July 2011)*.
Appendix E--Response to Comments
Response to Comments
200 West Area Evaporative Sewage Lagoon
May 14 – June 15, 2012

Summary of a public comment period and responses to comments

June 2012
Publication no. 12-05-013
Publication and Contact Information

This publication is available on the Department of Ecology’s website at http://www.ecy.wa.gov/biblio/nwp.html

For more information contact:

Stacy Nichols
Nuclear Waste Program
3100 Port of Benton Boulevard
Richland, WA  99354

Phone:  509-372-7950
Hanford Cleanup Line: 800-321-2008
Email: Hanford@ecy.wa.gov


Headquarters, Lacey  360-407-6000
Northwest Regional Office, Bellevue  425-649-7000
Southwest Regional Office, Lacey  360-407-6300
Central Regional Office, Yakima  509-575-2490
Eastern Regional Office, Spokane  509-329-3400

Ecology publishes this document to meet the requirements of Washington Administrative Code 173-303-840 (9).

If you need this document in a format for the visually impaired, call the Nuclear Waste Program at 509-372-7950. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.
Response to Public Comments

Waste Water Discharge Permit for Hanford’s
200 West Area Evaporative Sewage Lagoon
May 14 – June 15, 2012

Department of Ecology
Nuclear Waste Program
3100 Port of Benton Boulevard
Richland, Washington 99354
This page is purposely left blank.
# Table of Contents

Introduction..........................................................................................................................1  
Reasons for Issuing the Permit ............................................................................................1  
Public Involvement Actions.................................................................................................3  
Responses to Comments ......................................................................................................4  
List of Commenters..............................................................................................................8  
Appendix A: Copies of all public notices ............................................................................9  
Appendix B: Copies of all written comments.......................................................................21
This page is purposely left blank.
Introduction

The Washington State Department of Ecology (Ecology) requires industrial facilities in the state to have a permit before discharging waste or chemicals to the waters of the state, including groundwater.

When a new permit or a significant change to an existing permit is proposed, we hold a public comment period to allow the public to review the change and provide formal feedback.

The Response to Comments is the last step before issuing the final permit. Its purpose is to:

1. Specify which provisions, if any, of a permit will become effective upon issuance of the final permit, providing reasons for those changes.
2. Describe and document public involvement actions.
3. List and respond to all significant comments received during the public comment period and any related public hearings.

This Response to Comments is prepared for:

- Comment period: Waste Water Discharge permit for Hanford’s 200 West Area Evaporative Sewage Lagoon
- Permit: ST0045514
- Original issuance date: 2012
- Draft effective date: July 1, 2012

To see more information related to the Hanford Site or nuclear waste in Washington, please visit our website: www.ecy.wa.gov/programs/nwp.

Reasons for Issuing the Permit

State waste discharge permits protect groundwater by regulating how wastewater is discharged to the ground. However, this facility, consisting of double-lined evaporative lagoons, is not expected to discharge any effluent.

Ecology proposes to issue a state waste discharge permit to the 200 West Area Evaporative Sewage Lagoon to help regulate the facility’s operation and maintenance. The permit will also ensure we have the facility’s full history, should there ever be an emergency discharge.

The Permittee is the United States Department of Energy, Richland Operations Office (USDOE).
The 200 West Area Evaporative Sewage Lagoon is a new domestic wastewater treatment facility northeast of the 200 West Area of the Hanford Site. The facility consists of double-lined evaporative lagoons and is designed to have no liquid discharge to the ground. The system will provide domestic wastewater treatment for the 200 West and 600 Areas, as well as provide treatment for domestic wastewater hauled from the 200 East Area and other locations within the Hanford Site. At first, only wastewater will be trucked to the facility. As existing on-site systems fail and new infrastructure is needed, USDOE may construct a collection system within the 200 West and 600 Areas.

USDOE constructed the 200 West Area Evaporative Sewage Lagoon, in part, to replace the existing 100-N Sewage Lagoon (State Waste Discharge Permit ST0004507), which is nearing the end of its service life. In addition, most future Hanford Site cleanup activities will be around the 200 Area. This new wastewater treatment facility will be centrally located to serve a growing population of workers.

Ecology reviewed the permitting of the disposal facility under Washington’s State Environmental Policy Act (SEPA) in April 2012. The Permittee completed an environmental checklist at that time. We made a determination of nonsignificance under SEPA. No one submitted comments during the public comment period.
Public Involvement Actions

Ecology strives to make its decisions transparent and accessible to the people we work for. We encouraged public comment on the proposed permit, and held a 30-day comment period from May 14 through June 15, 2012 (33 days).

For this permit, Ecology carried out the following activities:

1. Notified regional stakeholders via the public involvement calendar prepared for the Hanford Advisory Board’s Public Involvement Committee.
2. Posted, emailed, and mailed a public notice of Application, as required by Washington Administrative Code (WAC) 173-216-090.
4. Sent advance notification to the HanfordInfo email list, which had 818 subscribers then, on March 9, 2012, and to the Water Quality email list, which has about 488 subscribers.
5. Mailed public notice to Hanford’s postal list and emailed it to the HanfordInfo listserv.
7. Published public notice as a legal classified ad in the Tri-City Herald on Thursday, May 17, and Sunday, May 20.
8. Posted comment period on Ecology’s public events online calendar.
9. Sent public notice and disk with the permit and fact sheet to Hanford’s four repositories two reading rooms, and the Richland Public Library.

The public information repositories located in Richland, Spokane, and Seattle, Washington, and Portland, Oregon, received the following

- Public notice of Application
- Public notice for the permit
- Transmittal letter.
- Statement of Basis for the proposed waste discharge permit.
- Draft state waste discharge permit.

The following public notices for this comment period are in Appendix A of this document:

1. Public notices.
2. Classified advertisement in the Tri-City Herald.
3. Notice sent to the Hanford-Info and Water Quality email lists.
4. Event posted on Ecology Hanford Education & Outreach Facebook page.
Responses to Comments

Ecology accepted comments from May 14 through June 15, 2012. No members of the public requested a meeting. This section lists comments received and our responses, as required by RCW 34.05.325(6)(a)(iii).

March 30, 2012
Alex Amonette

Comment: I received a Public Notice of Application for the Sanitary Sewage Lagoon for Hanford's Central Plateau. Why not use composting toilets? I observe much waste of energy at 200 East. People do not turn off the lights and turn off their computers.

Response: Composting toilets can be a great solution in many applications. However composting toilets would be cost-prohibitive in this case for a number of reasons.

- The Hanford site is projected to have over 10,000 workers throughout the designed service life of the sewage lagoon (for example, the Engineering Report estimates there will be 12,500 personnel on site by 2020). Based on population estimates and past experience, it is expected that about 30,000 gallons of domestic water will be generated per day. An unreasonably massive number of composting toilets would be required to handle the expected flow volumes.

- Composting toilets are, on average, considerably more expensive up front than flush toilet systems.

- Installing composting toilets would require replacing the existing flush toilets and septic systems already in place.

- Composting toilets are typically designed to handle little to no water. However, existing plumbing on site co-mingles water from showers and kitchen sinks with sanitary excreta, generating a mixed, highly liquid, sewage-like effluent that preclude the dry aerobic decomposition process.

As for energy efficiency on site, we thank you for being proactive about energy conservation. We hope you might find our “Enviro-Tips: What you can do” web page (http://www.ecy.wa.gov/news/envirotips/tips_main.htm) helpful. Please feel free to share it with others as a gentle way to encourage those around you to participate in conserving resources.
June 14, 2012
Curt Clement on behalf of the Permittees

Comments: The following comments on the May 2012 Fact Sheet and draft State Waste Discharge Permit Number ST0045514 are from a coordinated review by the United States Department of Energy (DOE), Richland Operations Office (RL), Mission Support Alliance, and affected Hanford Site contractors.

Draft Permit Comments

1. Page 4. We should not have to submit a separate letter confirming we reviewed the Operations and Maintenance Manual. Change the “First Submittal Date” to be “NA-Review of Operations and Maintenance Manual every 365 days. Update, if necessary, within 60 days following review.”

Response: This is standard language required in all State Waste Discharge Permits, including Hanford Permits. The confirmation can be included as a statement in a Discharge Monitoring Report (DMR) cover letter. An electronic confirmation with electronic DMRs is also acceptable. This will be clarified in the permit language.

2. Page 4. The application for permit renewal should be submitted at least sixty days prior to the expiration date of the permit per WAC 173-216-070. Change to read: “At least 60 days prior to expiration of the permit.” Alternatively, the date could be placed in the column once the expiration date is known.

Response: Ecology will change the date of December 2017 to a date of 60 days prior to expiration date of current permit (once effective date is established).

3. Page 5 and following pages. The header is not correct. Change to read “Permit No. ST00045514”

Response: Ecology corrected the headers.

4. Page 5, S1.A. Please make sure the dates June 1 and May 31, 2017 correspond to the effective date and expiration date, respectively.

Response: Ecology will update these dates when the effective date of the permit is established.

5. Page 5 and 6, S1.A and S2.A. The facility is designed as a zero discharge facility with the permit being issued only to accommodate emergency discharges into the waters of the state, which are not expected to occur. There should be no sampling parameters for “discharges” to the basins. (Order No. DE12NWP-001 for air emissions already requires influent wastewater sampling and analysis.)
The proposed parameters for BOD, TSS, and PH are not appropriate and no monitoring frequencies should be set for them. The specific permit limitations placed on the parameters do not appear to have any apparent basis and the suggested sampling locations are not located at a representative discharge point for this type of facility even if a sampling location was relevant (i.e. sampling location and limitations placed on an internal point within a treatment train is inappropriate even for a facility that has a discharge). The limitations do not even reflect concentrations for influent or effluent sewage parameters.

Response: Ecology removed effluent monitoring requirements. However, monitoring will be required in the event of an emergency discharge, as stated in Special Condition S2.A.

6. Page 7, S2.A. For note “b” it should read “quarterly” instead of “monthly.” Change to read “quarterly.”

Response: Ecology changed the footnote to “quarterly.”

7. Page 7, S2.A. For the reasons explained above, footnote “f” should be deleted. Delete the row that begins with “f.”

Response: Ecology removed footnote “f” because it related specifically to monitoring of the effluent. This monitoring requirement has been removed from the permit, so the footnote is no longer applicable.

8. Page 9, S3.A.4.b. For consistence suggest referring to the lagoons as “evaporative” lagoons.

Response: Ecology added the word “evaporative” to describe the lagoons in this section.

9. Page 17, S5.G.a.2. As discussed above, a separate letter to Ecology is unnecessary and the requirement could be clearer. Change to read as follows: Review the O&M Manual at least every 365 days. Update, if necessary, within 60 days following the review.

Response: This is standard language required in all State Waste Discharge Permits, including Hanford Permits. The confirmation can be included as a statement in a Discharge Monitoring Report (DMR) cover letter. An electronic confirmation with electronic DMRs is also acceptable. This will be clarified in the permit language.

10. Page 17, S5.G.a.5. Editorial: Change “this” to “the.”

Response: Ecology made this change.

11. The application for permit renewal should be submitted at least sixty days prior to the expiration of the permit per WAC 173-216-070. Change both “180”s to read “60.”

Response: In accordance with WAC 173-216-070, Ecology changed the submittal dates to 60 days.
12. Page 20, G5. This requirement is unnecessary and not in accordance with WAC 173-240. Any new facility would be subject to the regulations – not this permit. Delete section. If you want to have a requirement for modifications, that would be appropriate, but it should be a specific requirement for modifying the evaporative lagoon with a timeframe of 60 days in accordance with WAC 173-240-030.

**Response:** This section cannot be deleted. However, in accordance with WAC 173-240-300, Ecology changed the timeframe to 60 days.

13. There is no “Section A.” Correct the reference.

**Response:** Ecology made this correction.
List of Commenters

The table below lists the names of organizations or individuals who submitted a comment on the permit for the 200 West Area Evaporative Sewage Lagoon and where you can find Ecology’s response to the comment(s).

<table>
<thead>
<tr>
<th>Commenter</th>
<th>Where the comment is addressed in this summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alex Amonette</td>
<td>Page 4</td>
</tr>
<tr>
<td>Curt Clement</td>
<td>Page 5 – 7</td>
</tr>
</tbody>
</table>
Appendix A: Copies of all public notices

Public notices for this comment period:

1. Public notice of application
2. Public comment period announcement.
3. Classified advertisements in the *Tri-City Herald*.
4. Notices sent to the Hanford-Info email list.
Sanitary Sewage Lagoon for Hanford's Central Plateau

The U.S. Department of Energy (USDOE) has applied for a state waste discharge permit for a new sewage treatment lagoon system in Hanford’s 200 West Area. The permit application is available for your review.

Background
Thousands of employees work in the center of the Hanford Site. Today, the waste from the workers’ bathrooms, kitchens, and showers go to septic tanks. Some is trucked to a lagoon several miles away near the N Reactor, but that lagoon’s service life is ending. The USDOE does not plan to replace the septic tanks. Instead, it is building a new sewer lagoon system for those wastes, closer to where most of the workers are located.

The lagoon treatment system will use a grit chamber and settling lagoons to separate solids from liquids. The sludge and solids will go to Hanford’s permitted disposal trenches in 200 West Area. The system will use an aerated lagoon to biologically treat and remediate the influent. Finally, treated water will be stored in the evaporative lagoons.

Unlike most wastewater treatment plants, the lagoons are not expected to discharge any effluent. Instead, they are designed to evaporate the effluent.

The lagoons are lined and will not discharge to the ground. The discharge permit is to help Ecology regulate the facility’s operation and maintenance, and to ensure we have the facility’s full history, should there ever be an emergency discharge.

The lagoon treatment system will have the following:
- A state waste discharge permit.
- An evaluation under the State Environmental Policy Act (SEPA).
- An air permit.

Publication Number: 12-05-003

WHY IT MATTERS
Though Hanford has many more complex and dangerous wastes to manage, even the sanitary wastes must be managed in a way that protects the environment.

Public Comment Period:
We expect the comment period will be in the Spring of 2012.

Questions? Contact:
Stacy Nichols
3100 Port of Benton Blvd
Richland, WA 99354
hanford@ecy.wa.gov

Document Review Location:
Ecology’s Nuclear Waste Program website
www.ecy.wa.gov/programs/nwp/commentperiods.htm

Special accommodations
You can comment on the SEPA checklist and the water discharge permit when the comment period begins.

The air permit does not require a comment period because the air emissions will be too low to trigger one.

**What's next?**

This is **NOT** a comment period – yet.

When we have prepared a draft permit, we will make it available for public comment. We will provide links to the other decision documents as well.
Sanitary Sewer Lagoon for Hanford’s Central Plateau

Washington’s Department of Ecology invites you to comment on a proposed state waste discharge permit for a new sewage treatment lagoon system in Hanford’s 200 West Area. The draft permit is available for your review.

Background

Thousands of employees work in the center of the Hanford Site. Today, the waste from the workers’ bathrooms, kitchens, and showers goes to septic tanks. Some is trucked to a lagoon several miles away near the N Reactor, but that lagoon’s service life is ending. The permittee, US Department of Energy Richland Operations Office (USDOE) does not plan to replace the septic tanks. Instead, it is building a new sewer lagoon system for those wastes, closer to where most of the workers are located.

The lagoon treatment system will use a grit chamber and settling lagoons to separate solids from liquids. The sludge and solids will go to Hanford’s permitted disposal trenches in the 200 West Area. The system will use an aerated lagoon to biologically treat and remediate the influent. Finally, treated water will be stored in the evaporative lagoons.

Unlike most wastewater treatment plants, the lagoons are not expected to discharge any effluent. Instead, they are designed to evaporate the effluent.

The lagoons are lined and will not discharge to the ground. The discharge permit is to help Ecology regulate the facility’s operation and maintenance, and to ensure we have the facility’s full history, should there ever be an emergency discharge.

USDOE submitted an environmental checklist in July 2011, and we issued a determination of nonsignificance under the State Environmental Policy Act.

Publication Number: 12-05-007

Why it Matters

Though Hanford has many more complex and dangerous wastes to manage, even the sanitary wastes must be managed in a way that protects the environment.

Public Comment Period:
May 14 – June 15, 2012

Questions? Request a Public Hearing? Contact (in writing):
Stacy Nichols
3100 Port of Benton Blvd
Richland, WA 99354
hanford@ecy.wa.gov

Document Review Location:
Ecology’s Nuclear Waste Program website
www.ecy.wa.gov/programs/nwp/commentperiods.htm

Public Information Repositories
(see reverse)

Tips on Effective Commenting?
Visit

Special accommodations

Figure 2. Public notice for Permit page 1 of 2.
Will there be a public hearing? It’s possible. We don’t have one scheduled but if we get requests (see sidebar), we may reconsider.

What’s next? When the comment period closes, we will consider the comments we’ve received and revise the permit if needed. Then we will issue the final permit and responsiveness summary. The permit’s fact sheet describes the appeal process. The permit will be in effect for five years.

Hanford's Public Information Repositories

University of Washington
Suzzallo Library, Govt Publ Dept
Seattle, WA 98195
Hillary Reinert (206) 543-5597
ReinertH@uw.edu

Portland State University
Government Information
Branford Price Millar Library
1875 SW Park Avenue
Portland, OR 97207-1151
Liz Paulus (503) 725-4542
paulus@pdx.edu

Gonzaga University
Foley Center Library
East 502 Boone Ave
Spokane, WA 99258
John S. Spencer (509) 313-6110
spencer@gonzaga.edu

Washington State University
Consolidated Information Center
Room 101L
Richland, WA 99352
Janice Parthree (509) 375-3308
Janice.parthree@pnnl.gov

Department of Ecology
Nuclear Waste Program
Resource Center
3100 Port of Benton Boulevard
Richland, WA 99354
Valarie Peery (509) 372-7915
Valarie.Peery@ecy.wa.gov

Department of Energy
Administrative Record
2440 Stevens Drive, room 1101
Richland, WA 99354
Heather Childers (509) 376-2530
Heather_M_Childers@rl.gov

Figure 2. Public Notice of Permit page 2 of 2.
Washington's Department of Ecology invites you to comment on a proposed waste treatment plant for a new sewage treatment system in Hanford's 100 West Area. The draft permit is available for your review. The public comment period is May 14, 2012, through June 19, 2012. The draft permit is complex, and it is essential you understand the permit to make well-informed comments. The draft permit is available for your review. The public comment period is May 14, 2012, through June 19, 2012.

What is next?

When the comment period closes, officials will review the comments, make any necessary changes, and release the final permit. The public can access the final permit and the permit summary on the website. The website also provides a search for the permit.

The permit will be in effect for five years.

Production Cheek

HNF-55909, Rev 1. | Page | 150

Figure 3. First legal classified ad.
Classified Legals

Washington's Department of Ecology requests your comments on a proposed site waste discharge permit for a new sewage treatment lagoon system in Hanford's 200 West Area. The draft permit is available online and a public comment period is May 14, 2012, through June 18, 2012. Although Hanford has many more complex and dangerous waste to manage, even the sanitary waste must be managed in a way that protects the environment.

Thousands of employees work in the center of the Hanford Site. Today, the waste from the workers’ bathrooms, kitchens, and showers go to septic tanks. Some is trucked to a lagoon several miles away near the boat house, but that site is closing. The permit, due to be issued by the US Department of Energy’s Hanford Operations Office (DOE/DOE) does not plan to replace the septic tanks. Instead, it is building a new sewage lagoon system for those wastes, closer to where most of the workers are located.

The lagoon treatment system will use a grit chamber and settling basins to separate solids from liquids. The solids and solids will go to Hanford’s permitted disposal lagoons in the 200 West Area. The system is designed to protect the groundwater to thoroughly treat and minimize the influent. Finally, treated water will be piped to the evaporative ponds.

Unlike most wastewater treatment plants, the lagoons are not designed to discharge any effluent. Instead, they are designed to evaporate the effluent.

The lagoons are lined and will not discharge to the ground. The discharge permit is to help Ecology regulate the facility’s operation and maintenance, and to ensure we have the facility’s full history, should there ever be an emergency discharge.

USDA submitted an environmental checklist in July 2011, and we issued a determination of non-significance under the State Environmental Policy Act. You can find the proposed permit and supporting documents at the Department of Ecology’s Nisqually Watershed Program website: http://www.wdfw.wa.gov/nisquallywco/nisquallywco.cfm. You can also find the materials of the public information repositories listed below.

Will there be a public hearing?

Public hearings are scheduled but if we receive requests, we may reschedule.

If you have questions, or would like to request a hearing, contact Stacy Nichols at HanfordInfo@yellowriver.com or in writing to 9180 Port of Benton Blvd, Richland, WA 99354.

What’s next?

When the comment period closes, we will consider the comments we’ve received and issue a final permit if needed. We will then issue the final permit and respond to the comments.

The permit will be in effect for five years.
Figure 4. Second legal classified ad.
Brown, Madeleine (ECY)

From: Brown, Madeleine (ECY)
Sent: Thursday, March 08, 2012 3:53 PM
To: hanford-Info@listserv.wa.gov
Subject: Hanford plans a new sewage treatment plant for the Central Plateau

This is a message from Washington’s Department of Ecology

Advance Notice - a comment period will come for this in the Spring!

The U.S. Department of Energy (USDOE) has applied for a state waste discharge permit for a new sewage treatment lagoon in Hanford’s 200 West Area. The permit application will be available for your review. I will send you an email when we post the permit application. Though Hanford has many more complex and dangerous wastes to manage, even the sanitary wastes must be managed in a way that protects the environment.

Unlike most wastewater treatment plants, this lagoon is not expected to discharge any effluent. Instead, it is designed to evaporate the effluent. The lagoons are lined and will not discharge to the ground. The discharge permit is to help Ecology regulate the facility’s operation and maintenance, and to ensure we have the facility’s full history, should there ever be an emergency discharge.

The lagoon treatment system will have the following:
- A state waste discharge permit.
- An evaluation under the State Environmental Policy Act (SEPA).
- An air permit.

This is NOT a comment period – yet. When we have prepared a draft permit, we will make it available for public comment. We will provide links to the other decision documents as well.

Madeleine C. Brown
Washington Department of Ecology
Nuclear Waste Program
Mabr461@ecy.wa.gov
(509) 372-7936

Figure 5. Advance email notification.
Brown, Madeleine (ECY)

From: Brown, Madeleine (ECY)
Sent: Monday, May 14, 2012 4:47 PM
To: hanford-info@listserv.wa.gov
Subject: Comment period starts today!

This is a message from the Washington Department of Ecology.

Comment period starts today!

Washington's Department of Ecology invites you to comment on a proposed state waste discharge permit for a new sewage treatment lagoon system in Hanford's 200 West Area. The draft permit is available for your review. Though Hanford has many more complex and dangerous wastes to manage, even the sanitary wastes must be managed in a way that protects the environment.

Thousands of employees work in the center of the Hanford Site. Today, the waste from the workers' bathrooms, kitchens, and showers goes to septic tanks. Some is trucked to a lagoon several miles away near the N Reactor, but that lagoon's service life is ending. The permittee, US Department of Energy Richland Operations Office (USDOE) does not plan to replace the septic tanks. Instead, it is building a new sewer lagoon system for those wastes, closer to where most of the workers are located.

The lagoon treatment system will use a grit chamber and settling lagoons to separate solids from liquids. The sludge and solids will go to Hanford's permitted disposal trenches in the 200 West Area. The system will use an aerated lagoon to biologically treat and remediate the influent. Finally, treated water will be stored in the evaporative lagoons.

Unlike most wastewater treatment plants, the lagoons are not expected to discharge any effluent. Instead, they are designed to evaporate the effluent.

The lagoons are lined and will not discharge to the ground. The discharge permit is to help Ecology regulate the facility's operation and maintenance, and to ensure we have the facility's full history, should there ever be an emergency discharge.

USDOE submitted an environmental checklist in July 2011, and we issued a determination of nonsignificance under the State Environmental Policy Act.

The comment period is May 14 through June 15, 2012. You can review the proposed permit and supporting materials on our website, www.ecy.wa.gov/programs/nwp/commentperiods.htm. You can also find it at the following locations:
Figure 6. Email notification for comment period start page 3 of 3.
Appendix B: Copies of all written comments

From: Alex Amonette <abamonette@gmail.com>  
Sent: Friday, March 30, 2012 6:03 AM  
To: Hanford@ecy.wa.gov  
Subject: Sanitary Sewage Lagoon  
Follow Up Flag: Follow up  
Flag Status: Completed  

To Whom It May Concern:  

I received a Public Notice of Application for the Sanitary Sewage Lagoon for Hanford's Central Plateau. Why not use composting toilets? I observe much waste of energy at 200 East. People do not turn off the lights and turn off their computers.  

Thank you.  

Sincerely,  
Alex Amonette  
Richland, WA

From: Hanford (ECY)  
Sent: Thursday, June 14, 2012 3:24 PM  
To: Palomarez, Adam (ECY); Holmes, Erika (ECY); Bohrmann, Dieter (ECY)  
Subject: FW: 200 West Evaporative Sewer Lagoon  
Attachments: comments on draft ST0045514final (Recovered).docx  

From: Clement, Curt J  
Sent: Thursday, June 14, 2012 3:23:58 PM (UTC-08:00) Pacific Time (US & Canada)  
To: Hanford (ECY)  
Cc: Rasmussen, James; Jackson, Dale E; Well, Stephen R; Hahn, Sheila; Beam, Thomas G  
Subject: 200 West Evaporative Sewer Lagoon  

Ms. Nichols:  

Attached for your consideration are comments on Ecology's Draft State Waste Discharge Permit ST0045514 (200 West Area Evaporative Sewer Lagoon). Mission Support Alliance (MSA) is submitting these comments in cooperation with the U.S. Department of Energy (DOE).  

We look forward to receiving Ecology's responses to our comments. If you have questions or would like to discuss any of them further, please contact me at 509-376-6223 or via email at curt_j_clement@rl.gov. Thanks.  

Sincerely,  
Curt Clement  
MSA Environmental Integration  

PS. Reply confirmation of your receipt of these comments to meet Ecology's 06/15/2012 deadline would be much appreciated. Thanks.
## Hanford Site Comments—Draft State Waste Discharge Permit Number ST0045514

<table>
<thead>
<tr>
<th>Comment Number</th>
<th>Section/Citation</th>
<th>Comment</th>
<th>Recommended Action(s)/Requested Change(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanford-01</td>
<td>Page 4</td>
<td>We should not have to submit a separate letter confirming we reviewed the Operations and Maintenance Manual.</td>
<td>Change the “First Submittal Date” to be “NA-Review of Operations and Maintenance Manual every 365 days. Update, if necessary, within 60 days following review.”</td>
</tr>
<tr>
<td>Hanford-02</td>
<td>Page 4</td>
<td>The application for permit renewal should be submitted at least sixty days prior to the expiration of the permit per WAC 173-216-070.</td>
<td>Change to read: “At least 60 days prior to expiration of the permit.” Alternatively, the date could be placed in the column once the expiration date is known.</td>
</tr>
<tr>
<td>Hanford-03</td>
<td>Page 5 and following pages.</td>
<td>The header is not correct.</td>
<td>Change to read: “Permit No. ST0045514.”</td>
</tr>
<tr>
<td>Hanford-04</td>
<td>Page 5, S1.A</td>
<td>Please make sure the dates June 1, 2012 and May 31, 2017 correspond to the effective date and expiration date, respectively.</td>
<td>Delete parameters and any sampling requirements.</td>
</tr>
<tr>
<td>Hanford-05</td>
<td>Page 5 and 6, S1.A and S2.A</td>
<td>The facility is designed as a zero discharge facility with the permit being issued only to accommodate emergency discharges into the waters of the state, which are not expected to occur. There should be no sampling parameters for “discharges” to the basins. (Order No. DE12NWP-001 for air emissions already requires influent wastewater sampling and analysis.) The proposed parameters for BOD, TSS, and pH are not appropriate and no monitoring frequencies should be set for them. The specific permit limitations placed on the parameters do not appear to have any apparent basis and the suggested sampling locations are not located at a representative discharge point for this type of facility even if a sampling location was relevant (i.e. sampling location and limitations placed on an internal point within a treatment train is inappropriate even for a facility that has a discharge). The limitations do not even reflect concentrations for influent or effluent sewage parameters.</td>
<td>For the reasons explained above, footnote “F” should be deleted.</td>
</tr>
<tr>
<td>Hanford-06</td>
<td>Page 7, S2.A</td>
<td>For note “b” it should read “quarterly” instead of “monthly.”</td>
<td>Change to read “quarterly.”</td>
</tr>
<tr>
<td>Hanford-07</td>
<td>Page 7, S2.A</td>
<td>Delete the row that begins with “F.”</td>
<td></td>
</tr>
</tbody>
</table>

May 2012
## Hanford Site Comments—Draft State Waste Discharge Permit Number ST0045514

<table>
<thead>
<tr>
<th>Comment Number</th>
<th>Section/Citation</th>
<th>Comment</th>
<th>Recommended Action(s)/Requested Change(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hanford-08</td>
<td>Page 9, S3.A.4.b</td>
<td>For consistency suggest referring to the lagoons as “evaporative” lagoons.</td>
<td>Change to read: Submit the measured sludge depth in the evaporative lagoons no later than May 31, 2017.</td>
</tr>
<tr>
<td>Hanford-09</td>
<td>Page 17, S5.G.a.2</td>
<td>As discussed above, a separate letter to Ecology is unnecessary and the requirement could be clearer.</td>
<td>Suggest changing to read as follows: Review the O&amp;M Manual at least annually every 365 days and confirm this review by letter to Ecology by September 1 of each year. If necessary, within 60 days following the review.</td>
</tr>
<tr>
<td>Hanford-10</td>
<td>Page 17, S5.G.a.5</td>
<td>The application for permit renewal should be submitted at least sixty days prior to the expiration of the permit per WAC 173-216-070.</td>
<td>Editorial: Change “this” to “the.”</td>
</tr>
<tr>
<td>Hanford-11</td>
<td>Page 18, S7</td>
<td>This requirement is unnecessary and not in accordance with WAC 173-240. Any new facility would be subject to the regulations—not this permit.</td>
<td>Change both “180”s to read “60.”</td>
</tr>
<tr>
<td>Hanford-12</td>
<td>Page 20, G5</td>
<td>This requirement is unnecessary and not in accordance with WAC 173-240. Any new facility would be subject to the regulations—not this permit.</td>
<td>Delete section. If you want to have a requirement for modifications, that would be appropriate, but it should be a specific requirement for modifying the evaporative lagoon with a timeframe of 60 days in accordance with WAC 173-240-020.</td>
</tr>
<tr>
<td>Hanford-13</td>
<td>Page 20, G7.3</td>
<td>There is no “Section A.”</td>
<td>Correct the reference.</td>
</tr>
</tbody>
</table>

May 2012
Appendix F

Standard Lift Station
Appendix G

Technical Memorandum
Hydrogen Sulfide
Appendix G
Technical Memorandum

DATE: August 25, 2016
TO: Mission Support Alliance Support (MSA)
CC:
FROM: Brett M Converse, Ph. D.
SUBJECT: Hydrogen Sulfide

**Force Main Odor Potential and Odor Mitigation Strategies**

The potential for malodorous emissions from the long force main discharge location due to hydrogen sulfide (H\_2S) production and release is evaluated below as well as alternatives to mitigate odor. The main conditions needed for H\_2S production in wastewater collection systems are:

1. Anaerobic (absence of preferred electron acceptors), and a
2. Readily available “food” (source of carbon)
3. Sulfate (SO\_4^-2)

The force main is approximately 19,200 feet long and will hold about 28,200 gallons of wastewater. The force main’s hydraulic detention time will be about 14 hours between Monday at 6 a.m. and Thursday at 4 p.m. and 90 hours between Thursday at 4 p.m. and Monday at 6 a.m. Due to the long detention time in the forcemain, hydrogen sulfide (H\_2S) production is likely, in that:

- Sulfate is available in domestic wastewater. Sulfate concentrations in typical domestic wastewater range between 20 and 50 mg/l which could biologically convert to H\_2S.
- Preferred electron acceptors (NO\_3^-1, O\_2) are consumed early, and
- Domestic wastewater has sufficient soluble carbon to drive metabolism.

Pomeroy’s equation was used to predict the sulfide concentration at the end of the force main assuming unlimited available sulfate in the wastewater (USEPA Design Manual: Odor and Corrosion Control in Sanitary Sewers, EPA/625/1-85/018)^[1].

Pomeroy’s Equation:

\[
S_2 = S_1 + M \times t \times \left[ EBOD \left(\frac{4}{d} + 1.57\right) \right]
\]

- \(S_1\) = Sulfide Concentration at time \(t_1\), mg/l
- \(t\) = \(t_2-t_1\), hr
- \(d\) = pipe diameter
- \(M\) = sulfide flux coefficient for filled pipes, m/hr, 3X10^{-4}
- \(EBOD\) = Effective BOD = BOD\_5 * 1.07^{(T-20)}
Appendix G
Technical Memorandum

The predicted sulfide concentration, as calculated using Pomeroy’s Equation is:

- 172 mg/l for the weekend low flow scenario
- 35 mg/l for the weekday higher flow scenario

However, the potential sulfide production from domestic wastewater, with a sulfate concentration of 50 mg/l, would only be about 18 mg/l of \( \text{H}_2\text{S} \) as calculated in the following equation:

\[
\text{SO}_4^{2-} + 2\text{C} + 2\text{H}_2\text{O} \rightarrow 2\text{HCO}_3^{-} + \text{H}_2\text{S}
\]

\[
\frac{50 \text{ mg}}{96 \text{ mmol}} = 0.52 \text{ mmoles of Sulfate}
\]

\[
0.52 \text{ mmoles of hydrogen sulfide} \times \frac{34 \text{ mg}}{\text{mmole}} = 17.7 \text{ mg}
\]

Therefore, the production of hydrogen sulfide is limited to 18 mg/l of \( \text{H}_2\text{S} \) production by the available sulfate concentration in the domestic wastewater.

Upon exiting the force main, dissolved \( \text{H}_2\text{S} \) will transfer from the liquid phase to the atmosphere and thereby cause a potential for an odorous emission near the force main discharge. The rate and extent of mass transfer is a function of several coefficients. Since a few primary variables cannot be adequately estimated (turbulence and headspace concentration), a calculation was done to estimate emissions as if all of the available hydrogen sulfide was released in the discharge manhole.

If the effluent pH was near neutral, about half of the dissolved hydrogen sulfide would be in the volatile (gas) form which would allow about 9 mg/l from the liquid phase to escape to atmosphere. Under the weekend low flow scenario of about 9,820 gallons per day, about 0.15 pounds per day of \( \text{H}_2\text{S} \) would escape from the liquid phase. Under the weekday flow scenario of about 66,250 gallons per day, about 1.0 pound per day of \( \text{H}_2\text{S} \) would escape from the liquid phase.

Most of the hydrogen sulfide would escape in batches from the discharge manhole as the pump station cycled. Some of the hydrogen sulfide could also escape from the lagoon after the effluent enters the lagoon. There are several options available to manage atmospheric discharges of hydrogen sulfide; however, only a few are well suited for this application including:

- Dilution by natural atmosphere ventilation
- Dilution to threshold concentration by mechanical ventilation
- Capture hydrogen sulfide using granular activated carbon

**Dilution by Natural Atmosphere Ventilation**
If the threshold concentration for \( \text{H}_2\text{S} \) was set at 10 ppm near the discharge (maximum concentration for an 8 hour work shift), it would take 1.2 million cubic feet of air to dilute 1 pound of \( \text{H}_2\text{S} \) to the threshold concentration which could be done if the wind was blowing more than 0.13 feet per second. It is likely that atmospheric dispersion could keep local \( \text{H}_2\text{S} \) concentrations below 10 ppm over a long term average; however, there may be times when odor is evident.

**Dilution to Threshold Concentration by Mechanical Ventilation**
Mechanical ventilation could quickly and reliably reduce \( \text{H}_2\text{S} \) concentration under 10 ppm by pulling fresh air through the headspace foul air environment and discharging that foul air through a “flagpole” type stack (at about 820 ft³/min). Additionally, this alternative allows the threshold concentration to be reduced simply by increasing the flow of purge air.
Appendix G
Technical Memorandum

**Capture Hydrogen Sulfide using Granular Activated Carbon**

Granular Activated Carbon (GAC) adsorbs hydrogen sulfide and can be used to remove hydrogen sulfide from air by forcing the foul air through a vessel containing GAC. In this installation, the discharge manhole will be sealed and foul air will be forced through GAC vessel as the water elevation rises when the pumps turn on. When the water elevation drops after the pumps turn off, a vacuum brake will allow fresh air into the manhole. The weekday scenario produces more H\textsubscript{2}S and will therefore consume more GAC. A typical 200 pound GAC vessel can remove about 30 pounds of H\textsubscript{2}S; therefore, the GAC vessel will have to be replaced about once a month. Proprietary GAC products that claim to double the removal volume and/or larger carbon vessels are available and may prove more cost effective.

Under an estimated maximum H\textsubscript{2}S production and release scenario discussed above, there is a reasonable chance that atmospheric dilution could effectively negate any concern associated with odor near the discharge manhole; therefore, it is recommended that the system be constructed and evaluated for odor issues after construction. If odor is an issue that needs to be managed, the following options should be considered:

1. Measure the actual H\textsubscript{2}S concentration needing managed and estimate the lifecycle cost of using GAC. This option can be quickly employed.

2. A mechanical blower with a variable flow rate between 1000 and 4000 ft\textsuperscript{3}/m could be rented and used to purge the discharge manhole. The rate should be adjusted down until the desired threshold concentration is reached or odor is not an issue. Installing a blower with the proper capacity could then be priced.

3. If the GAC and mechanical blower are not cost effective or desirable solutions, other options could be considered and evaluated more accurately after the system is operational. Typical options to manage force main odor are (not inclusive):
   a. Contain and collect the foul air and treat it in a biofilter.
   b. Inject a chemical (hydrogen peroxide, oxygen, or chlorine) into the force main upstream of the discharge to oxidize H\textsubscript{2}S.
   c. Inject a chemical (iron salt) into the force main upstream of the discharge to precipitate the sulfide.

References:

Appendix H

Ecology Review Comments
## Appendix H

### Ecology Comments

**WAC 173-240-050 Checklist**

<table>
<thead>
<tr>
<th>Text from WAC 173-240-050</th>
<th>Location in General Sewer Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>050(3) Minimum Information Required</strong></td>
<td></td>
</tr>
<tr>
<td>The general sewer plan shall include the following information, together with any other relevant data as requested by the department:</td>
<td></td>
</tr>
<tr>
<td>(a) The purpose and need for the proposed plan.</td>
<td>See Section 1.1</td>
</tr>
<tr>
<td>(b) A discussion of who will own, operate, and maintain the systems.</td>
<td>See Section 1.1</td>
</tr>
<tr>
<td>(c) The existing and proposed service boundaries.</td>
<td>See Sections 2.1 and 2.2.</td>
</tr>
<tr>
<td>(d) Layout map including the following:</td>
<td></td>
</tr>
<tr>
<td>(i) Boundaries. The boundary lines of the municipality or special district to be sewered, including a vicinity map;</td>
<td>See Figures 2.1 and 2.2.</td>
</tr>
<tr>
<td>(ii) Existing sewers. The location, size, slope, capacity, direction of flow of all existing trunk sewers, and the boundaries of the areas served by each;</td>
<td>See Figures 1.3 and 2.3.</td>
</tr>
<tr>
<td>(iii) Proposed sewers. The location, size, slope, capacity, direction of flow of all proposed trunk sewers, and the boundaries of the areas to be served by each;</td>
<td>See Figure 6.1.</td>
</tr>
<tr>
<td>(iv) Existing and proposed pump stations and force mains. The location of all existing and proposed pumping stations and force mains, designated to distinguish between those existing and proposed;</td>
<td>See Figure 6.1.</td>
</tr>
<tr>
<td>(v) Topography and elevations. Topography showing pertinent ground elevations and surface drainage must be included, as well as proposed and existing streets;</td>
<td>See Figures 5.1 and 6.1.</td>
</tr>
<tr>
<td>(vi) Streams, lakes, and other bodies of water. The location and direction of flow of major streams, the high and low elevations of water surfaces at sewer outlets, and controlled overflows, if any. All existing and potential discharge locations should be noted; and</td>
<td>See Figure 2.1.</td>
</tr>
<tr>
<td>(vii) Water systems. The location of wells or other sources of water supply, water storage reservoirs and treatment plants, and water transmission facilities.</td>
<td>See Figure 2.3.</td>
</tr>
<tr>
<td>(e) The population trend as indicated by available records, and the estimated future population for the stated design period. Briefly describe the method used to determine future population trends and the concurrence of any applicable local or regional planning agencies.</td>
<td>See Section 2.5.</td>
</tr>
</tbody>
</table>
## Appendix H

### Ecology Comments

**WAC 173-240-050 Checklist**

<p>| (f) | Any existing domestic or industrial wastewater facilities within twenty miles of the general plan area and within the same topographical drainage basin containing the general plan area. | See Section 2.6. |
| (g) | A discussion of any infiltration and inflow problems and a discussion of actions that will alleviate these problems in the future. | See Section 3.4. |
| (h) | A statement regarding provisions for treatment and discussion of the adequacy of the treatment. | See Chapter 4. |
| (i) | List of all establishments producing industrial wastewater, the quantity of wastewater and periods of production, and the character of the industrial wastewater insofar as it may affect the sewer system or treatment plant. Consideration must be given to future industrial expansion. | See Chapter 3. |
| (j) | Discussion of the location of all existing private and public wells, or other sources of water supply, and distribution structures as they are related to both existing and proposed domestic wastewater treatment facilities. | See Section 2.4. |
| (k) | Discussion of the various alternatives evaluated, and a determination of the alternative chosen, if applicable. | See Section 5.1 and 5.2. |
| (l) | A discussion, including a table, that shows the cost per service in terms of both debt service and operation and maintenance costs, of all facilities (existing and proposed) during the planning period. | Not applicable. |
| (m) | A statement regarding compliance with any adopted water quality management plan under the Federal Water Pollution Control Act as amended. | Not applicable. There are no known applicable adopted CWA Water Quality Management Plans for the areas included in this General Sewer Plan. |
| (n) | A statement regarding compliance with the State Environmental Policy Act (SEPA) and the National Environmental Policy Act (NEPA), if applicable. | See Chapter 6. |</p>
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Comment or Question</th>
<th>Modification Needed</th>
<th>Basis/Justification</th>
<th>Permittee Response</th>
<th>Ecology Response</th>
<th>Open/Close</th>
<th>Reviewer Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General Comment</td>
<td>Washington Administrative Code (WAC) 173-240-050(3)(b) is not directly answered. The text needs to be specific on who is performing this function. If it is MSA, then a contract change will require updating if/when a contractor change occurs. Assigning all 3 functions to the Department of Energy (DOE) with acknowledgment that contractors could be responsible for day-to-day operations under DOE’s oversight would be acceptable.</td>
<td>Need to specifically answer the requirements of WAC 173-240-050(3)(b).</td>
<td>WAC 173-240-050(3)(b)</td>
<td>See Section 1.1, Page 12, Para. 1, 4th sentence. Per Comment, the text has been revised to indicate that DOE will own, operate, and maintain the system. However, contractors could be responsible for day-to-day operations under DOE oversight.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2.      | General Comment     | This document does not identify or describe how the project would address Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste sites that sewer lift station and/or pipelines would impact. These include: Main Lift Station (LS) Pipeline intersects with 4 waste sites in the 200-EA-1 OU (216-B-2-1, 216-B-2-2, 216-B-2-3, and 216-B-63) Pipeline to the 2607-E10 Lift Station intersects with the 216-A-29 ditch (200-EA-1) The new lift station, 2607-E12, could impact the 2607-E12 septic tank and drainfield Pipeline between 2607-E6 and 2607-E12 intersects with 3 unplanned release waste sites. (UPR-200-E-10, UPR-200-E-12, UPR-200-E-20.) Please consult with the project managers for the operable units where there are waste sites that intersect the proposed pipelines and lift stations. The impacted operable units are 200-EA-1 and 200-OA-1. To prevent the spread of contamination from these waste sites during sewer system construction. This spread of contamination would impact human health, the environment and workers. | CHPRC and the appropriate operable unit managers have been consulted regarding waste site interferes and crossings. The following will be added to section 1.1 Background – “The planned sewer collection system summarized in this General Sewer Plan is in support of the Hanford Site cleanup mission. Because there are a large number of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste sites within the 200 East Area, the planned sewer collection system will cross a variety of these waste sites. Excavation materials will be appropriately managed during the construction of the sewer collection system. | \ | \ | }
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Pg. #</th>
<th>Comment or Question</th>
<th>Modification Needed</th>
<th>Basis/Justification</th>
<th>Permitee Response</th>
<th>Ecology Response</th>
<th>Open/CLOSE</th>
<th>Reviewer Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.</td>
<td></td>
<td>General Comment</td>
<td>The document does not specifically state that the pipelines will be constructed to reduce or eliminate leaks from the pipelines.</td>
<td>Add section or appendix that would state the design specifications for the pipelines to minimize/eliminate leakage.</td>
<td>Soil contamination in the 200 Area is quite extensive and leakage from these pipelines could drive this soil contamination deeper into the vadose zone creating a much more expensive cleanup.</td>
<td>The sewer pipe joints are designed to maintain a seal. In addition to the extent feasible sewer manholes and sewage lift stations have been placed outside of waste site boundaries to reduce waste site interferences and impacts. It should be noted that the planned sewer network will eliminate the release of over 9 million gallons of treated wastewater per year to the 200 East Area vadose zone through the applicable drain fields.</td>
<td>The following will be added to Section 5.1 Introduction – “The conceptual plan was developed to use as much existing sewer infrastructure as possible and to minimize potential interferences with existing infrastructure and waste sites.” The following will be added – “Section 5.6 Pipe Joints and Locations of Manholes and Lift Stations – To limit potential impacts associated with waste site crossings, new sewers will have gasket joints or heat fused joints designed to maintain a seal. All piping will be subject to pressure or exfiltration testing prior to acceptance for use. To the extent feasible new manholes and lift stations are located outside of known waste site boundaries to minimize waste site interferences and impacts.”</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>General Comment</td>
<td>The document does not contain page numbers that align with the table of contents.</td>
<td>Please insert page numbers, or renumber the Table of Contents to be consistent with the numbering at the top of the pages.</td>
<td>It is difficult for the reader to locate topics listed in the Table of Contents without page numbers.</td>
<td>The Table of Contents has been renumbered.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Pg. 2</td>
<td>General Comment</td>
<td>The General Sewer Plan (GSP) must be prepared under the supervision of a professional engineer licensed in the state of Washington and shall bear the engineer’s seal and signature. The seal is not signed.</td>
<td>Submit final document that has been sealed and signed. Include Professional Engineer signature on final submittal of the GSP.</td>
<td>WAC 196-23-070 WAC 196-33-500 Guidance document #98-37 Section G1-3.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Pg. 12, figure ES-1</td>
<td>The planning boundary presented in the figure covers the 200E area, but doesn’t connect to the 200W Sewage lagoon. It is assumed that a main will be used to take 200E sewage to the lagoon. As such, shouldn’t the location of that line and the lagoon be part of the planning boundary?</td>
<td>Recommend that a complete planning boundary from collection to treatment be used.</td>
<td>WAC 173-240-050(3)(d)(i) and then subparts.</td>
<td></td>
<td>The planning boundary in figure ES-1 has been modified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Pg. 12, Sec. 1.2.2</td>
<td>Does the “Hanford Site Sewer System Master Plan HNF-6612 Revision 5” include the proposed 200E sanitary sewer system? Revision 5 is not in the Hanford Administrative Record (AR).</td>
<td>See comment.</td>
<td></td>
<td>Yes. The “Hanford Site Sewer System Master Plan HNF-6612 Revision 5” includes the proposed 200E sanitary sewer system. We can provide a copy if requested.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Pg. 13, Sec. 1.3 Last sentence</td>
<td>Appendix G contains a technical memorandum for hydrogen sulfide. Appendix H contains the checklist of criteria for WAC 173-240-050. Revise the last sentence of the Section to correct the reference.</td>
<td>Revise text.</td>
<td></td>
<td>The reference to Appendix G has been updated to reference Appendix H.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 2 of 7
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Pg. # Sec. # Par/Sent.</th>
<th>Comment or Question</th>
<th>Modification Needed</th>
<th>Basis/Justification</th>
<th>Permitee Response</th>
<th>Ecology Response</th>
<th>Open/Close</th>
<th>Reviewer Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.</td>
<td>Pg. 13 Sec. 1.4 Para. 1 Sent. 2-3</td>
<td>“There are 10 active subsurface soil absorption systems (drainfields) which serve the 200E Area of the Hanford Site. In addition, there are 3 permitted holding tanks in 200E.”</td>
<td>Revise text and provide clarifying information.</td>
<td>WAC 173-240-050(3)(d)(i)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure 1-2 appears to show 14 drainfields. Are these drainfields not active? Provide an explanation for the discrepancy between the text and the figure. Provide location, size, slope, capacity, and direction of flow for the drainfields as part of the existing sewer system. Only one storage tank is depicted on Figure 1-2. Where are the other storage tanks? Provide location, size, slope, capacity, and direction of flow for the storage tanks as part of the existing sewer system.</td>
<td></td>
<td></td>
<td>Figure 1-2 incorrectly depicted four inactive drainfields and this figure has been updated. The remaining two storage tanks will remain in service as storage tanks. Figure 1-2 and the text in Section 1.4, Paragraph 1 has been updated for clarification. Note that Sections 1.4.10-1.4.13 have been added to provide description of existing facilities to remain in service.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Pg. 13 Sec. 1.4</td>
<td>Provide slope and size for the existing sewer lines. Provide size and capacity for existing lift stations.</td>
<td>See comment.</td>
<td>WAC 173-240-050(d)(ii)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The slope and size of existing sewer pipes that will remain in service and be utilized as part of the sewer collection system are listed in Appendix C. The remaining existing pipes will be abandoned. Data is not provided on the existing pipes and lift stations that are to be abandoned.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Pg. 13 Sec. 1.4</td>
<td>The system overview should include information on all portions of the existing system.</td>
<td>Provide this information.</td>
<td></td>
<td>Information on facilities that are to be abandoned is omitted intentionally. Note that Sections 1.4.10-1.4.13 have been added to provide description of existing facilities to remain in service within the planning boundary.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Pg. 15, Figure 1-2</td>
<td>Include the permitted storage tanks with identifiers and identifiers for all drainfields. All identifiers must be consistent with the text.</td>
<td>Update figure as stated in the comment.</td>
<td>WAC 173-240-050(d)(ii)</td>
<td>Figure 1-2 has been updated to identify the storage tanks and drainfields.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Pg. 15, Figure 1-2</td>
<td>Is “Existing Storage Tank” in the figure legend equivalent to “permitted holding tank” text stated in Section 1.4? If so, the location of the existing storage tank on Figure 1-2 is not in the same vicinity as W-519 in Figure 5-2. As depicted in Figure 1-2, it appears that the tank is on a different street and farther away from where the lift station (depicted in Figure 5-2) for the tank will be located.</td>
<td>Identify where the permitted holding tanks are located.</td>
<td>WAC 173-240-050(d)(ii)</td>
<td>Figure 1-2 has been updated to properly identify the storage tanks.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Pg. 16, Sec. 1.4.1, Sent. 1</td>
<td>LOSS is not defined.</td>
<td>Add to acronym list and define the acronym prior to using it in the text. Please review document to verify that all acronyms are first defined before they are used.</td>
<td>Need to understand this acronym.</td>
<td>Added to list of abbreviations. Definition added to text in Section 1.4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Pg. 16, Sec. 1.4.5, Sent. 1</td>
<td>Although OSS is present in the list of commonly used abbreviations, it is not defined within the text before it is used.</td>
<td>Define OSS in the text.</td>
<td>Need to understand this acronym.</td>
<td>Definition added to text in Section 1.4.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Pg. #</td>
<td>Sec. #</td>
<td>Para./Sent.</td>
<td>Comment or Question</td>
<td>Modification Needed</td>
<td>Basis/Justification</td>
<td>Permittee Response</td>
<td>Ecology Response</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>-------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>16.</td>
<td>Pg. 19, Sec. 2.1</td>
<td></td>
<td></td>
<td>Will an updated GSP be used if any work in the 200W area is planned? What about the tie in from East to West? It seems an overlap could exist and create the potential for future 'issues.'</td>
<td>The text delineates between 200W and 200E, but E needs to transit through and into W. Full coverage from E to the lagoon needs to be included in this GSP.</td>
<td></td>
<td>Agreed. The General Sewer Plan figures will be revised to show full coverage from 200 East to the 200 West Lagoon. Yes, the General Sewer Plan will be updated if the 200 West sanitary sewer systems are planned for consolidation to the 200 West Lagoon. Currently the 200 West Area is serviced by on-site septic systems and through truck pumping.</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Pg. 21, Figure 2-2</td>
<td></td>
<td></td>
<td>Hanford roads/routes are depicted in Figure 2-2 but the roads have no names. Include major road names for clarity.</td>
<td>Revise figure.</td>
<td>WAC 173-240-050(3)(d)(v)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Pg. 22, Sec. 2.3</td>
<td></td>
<td></td>
<td>Grammatical error—please correct “general” to “generally.”</td>
<td>See comment.</td>
<td>Grammatical</td>
<td>Corrected as noted.</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Pg. 24, Sec. 2.5</td>
<td></td>
<td></td>
<td>The section does not provide a brief description of the method used to determine future population trends.</td>
<td>Provide a brief description of the method used in the Hanford Site population Projections 2016-2026 report.</td>
<td>WAC 173-240-050(3)(e): “Briefly describe the method used to determine future population…”</td>
<td>The following will be added to section 2.5 following the second sentence of the first paragraph – “The 200E population projections were developed from applicable Hanford Site Contractor and DOE population inquiries and anticipated funding.”</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Pg. 24, Sec. 2.5</td>
<td></td>
<td></td>
<td>WAC 173-240-050(3)(e) requires the estimated future population for the stated design period. No design period is discussed in the GSP. Population projection is provided for years 2016-2026, so it is implied that the design period is until 2026. The 200 West Area sewer lagoon engineering report states a 35 year design period, which would be until 2047. As well, other facilities in 200E will be operating past year 2026.</td>
<td>See comment--the population trend needs to be evaluated for the additional factors. State the design period of the 200 West Area sewer lagoon.</td>
<td>WAC 173-240-050(3)(e)</td>
<td>The following will be added to section 2.5 between the 2nd and 3rd paragraph – “From the 200 West Area Evaporative Sewer Lagoon Engineering Report (HNF-50995) with proper maintenance, the lagoon service design life including the planned sewer network is approximately 35 years. Although population projections for the Hanford Site beyond 10 years have not been developed, the population served by the sanitary sewer system summarized in this document is anticipated to remain relatively consistent throughout the design life.”</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Pg. 24, Sec. 2.5, Para. 2 and 3</td>
<td></td>
<td></td>
<td>Paragraph 2 states that the 200E sewage load is anticipated to grow from 29,359 gpd to 35,679 gpd. Paragraph 3 states that the 2015 average processed rate was 49,738 gpd which is a great increase from what just goes to the lagoon.</td>
<td>State the other sources of wastewater that contributes to the 49,738 gpd number.</td>
<td>Need this additional information to understand the entire system.</td>
<td>The following will be added at the end of the 3rd paragraph – “The 49,738 gallons per day number is based actual measured sewage volumes from 200 East and 200 West septic systems as well as measured volumes trucked to the 200W Treatment Lagoon from sewage holding tanks.”</td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Pg. #</td>
<td>Sec. #</td>
<td>Para./Sent.</td>
<td>Comment or Question</td>
<td>Modification Needed</td>
<td>Basis/Justification</td>
<td>Permitee Response</td>
<td>Ecology Response</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>22.</td>
<td>Pg. 26</td>
<td>Sec. 3.2</td>
<td>Para. 3</td>
<td>Sent. 2</td>
<td>Approximately where are these future facilities to be located? Will they tie in directly to the new gravity pipe leading to the main lift station, as indicated in Figure 5-3?</td>
<td>See comment.</td>
<td>Not all of the future flows will tie in directly to the new gravity pipe. The future flows shown on Figure 5-3 were modeled at this location to conservatively model the new gravity line. The following will be added at the end of paragraph 3 of Section 3.2 - “The WRPS 4th Street Trailer Complex is anticipated to be located north of 4th Street and depending on siting location and additional evaluations would be routed to the new gravity line or possibly the existing 2607-E6 lift station. The WRPS Construction Trailers will be located south of 7th Street and will be routed to the new gravity line. The DFLAW facility will be located between 4th Street and Canton Avenue and based on additional evaluations would be routed to the new 2607-E12 or 2607-E10 lift stations. Sewage flows from the existing HWVP holding tank will be rerouted to the 6607-11 lift station.”</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Pg. 30</td>
<td>Sec. 4.1</td>
<td></td>
<td>Specify that Ecology is the “Department of Ecology”</td>
<td>The second paragraph states “…is permitted by the Ecology under…” Please reword to include the language in the comment column.</td>
<td>Corrected as noted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Pg. 30</td>
<td>Sec. 4.1</td>
<td>Para. 1</td>
<td>Sent. 1</td>
<td>This sentence states that the lagoon has a National Pollutant Discharge Elimination System (NPDES) Permit. This is not correct. It has a State Waste Discharge Permit (SWDP) under the WAC 216 regulations. NPDES is only for direct discharge to waterways of the US.</td>
<td>Add the correct permitting information.</td>
<td>Correct permit needs to be in this master plan.</td>
<td>Corrected as noted.</td>
</tr>
<tr>
<td>25.</td>
<td>Pg. 31</td>
<td>Sec. 4.2</td>
<td></td>
<td>Change the title and the verbiage to reflect that the sewage treatment facility has a SWDP and not a NPDES Permit.</td>
<td>Add the correct permitting information.</td>
<td>Correct permit needs to be in this master plan.</td>
<td>Corrected as noted.</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Pg. 34</td>
<td>Sec. 5.1</td>
<td></td>
<td>The last sentence of the section contains a typo.</td>
<td>Correct “them” to “then.”</td>
<td>Grammatical</td>
<td>Corrected as noted.</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Pg. 35</td>
<td>Figure 5-1</td>
<td></td>
<td>Is the Y-axis in feet amsl? Include elevation label on figure and the datum used.</td>
<td>Revise figure.</td>
<td>A note has been added to Figure 5-1 to clarify that the y-axis is indeed feet of elevation and the datum used is NAVD 88.</td>
<td></td>
<td>Figure 5-2 is correct. Figure 5-1 has been updated.</td>
</tr>
<tr>
<td>28.</td>
<td>Pg. 35</td>
<td>Figure 5-1</td>
<td></td>
<td>2607-EP and 2607-E1A are shown as connecting first before connecting to 2607-E1 in Figure 5-2, whereas Figure 5-1 shows them connecting to 2607-E1 independently. Which is correct?</td>
<td>Revise figure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Pg. 36</td>
<td>Figure 5-2</td>
<td></td>
<td>Here is a drawing showing the main LS outside of the plan area. It is colored purple indicating it is a ‘new’ force main. The issue is that it is outside of the plan area and isn’t addressed. How is this line planned on being installed if it isn’t part of this GSP?</td>
<td>Make this GSP cover collection to treatment.</td>
<td>The entire forcemain is intended to be part of this GSP. Figure 5-2 has been updated to include the entire pipeline and planning area boundary.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Pg. #</td>
<td>Sec. #</td>
<td>Para./Sent.</td>
<td>Comment or Question</td>
<td>Modification Needed</td>
<td>Basis/Justification</td>
<td>Permittee Response</td>
<td>Ecology Response</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>30.</td>
<td>37</td>
<td>5.3.2.1</td>
<td>1</td>
<td>“LF” is not defined within the text or in the list of acronyms.</td>
<td>Define this acronym prior to using it within the text.</td>
<td>Definition added to text and also added to list if abbreviations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>37</td>
<td>5.3.2.2</td>
<td>Para. 1</td>
<td>“Three existing lift stations are proposed to be utilized in the GSP...” What will be done with the fourth existing lift station that is depicted in Figure 1-2?</td>
<td>Revise text.</td>
<td></td>
<td>The fourth existing lift station will be abandoned as described in Section 5.3.2.2, second sentence.</td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>40</td>
<td>5.4</td>
<td></td>
<td>What model is being used for this analysis? Appendix B and C provide the assumptions and the results, but not what program or basis is being used for the model.</td>
<td>Provide all design inputs and calculations used in the hydraulic model analysis. Also provide the standard design criteria that will be met.</td>
<td>A description of the calculations has been added to Section 5.4, paragraph two. Supporting calculations have also been added to Appendix C. The standard design criteria was for pipes to be a maximum of 50% full (d/D ≤0.5) at design flows. This was added to Section 5.4, paragraph 3, 3rd sentence.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>41</td>
<td>5.5</td>
<td>1</td>
<td>The hydraulic model results in Appendix C do not provide two significant figures for d/D to evaluate the consistency of the figure with the model result.</td>
<td>Revise figure or update Appendix C.</td>
<td></td>
<td>The hydraulic model results in Appendix C have been updated and now include two significant digits on the d/D results.</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>42</td>
<td>5.5</td>
<td>1</td>
<td>Reserve Capacity labeling is incorrect. Many of the pipeline segments have &gt;1.0 cfs reserve capacity based on the hydraulic model results presented in Appendix C.</td>
<td>Revise figure.</td>
<td></td>
<td></td>
<td>Figure 5-5 has been updated.</td>
</tr>
<tr>
<td>35.</td>
<td>43</td>
<td>5.5</td>
<td></td>
<td>What is the difference between a “wetwell” and a “wet well”? Both versions are present within Section 5.</td>
<td>Please correct the text to use the term consistently throughout the document.</td>
<td>Consistency</td>
<td>All instances of “wet well” have been changed to “wetwell”.</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>43</td>
<td>5.5</td>
<td>Para. 1, Sent. 1</td>
<td>The existing lift stations numbered 2607-E3 and 2607-E6 have abandoned septic tanks and leach fields associated with the lift stations.</td>
<td>Please add a statement that the associated septic tank and leach field have been abandoned and will not be used for the updated sewer system.</td>
<td>Clarifying the system and its status.</td>
<td>Statement added to Section 5.5, paragraph 1, third sentence.</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>47</td>
<td>5.5.11</td>
<td></td>
<td>The existing lift station numbered 2607-E12 have abandoned septic tanks and drain fields.</td>
<td>Please add a statement that the associated septic tank and leach field have been abandoned and will not be used for the updated sewer system.</td>
<td>Clarifying the system and its status.</td>
<td>Statement added to Section 5.5, paragraph 1, third sentence.</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>51</td>
<td>5.5</td>
<td></td>
<td>The topography contours on are not legible for the area within the service area. Additionally, the figure does not provide a datum used for the elevation values.</td>
<td>Revise figure.</td>
<td></td>
<td>WAC 173-240-050(3)(d)(v) Figure 6-1 has been updated to included darker contour lines for improved readability. A note regarding the datum has also been added.</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>51</td>
<td>5.5</td>
<td></td>
<td>The figure does not show the surface drainage.</td>
<td>Revise figure.</td>
<td></td>
<td>WAC 173-240-050(3)(d)(v) It is assumed that surface drainage will be apparent with the improved readability of the topographic contours.</td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>51</td>
<td>5.5</td>
<td></td>
<td>The figure does not include the drainfields and tanks that are not proposed to be replaced in the new sewer system. These drainfields and tanks will remain part of the collection system master plan in the service area, even though they are not being connected to the new sewer system.</td>
<td>Revise figure.</td>
<td></td>
<td>Figure 6-1 has been updated to include the two drainfield and two holding tanks that will remain in service in 200E.</td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>Pg. #</td>
<td>Sec. #</td>
<td>Para./Sent.</td>
<td>Comment or Question</td>
<td>Modification Needed</td>
<td>Basis/Justification</td>
<td>Permittee Response</td>
<td>Ecology Response</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>--------</td>
<td>-------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>41.</td>
<td>Pg. 62, Appendix B</td>
<td></td>
<td></td>
<td>The hydraulic model assumption uses a Manning’s “n” of 0.012 regardless of material, size, and age. Ecology guidance states that “an “n” value of 0.013 shall be used in Manning’s formula for the design of all sewer facilities (regardless of pipe material) except inverted siphons…” The hydraulic model must use a Manning’s “n” of 0.013.</td>
<td>Use “n” value of 0.013 and present new results of the hydraulic model.</td>
<td>Guidance document #98-37 Section C1-4.3</td>
<td>All calculations have been revised using a Manning’s “n” of 0.013. Calculations are provided in Appendix C.</td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>Appendix B/C</td>
<td></td>
<td></td>
<td>Appendix B, Parameter: Design Pipe Slope Determination states that the model assumption uses Ten State Standards minimum slopes and the minimum slopes for design pipes of 8” size is 0.40%. Appendix C uses a slope of 0.30% for pipe segment P-10. Which is correct? Additionally, Ecology guidance indicates that the minimum slope should be 0.40% for a sewer size of 8”. Correct the hydraulic model to include a minimum slope of 0.40% for all pipe segments.</td>
<td>Use 0.40% slope for all pipe segments and present new results of the hydraulic model.</td>
<td>Guidance document #98-37 Section C1-4.4 and Table C1-1</td>
<td>The minimum slope for new pipes will be 0.4%. Pipe P-10 is an existing pipe with a slope of 0.3%. The existing pipes have been functioning well and will not be replaced as the hydraulic analysis has determined acceptable capacity. Note that there is only one new pipe that will be constructed (P-27) and the remainder of pipes in Appendix C are existing pipes – the existing slopes for the existing pipes are listed as that was what was used in the hydraulic calculations.</td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>Pg. 68, Appendix D</td>
<td></td>
<td></td>
<td>Nothing is provided in Appendix D, Environmental Documents.</td>
<td>Provide supporting documents for Appendix D, or remove the appendix.</td>
<td></td>
<td>The content from Appendix I has been moved to Appendix D. Appendix I has been deleted.</td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>Pg. 153, Appendix H</td>
<td></td>
<td></td>
<td>Information to satisfy WAC 173-240-050(3)(f) and (m) was not included and no information provided as to why the regulations are not applicable.</td>
<td>Provide information to satisfy WAC 173-240-050(3)(f) and (m). WAC 173-240-050(3)(l) WAC 173-240-050(3)(m)</td>
<td>The following will be added – “Section 2.6 Existing Wastewater Facilities: There are existing non-sanitary sewage wastewater generating and treatment facilities on the Hanford Site, however none of the non-sanitary sewage wastewater is or will be connected to the sanitary sewer system.” The Appendix H table will be modified to refer the reader to Section 2.6 for (l). Also for item (m) additional the following will be added to the Appendix H table – “There are no known applicable adopted CWA Water Quality Management Plans for the areas included in this General Sewer Plan.”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>