Washington Department of Corrections

Statewide Water System Plan

Draft – June 2014

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Acknowledgement

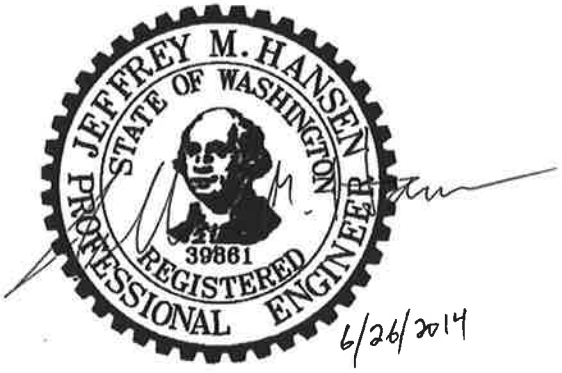
An undertaking of this magnitude is not possible without the efforts of numerous individuals and groups. HDR would like to pay particular tribute to those agencies and individuals listed below:

- Eric Heinitz, Environmental Services Director, Department of Corrections
- Plant Managers and Operators, Department of Corrections Facilities
- Members of the Department of Health and the Department of Ecology

Certificate of Engineer

Department of Corrections
Water System Plan

The material and data contained in this report were prepared under the direction and supervision of the undersigned, whose seal as a professional engineer, licensed to practice in the State of Washington, is affixed below.



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Acronyms

AC	asbestos cement
afy	acre-feet per year
AG	air gap
AHCC	Airway Heights Corrections Center
APWA	American Public Work Association
AVCC	Ahtanum View Corrections Center
BAT	Backflow Assembly Tester
bgs	below ground surface
BTO	Basic Treatment Operator
CBCC	Clallam Bay Corrections Center
CCCC	Cedar Creek Corrections Center
CCR	Consumer Confidence Report
CCS	Cross-connection Control Specialist
CI	cast iron
CIP	capital improvement program
CPU	Clark Public Utilities
CRCC	Coyote Ridge Corrections Center
CWSP	Coordinated Water System Plan
CWSSA	Critical Water Supply Service Area
D/DBP	Disinfectants/Disinfection By-products
DCDA	double check valve detector assembly
DCVA	double check valve assembly
DI	ductile iron
DNR	Washington Department of Natural Resources
DOC	Washington Department of Corrections
DOH	Washington Department of Health
DOT	Washington Department of Transportation/
DSHS	Washington Department of Social and Health Services
Ecology	Washington Department of Ecology
EPA	Environmental Protection Agency
EPS	extended period simulation
ERU	equivalent residential unit
FCV	flow control valve
Gal	gallons
GI	galvanized iron
gpd	gallons per day
gpm	gallons per minute
GUI	groundwater under the influence of surface water
GWR	Groundwater Rule
HAA5	five haloacetic acids
HAZCOM	Chemical hazard communication
HGL	hydraulic grade line
HPC	heterotrophic plate count
IDSE	initial distribution system evaluation
IESWTR	Interim Enhanced Surface Water Treatment Rule
IMU	Intensive Management Unit

IOC	inorganic compound
LCC	Larch Corrections Center
LCR	Lead and Copper Rule
LUST	Leaking Underground Storage Tank
MCC	Monroe Correctional Complex
MCCCW	Mission Creek Corrections Center for Women
MCLG	maximum contaminant level goal
MCL	maximum contaminant level
MDD	maximum day demand
MICC	McNeil Island Corrections Center
MRDL	maximum residual disinfectant level
O&M	operations and maintenance
OCC	Olympic Corrections Center
PHD	peak hour demand
Plan	Water System Plan
PLCCW	Pine Lodge Corrections Center for Women
PNR	Public Notification Rule
PNWS-AWWA	Pacific Northwest Section of the American Water Works Association
PRV	pressure reducing valve
psi	pounds per square inch
PSV	pressure sustaining valve
PUD	Public Utility District
PVBA	pressure vacuum breaker assembly
PVC	polyvinyl chloride
RPBA	reduced pressure backflow assembly
RPDA	reduced pressure detector assembly
SCC	Special Commitment Center
SCCC	Stafford Creek Corrections Center
SCTF	Secure Community Transition Facility
SDWA	Safe Drinking Water Act
SMCL	secondary maximum contaminant level
Standards	Technical Standards and Specifications
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TTHM	total trihalomethane
UPC	Uniform Plumbing Code
VOC	volatile organic compound
WAC	Washington Administrative Code
WCC	Washington Corrections Center
WCCW	Washington Corrections Center for Women
WCP	Watershed Control Program
WDM	Water Distribution Manager
WDS	Water Distribution Specialist
WETRC	Washington Environment Training Center
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program
WSP	Washington State Penitentiary
WTPO	Water Treatment Plant Operator

Part

A

Organization-Wide Information

Section A1
Introduction

This document provides a statewide update to the Washington Department of Corrections (DOC) Water System Plan (Plan). The document provides a summary and compilation of information from previous water system planning efforts, as well as current information regarding water system operation and management.

This section of the Plan provides the purpose of water system planning, both in general and within the context of DOC water systems, a summary overview of DOC water systems, a description of this document's organization, and a discussion of coordination with other planning efforts.

A1.1 Purpose

The purpose of a Water System Plan is to provide a uniform process for water purveyors to:

- Identify present and future needs
- Set forth the means for addressing those needs
- Demonstrate that the system has the operational, technical, managerial, and financial capability to achieve and maintain compliance with all relevant local, state, and federal plans and regulations.

DOC has developed this Plan according to Washington State Department of Health (DOH) regulations under Chapter 246-290 (Group A Public Water Supplies) of the Washington Administrative Code (WAC).

This Plan serves as an update to the 2005 DOC Statewide Water System Plan and Statewide Water System Operations and Maintenance Plan.

As such, this document updates information presented in the prior plan, while also including other elements per DOH Plan requirements.

In addition to fulfilling DOH requirements, this Plan is also intended to be an active planning tool for DOC. As a single reference, it contains readily accessible summary information on those water systems that have their own sources of supply, as well as documentation regarding many other operational components, such as coliform monitoring and wellhead protection plans.

A1.2 Overview of DOC Water Systems

DOC owns and operates 14 facilities that have associated water and sewer systems. Of these, eight are considered by DOH as being Group A Community Public Water Systems. These eight facilities have their own unique public water system identification numbers, and are subject to the water system planning regulations addressing Group A Community systems. Throughout this Plan, this subset of DOC facilities will be referred to as the "focus facilities."

The remaining facilities, which rely on water purchased from local purveyors, are generally not subject to these regulations. Staff at some of these facilities perform limited distribution system water quality testing within the institutions. However, responsibility for the public water

systems serving these facilities is retained by other purveyors. Therefore, these systems are not analyzed in detail within the scope of this Plan.

Table A1-1 provides a list of the 14 DOC institutions. The eight focus facilities, for which detailed system analyses are contained within this Plan, are shown in bold font. Exhibit A1-1 identifies the locations of each facility.

The water systems serving the eight bold facilities in Table A1-1 are owned and operated by DOC.

Table A1-1
DOC Facilities

Facility Name	Location	Public Water System Identification No.	DOH-Regulated?	Source of Supply	Expanding?
Airway Heights Corrections Center (AHCC)	City of Airway Heights	NA	No	City of Airway Heights	No
Cedar Creek Corrections Center (CCCC)	**Thurston County**	**118827**	Yes	Own Wells	Yes
Clallam Bay Corrections Center (CBCC)	Clallam County	NA	No	Clallam County PUD	No
Coyote Ridge Corrections Center (CRCC)	City of Connell	NA	No	City of Connell	Yes
Larch Corrections Center (LCC)	**Clark County**	**06461Y**	Yes	Own Wells	No
Maple Lane Corrections Center (MLCC)	**Thurston County**	**51195**	Yes	Own Wells	Yes
McNeil Island Corrections Center (MICC)	**Pierce County**	**52900E**	Yes	Own Surface Water	No
Mission Creek Corrections Center for Women (MCCCW)	**Mason County**	**55325Y**	Yes	Own Well	Yes
Monroe Correctional Complex (MCC)	City of Monroe	NA	No	City of Monroe	No
Olympic Corrections Center (OCC)	**Jefferson County**	**13560D**	Yes	Own Wells	No
Stafford Creek Corrections Center (SCCC)	City of Aberdeen	NA	No	City of Aberdeen	No
Washington Corrections Center (WCC)	**Mason County**	**93063K**	Yes	Own Wells	No
Washington Corrections Center for Women (WCCW)	**Pierce County**	**69945J**	Yes	Own Wells/City of Gig Harbor	No
Washington State Penitentiary (WSP)	City of Walla Walla	NA	No	City of Walla Walla	Yes

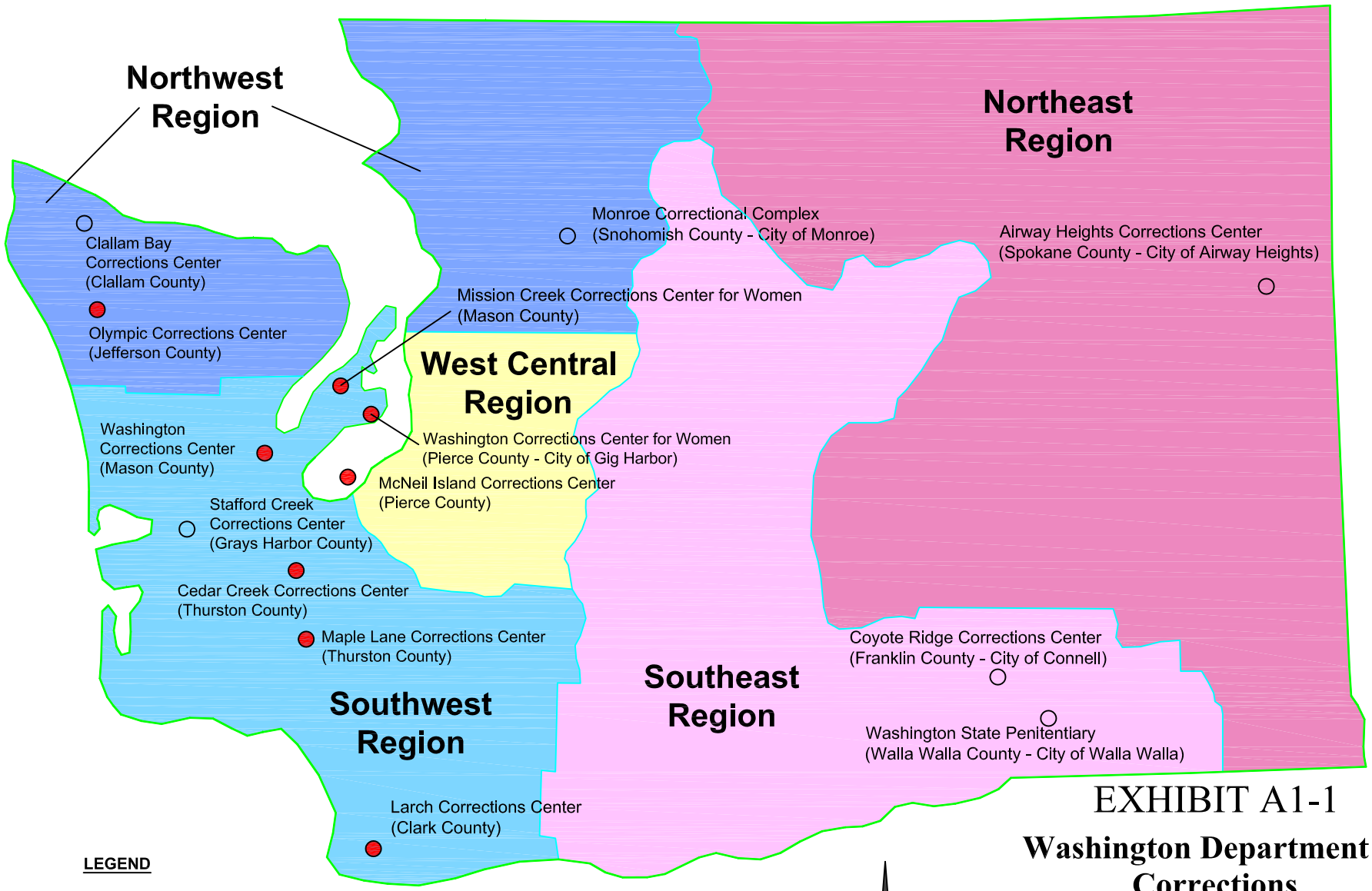


EXHIBIT A1-1

Washington Department of Corrections

Location Map

June 2014

HDR

A1.3 Organization of Report

This Plan addresses the needs of multiple water systems. Therefore, the organization of the document has been prepared in a manner that most efficiently conveys system information. The Plan is organized in the following three volumes:

- ***Part A –*** This "umbrella" portion of the Plan contains general information applicable to all DOC systems. A system capacity summary is provided, followed by a summary of all capital improvements identified in Part B. General program elements related to the operation of all DOC-owned water systems are also provided, including Safe Drinking Water Act requirements applicable to all systems, and DOC's water conservation, operations and maintenance, and cross-connection control programs.
- ***Part B –*** This volume contains system specific information for the eight focus facility water systems highlighted in Table A1-1. Water system analyses are presented, along with determination of regulatory compliance. System specific information regarding general programs (e.g., conservation, cross-connection control) is also provided in Part B.
- ***Part C –*** This volume is composed of appendices that contain system documentation and previous planning efforts that are referenced in Part B. This volume also contains DOC's water system technical standards and specifications, which were previously approved by DOH on January 21, 2005.

By employing this type of document structure, system specific descriptions, analyses, and program elements found in Part B are streamlined, while program elements applicable statewide are consolidated in Part A.

A1.4 Relation to Other Planning Efforts

Consistency with local plans has been an element of DOH drinking water regulations since 1977, as outlined in WAC 246-290-100 (4)(a)(iii). Coordination of water system planning with other local planning efforts was recently emphasized by (the Municipal Water Law – Efficiency Requirements Act (2E2SH1338 Chapter 5 Laws of 2003).

DOC utilizes coordination with city or county planning staff and DOH's *Water System Plan and Small Water System Management Program Consistency Statement Checklist* to ensure consistency between its efforts and those of local planning agencies. DOC has forwarded information regarding its water service areas and population expansions to the applicable county and city planning agencies, and has obtained confirmation of these planning assumptions via completion of Consistency Statement Checklists, which are provided in Part C.

Three of the eight facilities highlighted in Table A1-1 are located in counties where Critical Water Supply Service Areas (CWSSAs) have been defined as being county-wide, and for which Coordinated Water System Plans (CWSPs) have been developed. These three facilities are LCC (in Clark County), MICC (in Pierce County), and OCC (in Jefferson County).

A Plan developed by a purveyor within a CWSSA generally must undergo a review process described within a CWSP (i.e., typically by the county government), in order to determine

conformance with local planning, ordinances, and regulations. For the purpose of this Plan, the coordination process described above with county planning staff, regarding consistency with local planning, represents DOC's local coordination and review efforts. The activities of the LCC, MICC, and OCC water systems described in this Plan have minimal to no impacts upon other water systems and resources within the three CWSSAs mentioned above, as the water systems are not expanding or otherwise modifying their service areas.

Section A2
Summary of System Capacity

Table A2-1 provides a summary of water system limiting factors and the carrying capacities for the eight DOC focus facilities with regard to the water utility. Carrying capacities are presented in terms of both maximum offender populations and equivalent residential units (ERUs). Viewing carrying capacity in terms of offender population is the most functional approach for DOC, as facility expansion planning is conducted based on numbers of offenders to be accommodated. By contrast, DOH typically views carrying capacity in terms of ERUs. Since this is not the most applicable approach for water systems like those operated by DOC, the calculation of ERU carrying capacity must be based on a per-ERU water use assumption. For the purpose of this analysis, one ERU is defined as the average water usage of a typical single-family residence, or approximately 230 gallons per day (gpd), based on assumptions of 100 gpd per person and 2.3 persons per ERU.

For the eight DOC focus facilities, water rights are the limiting water system factor, meaning water rights constrain the amount of water that may be utilized at the facilities. For DOC systems purchasing potable water from other purveyors (not depicted on the table), the limiting water system factor is typically pump station or storage capacity.

This information is provided to aid DOC in facility expansion planning. However, it should be noted that this analysis only considers water utility related factors. Other facility characteristics (e.g., wastewater system capacity, site capacity, etc.) may also pose constraints upon facility expansion.

Table A2-1
Summary of Water System Capacities

Facility	2014 Offender Population [1]	Per-Offender Water Usage (gpd)[2]	Limiting Water System Factor [3]	Carrying Capacity	
				Offender Population [4]	ERUs [5]
CCCC	471	119	Water rights (70 afy)	525	271
LCC	466	121	Water rights (66.1 afy)	487	256
MICC	267	677	Water rights (485.5 afy)	640	1,883
MCCCW	314	63	Water rights (35.3 afy)	500	137
MLCC [6]	0	120	Water rights (96 afy)	712	371
OCC	381	160	Water rights (150 afy)	836	581
WCC	1,678	131	Water rights (268 afy)	1,825	1,039
WCCW [7]	918	93	Water rights (135 afy)	1,294	524

gpm = gallons per minute; gpd = gallons per day; gal = gallons; afy = acre-feet per year

(1) From: DOC Prison Snapshot 2014. The MICC value is the 2014 population associated with the DSHS SCC/SCTF facilities.

(2) Calculated From: Offender population and reported water usage for each facility. The MLCC value is assumed, based on typical usage at other western Washington facilities, since there are no offenders currently housed at this facility.

(3) Water system component that effectively constrains expansion of facility, solely from the perspective of the water utility.

(4) Maximum population the facility's water system can support. For most facilities, this is calculated as the maximum water use supported by the most limiting utility factor, divided by the per-offender water usage.

(5) Maximum Equivalent Residential Units (ERUs) the facility's water system can support. Calculated as the maximum water use supported by the most limiting utility factor divided by 230 gpd/ERU.

(6) Constraints pertain only to DOC-owned facilities. Additional supply may be available from Thurston County's Grand Mound water system, in the event DOC elects to house 946 offenders at this facility in the future.

(7) Constraints pertain only to DOC-owned facilities. Additional supply is available from the City of Gig Harbor in the amount of 80,000 gpd, which translates into an additional offender population capacity of 860.

Section A3
Capital Improvement Program

This section provides a summary of the capital improvement program (CIP) developed for the eight Department of Corrections (DOC) focus facilities. Projects and their costs are presented, followed by a brief discussion of DOC's financial program.

A3.1 Capital Improvement Program

Capital improvement projects have been developed for the eight focus facilities, based upon analyses presented in Part B of this Water System Plan. Details regarding the projects are provided in the respective Part B sections for each facility. Table A3-1 presents a summary of the projects and their costs. Also provided in the table is the primary purpose for each project (i.e., whether it is related to health and safety, operational, or growth needs). A priority ranking of projects is then listed. Those projects given a priority ranking of "1" are of the highest priority and have been provided funding in the 10-year planning period. Projects with a priority ranking of "2" have been identified as important projects, but have not received funding.

In total, the CIP includes approximately $4,870,270 in capital projects planned for implementation over the next ten years (i.e., by 2024) at the eight focus facilities. Of the 19 identified projects, 4 are given a priority rating of "1".

It is noted that this CIP does not include operations and maintenance budgets developed for each institution. The purpose of this CIP is solely to identify larger scale projects for which dedicated funds are required.

A3.2 Financial Program

The implementation of DOC's water system CIP is contingent upon the state budget, which operates on a two-year cycle. Every biennium DOC is provided a new budget with which to fund improvements such as these. DOC will begin including these projects in budget requests. However, it is noted that there is uncertainty every biennium as to what funds DOC will have for these types of project, since the budget is ultimately decided upon by the Legislature and is therefore subject to alterations prior to being approved.

Table A3-1
Summary of DOC Water System Capital Improvement Projects, 2014-2024 (1)

Project Code	Description (2)	Cost	Purpose (3)	Priority Ranking (4)
Cedar Creek Corrections Center				
CCCC-1	Annual Renewal & Replacement	$200,000	OP	2
Subtotal - CCCC		$200,000		
Larch Corrections Center				
LCC-1	Annual Renewal & Replacement	$200,000	OP	2
LCC-2	Reservoir Replacement	$981,277	OP	1
Subtotal - LCC		$1,181,277		
Mission Creek Corrections Center for Women				
MCCCW-1	Annual Renewal & Replacement	$200,000	OP	2
Subtotal-MCCCW		$200,000		
McNeil Island Corrections Center				
MICC-1	Annual Renewal & Replacement	$400,000	OP	2
MICC-2	Updated Distribution System Capital Improvement Plan	$75,000		2
Subtotal-MICC		$475,000		
Olympic Corrections Center				
OCC-1	Annual Renewal & Replacement	$200,000	OP	2
OCC-2	Reservoir Liner	$200,000	OP	2
OCC-3	Well 2 Pump Replacement	$75,000	OP	2
OCC-4	Cross Connection Control Assembly at DNR Facilities	$48,000	H/S	2
OCC-5	Fire Flow Improvements	$10,000	H/S	2
Subtotal-OCC		$533,000		
Washington Corrections Center				
WCC-1	Annual Renewal & Replacement	$300,000	OP	2
WCC-2	System Modifications to Connect to Regional Reclaimed Water System	$150,000	OP	2
WCC-3	Maintenance of 300,000 gallon Reservoir	$502,000	OP	1
WCC-4	Maintenance of 500,000 gallon Reservoir	$440,000	OP	1
WCC-5	Address Water System Leaks	$239,000	OP	1
Subtotal-WCC		$1,631,000		
Washington Corrections Center for Women				
WCCW-1	Annual Renewal & Replacement	$300,000	OP	2
Subtotal-WCCW		$300,000		
Maple Lane Corrections Center				
MLCC-1	Annual Renewal & Replacement	$300,000	OP	2
MLCC-2	Updated Distribution System Hydraulic Evaluation	$50,000	OP	2
Subtotal-MLCC		$350,000		
DOC Total		$4,870,277		

(1) See Part B of the WSP for details regarding each project.
(2) Annual renewal and replacement costs are presented as total costs over the 10-Year planning period, not as annual costs.
(3) H/S = Health/Safety; OP = Operational; G = Growth
(4) "1" = High Priority (and funded), "2" = Moderate Priority (and not yet funded)

Section A4
Water Quality Compliance Requirements

This section provides a review of current Washington Administrative Code (WAC) 246-290 and federal drinking water regulations pursuant to the Safe Drinking Water Act (SDWA). An assessment of regulatory compliance is provided in Part B of this Water System Plan (Plan) for the eight focus facilities.

A4.1 Safe Drinking Water Act and Washington Administrative Code Regulations

The federal regulatory framework directing water quality is the SDWA and its 1986 and 1996 Amendments. The SDWA and Amendments, administered by the U.S. Environmental Protection Agency (EPA), provide the framework for the operation and monitoring of public water supply systems. Washington has incorporated these regulations into state law and the Washington State Department of Health (DOH) has assumed primacy agency responsibility for administering them.

Washington law incorporates the SDWA and its amendments as Chapter 246-290 of the Washington Administrative Code (WAC 246-290). According to WAC 246-290, a Group A community public water system is a system that serves 15 or more residential connections or 25 or more people per day for 60 or more days per year. As Group A public water systems, the eight DOC focus facilities are required to meet drinking water quality regulations and conform to sampling and reporting requirements as described by WAC 246-290.

The DOC facilities are all groundwater supplied systems, with the exception of McNeil Island Corrections Center (MICC), which uses a surface water source. The facilities are responsible for complying with the following regulations:

Water Quality Regulation	Federal Register Citation	WAC Reference
■ Phase I (inorganic chemicals)	50 FR 47155	246-290-300 and 246-290-390
■ Phase II (synthetic organic chemicals)	50 FR 46901	246-290-300 and 246-290-390
■ Phase V (volatile organic chemicals)	50 FR 46901	246-290-300 and 246-290-390
■ Arsenic Rule		246-290-300 and 246-290-310
■ Stage 1 Disinfectant/ Disinfectant Byproduct Rule	63 FR 69390-69476	246-290-390
■ Stage 2 D/DBP Rule	71 FR 388	
■ Long-Term 2 Enhanced Surface Water Treatment Rule	71 FR 654	
■ Lead & Copper Rule	56 FR 26460-26564	246-290-390
■ Radionuclides Rule	65 FR 76708-76753	246-290-300 and 246-290-390
■ Source Water Protection Programs	SDWA Sec. 1428	246-290-135(3) and 246-290-135(4)
■ Consumer Confidence Rule	40 CFR Part 141, Subpart O	246-290-390

■ Public Notification Rule	65 FR 25981	246-290-390
■ Surface Water Treatment Rule	54 FR 27486	246-290-668
■ Total Coliform Rule	54 FR 27544-27568	246-290-300
■ National Secondary Drinking Water Regulations		
■ Groundwater Rule	71 FR 65574	

A4.2 Summary of Effective Source Water Quality Regulations

This section describes the currently effective potable water quality regulations as enforced by the EPA and DOH.

A4.2.1 Phase I, II, and V Regulations

Phases I, II, and V of the federal Primary Drinking Water Regulations set maximum contaminant levels (MCLs) for 15 inorganic compounds (IOCs), 33 synthetic organic compounds (SOCs), and 21 volatile organic compounds (VOCs). WAC 246-290-300 and 246-290-390 defer to the federal rules and require testing based on a vulnerability of occurrence assessment. WAC 246-290-300 stipulates that regulated IOCs, VOCs and SOCs are to be monitored on 12 to 36 month sampling cycles depending on the contaminant. The Primary Drinking Water Regulations apply to all sources that are not classified as emergency sources. Table A4-1 lists regulated contaminants.

Table A4-1
Drinking Water Quality IOC, SOC, and VOC Parameters

Inorganic Contaminants			
Antimony	Arsenic	Asbestos	Barium
Beryllium	Cadmium	Chromium	Cyanide
Fluoride	Mercury	Nickel	Nitrate (as N)
Nitrite (as N)	Selenium	Thallium	
Synthetic Organic Contaminants			
2,4 – D	2,4,5-TP (Silvex)	Alachlor (Lasso)	Aldicarb (Temik)
Aldicarb sulfone	Aldicarb sulfoxide	Atrazine	Benzo(a)pyrene
BHC-gamma (Lindane)	Carbofuran	Chlordane	Dalapon
Dibromochloropropane	Di(ethylhexyl)adipate	Di(2-ethylhexyl)phthalate	Dinoseb
Dioxin	Diquat	Endothall	Endrin
Ethylene dibromide	Glyphosate (Roundup)	Heptachlor	Heptachlor epoxide "B"
Hexachlorocyclopentadiene	Methoxychlor	Oxamyl (Vydate)	Polychlorinated biphenyls (PCBs)
Pentachlorophenol	Picloram	Simazine	Trichloroethylene
Toxaphene			
Volatile Organic Contaminants			
Benzene	Carbon tetrachloride	Chlorobenzene	o-Dichlorobenzene
p-Dichlorobenzene	1,2-dichloroethane	1,1-Dichloroethylene	Cis-1,2-dichloroethylene
Trans-1,2-dichloroethylene	Dichloromethane	1,2-Dichloropropane	Ethylbenzene
Styrene	Tetrachloroethylene	1,2,4-Trichlorobenzene	1,1,1-Trichloroethane
1,1,2-trichloroethane	Trihalomethanes (total)	Toluene	Vinyl chloride
Xylene (total)			

A4.2.2 Radionuclides

The Radionuclides Rule became effective in 1978 and is part of the Primary Drinking Water Regulations. Current radionuclide MCLs include limits for radium-226, radium-228, adjusted gross alpha emitters, gross beta and photon emitters, and uranium.

A4.2.3 Arsenic Rule

The original arsenic MCL of 0.05 mg/L was established as part of the 1975 National Interim Primary Drinking Water Regulations. After years of additional health effects research and cost/benefit analysis, the EPA published the final Arsenic Rule in January 2001 with an effective date of January 2006. The Arsenic Rule revised the arsenic MCL downward to 0.010 mg/L and identified several best available treatment technologies for compliance. As with other primary MCLs, compliance with the new arsenic MCL is based on the running annual average of results collected for each entry point to the distribution system. The rule makes arsenic monitoring requirements consistent with monitoring for other IOCs regulated under the Phase II/V standardized monitoring framework. However, if arsenic is detected above the MCL in any individual sample, the system must increase the frequency of monitoring at that sampling point to quarterly.

A4.2.4 Source Water Protection Programs

The SDWA (Section 1428) established a Wellhead Protection Program (WHPP) to protect groundwaters that contribute to public water systems. DOH has expanded those federal source protection regulations to include all Group A community and non-community water systems, including groundwater, groundwater under the influence of surface water, and filtered and non-filtered surface water sources. Accordingly, DOH has developed regulations that require all Group A water systems that maintain and operate their own sources to implement a WHPP (WAC 246-290-135(3)), or a Watershed Control Program (WCP) (WAC 246-290-135(4)), or any combination thereof, as deemed appropriate by DOH.

Source water protection programs are planning tools to be used by water utilities to identify potential sources of water contamination, and to protect existing and future drinking water supplies. The objective is to minimize risk of accidental releases of contaminants in areas contributing water to the public water supply system. The three basic elements of a source water protection plan are:

- Definition of the area, either a Wellhead Protection Area (WHPA) or a watershed, that directly contributes to a water supply. A WHPA is defined as an area contributing to a source within a specified amount of time
- Inventory of land uses and identification of potential sources of contamination within the WHPA or watershed
- Management strategies including emergency spill response and contingency plans to minimize or eliminate the possibility of potential contamination of the water supply.

A4.2.5 Total Coliform Rule

WAC 246-290-300 coliform monitoring requirements are in conformance with the federal Total Coliform Rule (TCR), and are based upon a detection of coliform in a given distribution system sample. The population served determines the total monthly monitoring requirements for coliform.

For systems that collect fewer than 40 samples per month, no more than one sample per month can be positive for coliform. For systems collecting more than 40 samples per month, no more than five percent of the total number of samples collected in a given month can be coliform positive. All routine monthly samples testing positive for coliform must be followed by repeat sampling and analysis. If coliforms are found, the positive sample must be analyzed for either fecal coliform or *E. coli* within 24 hours.

A4.2.6 Stage I Disinfectants/Disinfection By-Products Rule

Stage I of the Disinfectants/Disinfection By-Products (D/DBP) Rule was promulgated in December 1998 and revised in January 2001. The D/DBP Rule became effective in January 2002 and replaced the former Trihalomethane Rule. The D/DBP Rule sets MCLs for disinfection byproducts including the sum of four trihalomethanes, or total trihalomethanes (TTHMs), the sum of five haloacetic acids (HAA5), chlorite and bromate, and maximum residual disinfectant levels (MRDLs) for disinfectants including chlorine, chloramine, and chlorine dioxide. It also includes monitoring, reporting and public notification requirements for these compounds and sets several Maximum Contaminant Level Goals (MCLGs) for specific DBP species. Table A4-2 summarizes the Stage 1 D/DBP Rule parameters and monitoring requirements for water systems that use both groundwater and surface water sources, and provide chlorine disinfection.

Table A4-2
Stage I D/DBP Monitoring Requirements

Chemicals	MCL or MRDL	Number of Samples	Sample Locations
TTHM	MCL 80 µg/L	4 per quarter per disinfected source.	1 at max. residence time; 3 at average residence time in distribution system.
HAA5	MCL 60 µg/L	Same as TTHM requirement.	At same location as TTHM requirement
Chlorine	MRDL 4.0 mg/L	Same as number of total coliform samples collected monthly	Same location as total coliform samples.

A4.2.7 Stage 2 Disinfection/Disinfection By-Products Rule

The final Stage 2 D/DBP Rule was promulgated on January 4, 2006. The Stage 2 D/DBP Rule has been developed by the EPA to further reduce exposure to DBPs linked to bladder, rectal, and colon cancers. This rule applies to community water and non-transient, non-community water systems that serve drinking water treated with a primary

or secondary disinfectant other than ultraviolet treatment. The Stage 2 Rule does the following:

- Changes the method of calculating DBP regulatory compliance to a locational running annual average of quarterly samples, in which the system calculates a running annual average for each DBP monitoring location instead of calculating a running annual average for the entire system.
- Establishes DBP operational evaluation levels. Systems are to calculate a system-specific operational evaluation level which provides early warning, indicating a system could exceed the MCL within the next year. A system with an operational evaluation level greater than the MCL is required to conduct an operational evaluation, i.e., evaluating their distribution system operations to determine ways to reduce DBP levels. The system is required to notify the State of an operational evaluation level exceedance and submit evaluation results within 90 days of the exceedance. Consecutive systems that purchase drinking water carrying a disinfectant are required to implement Stage 2 DBP requirements on the same schedule as the largest water system in their combined distribution system.
- Re-establishes the location and number of DBP monitoring sites. The rule requires systems to conduct an Initial Distribution System Evaluation (IDSE) to identify areas that have routinely higher DBP concentrations than other areas in the distribution system and use this information to select monitoring locations for long-term Stage 2 D/DBP compliance monitoring. The first step in complying with the Stage 2 D/DBP Rule is conducting an IDSE. Additionally, the final Stage 2 DBP Rule requires systems to determine monitoring requirements based on retail population. The IDSE requirement can be met in four ways:

  1. *Very Small System Waiver* – Systems serving less than 500 customers that qualify for this waiver are exempt from IDSE requirements.

  2. *40/30 Certification* – This approach allows systems to meet the IDSE requirement by certifying that all individual Stage 1 total TTHM and HAA5 compliance monitoring results or equivalent DBP data collected over a specified 2-year period have met the following criteria:

     $$\text{TTHM} \leq 40\ \mu g/L$$
     $$\text{HAA5} \leq 30\ \mu g/L$$

     Systems must submit the required documentation to the primacy agency.

  3. *Standard Monitoring Program (SMP)* – Systems conduct 1 year of monitoring in the distribution system to identify high DBP locations. Systems must submit an SMP plan and IDSE report to the primacy agency as part of the IDSE process.

  4. *System Specific Study (SSS)* -

- SSS Using Existing Monitoring Data - Systems can meet IDSE requirements using existing monitoring data. The EPA has established criteria that the existing data must

meet in order to be used to meet the SSS requirement. Systems must submit an SSS plan and/or IDSE report to the primacy agency as part of the IDSE process.

- SSS Using Hydraulic Model - Systems can meet IDSE requirements using a water distribution system hydraulic model. The EPA has established criteria that the hydraulic model must meet in order to be used for IDSE compliance. Systems must submit an SSS plan and IDSE report to the primacy agency as part of the IDSE process.

Systems that are consecutive systems, purchasing some or all of their water from another system, and systems that sell water wholesale must comply with the Stage 2 Rule on the same schedule based on the largest system in the combined distribution system. A combined distribution system consists of the interconnected wholesale systems and consecutive systems that receive finished water from those wholesale system(s). However, Stage 2 sampling requirements are based on the retail population served by each individual system, not on the combined distribution system.

A4.2.8 Long-Term 2 Enhanced Surface Water Treatment Rule

The Long-Term 2 Enhanced Surface Water Treatment Rule (LT2 Rule) was promulgated in January 2006 and became effective on March 6, 2006. This regulation applies to public water systems using surface water or groundwater under the influence of surface water sources. This rule was developed to protect drinking water consumers from microbiological pathogens, especially Cryptosporidium. Cryptosporidium, which can be found in surface water supplies, is of particular concern because it can cause cryptosporidiosis, a gastrointestinal illness that can have severe impacts on people with weakened immune systems. Additionally, Cryptosporidium is resistant to chlorination.

The rule bolstered prior regulations and provides a higher level of protection of the drinking water supply by:

- Targeting additional Cryptosporidium treatment requirements to higher risk systems
- Requiring provisions to reduce risks from uncovered finished water storage facilities
- Providing provisions to ensure that systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts.

The LT2 Rule establishes the following types of requirements:

- Two distinct rounds of source water monitoring for Cryptosporidium and E. coli
- Profiling and benchmarking requirements
- Treatment technique requirements
- Microbial toolbox for meeting inactivation requirements
- Covering finished water storage facilities
- Sanitary surveys.

Filtered and unfiltered systems must conduct 12 or 24 months of source water monitoring for Cryptosporidium to determine treatment requirements. To reduce monitoring costs,

small filtered water systems will first monitor for E. coli–a bacterium that is less expensive to analyze than Cryptosporidium–and will be monitor for Cryptosporidium only if their E. coli results exceed specified concentration levels. Bigger water systems need to monitor both E. coli and Cryptosporidium.

Treatment: Filtered water systems are classified in one of four treatment categories (bins) based on their monitoring results. Most systems are expected to be classified in the lowest bin and will face no additional requirements. Systems classified in higher bins must provide additional water treatment to further reduce Cryptosporidium levels by 90 to 99.7 percent (1.0 to 2.5-log), depending on the bin. Systems will select from different treatment and management options in a "microbial toolbox" to meet their additional treatment requirements. All unfiltered water systems must provide at least 99 or 99.9 percent (2 or 3-log) inactivation of Cryptosporidium, depending on the results of their monitoring.

Uncovered Finished Water Reservoirs: Systems that store treated water in open reservoirs must either cover the reservoir or treat the reservoir discharge to inactivate 4-log virus, 3-log Giardia lamblia, and 2-log Cryptosporidium. These requirements are necessary to protect against the contamination of water that occurs in open reservoirs.

Disinfection Benchmarking: Systems must review their current level of microbial treatment before making a significant change in their disinfection practice. This review will assist systems in maintaining protection against microbial pathogens as they take steps to reduce the formation of disinfection byproducts under the Stage 2 Disinfection Byproducts Rule, which EPA is finalizing along with the LT2 Rule.

Monitoring starting dates are staggered by system size. The largest systems (serving at least 100,000 people) began monitoring in October 2006 and the smallest systems (serving fewer than 10,000 people) began monitoring in October 2008. After completing monitoring and determining their treatment bin, systems generally have three years to comply with any additional treatment requirements. Systems must conduct a second round of monitoring six years after completing the initial round to determine if source water conditions have changed significantly.

Systems that are consecutive systems, purchasing some or all of their water from another system, and systems that sell water wholesale must comply with the LT2 Rule on the same schedule based on the largest system in the combined distribution system. A combined distribution system consists of the interconnected wholesale systems and consecutive systems that receive finished water from those wholesale system(s).

A4.2.9 Lead and Copper Rule

The Lead and Copper Rule (LCR) requires that public water systems conduct lead and copper monitoring to determine if appropriate corrosion control treatment is implemented as determined by lead and copper levels at customer taps. The LCR monitoring determines optimized corrosion control based on an action level for lead (0.015 mg/L) and copper (1.3 mg/L) as measured at the 90^{th} percentile of all tap samples taken during a

given sampling round. The LCR sets out required actions for systems exceeding the action limits at the 90th percentile, which is calculated as follows:

- Step 1 – The results of all lead samples taken during a given monitoring period are listed in ascending order, from lowest concentration to highest.
- Step 2 – Each sample is given a number, starting with the number 1 for the sample with the lowest concentration.
- Step 3 – The number assigned to the sample with the highest concentration must be equal to the total number of samples taken.
- Step 4 – The total number of samples is multiplied by 0.9.
- Step 5 – The concentration in the numbered sample yielded by the calculation in Step 4 is the 90th percentile level. This is compared to the action limit.
- Step 6 – Follow the above steps for copper samples.
- Note – For water systems collecting less than 10 samples per monitoring period, the 90th percentile is calculated by taking the average of the two highest concentrations.

A4.2.10 Consumer Confidence Reports (CCR) and Public Notification Rule

Under the Consumer Confidence Report (CCR) Rule, promulgated in 1998, community water systems are required to provide an annual CCR on the quality of their drinking water and levels of detected contaminants, if any. The annual report must be supplied to all customers and must include:

- Information on the source of drinking water
- A brief definition of terms
- If regulated contaminants are detected, the MCLG, the MCL, and the level detected
- If an MCL is violated, information on health effects
- If EPA requires it, information on levels of unregulated contaminants.

MICC is the only facility for which CCRs are distributed, as there are residential customers of the water system in addition to offenders and staff. CCRs, and similar materials, are not distributed to offenders.

While the CCR provides annual "state-of-the-water" reports, the Public Notification Rule (PNR) directs utilities in notifying customers of acute violations when they occur. The PNR outlines public notification requirements for violations of MCLs, treatment techniques, testing procedures, monitoring requirements, and violations of a variance or exemption. If violations have the potential for "serious adverse effect," consumers and DOH must be notified within 24 hours of the violation. The notice must explain the violation, potential health effects, corrective actions, and whether consumers need to use an alternate water source. Less serious violations must be reported to consumers within 30 days or in an annual report. Similar to CCRs, communication per PNR requirements is provided to the non-offender residential customers of MICC's water system.

A4.2.11 Surface Water Treatment Rule and Interim Enhanced Surface Water Treatment Rule

The Surface Water Treatment Rule (SWTR) and Interim Enhanced Surface Water Treatment Rule (IESWTR) apply to systems using surface waters and/or groundwater under the influence of surface water (GUI). For the DOC facilities addressed in this Plan, these two rules apply only to MICC. The SWTR and IESWTR include regulations for filtration, disinfection, *Giardia lamblia*, viruses, *Legionella*, heterotrophic bacteria, and turbidity levels of finished water.

The SWTR requires a minimum disinfectant residual of 0.2 mg/L at the point of entry to the distribution system at all times, and a detectable disinfectant residual in 95% of all distribution system samples collected at the same location and frequency as total coliform samples. Samples with a heterotrophic plate count (HPC) of 500 colony forming units per milliliter or less is another accepted measure of detectable disinfectant residual. In addition to these treatment requirements, the SWTR and WAC 246-290-668 require purveyors to develop and implement a DOH-approved source water control program.

The IESTWR, promulgated in 1998, builds on the SWTR. The primary purposes of the IESWTR are (1) to improve control of microbial pathogens in drinking water, particularly for *Cryptosporidium*, and (2) to guard against significant increases in risk that might otherwise occur when systems implement the Stage I D/DBP Rule.

A4.2.12 National Secondary Drinking Water Regulations

The SDWA addresses secondary maximum contaminant levels (SMCLs) for non-health related contaminants that impact the aesthetic quality of water. These SMCLs are not enforceable in terms of providing safe drinking water. Table A4-3 lists the contaminants included under the secondary regulations and the related SMCLs.

Table A4-3
National Secondary Drinking Water Parameters and SMCLs

Parameter	SMCL
Chloride	250 mg/L
Fluoride	4 mg/L
Iron	0.3 mg/L
Manganese	0.05 mg/L
Silver	0.1 mg/L
Sulfate	250 mg/L
Zinc	5 mg/L
Color	15 color units
Conductivity	700 umhos/cm
Hardness	NA
Sodium	NA

A4.2.13 Groundwater Rule

The Groundwater Rule (GWR) was promulgated on November 8, 2006 and became effective in December 2009. It applies to all public water systems that use groundwater, unless the groundwater sources are under the influence of surface water or groundwater and surface water are blended prior to treatment (neither of which applies to the DOC facilities). The GWR contains the following primary elements:

- Sanitary surveys
- Source water monitoring
- Corrective action treatment requirements
- Public notification requirements.

Systems must be in compliance with all requirements except for the sanitary surveys requirement by December 1, 2009. States must conduct the first cycle of sanitary surveys by December 31, 2012. Further details on each primary element are below.

Sanitary Surveys

The GWR requirement for sanitary surveys builds on existing requirements related to the SWTR and related rules. However, the GWR adds requirements for frequency, scope of surveys, survey documentation, and corrective actions. DOH must conduct sanitary surveys every three years, or five years if the system meets specified performance criteria. The sanitary survey must include eight elements:

- Source
- Treatment
- Distribution system
- Finished water storage
- Pumps, pump facilities, and controls
- Monitoring, reporting, and data verification
- System management and operation
- Operator compliance with State requirements.

If DOH identifies a significant deficiency during the course of the sanitary survey, the State must notify the system within 30 days and may specify the appropriate corrective action. The system has 120 days to take the corrective action or develop a State-approved plan for being in compliance.

Source Water Monitoring

Systems which do not provide (and demonstrate via monitoring) 4-log treatment of viruses at groundwater sources may be required to conduct source water monitoring for fecal indicators. The GWR specifies two types of source monitoring: assessment monitoring and triggered monitoring. DOH may require systems to conduct assessment source water monitoring for fecal indicators on a case-by-case basis at each source. Groundwater systems will be required to conduct triggered source water monitoring

within 24 hours of a positive distribution system total coliform sample to determine whether the coliform presence is due to fecal contamination of the source. Triggered monitoring requires systems to collect a source water sample from each groundwater source in use when the positive sample occurred (or at sources requested by DOH).

DOH will determine whether groundwater systems must conduct assessment source water monitoring and will specify the appropriate fecal indictor. The GWR indicates that States could require systems to monitor for E. coli, enterococci, or coliphage.

Corrective Action Treatment Requirements

If it is determined that a system has a significant deficiency, either through the results of a sanitary survey or source water monitoring, the system will be required to implement corrective actions. The GWR specifies that corrective actions are:

- Correct significant deficiencies
- Provide an alternative source of water
- Eliminate the source of contamination
- Provide treatment that reliably achieves at least 4-log treatment of viruses.

Public Notification Requirements

The GWR also establishes requirements for notifying the public according to the type of violation incurred by the groundwater system.

A4.3 Promulgated and Anticipated Regulations

Three new drinking water regulations have been promulgated that will have a direct impact on the DOC. It is important that DOC staff continue to track the development of these regulations. Table A4-4 presents a listing of anticipated regulations applicable to the eight DOC focus facilities, the projected regulatory schedule, and regulated parameters. It is important to note that the monitoring requirements commence from the promulgation date of the rule. The effective date is the date by which water systems must be in full compliance.

Table A4-4
Summary of Anticipated Drinking Water Regulations

	Action	Date	Parameter(s)
Aldicarb	Promulgated Effective	2006 Unknown	Aldicarb Aldicarb sulfoxide Aldicarb sulfone
Radon	Promulgated Effective	2004 Unknown	Radon
Total Coliform Rule (TCR) (Revised)/ Distribution System Rule	Proposed Promulgated Effective	2006 (planned) 2013 2016	Total Coliforms Fecal Coliforms *E. coli*

A4.3.1 Proposed Aldicarb Rule

Final MCLs for the pesticides aldicarb, aldicarb sulfone, and aldicarb sulfoxide have been established under the Phase II Rule for SOCs and IOCs. However, the effective date for these MCLs was postponed when the EPA agreed to reexamine the health effects for the aldicarb compounds. No new effective date has been established.

A4.3.2 Proposed Radon Rule

A proposed Radon Rule was released in October 1999 that provides two options for the maximum level of radon that is allowable in community water supplies. The EPA's radon proposal includes a 300 pCi/L maximum contaminant level for community water systems that use ground water, or an alternative, less-stringent MCL of 4,000 pCi/L water systems can comply with if they or their state implements an EPA-approved program to reduce radon risks in household indoor-air as well as tap water. The drinking water standard that would apply to DOC facilities depends on whether or not DOH develops a multimedia mitigation program.

A4.3.3 Revised Total Coliform Rule/ Distribution System Rule

As part of its six year review of existing regulations, EPA has determined the need to revise the TCR. Revisions to the rule may include requirements to address finished water quality in the distribution system, as well as to evaluate additional or alternative monitoring strategies that would be more cost effective and maintain or improve public health. In September 2008, a Total Coliform Rule/Distribution System Rule Federal Advisory Committee (FAC) reached an agreement-in-principle on revisions to the TCR and on what information about distribution systems is needed to better understand and address possible public health impacts from degradation of drinking water quality in distribution systems. The revised TCR was promulgated in February 2013 and becomes effective in April 2016.

With regard to a potential future Distribution System Rule, the FAC is considering the following: (1) evaluation of available data and research on aspects of distribution systems that may create risks to public health, (2) identification of priority data gaps, and (3) identification of data collection approaches (such as a data collection rule and/or additional research).

A4.4 Monitoring Requirements

Each water system has unique monitoring requirements, as established by DOH. Every year, DOH provides all water systems with water quality monitoring reports, specifying monitoring and reporting requirements for that year. Specific monitoring requirements and regulatory compliance for each DOC focus facility are provided in Part B of this Plan.

Section A5
Water Conservation Program

Water conservation consists of any beneficial reduction in water losses, waste, or use. Efficient water use benefits the environment, public health, and economy by helping to improve water quality, maintain aquatic ecosystems, and protect water resources. Through activities such as offender and staff education, reduced turf irrigation, and leak detection, the Department of Corrections (DOC) has realized significant water savings at many facilities via conservation in recent years. DOC is committed to further strengthening and expanding its conservation efforts.

This section of the Water System Plan (Plan) presents a general water conservation program for DOC. Water conservation planning requirements have been set forth by the Department of Ecology (Ecology) and the Department of Health (DOH) in their *Conservation Planning Requirements* (Ecology Publication No. 94-24; DOH PUB 331-008). The emphasis upon water conservation has been further bolstered by passage of the Municipal Water Law – Efficiency Requirements Act (2E2SH1338, Chapter 5 Laws of 2003) and the subsequent Water Use Efficiency Rule.

This section provides information to comply with DOH guidance regarding conservation planning requirements. Included is a statement of conservation objectives, evaluations of water conservation measures, and identification of water conservation activities that DOC intends to implement at all facilities, as resources permit. Discussion of system specific water conservation activities, both historical and planned, is provided in Part B of this Plan.

A5.1 Conservation Objectives

DOC has established programs that strive to make efficient use of water. DOC's commitment to conservation is reflected in the following objectives:

- Promote offender and staff awareness about the need for the wise use of water through an effective water conservation education program
- Minimize non-potable uses of water, and/or replace such uses with non-potable supplies
- Decrease DOC's level of unaccounted for water use through implementation of proven supply side management strategies such as leak detection and repair and replacement of inferior water mains.

A5.2 Conservation Planning Requirements

The conservation planning requirements that must be addressed in water system plans are contained in the following sources:

- State of Washington Water Use Efficiency Rule (January 2007)
- Department of Health Water Use Efficiency Guidebook (January 2011)
- Department of Health Water System Planning Handbook (April 1997)

Washington State recently revised water conservation planning requirements as a result of the 2003 Municipal Water Law. An outgrowth of that law is the Water Use Efficiency Rule (Rule), which was finalized in January 2007.

There are seven main categories of requirements: 1) meters, 2) data collection, 3) distribution system leakage, 4) goals, 5) efficiency program, 6) demand forecast, and 7) performance reports. Table A5-1 lists the requirements of the Rule.

Table A5-1
Water Use Efficiency Rule Requirements

Category	Requirement
Meters	1. Meter all sources.
	2. Meter all service connections.
Data Collection	1. Provide annual consumption by customer class.
	2. Provide "seasonal variations" consumption by customer class.
	3. Evaluate reclaimed water opportunities.
	4. Consider water use efficiency rate structure.
	5. Provide monthly and annual production for each source.
Distribution System Leakage	1. Calculate annual volume and percent using formula defined in the Rule.
	2. Report annually: annual leakage volume, annual leakage percent, and for systems not fully metered, meter installation progress and leak minimization activities.
	3. Develop water loss control action plan (if leakage is over 10% for 3 year average).
Goals	1. Establish measurable (in terms of water production or usage) conservation goals and re-establish every 6 years. Provide schedule for achieving goals.
	2. Use a public process to establish goals.
	3. Report annually on progress.
Efficiency Program	1. Describe existing conservation plan.
	2. Estimate water saved over last 6 years due to conservation program.
	3. Describe conservation goals.
	4. Implement or evaluate 1-12 measures, depending on size.
	5. Describe conservation programs for next 6 years including schedule, budget, and funding mechanism.
	6. Describe how customers will be educated on efficiency practices.
	7. Estimate projected water savings from selected measures.
	8. Describe how efficiency program will be evaluated for effectiveness.
	9. Estimate leakage from transmission lines (if not included in distribution system leakage).
Demand Forecast	Provide demand forecast reflecting no additional conservation.
	Provide demand forecast reflecting savings from efficiency program.
	Provide demand forecast reflecting all "cost effective" evaluated measures.
Performance Reports	Develop annual report including: goals and progress towards meeting them, total annual production, annual leakage volume and percent and, for systems not fully metered, status of meter installation and actions taken to minimize leakage.
	Submit annually by July 1 to DOH and customers and make available to the public.

A5.3 Evaluation of Conservation Program Elements

Following are the key elements of DOC's statewide water conservation program. All of these activities either have been or will be implemented at the eight focus facilities, as resources allow. Information regarding system-specific activities is found in Part B.

A5.3.1 Meters and Data Collection

- ***Source Meters*** – All water sources serving the eight focus facilities are metered. Water production is tracked, with historical trends serving as the tool for monitoring many other conservation measures. DOC will continue to meter all sources.
- ***Service Meters*** – Tracking of actual water use has historically been very limited at DOC facilities, due to the lack of building water meters. However, in 2002, DOC began a program to identify key service meter locations and install such devices. Installation took place during 2004 and in the early months of 2005. The purpose of these service meters is to track water usage by category (e.g., housing units versus food preparation versus laundry). Upon monitoring this type of data for a period of time, DOC will be able to determine with better certainty which uses are most significant, and then focus further conservation activities on those uses.

  DOC will continue to install service meters as resources allow. As a larger percentage of buildings are metered, data can be extrapolated to estimate water usage throughout entire facilities. This will then allow for a more informed estimate of unaccounted-for water (e.g., water lost due to pipe and reservoir leaks, etc.) Currently, such estimates are based on assumptions of usage compared with production data.

A5.3.2 Distribution System Leakage

- ***Leak Detection and Water Main Replacement*** – There have been improvements in the efficiency of water delivery at some DOC water systems in the past five years, due to implementation of leak detection, followed by fixing of identified leaks. DOC will continue to employ leak detection services on a routine basis (i.e., approximately every 5 years) at facilities where there are noted concerns with distribution system integrity.

A5.3.3 Efficiency Program and Goals

- ***Education*** – Education is the foundation of every successful water conservation program. Patterns of water use are primarily an individual activity based on habits and underlying values. For water conservation to be effective over the long term, use patterns (i.e., behaviors) must be addressed, which often requires changes in understanding, beliefs, and finally implementation. This is as true for offenders as it is for staff.

DOC's level of water conservation education has historically varied throughout the eight focus facilities. However, over the past five years, there has been a consistent, concerted effort by DOC headquarters staff to instill a conservation ethic in water system operations at the facilities. This has taken the form of providing facility staff with information regarding:

- Levels of water use and how conservation activities could lower such levels
- Ways in which certain uses of water (e.g., irrigation) can be minimized or eliminated
- Water conservation improvement projects and water savings devices.

At the facility level, education has also occurred, especially at those facilities where water resources are substantially limited. In such cases, facility staff have educated other staff and offenders about efficient use of water.

As DOC continues to implement a variety of conservation measures, education will serve as a fundamental element.

- ***Landscape Management/Xeriscaping*** – Significant amounts of water have historically been used for landscape and turf irrigation at some DOC facilities during the relatively dry, summer months. There are a number of ways in which DOC can effect significant peak season water demand reduction by employing effective landscape irrigation management.

  Irrigation-related conservation activities that have been implemented at various facilities include:

  - Limit all landscape watering to no more than 1 inch per week, applied once per week (and when precipitation has not already provided 1 inch). Water application is measured via the "tuna can" method
  - Eliminate all turf irrigation during summer months (e.g., July through September)
  - Conduct irrigation in early mornings or late evenings, to reduce evaporation
  - Collect and store rooftop runoff water and use for irrigation and other non-potable uses

  Additional, long-term activities that DOC will consider implementing, especially at facilities where water resources are most limited include:

  - Replace current landscaped and turf areas with native species, reducing water requirements
  - Install drip irrigation or other water efficient systems in greenhouses and landscaping beds
  - Mulching, as opposed to standard lawn mowing procedures. This will increase organic matter, which in turn will increase water-holding capacity and reduce evaporation and water usage

- Use of hybrid grass varieties to reduce fertilizer, water and mowing frequency.

- ***Housing Units*** – Domestic water use in the housing units typically comprises more than 25 percent of water usage at most DOC facilities. Therefore, conservation activities aimed at addressing these uses can be effective in reducing per-offender water usage. Housing unit-related conservation activities that have been implemented at various facilities include:

  - Installation of low-flow faucet aerators
  - Installation of shower flow restrictors. Shower timers have also been installed at some facilities.
  - Temporary reduction in shower length and number of showers per offender per day
  - Installation of flushometer toilets
  - Installation of waterless urinals. In most cases where these have been installed, they have subsequently been removed due to what have been described by facility staff as flaws in the design of early technologies
  - Repair of leaky faucets, showers, and toilets

  Activities that DOC will consider implementing, especially at facilities where water resources are most limited include:

  - Permanent restriction of shower length (e.g., to 5-7 minutes per offender per day). This is only likely to be successful in the long term with an aggressive education approach, rather than by mandate
  - Evaluation of new waterless urinal technologies. As advances are made in this area, DOC will consider installation of new models

- ***Laundry*** – Laundry water use comprises another significant portion of water usage at most DOC facilities. DOC has aggressively pursued conservation savings through laundry system retrofits. Activities that have been implemented at various facilities include:

  - Replacement of old residential washing machines with high-efficiency models
  - Replacement of old commercial washing machines with high-efficiency models
  - Installation of a laundry rinse water recycle system (still under construction)

  Additional activities that have been and will continue to be considered include:

  - Installation of a complete laundry wash and rinse water recycle system
  - Ship all laundry to a commercial laundry facility or another DOC facility. In some cases, this may only be considered during peak water use times

- ***Reclaimed Water*** – Reclaimed water has the potential to reduce potable water demands by replacing use of potable water for non-potable purposes (e.g., irrigation,

toilet flushing, etc). DOC has evaluated the feasibility of upgrading or replacing some wastewater treatment facilities in order to produce reclaimed water for these types of uses. In one case, improvements were recently made to allow use of treated wastewater effluent for in-plant washdown purposes at the wastewater treatment facility, resulting in some potable water savings. DOC will continue to consider reclaimed water as a viable water savings option, especially in those cases where facility expansion is planned and current wastewater treatment capacities are limited and necessitate system modifications.

Section A6
Operation and Maintenance Program

This section describes the Washington State Department of Corrections (DOC) water system operations and maintenance program. Provided in the section are:

- An overview of water system management and personnel, training, and safety
- A summary of routine and preventative maintenance activities
- The general elements of an emergency response program
- A summary of record keeping and reporting procedures.

System specific information pertaining to these elements is provided in Part B of this Water System Plan (Plan) for the eight focus facilities, including system operations and control.

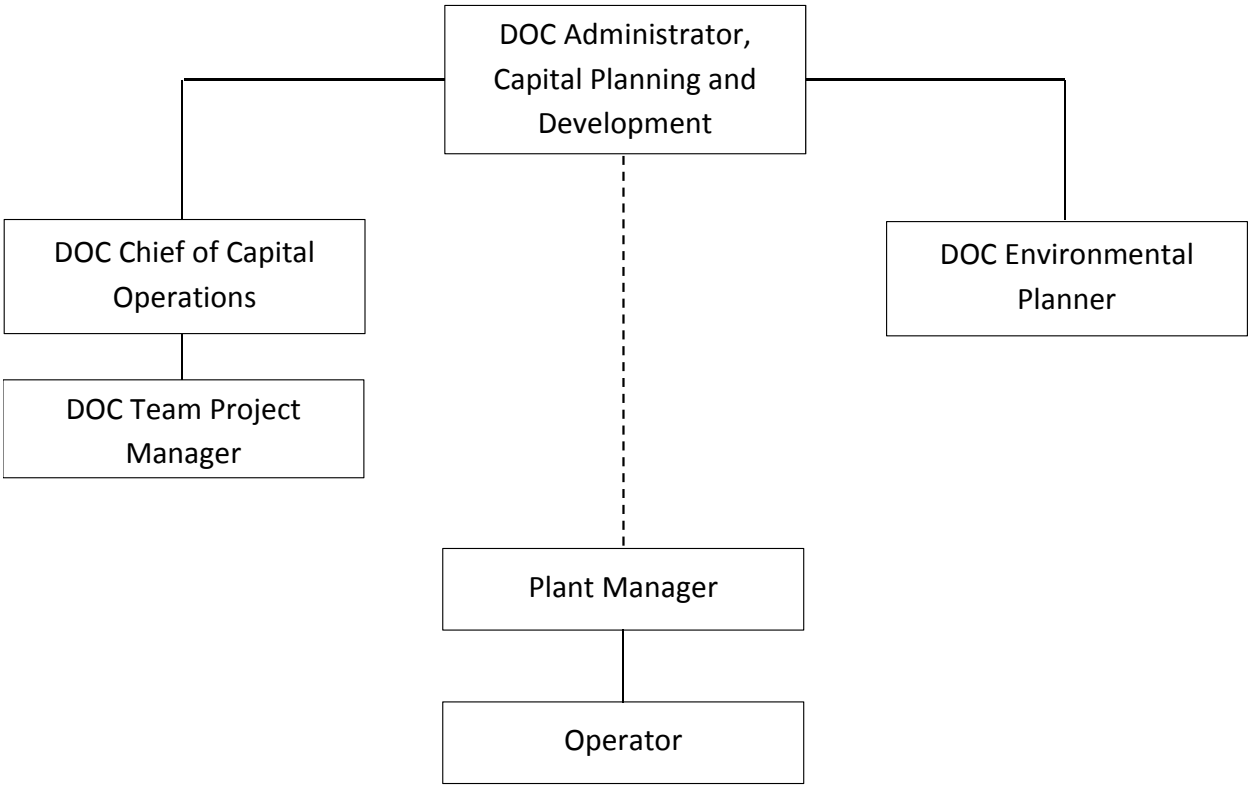
A6.1 Water System Management and Personnel

A6.1.1 Personnel Organization

Proper documentation of the responsibilities of water system managers and operators can increase system performance. The various correctional institutions and associated water systems are owned by DOC and managed by DOC personnel.

In emergency situations, critical time can be lost if the correct decision-making personnel are not kept informed. Therefore, an established ranking of decision-making individuals and the command structure has been documented. During emergency conditions, DOC water systems are most appropriately operated by system operators who are familiar with routine system operations and are specially trained to deal with emergencies. An organizational chart showing the typical chain-of-command for the eight DOC focus water systems is provided in Exhibit A6-1. Typically, the persons with the greatest abilities to deal with emergencies at DOC facilities are the Plant Managers and the Water System Operators. Emergency phone numbers for each of the focus facilities are located in Part B of the Plan.

Exhibit A6-1. Organization Chart



A6.1.2 Operator Certification

The Washington State Department of Health (DOH) requires all Group A water systems to have at least one certified operator as required under WAC 246-292-050. There are several categories of water system operators recognized or defined by DOH: Water Distribution Manager (WDM), Water Treatment Plant Operator (WTPO), Water Distribution Specialist (WDS), Basic Treatment Operator (BTO), Cross-Connection Control Specialist (CCS), and Backflow Assembly Tester (BAT). The DOH establishes the mandatory positions for each water utility based on the system's size and complexity. For the purpose of clarifying operator requirements, DOH has classified water systems according to population, as depicted in Table A6-1.

Table A6-1
DOH Classification of DOC Water Systems [1]

Classification	Population Served	DOC Systems
Class S	< 251	None
Class 1	251 to 1,500	CCCC, LCC, OCC, MCCCW, MICC, MLCC [2], WCCW
Class 2	1,501 to 15,000	WCC
Class 3	15,001 to 50,000	None
Class 4	> 50,000	None

[1] Source: WAC 246-292-040.
[2] Once offenders are housed at this facility, the population will place it in this category.

Table A6-2 summarizes the minimum certification requirements for public water systems.

Table A6-2
Minimum Operator Certification Requirements [1]

Operator Type	Where Required, as a Minimum	Where Required, at DOC Systems
WDM	Responsible for the operation of a Group A water system with: • Population greater than 250 people, • A Class 2 purification plant rating or higher, or • Any purification plant using complex filtration technology.	CCCC OCC LCC WCC MICC WCCW MCCCW MLCC
WDS	Responsible for the operation of a Group A community or non-transient noncommunity water system with: • Population of 250 people or less, or • Transient noncommunity water systems classified as significant noncompliers.	None
WTPO	Responsible for the operation of: • A purification plant with a Class 2 rating or higher, • Any purification plant using complex filtration technology, or • Any unfiltered Group A surface water or GWI system with 100 or more services.	MICC
BTO	Responsible for the operation of: • A public water system with a Class 1 purification plant rating, or • Any unfiltered Group A surface water or GWI system with less than 100 services.	None
CCS	Responsible for the system's cross-connection control program and inspection of premises served by the system.	All Systems
BAT	Responsible for inspecting, testing, and monitoring backflow prevention assemblies.	All Systems

[1] Source: WAC 246-292-050.

Current operators and certification levels for each focus facility are provided in Part B of the Plan.

A6.1.3 Safety Training Requirements

DOC has published a list of safety training policies in a draft safety program manual (1994). It is the responsibility of the individual facilities to adopt programs to comply with the policies outlined in the manual. The manual outlines the policies as follows:

- Safety program policies including management of the agency safety program and vehicle safety
- Risk management including accident prevention and safety program management
- Loss control including claims management and performance analysis
- Emergency procedures for the following:
  - Fatal/Multiple injury accidents
  - Life safety hazards
  - Fire and disaster planning
  - Earthquake survival
- Reference sources
- Special emphasis bulletins and memos for the following:
  - Flammable liquid container safety
  - Hazardous chemical safety
  - Emergency washing facilities
  - How to protect automotive maintenance staff from asbestos
  - Confined spaces
  - PVC pipe hazard alert
  - Video display terminals
  - Cleaning agents for electronic equipment screens
  - Sharps alert
  - Dust control
- Local policies and procedures
- Special emphasis programming for the following:
  - Division directive development
  - Modified duty/return to work program
  - Hepatitis "B" employee protection
  - First-aid and emergency medical treatment
  - DOC Safety Program Manual
  - Confined space entry written program
  - Hazardous/Dangerous waste management
  - Container management
  - Chemical hazard communication (HAZCOM)
  - Asbestos program

- Respirator program
- Fall protection plan for construction/maintenance workers
- Employee tuberculosis program
- Excellence in safety awards.

A6.2 Routine and Preventive Maintenance

In general, established operations and maintenance plans and maintenance schedules are not available at DOC facilities. Equipment manufacturer recommendations and literature are often used to provide guidance on proper upkeep of the equipment. Maintenance is often performed on an as-needed basis. The groundwater systems require little routine maintenance.

However, all systems employ the following preventive maintenance procedures to preserve the value of the water system components and ensure that the systems can continue to operate in an efficient manner.

A6.2.1 Reservoirs

Improperly maintained reservoirs are a chief cause of contamination in water systems. This is a result of contaminants entering the reservoir through cracks or openings at the vent, overflow, or drain screens. Deteriorating hatch covers and vandalism can also compromise reservoir water quality. Poorly designed and maintained reservoirs can hamper the emergency operation of a water system. If reservoir drains are not functioning properly, it may be impossible to purge a contaminant from the system.

It is important to perform diligent and routine maintenance. This includes careful annual inspection of screens, vents, and overflows, as well as the repair or replacement of cracked or torn screens. In addition, the reservoir drain must be operated and the reservoir run to overflow to ensure that these appurtenances are functioning properly. Maintenance of the interior of a reservoir is also important. Reservoirs must be routinely drained, the interiors carefully examined, cleaned if necessary, and needed repairs made in order to extend the reservoir's useful life. In general, this servicing must be performed at least every 5 years.

A6.2.2 Distribution System Valves

Distribution system valves are to be exercised on an annual basis to prevent valve mechanisms from freezing up.

A6.2.3 Fire Hydrants

Inspection, exercising, and flow testing of fire hydrants is to be performed annually. As with valve maintenance, a program to document repairs and maintenance of each hydrant is to be implemented.

A6.2.4 Dead-End Water Lines

Dead-end water lines are susceptible to water quality problems and are to be flushed at least quarterly to remove stagnant water, debris, and deposits which may have accumulated.

A6.2.5 Pump and Motor

Each well and its associated pump and motor is a complex unit involving several major maintenance items. The most expensive and disruptive task in this area is the removal, repair, and reinstallation of pumps. In general, pump and motor failures tend to occur during periods of high water demand when pump run times are long. It is far more cost effective and efficient to provide pump repair and maintenance on a scheduled basis than under emergency conditions.

A long term monitoring program consists of checking pump output. The output of a pump is to be tested annually to monitor changes in performance. This can be done by reading the pump meters, running the pumps for several hours, followed by reading the meters again to determine total volume. The pressure at the pump outlet and the power draw in amps should be recorded at least once during the pump test.

A6.2.6 Meters

Accurate water metering is an essential conservation oriented component of water system infrastructure. Water meter testing and calibration is to be performed every three years.

A6.2.7 Records

Records are to be made and retained in accordance with WAC 246-290-480. See Section A6.4 for details.

A6.2.8 Inventory of Repair Parts

An inventory of parts and supplies, including the appurtenances needed to make emergency repairs, is to be available at each facility. As a minimum, this includes the materials necessary to repair leaks for every size and type of pipe in the system, and spare valves in sizes 8-inch and smaller.

A6.2.9 Preventive Maintenance Schedule

Table A6-3 provides a listing and schedule of normal maintenance and operations activities. The frequency listed is a minimum and the actual frequency is to be adjusted as necessary to meet system requirements.

Table A6-3 Preventive Maintenance Schedule	
Activity	**Frequency**
Flush dead end water lines.	Quarterly
Thoroughly inspect reservoir screens, vents, and overflows. Repair as needed.	Annually
Operate the reservoir drain and allow the reservoir to run to overflow to ensure appurtenances are functioning properly.	Annually
Exercise distribution valves.	Annually
Inspect and exercise fire hydrants.	Annually
Test and calibrate meters.	Every 3 years
Drain, inspect, and service reservoir interiors.	Every 5 years
Pump performance tests to measure output, pressure, and power draw.	Annually
Paint fixtures for rust protection as needed.	Variable

A6.2.10 Equipment, Supplies, and Chemical Listing

For typical Group A water systems, DOH suggests that an accurate and comprehensive materials inventory be kept at all time to prevent unnecessary system down time. This inventory typically includes the following:

- All equipment, supplies, and chemicals used by the water system
- Service representatives for major system components and chemical suppliers
- Manufacturer's technical specifications for major system components
- Stock of supplies needed to assure continuous operation of the water system.

DOC facilities have much of this information on hand, in various formats.

A6.3 Emergency Response Program

DOC's emergency response program consists of a vulnerability assessment, emergency call-up lists, contingency plans, and emergency chlorination procedures. The organization-wide vulnerability analysis is provided here, followed by emergency chlorination procedures. Facility-specfic call-up lists and contingency plans are provided in Part B of this Plan.

A6.3.1 Vulnerability and Susceptability Assessment

Water system vulnerability is defined as the degree to which facilities are adversely affected under different emergency and disaster situations. It is prudent for small water system purveyors to forecast likely emergency and disaster situations and establish mitigation and prevention measures to minimize disruption to service. Water system susceptibility is defined as the degree to which water systems are prone to upset or contamination by non-emergency factors or situations.

Table A6-4 separates emergency events into three broad categories: 1) water quality, 2) source production, and 3) distribution, storage and related components. Within each category are several possible emergency scenarios. While this list is notinclusive, the intention is to provide a basis for emergency planning that DOC will follow. Mitigation

and prevention measures are included in the table, along with DOC's current ability to provide such measures.

Emergency response procedures for the water systems have been developed for fire, contamination of water supply, major power failure, and water main failure. While water supply contamination, fire, and water main failure emergencies could affect any DOC water system, DOC water systems would be minimally affected by a power failure due to the availability of emergency power located at most facilities and standby storage at all facilities.

Table A6-4
Vulnerability Assessment

Potential Emergency	Preventive Measures	Current Mitigation Efforts
Water Quality		
Exceed bacteria MCL	Chlorination	Chlorination at all facilities, except MCCCW
Exceed VOC or SOC MCL	Source protection plan	Plans previously developed, or developed as a part of this Plan
Major spill event near a well or within watershed	Spill control training, absorbent materials kept on-site	Several facilities have absorbent materials and have provided some level of training
Cross-connection related distribution system contamination	Effective cross-connection control program	Program documented as a part of this Plan. Implementation underway at all facilities
Source		
Major power outage	Standby emergency power. Standby storage	Each facility has standby storage. Most facilities have emergency power
Pump or motor failure	Ensure adequate replacements are available	Nearest vendor of pump/motor parts is known
Loss of source capacity	Routine groundwater level measurements at each source. Maintain pumping records	Water level measurements taken at some facilities where concerns have been noted. Pumping records maintained at all facilities
Chlorination equipment breakdown	Keep supply of liquid sodium hypochlorite on hand. Monitor chlorine residual daily	All facilities have means of chlorination, except MCCCW
Distribution, Storage, and Related Issues		
Water system contamination	Flushing and reservoir disinfection	All facilities perform varying degrees of system and hydrant flushing
Reservoir overfilling or underfilling	Reliable telemetry, routine inspection of reservoir	All reservoirs are to be inspected per the preventive maintenance program

A6.3.2 Emergency Chlorination Procedures

The procedure for emergency chlorination is to introduce liquid sodium hypochlorite into a reservoir. To achieve a 0.5 ppm chlorine residual, one-third of a gallon of 12.5 percent

sodium hypochlorite or one gallon of 5.25 percent sodium hypochlorite will adequately chlorinate 100,000 gallons of water. It will be necessary to monitor the water use and periodically introduce additional chlorine throughout the duration of an emergency.

A6.3.3 Trucked Water Procedures

Most DOC facilities have included trucked water as a contingency measure in the event that onsite sources of supply become contaminated or are otherwise unavailable. This is due primarily to the remote locations of most facilities and the inability to obtain water from other purveyors or sources. When conditions necessitate trucked water, DOC will first consult with the appropriate DOH regional Office of Drinking Water, to ensure proper steps are taken. DOC has identified specific trucked water providers that are capable of supplying each facility. When these providers are contacted for trucked water, DOC will ensure that their procedures are consistent with DOH's trucked water guidelines, which are included in this Plan as Appendix C-12.

A6.4 Record Keeping and Reporting

A crucial element of an operations and maintenance plan is accurate recordkeeping. Accurate records allow system operators to make informed decisions about the system. Similarly, proper record availability and order can facilitate the operation of the water system.

A6.4.1 Record Keeping

Each facility maintains the following records, as required by DOH:

- Bacteriological and turbidity analysis results (kept for five years). Chemical analysis records (kept for as long as the system is in operation). Records of daily or weekly source meter readings (kept for ten years). Other records of operation and analyses required by the DOH (kept for ten years). All records bear the signature of the operator in responsible charge of the water system or his or her representative. Systems keep these records available for inspection by DOH and send the records to DOH if requested.
- Actual laboratory reports may be kept or data may be transferred to tabular summaries, provided the following information is included:
  - The date, place and time of sampling, and the name of the person collecting the sample
  - Identification of the sample type (routine distribution system sample, repeat sample, source or finished water sample, or other special purpose sample)
  - Date of analysis
  - Laboratory and person responsible for performing analysis
  - The analytical method used
  - The results of the analysis
- Records of action taken by the system to correct violations of primary drinking water standards

- Copies of any written reports, summaries, or communications relating to comprehensive system evaluations of the system conducted by system personnel, by a consultant, or by any local, state, or federal agency shall be kept for ten years after completion of the evaluation
- Copies of project reports, construction documents and related drawings, inspection reports and approvals shall be kept for the life of the facility
- Where applicable, daily records including:
  - Chlorine residual
  - Turbidity
  - Source meter readings
  - Water treatment plant performance including but not limited to:
    - Type of chemicals used and quantity
    - Amount of water treated
    - Results of analyses
  - Other information as specified by DOH.

A6.4.2 Reporting

DOC is required to provide periodic reports to DOH which summarize the results of water quality testing. If any maximum contaminate levels (MCLs) are exceeded, DOH must be notified in accordance with WAC 246-290-71001 through 246-290-71007.

DOH, through WAC 246-290-71001 (which in turn references 40 CFR 141.201 through 208) has defined situations that require water purveyors to notify customers and DOH of the circumstances and actions being taken to address certain acute issues. Violations and other situations are categorized into three tiers, based upon the degree of potential adverse impacts to human health. The most common situations listed in the three tiers are described below:

Tier 1 (details found in Table 1 of 40 CFR 141.202 (a))

a) Violation of the MCL for total coliforms when fecal coliform or E. coli are present in the system, or when there is a failure to test for fecal coliform or E. coli when required

b) Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, or failure to perform required confirmation sampling

c) Certain situations when there is a violation of the maximum residual disinfectant level (MRDL) for chlorine dioxide

d) Certain situations when there is a violation of the turbidity MCL

e) Certain situations when there is a violation of the Surface Water Treatment Rule, Interim Enhanced Surface Water Treatment Rule, or Long Term 1 Enhanced Surface Water Treatment Rule treatment technique requirement

f) Occurrence of a waterborne disease outbreak or other waterborne emergency

g) Other violations or situations with significant potential to have serious adverse effects on human health.

Tier 2 (details found in Table 1 of 40 CFR 141.203 (a))

a) All MCL, MRDL, and treatment technique requirement violations, except those classified as Tier 1

b) Violations of the monitoring and testing procedure requirements, where DOH determines that a Tier 2 notice is required rather than a Tier 3 notice

c) Failure to comply with the terms and conditions of any variance or exemption in place.

Tier 3 (details found in Table 1 of 40 CFR 141.204 (a))

a) Monitoring violations that do not fall under Tiers 1 or 2
b) Failure to comply with a testing procedure that does not fall under Tiers 1 or 2
c) Operation under a variance or exemption
d) Availability of unregulated contaminant monitoring results
e) Exceedance of the fluoride secondary MCL.

Public notification distribution requirements are set forth according to the Tier system. DOC utilizes the DOH public health advisory materials included in Appendix C-11 as applicable, according to the requirements outlined in the Tier system. In general, the timing and manner of public notification is as follows:

Tier 1 (details found in 40 CFR 141.202 (b) and (c))

a) Public notice shall be provided as soon as possible but no later than 24 hours after the system learns of the violation.

b) DOH shall be contacted as soon as possible but no later than 24 hours after the system learns of the violation.

c) At a minimum, one of the following forms of delivery is to be used:

   a. Broadcast media (radio, television)
   b. Conspicuous posting
   c. Hand delivery of notice
   d. Another method approved by DOH.

Tier 2 (details found in 40 CFR 141.203 (b) and (c))

a) Public notice shall be provided as soon as possible but no later than 30 days after the system learns of the violation.

b) The public notice must be repeated every three months as long as the violation or situation persists, unless DOH determines that another frequency is warranted.

c) At a minimum, the form of delivery must meet the following:
   a. Mail or direct delivery

b. Any other method reasonably calculated to reach other persons regularly served by the system, such as publication in a local newspaper, posting in public places, etc.

Tier 3 (details found in 40 CFR 141.204 (b) and (c))

a) Public notice shall be provided no later than one year after the system learns of the violation or situation.

b) The public notice must be repeated every year as long as the violation or situation persists.

c) Instead of individual Tier 3 notices, an annual report may be used to detail all violations and situations that occurred during the year.

d) The form of delivery is to meet the same requirements as that for Tier 2 notices.

A6.4.3 DOH Addresses

CCCC, LCC, MCCCW, MLCC, OCC, and WCC report to the Southwest Regional Office of DOH at the following address:

Washington State Department of Health
Division of Drinking Water
Southwest Drinking Water Operations
P.O. Box 47823
Olympia, WA 98504-7823
(360) 236-3030

MICC and WCCW report to the Northwest Regional Office of DOH at the following address:

Washington State Department of Health
Division of Drinking Water
Northwest Drinking Water Operations
20425 72nd Ave. South, Building 2, Suite 310
Kent, WA 98032-2358
(253) 395-6750

For completeness of this Plan, the DOH Eastern Regional Office (to which none of the seven former facilities report) can be reached at the following address:

Washington State Department of Health
Division of Drinking Water
Eastern Drinking Water Operations
16201 East Indiana Avenue, Suite #1500
Spokane Valley, WA 99216
(509) 329-2100

Section A7
Cross-Connection Control Program

This section describes the Washington State Department of Corrections (DOC) cross-connection control program. Provided in the section are:

- Purpose of the program
- Code authority and enforcement
- Required program elements
- Definitions.

This cross-connection control program is based largely on the program previously developed for Larch Corrections Center[1]. The information presented here, however, is applicable to all eight DOC focus water systems. To the extent practical, DOC will also implement these policies and procedures at those facilities for which DOC does not own a public water system but purchases water from other purveyors.

System-specific information pertaining to these elements is provided in Part B of this Water System Plan (Plan) for the eight focus facilities, including a description of installed backflow prevention assemblies, where available.

A7.1 Purpose

The purpose of a cross-connection control program is to protect the public water system from contamination due to existing or potential cross-connections. This program has been developed by DOC to establish cross-connection control policies, program guidelines, and requirements for installation, testing, and maintenance of approved backflow prevention assemblies.

Typically, a water system owner is responsible for cross-connection control beginning at the water supply source, throughout the public water system, and ending at the point of delivery to the consumer's water system. However, in an institutional setting, as at DOC facilities, there is no boundary between owner and consumer, so the water system owner's responsibility continues to the point of consumption. One exception to this concept is at locations where DOC supplies water to another agency or consumer. At some facilities, for example, DOC's public water system serves a Washington State Department of Natural Resources (DNR) facility. It is the policy of DOC to provide cross-connection control inspection for DNR facilities to the extent necessary to protect DOC's public water system. In most cases, DOC also performs assembly testing for assemblies serving such facilities. DOC will continue to evaluate DNR premises to determine the extent of cross-connections and provide oversight of any necessary cross-connection control corrections.

[1] Larch Corrections Center Cross-connection Control Program (Gray and Osborne, February 2000).

A7.2 Code Authority and Enforcement

DOC has not formerly had a system wide cross-connection control program, although some facilities have local programs. With the issuance of this Plan, DOC will implement a cross-connection control program at each of its facilities where it operates a Group A water system. This program will include the program elements as defined in RCW 70.54 and WAC 246-290-490.

A7.3 General Program Description

Any service connection to a DOC public water system shall not allow contaminants to backfeed into the system via backflow or backpressure. Any existing or new connection that may permit backfeed of any contaminants or pollutants into the water distribution system shall be discontinued and/or eliminated. Installation of a backflow prevention assembly shall be a condition of service and public water service will not be provided until the potential for backflow is either eliminated or corrected by installation of an appropriate backflow prevention assembly.

Each DOC facility shall have a staff person who is a certified cross-connection control specialist. This staff member shall be responsible for implementing the cross-connection control program at that location.

A7.4 Program Elements

DOH regulations mandate that DOC's cross-connection control program include certain minimum functions or elements. Those elements are prescribed in WAC 246-290-490(3). The following sections describe these elements and the procedures DOC uses or intends to use to implement them. Italicized text indicates the requirements based on language extracted from WAC 246-290-490.

A7.4.1 Element 1 - Establish Local Authority

Adopt an ordinance, code, or other legal instrument that:

- *Establishes DOC's legal authority to implement a cross-connection control program*
- *Describes the operating policies and technical provisions of the cross-connection control program*
- *Describes corrective actions available to DOC for use in ensuring that consumers comply with the cross-connection control program requirements.*

Section A7.2 provides the authority by which DOC has enacted and is implementing its program. The general operating policies and technical provisions of the program are provided in Section A7.3.

Enforcement of cross-connection control program policies is not a significant issue, as DOC typically constitutes both the purveyor and consumer of water from DOC public water systems. However, in those situations where DOC does provide service to another

entity (e.g., DNR), DOC reserves the right to immediately disconnect water service if DOC determines that an actual or potential cross-connection health hazard exists. Five days prior to disconnection, DOC would deliver written notice to the customer by posting a Termination Notice at the property. Reasons for disconnecting water service could include:

- Customer's refusal to install an approved backflow prevention assembly as directed by DOC or DOH
- Customer's failure to have the backflow prevention assembly inspected and tested per DOC requirements
- Customer's refusal to allow DOC personnel to inspect the premises
- DOC's discovery that an existing backflow prevention assembly is the wrong type, is defective, or is installed improperly
- DOC's discovery of a low health hazard cross-connection to DOC's water system.

In the event that a customer fails to abate an existing cross-connection within a prescribed time period, DOC may disconnect water service to the premises immediately. Alternatively, DOC may abate the cross-connection by installing an approved backflow prevention assembly on the customer's property, or by hiring a DOH-certified contractor to do so. If either of these procedures is necessary, DOC will charge to the customer all associated labor and administrative costs and will enforce payment in the same manner as for other DOC utility rates and charges. If disconnection is necessary, DOC will not restore water service until the customer has complied with the backflow program requirements and paid any delinquent rates, charges (including meter reinstallation charges), and fines.

A7.4.2 Element 2 - Evaluate Service Connection Hazards

Develop and implement procedures and schedules for evaluating new and existing service connections to assess the degree of hazard each poses. Notify individual consumers of the results within a reasonable time frame.

At a minimum:

a. For new connections made on or after the effective date of these regulations, conduct initial evaluations before providing water service.

Any new service installation will be evaluated by both the DOC Cross-Connection Control Specialist and the applicable Local Administrative Authority. The Local Administrative Authority is the county Building Official or other authority responsible for implementation of the Uniform Plumbing Code (UPC). Coordination between the Cross-Connection Control Specialist and Local Administrative Authority regarding new connections will occur as follows.

The Local Administrative Authority will review plans and specifications for new buildings, and conduct an evaluation of the probability of cross-connections, availability

of auxiliary water supply, and/or the handling of substances which, if introduced into the building's water supply, would constitute a health, plumbing, or system hazard.

The Cross-Connection Control Specialist will then conduct an evaluation of the probability of cross-connections posing a potential health hazard to the public water system. If deemed necessary, the Cross-Connection Control Specialist will require the appropriate backflow prevention assembly be installed during construction.

During the construction phase of any new building, structure, or ground installation, and during the plumbing inspection, the Local Administrative Authority or authorized designate will also perform the required cross-connection control inspection. Upon completion of the plumbing inspections, the Local Administrative Authority shall acknowledge compliance of the installation with the UPC, latest edition. The Cross-Connection Control Specialist will then complete the Cross-Connection Control Program Field Inspection form (see Appendix C-6, to document that a cross-connection control inspection has been made and to document the location of any and all backflow prevention assemblies and/or devices.

b. For existing connections made prior to the effective date of these regulations, conduct initial evaluations in accordance with a schedule acceptable to DOH.

A systematic program of inspection will be established for cross-connection control evaluations of existing buildings and structures at each DOC facility, with priority given to those installations that pose the greatest risk to public health. At many facilities, an initial evaluation has already been performed and is documented with lists of priority installations and installed backflow prevention assemblies located onsite.

For those facilities where an initial evaluation has not been performed, the Cross-Connection Control Specialist will evaluate all existing service connections. This inspection will be based on past records and knowledge of the water supply system and its operations. If as-built drawings of the plumbing system are not available, the Cross-Connection Control Specialist will sketch a field drawing of each line to its end point, noting any actual or potential cross-connections or any conditions that might tend to pollute the public water system.

Upon completion of the inspection, the Cross-Connection Control Specialist will prepare a report that notes whether any cross-connections were found, their location, and optional methods of control. All industrial fluids, chemicals, or other contaminating liquids used or pumped under pressure and their use shall be identified. All hazards will be categorized as High or Low Health Hazards, based upon the degree of threat the situation poses to public health, and the appropriate remedy noted.

If corrective action is deemed necessary by the Cross-Connection Control Specialist, the corrective action will be completed within sixty days of identification of the hazard. This time period may be shortened by the Cross-Connection Control Specialist depending on the degree of hazard involved. If the Cross-Connection Control Specialist determines that a serious threat to public health exists, water service to the premise shall be terminated

immediately and notice posted. On the corrective action date, or as soon as the correction is completed, the Cross-Connection Control Specialist shall re-inspect any items that required corrective action and ensure that any backflow prevention assembly that is installed is tested by a certified Backflow Assembly Tester (BAT).

c. For all service connections, after an initial evaluation is completed, conduct reevaluations on a periodic basis, using a schedule acceptable to DOH, and whenever there is a change in the use of the premises

Existing water service lines and the locations of existing backflow prevention assemblies will be evaluated once every five years for any change of use, or other condition that may affect the potential for cross-connection contamination. Proposed changes or replacements of assemblies or devices will be recommended by the Cross-Connection Control Specialist at that time.

A7.4.3 Element 3 - Establish Procedures and Schedules

Develop and implement procedures and schedules to ensure that:

a. Cross-connections are eliminated if possible.

Elimination is the optimum remedy for cross-connections.

b. Cross-connections that cannot be eliminated are controlled by approved backflow prevention assemblies appropriate to the assessed degrees of hazard.

In cases where elimination is not feasible from a mechanical or economic standpoint, the Cross-Connection Control Specialist uses the criteria and procedures detailed in Element 2 above to determine the appropriate backflow prevention for a given water service connection. For resulting installations, the Cross-Connection Control Specialist ensures that the selected type of backflow assembly meets the minimum specifications found in DOH regulations [Table 8 of WAC 246-290-490 (4)(a)(ii)]. Table A7-1 summarizes these minimum specifications.

Table A7-1
Appropriate Methods of Backflow Protection for Cross-Connection Isolation [(1)]

Degree of Hazard	Application Condition	Appropriate Approved Backflow Preventer[(2)]
High health cross-connection hazard	Backsiphonage or backpressure backflow	AG, RPBA, or RPDA
Low health cross-connection hazard	Backsiphonage or backpressure backflow	AG, RPBA, RPDA, DCVA, or DCDA

(1) Taken from Table 8 of WAC 246-290-490 (4) (a) (ii).

(2) Definitions:

AG	approved air gap
DCDA	double check detector assembly
DCVA	double check valve assembly
RPBA	reduced pressure backflow assembly
RPDA	reduced pressure detector assembly

WAC 246-290-490 further mandates that certain categories of properties or facilities install reduced pressure backflow assemblies (RPBA) or air gaps (AG) at the service connection appropriate to protect DOC's public water system from the actual or potential degree of hazard. The core list of such categories is listed in Table 9 of WAC 246-290-490 (4) (b). A subset of this list representing activities most likely found at a DOC facility is provided in Table A7-2. Thus, DOC water customers or facilities having a premise or process listed in Table A7-2 or Table 9 of WAC 246-290-490 (4) (b) must install and maintain an approved AG or an approved RPBA at the customer end of the service connection, prior to any branch connections.

Table A7-2
High Health Cross-Connection Hazards Requiring Premises Isolation

Utilizing an AG or RPBA [(1)]
Agricultural (farms and dairies)
Car Washes
Food Processing Plants
Hospitals, Medical/Dental Clinics
Laboratories
Metal Plating Industries
Commercial Laundries
Petroleum Processing or Storage Plants
Piers and Docks
Irrigation systems with Chemical Addition
Wastewater Lift Stations and Pumping Stations
Wastewater Treatment Plants

(1) Extracted from Table 9 of WAC 246-290-490 (4) (b).

c. Approved backflow prevention assemblies are selected and installed in accordance with WAC 246-290-490(6).

DOC requires that all backflow prevention assemblies be selected and installed in accordance with the current edition of the ***Cross-Connection Control Manual, Accepted Procedure and Practice***, published by the Cross-Connection Control Committee of the Pacific Northwest Section of the American Water Works Association, referred to as the Manual.

The following paragraphs provide further clarification as to minimum installation requirements, based on information in the Manual. If there is any disagreement between these minimum requirements and those listed elsewhere in the current edition of the Manual, the more restrictive shall govern. The premises isolation requirement may be waived or reduced for certain facilities, providing the Cross-Connection Control Specialist has justified and documented this decision.

Minimum Requirements – Reduced Pressure Backflow Assemblies

(1) Premises on which hazardous materials are handled shall be required to have an approved reduced pressure backflow assembly installed at the service connection.

(2) Premises having an auxiliary water supply with internal cross-connections that are not correctable or intricate plumbing arrangements which make it impractical to ascertain

whether or not cross-connection exist, shall be required to have an approved reduced pressure backflow assembly installed at the service connection.

Minimum Requirements – Double Check Valve Assemblies

(1) Premises which handle a substance that is objectionable, although not a health hazard, in a manner constituting a potential cross-connection, shall be required to have an approved double check valve assembly installed at the service connection.

(2) Premises which have an auxiliary water supply with no known cross-connections shall be required to have an approved double check valve assembly installed at the service connection.

(3) Premises on which any substance that is not a health hazard but is under pressure so as to enable entry into the public water system or where a cross-connection could reasonably be expected to be present, shall be required to have an approved double check valve assembly installed at the service connection.

(4) Premises which have a repeated history of cross-connections being established or re-established, shall be required to have an approved double check valve assembly installed at the service connection

Minimum Requirements – Fire Protection Systems

(1) Premises having a fire protection system where no chemicals are allowed to be used shall be required to have an approved double check valve assembly or approved double check detector assembly installed at the fire service connection.

(2) Premises having a fire protection system with chemical addition or using an unapproved auxiliary water supply, shall be required to have a reduced pressure backflow assembly or reduced pressure detector assembly installed at the fire service connection.

Minimum Requirements – Irrigation Systems

(1) Premises having an irrigation system where chemicals or herbicides are allowed to be used shall be required to have an approved reduced pressure backflow assembly installed at the service connection.

(2) Premises having an irrigation system which is subject to flooding, backpressure, elevated piping or where compressed air is allowed to be used shall be required to have an approved double check valve assembly installed at the service connection.

(3) Premises having an irrigation system which does not fall into one of the prior two categories shall be required to have an approved pressure vacuum breaker assembly or double check valve assembly installed on the system.

A7.4.4 Element 4 - Utilize Qualified Cross-Connection Specialists

DOC must ensure that qualified personnel are available to develop and implement the program. The personnel provided must include at least one individual who holds DOH certification as a Cross-Connection Control Specialist.

Per WAC 246-292, a certified Cross-Connection Control Specialist is required to have a minimum of 12 years of education and six months of practical experience in performing hands-on duties associated with cross-connection evaluation and control.

Each facility shall have a certified Cross-Connection Control Specialist to implement the program.

A7.4.5 Element 5 - Establish Testing and Inspection Procedures

Develop and implement procedures to ensure that approved backflow prevention assemblies are inspected and/or tested in accordance with WAC 246-290-490(7).

Minimum requirements for the installation and testing of all backflow prevention assemblies shall be in accordance with the Manual, adopted by reference herein. All DOC Cross-Connection Control Specialist certified staff shall retain a copy of the latest edition of the Manual, for use in implementation of the program.

All backflow prevention assemblies shall be installed at a location that is easily accessible for inspection and testing. Assemblies located in vaults shall have adequate clearances and depths to allow the Cross-Connection Control Specialist and BAT reasonable access. Assemblies that cannot be easily and readily inspected shall be relocated and re-plumbed as necessary to assist in their inspection and testing.

All bypass lines parallel to a line on which a backflow prevention assembly is installed shall have an approved assembly installed that is equal in type to the assembly required for the main line.

All backflow prevention assemblies are to be tested on an annual basis. All backflow prevention assembly testing shall be recorded using the test report form located in Appendix C-6. Completed test reports must be filed by the BAT within sixty days of completing the test.

A7.4.6 Element 6 - Establish a Quality Assurance Program for Testing

Develop and implement a quality assurance program for testing backflow prevention assemblies. The program must include documentation of tester certification and test kit calibration, test report content, and schedules for submitting test reports.

Testing of backflow prevention assemblies must be conducted by a certified BAT. A BAT-certified DOC staff person can perform this function, or the service can be contracted with a certified BAT. When the latter approach is used, DOC employs an internet-based resource as its primary tool for ensuring only certified BATs are hired. This tool was developed by the Washington Environment Training Center under contract to DOH, with the purpose of providing and maintaining a public list of certified BATs. The resource is located at www.wetrc.org. Certified BAT information is accessed at the site by first selecting the "Backflow Assembly Tester" link on the website's home page. Then, the "BAT Public Listing" link is selected. It is on this page that updated lists of currently certified BATs may be viewed by County or by individual BAT name. In addition, an entire list for the state can be viewed and printed.

DOC requires that all contracted BATs maintain proof of current certification and provide proof of current calibration tests for test equipment.

A7.4.7 Element 7 - Establish Incident Response Procedures

Develop and be prepared to implement procedures for responding to backflow incidents.

In the event that a backflow incident is known to have occurred, or it is probable that one has taken place, certain precautions are necessary to protect public health. The Cross-Connection Control Specialist will be responsible for coordinating the response to a backflow incident. Procedures will vary according to facility, but will include at a minimum:

- Aiding persons affected and contacting emergency agencies for their assistance
- Determining the source and cause of the backflow
- Determining the extent of contamination
- Collection of bacteriological and chemical samples, depending on the nature of the known or suspected incident
- Issuing a warning to potentially affected persons and/or posting of affected areas of the water system
- Providing an alternative source of potable water from an approved public water supply source or bottled water as necessary
- Decontamination, flushing, and disinfection of affected areas within the water distribution system
- Testing of any backflow assemblies involved
- Contacting or reporting to governmental agencies having jurisdiction (such as DOH, Labor and Industries, local health jurisdictions, etc.) prior to 5:00 pm of the next business day following the incident
- Documenting the incident on the proper report forms.

A7.4.8 Element 8 - Implement Consumer Education

Incorporate information on cross-connection control into DOC's existing consumer education program.

DOC will distribute information to facility staff and representatives of other agencies that obtain water from DOC systems (e.g., DNR) regarding DOC's cross-connection control program. This will also include notices regarding proper use of irrigation systems, fire sprinkler systems, and any health hazards associated with the use of hose connections, utility sinks, and other potential backflow situations.

In those situations where Consumer Confidence Reports are developed (e.g., for McNeil Island Corrections Center), program information will be included in the Consumer Confidence Reports, informing staff, residents, and other Consumer Confidence Report recipients of the DOC program and informing customers of the public health implications of cross-connections.

A7.4.9 Element 9 - Maintain Program Records

Develop and maintain cross-connection control program records including:

a. A master list of service connections and/or premises where backflow prevention assemblies are installed, the assessed hazard level for each location, and the type of assembly required and/or installed at each location

b. Inventory information on:

- *Approved air gaps installed in lieu of approved assemblies, including exact location, assessed degree of hazard, history of health hazard evaluations, installation date, and inspection history (identify dates, results, and inspectors)*
- *Approved backflow prevention assemblies including exact location, description (type, manufacturer, model, size, and serial number), assessed degree of hazard, history of health hazard evaluations, installation date, and inspection history (identify dates, tests performed, test results, assembly repairs, and inspectors)*
- *Approved atmospheric vacuum breakers used for irrigation systems including exact location, description (manufacturer, model, and size), installation date, and inspection history (identify dates, results, and inspectors)*

A critical program element is the maintenance of accurate records. Each DOC facility shall retain a list of installed backflow preventer information, including for each installation the information listed above.

The level of detail regarding assembly inventories varies by DOC facility. Descriptions of the inventories are provided in Part B of this plan. Where inventory information is limited or of a minimal nature, the Cross-Connection Control Specialist will work to develop more detailed information. These inventories are retained onsite at each facility.

c. Cross-Connection Control Program summary reports and backflow incident reports required by WAC 246-290-490(8).

Each DOC facility shall maintain a copy of an annual summary report of activities associated with the cross-connection control program, as well as copies of backflow incident reports.

A7.4.10 Element 10 - Satisfy Reclaimed Water Requirements

Purveyors who distribute and/or have facilities that receive reclaimed water within their service area shall meet any additional cross-connection control requirements imposed by the DOH by obtaining a permit issued in accordance with Chapter 90.46 of the Revised Code of Washington.

Some DOC facilities utilize reclaimed water generated at their own wastewater treatment plants for various non-potable purposes (mainly wastewater treatment plant wash-down, maintenance, and landscape irrigation). In these instances, the Cross-Connection Control Specialist shall verify that the proper cross-connection controls have been made and the appropriate backflow prevention assemblies are in place.

A7.5 Definitions

The following are common terms used in cross-connection control.

Air Gap (AG) – A physical separation between the free-flowing end of a potable water supply pipeline and overflow rim of an open or nonpressurized vessel. A DOH-approved AG must be at least twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel, and in no case less than one inch, when unaffected by vertical surfaces (sidewalls).

Approved Backflow Prevention Device – Any assembly used to prevent backflow has been approved for use by the DOH. Approved assemblies shall be those that have successfully passed performance tests of the University of Southern California Engineering Center or other testing laboratories so approved.

Atmospheric Vacuum Breaker - Shall mean a backflow preventive assembly which is operated by atmospheric pressure in combination with the force of gravity. The unit is so designed to work on a vertical plane only. The moving part consists of a poppet valve which must be carefully sized to slide in a guided chamber and effectively shut off the reverse flow of water when a negative pressure exists in the supply system. They are designed to protect against back siphonage events only.

Backflow – A flow in reverse from the normal direction of flow in a piping system. It occurs due to a differential pressure existing between two points within a continuous fluid system (i.e., fluid flowing from higher pressure to an area of lower pressure). Backflow may occur due to either backpressure or "backsiphonage."

Backpressure - May cause a backflow to occur when the potable supply piping is connected to a system or fixture which exceeds the operating pressure of the supply piping. The higher pressure can be caused by booster pumps, well pumps, boilers, pressure vessels, or elevated piping, such as high rise buildings or tanks, or homes which are 30 feet or more above the service connection.

Backsiphonage – Caused by negative pressure in the supply piping. Some common causes of backsiphonage are:

- High velocities in pipe lines
- Line repair or break that is lower than a service point
- Lowered main pressure due to high water withdrawal rates such as during fire fighting or water main flushing
- Reduced supply pressure on the suction side of a booster pump.

Cross-Connection – Any actual or potential physical connection between a potable water line and any pipe, vessel, or machine which contains, or has the possibility of containing, a non-potable fluid, solid, or gas, such that it is possible for the non-potable fluid, solid, or gas to enter the potable water system via backflow.

Double Check Valve Assembly (DCVA) – An assembly composed of two single, independently acting, approved check valves, including tightly closing shut-off valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve. DCVAs protect the water system from both back siphonage and back pressure events. They are not suitable for use in protecting the water system from health threatening substances.

Double Check Valve Detector Assembly (DCDA) - An assembly composed of two single, independently acting, approved check valves, including tightly closing shut-off valves located at each end of the assembly and suitable connections for testing the water tightness of each check valve. A factory installed bypass feature shall also be provided to monitor low flows on low hazard fire systems. It is used to detect unauthorized use of the water allocated for fire protection and/or to detect leaks in the fire system. DCDAs protect the water system from both back siphonage and back pressure events. They are not suitable for use in protecting the water system from health threatening substances.

Potable Water - Water that meets DOH drinking water standards.

Premise Isolation – The prevention of backflow into a public water system from a user's premises by installation of a suitable backflow preventer on the user's primary service connection or on the user's side-stream (branch) connections that are dedicated to residential fire sprinkler or landscape irrigation systems.

Pressure Vacuum Breaker Assembly – An assembly consisting of a spring loaded check valve (3-inch diameter and larger pipes consists of two spring loaded check valves), an independently operating air inlet valve, inlet and discharge shut-off valves, and properly installed test cocks. The air inlet valve is internally loaded to the open position, normally by

means of a spring. This internal loading allows the device to be installed on the pressure side of a shut-off valve. They are designed to protect against back siphonage only.

Reduced Pressure Backflow Assembly (RPBA) – An assembly consisting of a minimum of two independently acting approved check valves, and an automatically operated pressure differential relief valve located between the check valves. During normal flow, the pressure between the check valves shall be less than the upstream (supply) pressure. In case either check valve leaks, the differential relief valve, by discharging to the atmosphere, shall operate to maintain a pressure not less than 2 pounds per square inch between the supply pressure and the zone between the check valves. The unit must include tightly closing shut-off valves located at each end of the assembly, and each assembly shall be fitted with properly located test cocks.

Reduced Pressure Detector Assembly – An assembly consisting of two approved RPBAs, set in parallel, equipped with a meter on the bypass line to detect small amounts of water leakage or use. This unit must be purchased as a complete assembly.

Part

B

Individual System Evaluation

Section B1
General Methodologies for Individual System Evaluations

This section describes the methodology used throughout Part B of this Water System Plan (Plan) for evaluating each of the Washington State Department of Corrections (DOC) focus facilities. The analysis methodologies regarding the following water system features are discussed:

- Population and demand projections
- Water rights
- Source capacity
- Storage capacity
- Distribution system
- Water quality compliance
- Water conservation
- Source protection
- Operations and maintenance
- Cross-connection control
- Capital improvement program.

The analysis presented in Sections B2 through B9 follows the methodology described in this section unless otherwise indicated. A common presentation format is provided in each of the detailed sections to facilitate efficient use of the document.

B1.1 Population and Demand Projections

DOC's capital planning efforts are based on a 10-year time frame. Facility expansions and modifications are planned for within this time horizon. Planning forecasts beyond ten years are not typically conducted. Therefore, to remain consistent with other planning activities, a 10-year time period is utilized for the purposes of this Plan. While different from the standard 6-year and 20-year planning horizons typically used in water system planning, the 10-year period is the most logical time frame for this effort.

Projected offender population changes over the next 10 years are based on information contained within DOC's 10-Year Capital Plan.

Current (i.e., 2014) water demands are based on water production data for 2012-2013 for each system. From these data, average day water demands per offender are calculated. These water use factors include all facility water usage, even that by staff and other non-offender use. Projected water demands for 2024 are then calculated by multiplying forecast offender populations by these per-offender water use factors. Projected maximum day demands (MDDs) are based on current peaking factors. Where peaking relationships are unknown, an estimated peaking factor of 2.0 is generally used to calculate maximum day demands.

DOH makes use of equivalent residential units (ERUs) in evaluating certain elements of a water system. The purpose of an ERU is to convert non-residential usage into an equivalent level of single-family residential usage. One ERU is defined as the typical water consumption of one single-family residence. In many communities, a standard ERU is 230 gallons per day (gpd) based on approximately 100 gpd per person and 2.3 people per residence.

Therefore, to provide an estimate of current and future ERUs served by DOC water systems, average day water demand is converted to ERUs using the water use factor of 230 gpd per ERU.

B1.2 Water Rights

The adequacy of existing water rights, on both an annual and instantaneous basis, is evaluated for each system. The analysis is conducted for years 2014 and 2024.

Annual water rights are compared against total annual production to determine if existing water rights are sufficient to support anticipated ADDs. Instantaneous water rights are compared against MDDs to determine if the existing rights are sufficient to support peak needs.

B1.3 Source Capacity

Supply facilities must be designed to meet the MDD. Supply capacity is typically also sufficient to replenish storage within three days of fire or emergency drawdown during MDD conditions. Supplies are to be provided at a hydraulic grade line that meets replenishment needs of storage facilities.

B1.4 Storage Capacity

The Washington State Department of Health (DOH) requires public water systems to provide sufficient storage to meet any seasonal or diurnal variations in demand, fire flows, and emergency demands such as during power outages and equipment failures. This Plan utilizes these guidelines as criteria for determination of sufficient treated water storage for each of the DOC focus facilities.

For a given reservoir design, each of the five storage components listed below must be considered:

- Operational storage
- Equalizing storage
- Standby (emergency) storage
- Fire suppression storage
- Dead storage, if any.

Only effective storage may be used in determining actual available, or design storage volume. Effective storage is equal to the total volume minus the dead storage built into the reservoir. The required storage volume has been interpreted as the sum of equalizing storage and the greater of standby (emergency) storage or fire suppression storage at an elevation sufficient to provide 20 pounds per square inch (psi) (static) to the highest customer in any pressure zone. In addition,

equalizing storage is evaluated with the requirement that 30 psi (static) is provided to the highest customer within the analyzed pressure zone. Operational storage is any surplus storage that is available after subtracting the other required storage components.

In most cases, either the standby or fire suppression volume, whichever is smaller, can be excluded from a water system's storage requirement. This is a practice termed nesting. Local ordinances and fire authorities in the counties within which the DOC focus facilities are located allow the use of nesting in designing storage facilities.

Operational Storage

Operational storage is the volume of the reservoir devoted to supplying the water system while, under normal operating conditions, the sources of supply are in "off" status. Operational storage is additive to the other components of storage and provides an additional factor of safety. The volume of operational storage should be sufficient to prevent excess pump cycling.

Equalizing Storage

Equalizing storage capacity is utilized to meet the daily (diurnal) variations in demand. Peak use periods typically occur during the morning and evening hours, especially during the breakfast and dinner hours. Water is typically withdrawn from storage during these peak demand periods and replenished during low demand periods such as late evening and early morning hours.

For systems like those serving DOC facilities that supply water to storage based on the reservoir water levels (on-call-demand), the DOH guidelines specify that the following equation be used to estimate equalizing storage:

equalizing storage (gal) = $(PHD - Q_S)(150 \text{ min})$, where
PHD = peak hourly demand (gpm)
Q_S = source production rate (gpm)

In DOC's situation, Q_S is greater than the peak hourly demand in most cases, resulting in no need for equalizing storage. However, to enhance system reliability, a minimum equalizing storage amount equal to five percent of the maximum day demand has been assumed. This is a standard approach taken by water systems with large source capacities that wish to ensure potentially large fluctuations in demand do not adversely impact system operations.

Standby Emergency Storage

The purpose of standby storage is to provide a measure of reliability should sources fail or when unusual conditions impose higher demands than anticipated. The volume of emergency storage required is dependent upon the reliability of the source of supply and the ability to provide an alternative supply. If the system or zone has multiple sources of supply, the volume of water produced by the remaining supply sources (after assuming the largest source is out of service) can reduce the standby storage requirement.

The recommended standby storage should not be less than 200 gallons per ERU. For systems with multiple sources the standby storage is based on the following equation:

standby storage (gal) = (2*ADD) – t_m (Q_S- Q_L) where
ADD = average day demand
Q_S = sum of all installed and available sources of supply in gpm
Q_L = the largest capacity source available to the system in gpm
t_m = time that remaining sources are pumped on the day that the largest source is not available in minutes (assumed as 24 hours)

The larger of the amount calculated in the equation above, or 200 gallons per ERU, is used for standby emergency storage in this analysis.

Fire Suppression Storage

Water systems are required to construct and maintain facilities capable of delivering fire flows in accordance with the fire flow requirements established by the local fire protection authority while maintaining 20 psi pressure throughout the distribution system. Fire flow requirements vary among DOC water systems. Specific requirements are presented in Sections B2 through B8. These flow requirements were used in storage and distribution system analyses.

The minimum fire suppression storage for systems is the product of the required flow rate multiplied by the flow duration and is based on the following equation:

fire suppression storage (gal) = FF (t_m) where
FF = required fire flow rate
t_m = duration of FF rate

Dead Storage

Dead storage is the volume of stored water not available to all customers at the minimum design pressures. Dead storage is excluded from the volumes provided to meet the effective storage. Dead storage is assumed as that volume which is at an elevation lower than the elevation necessary to provide 20 psi (static) at the meter of the highest customer in any pressure zone.

B1.5 Distribution System

The function of the distribution system is to convey water at adequate service pressures and to provide fire flows. During the peak-hour demand, the capacity of the distribution system must meet demands with a residual pressure of no less than 30 psi. During fire-fighting events, the minimum residual pressure permitted at the fire location is 20 psi, while maintaining positive system pressures throughout the rest of the distribution system (under MDD conditions).

Usually, the inability to meet these demand conditions results from inadequate distribution capacity; that is, pipes are not large enough or pipeline looping is poor. The capacity of the distribution system is greatly reduced when head loss is greater than about 10 feet per 1,000 feet of pipe length.

Sometimes increasing pipe diameters or pipeline grid spacing is not sufficient to significantly increase flows. In these cases, it is better to consider adjusting the hydraulic elevation of either the supply or storage facilities. When analyzing the distribution system, the capability to replenish equalizing storage volume must be considered. The equalizing volume must be

replenished at a rate sufficient to refill the storage reservoirs during the late evening/early morning replenishment hours.

The water distribution systems of DOC focus facilities were evaluated in the following manner. For McNeil Island Corrections Center (MICC), Washington Corrections Center (WCC), Washington Corrections Center for Women (WCCW), and Maple Lane Corrections Center (MLCC) computer models were developed in conjunction with preparation of the 2005 Plan[1], to analyze the distribution systems, due to their complexity. For the remaining focus facilities, field hydrant flow testing was performed in lieu of modeling to gain an understanding of flow and pressure relationships within the various systems. Details regarding both methods are provided below.

B1.5.1 Hydraulic Modeling

The water distribution systems for MICC, WCC, WCCW, and MLCC were analyzed using the hydraulic modeling software program CyberNet, version 3.1. The CyberNet software is a Microsoft Windows-based program that interfaces with AutoCAD to enter all of the system properties and display them on the monitor as an AutoCAD drawing file.

The general methodology of this hydraulic modeling analysis was to examine the current distribution systems during various demand and fire flow conditions and according to the pressure criteria described above. System deficiencies were noted and distribution system improvements proposed, where warranted. Further analysis was performed to verify that additional improvements associated with offender population growth would meet the minimum distribution system criteria.

Because there have been no significant changes to the distribution systems at these facilities, the hydraulic modeling was not updated. Thus, the results documented in the 2005 Plan were retained in this update and are assumed to accurately depict the hydraulic capabilities of the distribution systems.

B1.5.2 Pressure Testing

The water distribution systems for Cedar Creek Corrections Center (CCCC), Larch Corrections Center (LCC), Mission Creek Corrections Center for Women (MCCCW), and Olympic Corrections Center (OCC) were not analyzed using computer models due to the simplicity of the systems. Instead, DOC staff performed fire hydrant flow tests to determine pressure drops in the systems. In general, this process involves flowing one hydrant while recording static and residual pressures at another hydrant. This information can then be used to determine what flows the distribution system is capable of supporting at a minimum fire flow residual pressure (i.e., 20 psi). In this manner, it can be determined if the system is capable of providing required fire suppression flows. The relationship between flow and pressure drop used in this analysis is:

$Q_{20} \times P_t^{0.54} = Q_t \times P_{20}^{0.54}$, where
Q_{20} = flow that provides a residual pressure of 20 psi at the residual hydrant

[1] The MLCC modeling was conducted as part of a 1998 water system evaluation. See Section B9 for more detail.

P_t = pressure drop (static – residual) noted at residual hydrant during flow test
Q_t = flow measured at flowing hydrant during flow test
P_{20} = pressure drop (static – 20) required at residual hydrant required for pressure to decrease to 20 psi

Summary tables are provided for CCCC, LCC, MCCCW, and OCC (in section B2, B3, B4, and B6, respectively) presenting the results of these tests and indicating if minimum fire flow requirements can be met.

It should be noted that this approach is limited. While pressure testing evaluates the distribution system's ability to meet fire flow requirements, it does little in the way of examining ADD or MDD conditions. It is therefore applicable only in situations where these limitations are reasonable, such as with systems that are hydraulically simple and where modifications to the distribution system are not anticipated. If such system modifications are to occur at CCCC, LCC, MCCCW, or OCC in the near future, additional analysis (e.g., hydraulic modeling) will be required.

For some facilities, the results associated with development of the 2005 Plan are retained, as there have been no changes to the system and no recent fire flow tests were conducted. However, for those facilities where more recent fire flow tests have been conducted, the results have been included in Part B.

B1.6 Water Quality Compliance

For each focus water system, a review of recent water quality monitoring data was performed, so as to determine the compliance of each facility with the water quality regulations presented in Section A4. Sections B2 through B9 each contain brief discussions of this review and a table summarizing system monitoring requirements. To ensure proper monitoring, each system follows its water quality monitoring report issued on an annual basis by DOH.

B1.7 Water Conservation

Water conservation plans and/or audits have previously been conducted for some of the focus water systems. These plans are included in Part C. Sections B2 through B9 provide summary information regarding these previous planning efforts, conservation activities planned for implementation at each facility, water meter installation projects (where applicable), compliance with Water Use Efficiency Rule requirements, and other issues related to conservation.

B1.8 Source Protection Program

Wellhead protection plans (WHPPs) are required of all DOC water systems utilizing groundwater. This includes all focus facilities in this Plan except for MICC. The goal of a WHPP is to protect a system's water supply by identifying and managing potential sources of groundwater contamination that could impact groundwater wells.

The primary components of a WHPP are: delineation of wellhead protection area zones of contribution (i.e., time-of-travel zones), establishment and maintenance of an inventory of potential sources of groundwater contamination, and presentation of emergency spill response

and contingency plans. A WHPP also provides a formalized process to notify business owner/operators and educate the public about wellhead protection, where applicable.

WHPPs have already been developed for CCCC, LCC, MLCC, and WCCW. Documentation of these previous efforts is provided in Part C. Updates have been performed for these WHPPs in conjunction with this Plan. Information subject to updating includes delineation of wellhead protection zones of contribution for those systems whose sources and/or source capacities have significantly changed, and the inventory of potential contaminant sources.

WHPPs were developed for MCCCW, OCC, and WCC as a part of the 2005 Plan effort.

B1.9 Operations and Maintenance

The operations and maintenance program presented in Section A6 pertains to all DOC focus systems. Facility-specific information, however, is provided in Sections B2 through B9. The information summarized in these sections includes: operator certifications, emergency call-up lists, water quality laboratories, and contingency plans.

B1.10 Cross-Connection Control

The cross-connection control program presented in Section A7 pertains to all DOC focus systems. Facility-specific information regarding types of installed backflow prevention assemblies is provided in Sections B2 through B9, where this information is available. All other information regarding cross-connection control is found in Section A7.

B1.11 Capital Improvement Program

Sections B2 through B9 each contain a final section that describes the capital improvement program for that facility. These programs include projects necessary for the systems to continue providing safe and reliable drinking water to DOC facilities. For each project, an estimated project cost has been developed.

In cases where projects were identified during development of this plan, project costs were based on estimates of construction cost, plus allowances for sales tax, design fees, and administrative costs. In all instances, projects are in 2014 dollars.

All projects are identified as being planned for implementation within the 10-year planning period (i.e., by 2024). Specific implementation years have not been assigned, as that occurs during a DOC budgeting process that is conducted separately from water system planning. However, the projects have been categorized according to priority. Projects with a priority ranking of 1 are considered to be of high priority. These are typically projects that address health and safety concerns and have obtained funding through DOC's capital planning process. Projects with a priority ranking of 2 are considered to be of moderate priority. These are typically projects that address less critical operational and growth-related issues, and have not been designated for funding.

For each water system, a project is included to address annual renewal and replacement activities associated with the system. The associated budget is intended to be allocated throughout the 10-Year planning period for activities such as leak detection and repair, replacement of aging lines and valves, and installation of service meters and backflow preventers, etc.

Section

B2

Cedar Creek Corrections Center

Section B2
Cedar Creek Corrections Center

B2.1 Facility Description

Cedar Creek Corrections Center (CCCC) is a minimum-security facility located approximately seven miles west of Littlerock in Thurston County. CCCC is located on a remote site within the Capitol Forest under a lease agreement between the Washington State Department of Natural Resources (DNR) and the Washington State Department of Corrections (DOC). The Cedar Creek site is currently used by both DOC and DNR. CCCC facilities are located on five non-contiguous parcels totaling approximately 42 acres.

The existing structures on the site are clustered into several areas: the main institution (which includes the living units), the facility and maintenance area (which contains structures used by both DOC and DNR), and the wastewater treatment plant.

The facility initially opened as a DNR camp in the 1930s and later became a prison for juvenile boys in 1955. Currently, the facility houses approximately 470 male offenders, and employs approximately 120 staff. DNR still maintains a small camp on the site which employs approximately 13 staff and includes a small lumber mill, tree storage coolers, and several maintenance buildings.

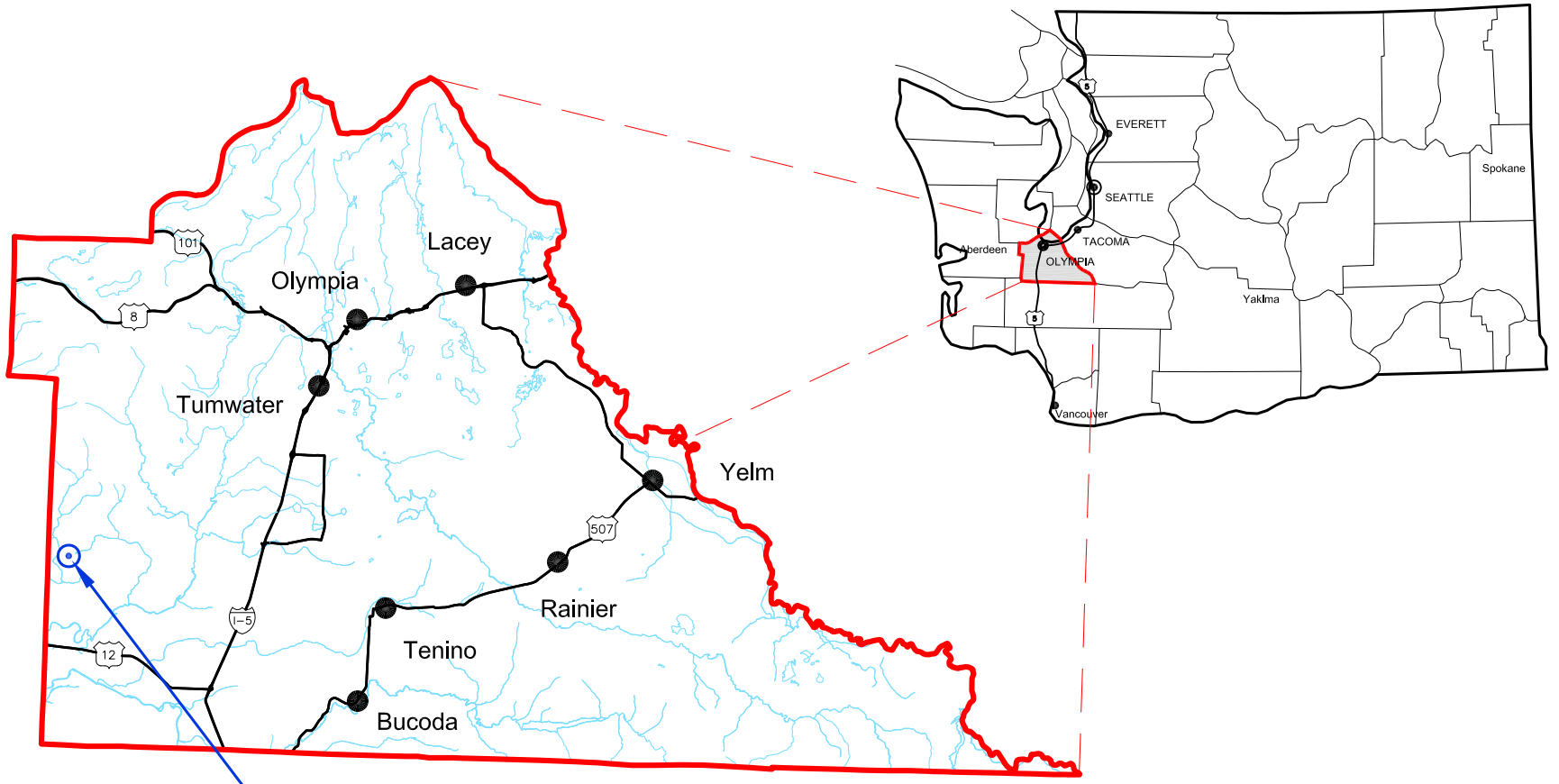
Exhibit B2-1 provides a location map for the facility.

B2.2 Water System Description

Table B2-1 provides a summary of CCCC's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B2-2 depicts the service area of the water system, and Exhibit B2-3 provides a schematic of key water system features. Detailed monthly water production data for 2012-2013 are provided in Appendix C-13.

CCCC relies upon ground water as its source of water supply. Three wells located within an approximately 500-foot radius from each other at the facility provide all water used by the institution. The well logs for each of these wells show that they are cased down through the upper 50 to 80 feet of sand, silt, and clay, with black or blue hard rock continuous to the completed depths of the wells at approximately 200 feet below ground surface (bgs) for Wells 1 and 2, and 402 feet bgs for Well 3. This indicates that water is entering the well columns from the hard rock area, below the overlying sediments.

Since 2007, Well No. 1 has been taken offline and is no longer used by CCCC, but it is still functional and can be used if necessary. Well No. 1 pumps its water through a chlorinator. There were concerns with having the chlorine chemicals accessible to offenders inside the facility, prompting the Superintendent at the time to shut down the well.



Thurston County

Cedar Creek Corrections Center

EXHIBIT B2-1

Washington Department of Corrections

CCCC - Vicinity Map

June 2014

HDR

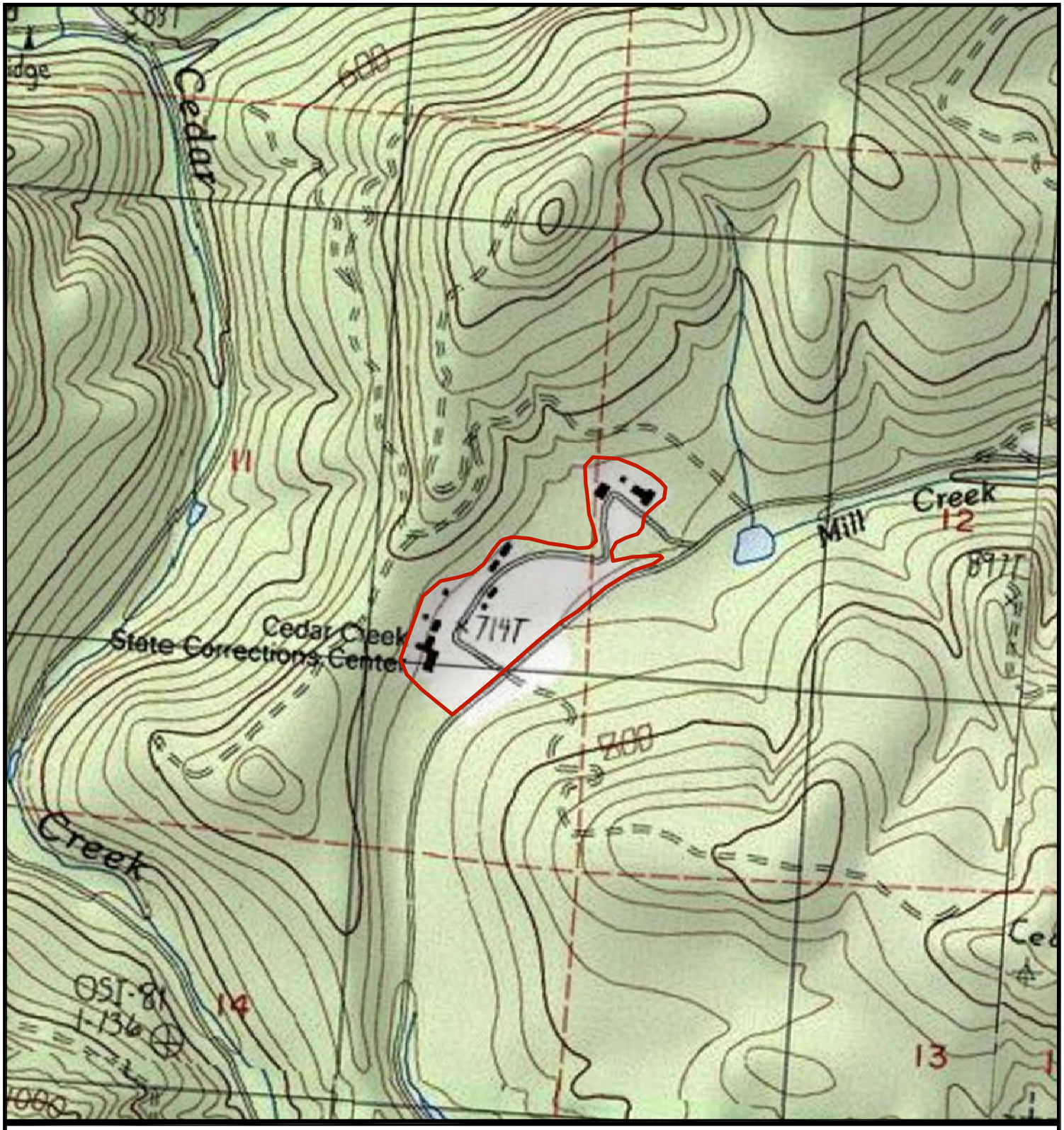


EXHIBIT B2-2

Washington Department of Corrections

CCCC - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

SCALE IN FEET

June 2014

HDR

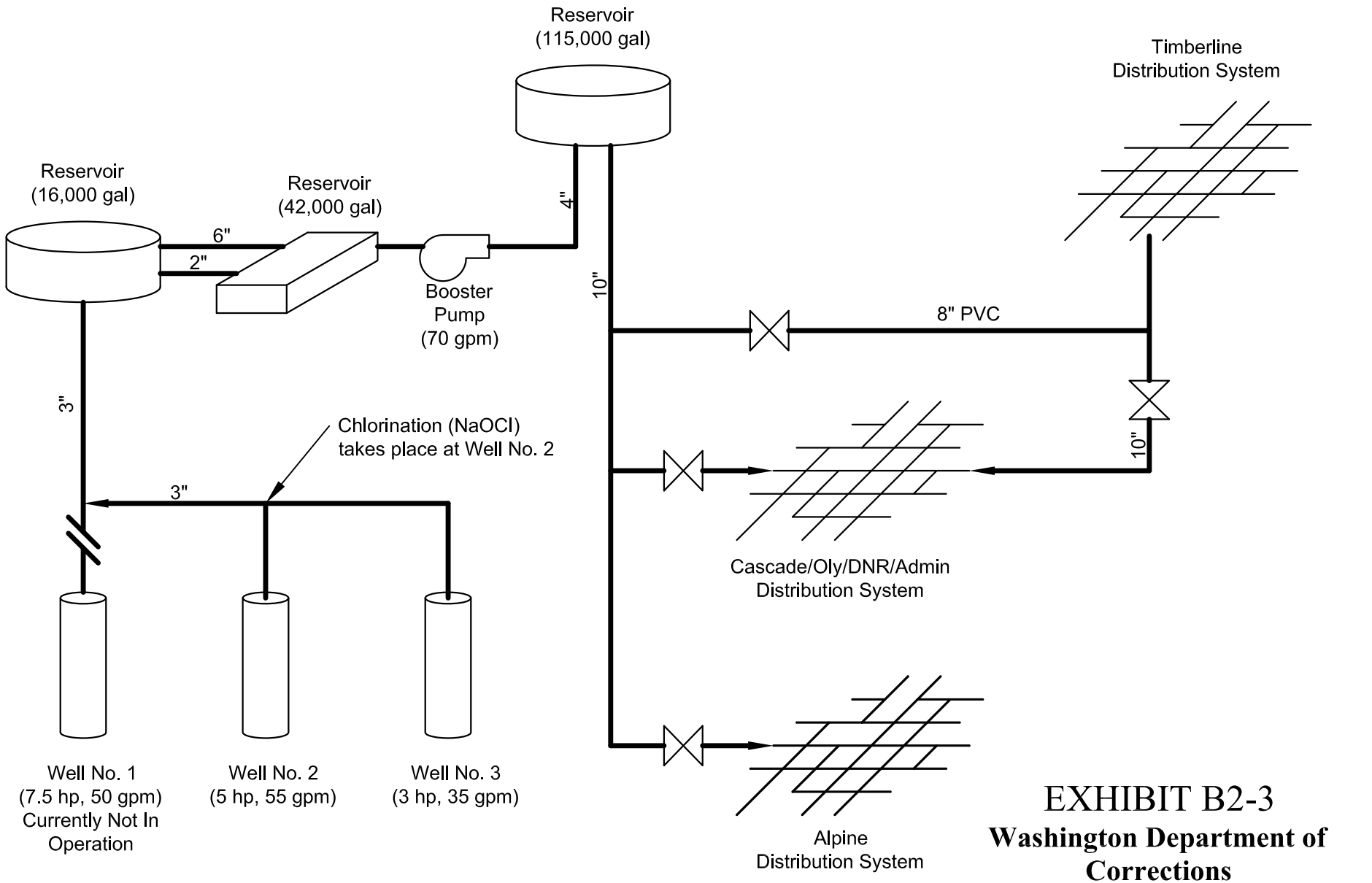


EXHIBIT B2-3

Washington Department of Corrections

CCCC - Water System Schematic

Not to Scale

June 2014

HDR

Table B2-1
Water System Summary - CCCC

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum [2] (gpd)	Peaking Factor	Average (gpd)	Maximum (gpd)
2012-2013	56,108	91,650	1.63	119	195

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
G2-27061C	Well 1[3]	03/02/87	29.5	70
G2-28164	Well 2	05/24/91	46.5 (40.5 domestic, 6.0 irrigation)	60

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm) [4]
Well No. 1[3]	Depth = 200 feet	7.5	50
Well No. 2	Depth = 200 feet	5	55
Well No. 3	Depth = 402 feet	12	35
Treatment Process	Chlorination	NA	NA

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Concrete Reservoir	115,000	1992
In-ground Storage Tank	16,000	1965
In-ground Storage Tank	42,000	1965

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
PVC, AC, Steel	2-10	ND	ND

NA = Not Applicable; ND = Insufficient Data; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

(1) Calculated as facility water-use divided by February 2014 offender population (471).
(2) Based on peak day use recorded in August 2012.
(3) Well No. 1 is not longer in operation, but is still functional if needed to be used.
(4) Per WFI.

Current operations of the CCCC wells typically involve the pumping of any combination of the three wells simultaneously to fill two ground-level storage reservoirs that provide a combined storage capacity of 58,000 gallons. Since Well No. 3 is located in the same quarter-quarter section as Well Nos. 1 and 2, a Showing of Compliance form can be filed to allow Well No. 3 to act as an additional point of withdrawal on the existing water rights for Well Nos. 1 and 2, provided that the total instantaneous and annual water rights for those wells are not exceeded. As it stands, Well No. 3 cannot be used when both Well Nos. 1 and 2 are operating without exceeding the instantaneous water rights. If CCCC decides to obtain additional water rights for Well No. 3, then a new water right application would need to be filed with the Washington State Department of Ecology (Ecology); this can take several years to process and grant.

From the ground-level reservoirs, a booster pump lifts water to an 115,000 gallon reservoir located at a higher elevation. From this reservoir, water is distributed via gravity to the institution through a looped piping system.

The well and reservoir system operates on a series of reservoir level calls. Low water levels in the 115,000 gallon reservoir trigger the booster pump. Low water levels in the in-ground reservoirs trigger the well pumps. When the booster pump is operating and levels in the in-ground reservoir are low, both wells must operate to fill the ground-level reservoirs. Operation of only one well will result in the in-ground reservoirs being drained faster than they can be refilled. This is because the booster pump capacity exceeds the capacity of either well operated independently.

B2.3 Population and Water Demand Forecast

Table B2-2 provides a summary of the 2014 and projected 2024 offender population and water demand. No offender population growth is assumed to occur at this facility in the next 10 years. As such, the water demand is projected to remain constant. Future water conservation activities may decrease the facility's water use factor over time.

Table B2-2
Water Demand Forecast - CCCC

	2014	2024
Offender Population	**471**	**471**
Average Day Demand (gpd)		
Facility	56,108	56,108
Per Offender	119	119
Maximum Day Demand (gpd)		
Facility	91,650	91,650
Per Offender	195	195
ERUs [(1)]	**244**	**244**

(1) Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B2.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B2.4.1 Water Rights

The certificated primary water right for Well No. 1 and Well No. 3 allows up to 29.5 acre-feet per year (afy) withdrawal for multiple domestic use. The maximum instantaneous withdrawal rate allowed under the water right from Well No. 1 and Well No. 3 is 70 gallons per minute (gpm). The water right permit for Well No. 2 and Well No. 3 allows the withdrawal of up to 40.5 afy for multiple domestic supply and 6 afy for irrigation. In addition, the water right permit allows for 29.5 afy supplemental to the primary water right on Well No. 1. The maximum instantaneous withdrawal rate under the water right permit for Well No. 2 and Well No. 3 is 60 gpm.

The total amount of water available under the ground water right for multiple domestic use is 70 afy, or an average of approximately 62,500 gpd. An additional 6 afy (5,300

gpd) is available for irrigation of up to 3 acres, for a total water right available to the site of 76 afy (67,800 gpd).

Table B2-3 provides a comparison of existing water rights with current and projected levels of water demand. Existing water rights are sufficient to meet projected demands.

Table B2-3
Water Right Analysis - CCCC

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)		
G2-27061C (29.5 afy)	26,316	26,316
G2-28164 (40.5 afy)	35,682	35,682
Total	62,444	62,444
Average Day Demand (gpd)	56,108	56,108
Water Right Surplus/(Deficiency) (gpd)	**6,336**	**6,336**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)		
G2-27061C (70 gpm)	100,800	100,800
G2-28164 (60 gpm)	86,400	86,400
Total	187,200	187,200
Maximum Day Demand (gpd)	91,650	91,650
Water Right Surplus/(Deficiency) (gpd)	**95,550**	**95,550**

(1) Only domestic water rights are included in this analysis. Irrigation rights are excluded, as they are not available to meet domestic water needs.

B2.4.2 Source Capacity

Table B2-4 provides a comparison of source capacity with maximum day demand.

Table B2-4
Source Capacity Analysis - CCCC

	2014	2024
Available Source (gpd)		
Well No. 1 (50 gpm) (1)	---	---
Well No. 2 (55 gpm)	79,200	79,200
Well No. 3 (35 gpm)	50,400	50,400
Total	129,600	129,600
Maximum Day Demand (gpd)	91,650	91,650
Source Capacity Surplus/(Deficiency) (gpd)	**37,950**	**37,950**

(1) Well No. 1 is currently not in use; thus, its capacity is excluded from the analysis.

Strictly from a pumping capacity perspective, the CCCC wells are sufficient to meet projected maximum day demands. However, historically there have been concerns regarding the state of the aquifer from which CCCC obtains its water supply. Past studies indicate that static and pumping water levels in the wells have experienced declines since installation[1]. The data suggest that the decline has been long-term, with an initial decline of approximately 6 feet occurring between 1987 and 1992, and a more significant decline of 13 feet occurring between 1995 and 2003. Such declines are prevalent among other well owners that tap fractured basalt zones in the Black Hills area. This is an indication that the pockets of water found in the Black Hills basalt aquifers recharge at rates lower than typical well withdrawals, and are essentially being "mined."

[1] Source: Cedar Creek Corrections Center Utility Expansion Cost Evaluation (EES, June 2004).

DOC has analyzed this issue and identified a range of options aimed at bolstering the sustainability of CCCC's water supply. Long-term alternatives range from enhanced conservation to development of a new ground water source off-site in the glacial outwash aquifer at the foot of the Black Hills. At this time, no specific long-term strategy has been selected. The development of Well No. 3 was done, in part, to bolster the facility's water supply. However, DOC may elect to also pursue an additional, more long-term option, as the issue is further considered in the future, particularly if the population were to increase.

B2.4.3 Storage Capacity

CCCC is currently served by three storage reservoirs. Total system storage is 173,000 gallons. Total required storage is 114,174 gallons, based primarily on a fire flow requirement of 1,810 gpm for one hour, as established by the Thurston County Fire Marshal. As shown in Table B2-5, the existing storage is sufficient to meet projected needs.

Table B2-5
Storage Capacity Analysis – CCCC

	Year	
	2014	**2024**
Projected Population and Demand [1]		
Population (Offenders)	471	471
Per Offender Usage (gpod)	119	119
Projected Demand (gpd)		
Average Day	56,108	56,108
Peak Day	91,650	91,650
ERUs	244	244
Available Source (gpd) [2]		
Well No. 1 (50 gpm)	---	---
Well No. 2 (55 gpm)	79,200	79,200
Well No. 3 (35 gpm)	50,400	50,400
Total Available Source, (gpd)	129,600	129,600
Required Storage Calculations		
Standby Storage (gal) [3]	48,800	48,800
Equalizing Storage (gal) [4]	8,918	8,918
Fire Flow Storage (gal) [5]	108,600	108,600
Total Required Storage [6]	**117,518**	**117,518**
Existing Available Storage (gal)		
42,000 gallon Reservoir	42,000	42,000
16,000 gallon Reservoir	16,000	16,000
115,000 gallon Reservoir	115,000	115,000
Total Available Storage	**173,000**	**173,000**
Storage Surplus/(Deficiency)	***55,482***	***55,482***

(1) See Section B2.3 for details.
(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.
(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or (200 gpd/ERU).
(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)
(5) Required fire flow storage = Flow * duration = 1,810gpm * 1 hr * 60min/hr.
(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B2.4.4 Distribution System Analysis

Fire hydrant flow tests were conducted at CCCC on November 30, 2012. The results of these tests are summarized in Table B2-6. Details are provided in Part C. Three of the 16 hydrants tested resulted in a calculated available flow less than 1,810 gpm, the required fire flow for the facility, at a residual pressure of 20 pounds per square inch (psi). However, it appeared during the tests that the valve stems for hydrants 2 and 3 may have been broken, which could have impacted the results of the test. Based on these results, the facility's distribution system is considered to be able to sufficiently provide required fire flow, with the understanding that flow is limited at three specific hydrants.

Static pressures throughout the facility are typically 65 psi, indicating that the facility is capable of meeting regular system demands while maintaining pressure requirements.

Table B2-6
Distribution System Analysis - CCCC

Hydrant No.	Hydrant Flow (Q_t, gpm) [1]	Static Pressure (psi) [2]	Residual Pressure (psi) [3]	Δ_t (psi) [4]	Δ_{20} (psi) [5]	Q_{20} (gpm)[6]
1	1,275	65	50	15	45	2,300
2	800	65	15	50	45	800
3	800	65	20	45	45	800
4	1,350	65	60	5	45	4,400
5	1,350	65	65	0	45	>2,000
6	1,275	65	50	15	45	2,300
7	1,350	65	60	5	45	4,400
8	1,275	65	55	10	45	2,900
9	1,275	65	50	15	45	2,300
10	1,275	65	55	10	45	2,900
11	1,275	65	55	10	45	2,900
12	1,275	65	55	10	45	2,900
13	840	60	25	35	40	900
14	1,190	65	50	15	45	2,200
15	1,190	65	50	15	45	2,200
16	380	65	5	60	45	300

(1) Measured flow at flowing hydrant during test.
(2) Static pressure at residual hydrant during test.
(3) Residual pressure at residual hydrant during test.
(4) Difference between static and residual test pressures.
(5) Difference between static test pressure and 20 psi.
(6) Flow available at a residual pressure of 20 psi, per equation: $Q_{20} \times \Delta_t^{0.54} = Q_t \times \Delta_{20}^{0.54}$

B2.5 Water Quality Compliance Review

Table B2-7 provides a summary of CCCC's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, CCCC has maintained compliance with water quality regulations in recent years. Minor incidents of noncompliance since 2005 include violation of the Total Coliform Rule in June 2005.

Table B2-7 Water Quality Monitoring – CCCC	
Parameter	**Monitoring Frequency**
Bacteriological	Once per month
Lead & Copper	Once every 3 years
D/DBP [2]	Once every year
Nitrate	Once every year
IOC	Waiver through 2017 (Well No. 2) Once every 3 years (Well No. 3)
VOC	Once every 3 years (Well No. 2) Waiver through 2017 (Well No. 3)
SOC (H,I,P) [1]	H - Waiver through 2020 P and I - Waiver in place- DOH has not established the next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years Gross alpha- Once every 3 years (Well No. 3)
Asbestos	None established

[1] H = Herbicides; I = Insecticides; P = Pesticides
[2] Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B2.6 Water Conservation

CCCC has implemented many conservation measures, including eliminating turf irrigation, installation of low-flow plumbing fixtures, and installation of water-efficient laundry machines. CCCC has also installed a rooftop rainfall collection system for landscape and garden irrigation.

The facility is also considering implementation of shower restriction devices (e.g., timers, motion detectors), shipping of laundry to off-site facilities, leak detection surveys, and use of reclaimed water for a variety of non-potable uses.

CCCC was also part of a statewide metering project. Two meters had previously been installed, at the kitchen and at the Cascade housing unit. In 2004, a third meter was installed, at the Alpine building. Funding has been appropriated by the State Legislature for the CCCC Install Water Meters Project. Meter installation is expected to begin in 2014. Upon completion the facility will be fully metered.

Distribution system leakage is estimated to be zero percent of total water supply. Once CCCC is fully metered, it is anticipated that any unaccounted for water or leaks will be more readily identifiable. CCCC established a goal in 2004 to reduce water consumption 20 percent by 2011.

B2.7 Source Protection

CCCC's wellhead protection plan was developed in 1999. The entire document is included in Part C. An update to the contaminant source inventory was conducted in conjunction with this Water System Plan update. Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within CCCC's wellhead protection area. None were identified. The discussion presented in the wellhead protection plan remains valid in light of this review.

The primary sources of potential contamination at the facility, as previously documented in the wellhead protection plan and recently confirmed by staff, include the following:

- Oils and fuels stored in the chemical shed
- Auto shop
- Abandoned fueling station
- Diesel generator
- Accidental spills on E-line road
- Abandoned underground fuel tank
- Abandoned wood preserving site
- Above ground auto fuel storage at vehicle fueling station
- Wastewater treatment plant (with surface water discharge downstream of CCCC).

B2.8 Operations and Maintenance

B2.8.1 Certified Operators

CCCC currently has two certified operators, Larry Vene (WDM1, No. 10892) and Mark Riddell (No. 13248).

B2.8.2 Emergency Call-up List

Table B2-8 provides the emergency call-up list for CCCC.

Table B2-8
Emergency Call-up List - CCCC

Personnel/Agency	Working Hours Number	Off-Duty Number
Plant Manager – Demar Holtz	(360) 359-4141	(360) 427-9448
Water System Manager – Larry Vene	(360) 664-0718	(360) 490-9866
Superintendent – Douglas Cole	(360) 359-4100	
DOC Project Manager – Ed Hampton	(360) 725-8345	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water – SWRO	(360) 236-3030	1-877-481-4901
Parts Supplier - Keller Plumbing & Parts	(360) 491-0550	
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
Electrical Utility- Puget Sound Energy	(800) 321-4123	
Thurston County Office of Emergency Management	(360) 754-3360	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	700 (Command Control)	
Fire Department	700 (Command Control)	
Emergency Medical	700 (Command Control)	

B2.8.3 Water Quality Testing Laboratories

CCCC uses the following laboratories for water quality testing:

Am Test
14603 NE 87th St.
Redmond WA 98052

Washington State Public Health Laboratory
1610 NE 150th St
Shoreline WA 98155

B2.8.4 Contingency Plan

CCCC has arranged for water to be delivered to the facility by DNR tanker trucks or private vendors in case of an emergency, per the trucked water plan presented in Section A6.3.3. The private vendors are Kelly's Water Service in Littlerock (360-534-0355) and Water Truck Services.

B2.9 Cross-Connection Control

Backflow prevention assemblies were installed throughout the institution during a 1997 architectural renovation. Assemblies are installed at the following locations:

- Olympic fire system (2")
- Olympic fire system (4")
- Olympic boiler make-up (3/4")
- Warehouse fire system (6")
- Furnace room hot water tank (1")
- Vault by water tower (4")
- Vault by water tower (3/4")
- Lower reservoir pump room (2")
- Vault behind T-line (4")
- T-line boiler room (3/4")

All assemblies are tested on an annual basis by a contracted certified backflow assembly tester.

B2.10 Capital Improvement Program

The following are capital improvement projects planned for implementation at CCCC within the ten year planning period.

CCCC-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $20,000. Therefore, the total 10-Year planning period estimated cost is $200,000. **Priority Ranking = 2.**

Section

B3

Larch Corrections Center

Section B3
Larch Corrections Center

B3.1 Facility Description

Larch Corrections Center (LCC) is a minimum security adult correctional facility. LCC is located in a remote area in unincorporated Clark County about 10 miles east of the Town of Yacolt. Yacolt is approximately 25 miles northeast of Vancouver, Washington.

LCC was originally constructed in 1956 in response to a series of fires in the Yacolt Burn State Forest. The Washington State Department of Natural Resources (DNR) and the Washington State Department of Corrections (DOC) work cooperatively to provide forest management jobs for offenders. Such activities consist of fire suppression, reforestation, and park maintenance.

Currently, the facility houses approximately 470 male offenders, and employs approximately 125 staff. There are approximately 14 DNR staff who also work on the site.

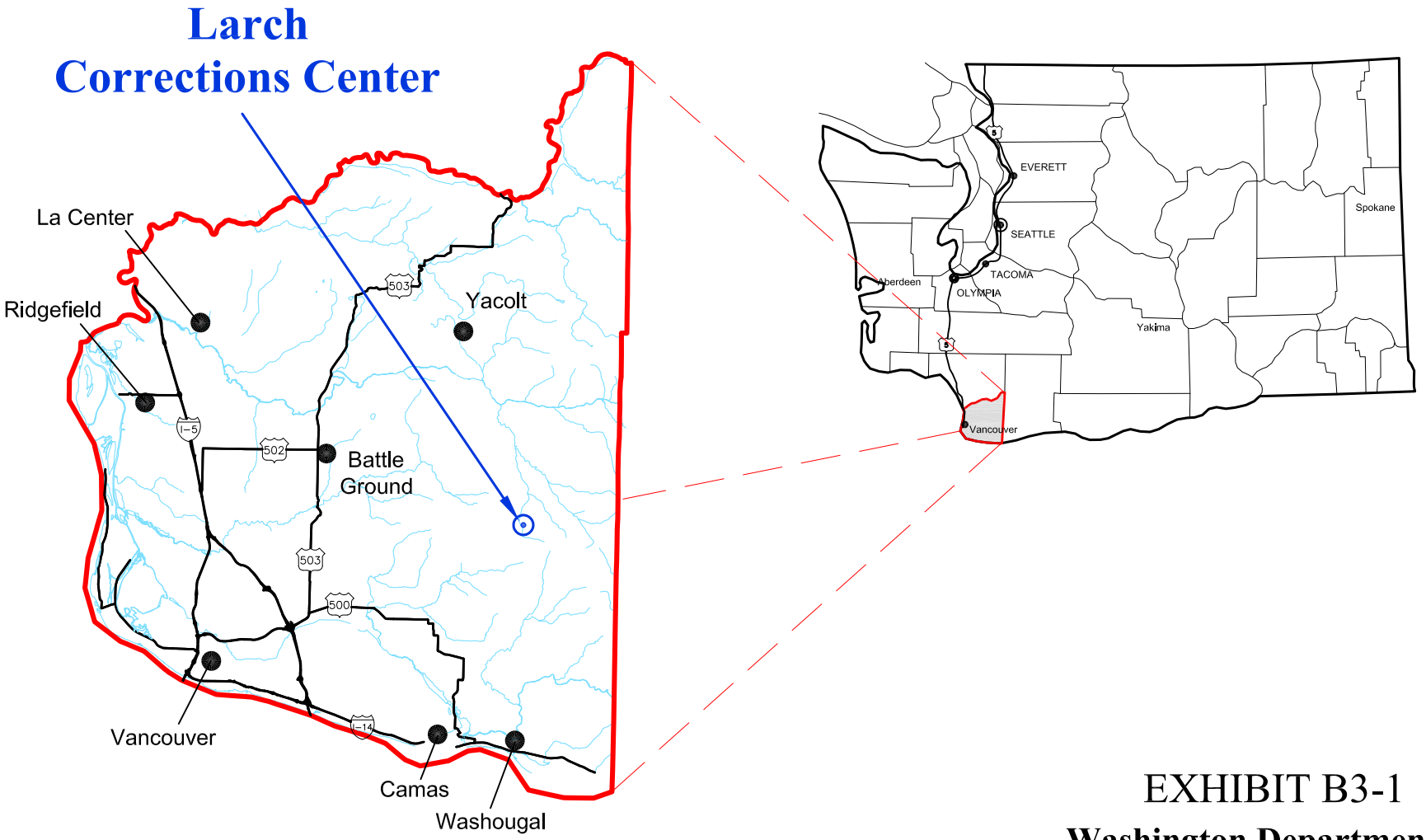
Exhibit B3-1 provides a location map for the facility.

B3.2 Water System Description

Table B3-1 provides a summary of LCC's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B3-2 depicts the service area of the water system, and Exhibit B3-3 provides a schematic of key water system features. Detailed monthly water production data for 2012-2013 are provided in Appendix C-13.

LCC relies upon two wells as its source of water supply. Well No. 3 produces approximately 65 gallons per minute (gpm), and is used less than the newer Well No. 4, which operates at 100 gpm. Two other wells located within the property boundaries of the institution (Wells No. 1 and 2) have been abandoned and properly decommissioned.

Water from Wells No. 3 and 4 is disinfected and pumped directly to two concrete storage reservoirs. Water is conveyed via gravity from the reservoirs to the distribution system.



Clark County

EXHIBIT B3-1

Washington Department of Corrections

LCC -Vicinity Map

June 2014

HDR

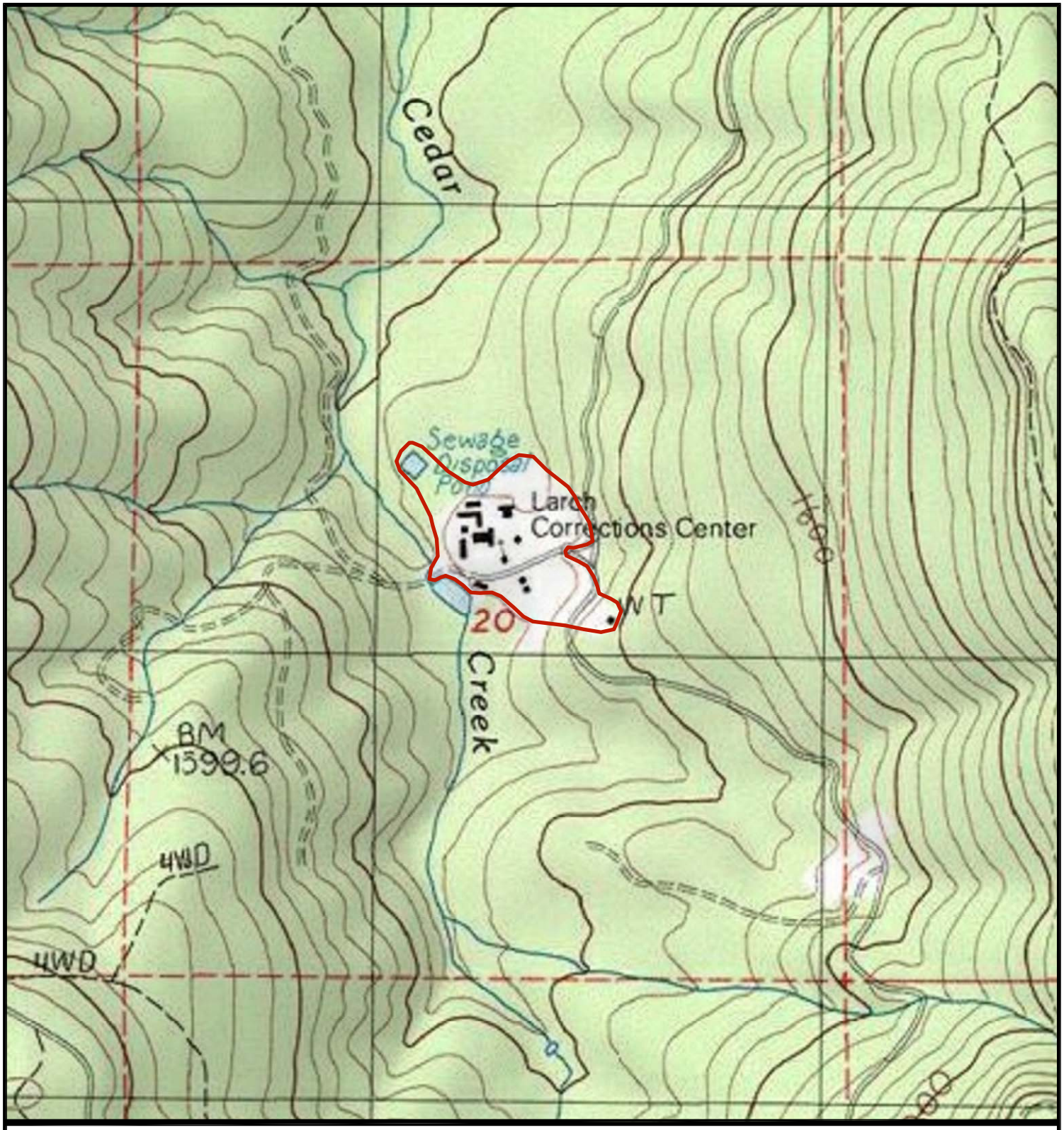


EXHIBIT B3-2

Washington Department of Corrections

LCC - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

SCALE IN FEET

June 2014

HDR

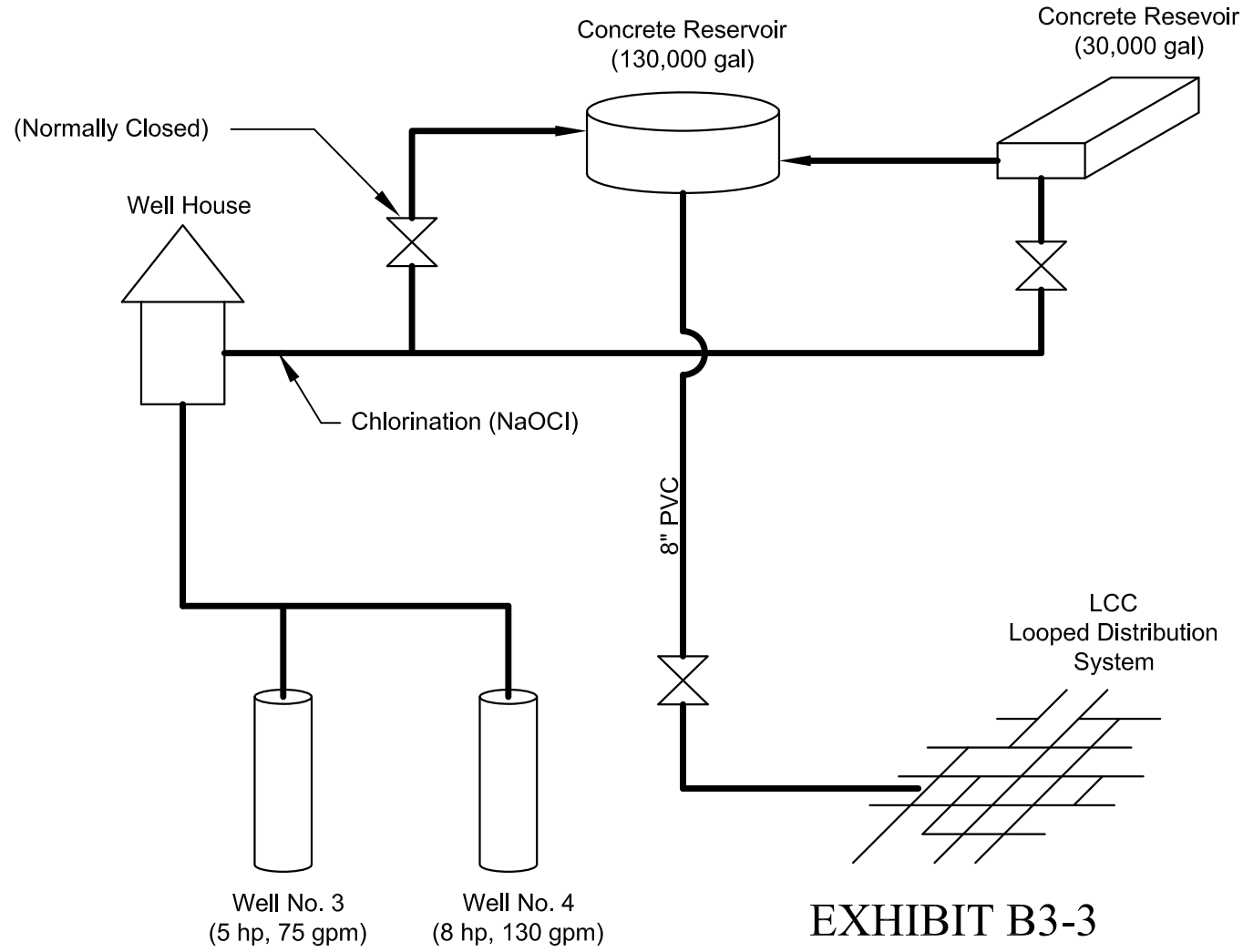


EXHIBIT B3-3

Washington Department of Corrections

LCC - Water System Schematic

Not to Scale

June 2014

HDR

Table B3-1
Water System Summary - LCC

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum (gpd) [2]	Peaking Factor	Average (gpd)	Maximum (gpd)
2012-2013	56,410	104,346	1.8	121	224

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
G2-29044	Wells 3 & 4	05/10/94	70.1 (66.1 domestic, 4 irrigation)	115

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Well No. 3	Depth = 200 feet Screening interval unknown	5	65
Well No. 4	Depth = 170 feet	7	100
Treatment Process	Chlorination	NA	NA

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Rectangular concrete tank	30,000	1982
Circular concrete tank	130,000	1994

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
PVC	8	2,500	1998

NA = Not Applicable; ND = Insufficient Data; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

(1) Calculated as facility water use divided by average 2014 offender population (466).
(2) Based on peak day use recorded in September 2013.

B3.3 Population and Water Demand Forecast

Table B3-2 provides a summary of the 2014 and projected 2024 offender population and water demand. No offender population growth is assumed to occur at this facility in the next 10 years. As such, the water demand is projected to remain constant. Future water conservation activities may decrease this water use factor over time.

Table B3-2
Water Demand Forecast - LCC

	2014	2024
Offender Population	**466**	**466**
Average Day Demand (gpd)		
Facility	56,410	56,410
Per Offender	121	121
Maximum Day Demand (gpd)		
Facility	104,346	104,346
Per Offender	224	224
ERUs [1]	**245**	**245**

[1] Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B3.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B3.4.1 Water Rights

Existing water rights limit withdrawals to 70.1 acre-feet per year (afy) on an annual basis. Of this total, 66.1 afy are for domestic purposes while the remaining 4.0 afy are for irrigation.

Table B3-3 provides a comparison of existing water rights with current and projected levels of water demand. Existing water rights are sufficient to meet projected demands.

Table B3-3
Water Right Analysis - LCC

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)	58,965	58,965
Average Day Demand (gpd)	56,410	56,410
Water Right Surplus/(Deficiency) (gpd)	**2,555**	**2,555**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)	165,600	165,600
Maximum Day Demand (gpd)	104,346	104,346
Water Right Surplus/(Deficiency) (gpd)	**61,254**	**61,254**

(1) Only domestic water rights are included in this analysis. Irrigation rights are excluded, as they are not available to meet domestic water needs.

B3.4.2 Source Capacity

Table B3-4 provides a comparison of source capacity with maximum day demand. Existing source capacity is sufficient to meet projected demands.

Table B3-4
Source Capacity Analysis - LCC

	2014	2024
Available Source (gpd)		
Well No. 3 (65 gpm)	93,600	93,600
Well No. 4 (100 gpm)	144,000	144,000
Total	237,600	237,600
Maximum Day Demand (gpd)	104,346	104,346
Source Capacity Surplus/(Deficiency) (gpd)	**133,254**	**133,254**

B3.4.3 Storage Capacity

LCC is currently served by two storage reservoirs. Total current system storage is 160,000 gallons. By the end of 2014, the existing 30,000 gallon reservoir is planned to be replaced by three 120,000 gallon tanks. When that is completed, total reservoir storage will equal 490,000 gallons.

Total required storage is 123,146 gallons, based primarily on a fire flow requirement of 1,000 gpm for two hours, as established by the Clark County Fire Marshal. As shown in Table B3-5, the existing storage is sufficient to meet projected needs.

Table B3-5
Storage Capacity Analysis – LCC

	Year	
	2014	**2024**
Projected Population and Demand [1]		
Population (offenders)	466	466
Per Offender Usage (gpod)	121	121
Projected Demand (gpd)		
Average Day	56,410	56,410
Peak Day	104,346	104,346
ERUs	245	245
Available Source (gpd) [2]		
Well No. 3 (65 gpm)	93,600	93,600
Well No. 4 (100 gpm)	144,000	144,000
Total Available Source, when operating together (gpd)	237,600	237,600
Required Storage Calculations		
Standby Storage (gal)[3]	49,000	49,000
Equalizing Storage (gal)[4]	5,217	5,217
Fire Flow Storage (gal)[5]	120,000	120,000
Total Required Storage [6]	**125,217**	**125,217**
Existing Available Storage (gal)		
30,000 gallon Reservoir	30,000	---
130,000 gallon Reservoir	130,000	130,000
360,000 gallons (Future 3 Reservoirs)	---	360,000
Total Available Storage	**160,000**	**490,000**
Storage Surplus/(Deficiency)	***34,783***	***364,783***

(1) See Section B3.3 for details.

(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.

(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or (200 gpd/ERU).

(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)

(5) Required fire flow storage = Flow * duration = 1,000 gpm * 2 hr * 60min/hr.

(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B3.4.4 Distribution System Analysis

Fire hydrant flow tests were conducted at LCC in September, 2012. The results of these tests are summarized in Table B3-6. Details are provided in Part C. Both tests resulted in a calculated available flow greater than 1,000 gpm, the required fire flow for the facility, at a residual pressure of 20 pounds per square inch (psi). Therefore, the distribution system appears to provide sufficient fire flows while maintaining residual pressure requirements.

Static pressures throughout the facility were between 40 and 60 psi, indicating that the facility is capable of meeting system demands while maintaining pressure requirements.

Table B3-6 Distribution System Analysis - LCC						
Test	**Hydrant Flow (Q_t, gpm) [1]**	**Static Pressure (psi) [2]**	**Residual Pressure (psi) [3]**	**Δ_t (psi) [4]**	**Δ_{20} (psi) [5]**	**Q_{20} (gpm) [6]**
1	1,030	41	30	11	21	1,500
2	1,060	52	42	10	32	2,000

(1) Measured flow at flowing hydrant during test.
(2) Static pressure at residual hydrant during test.
(3) Residual pressure at residual hydrant during test.
(4) Difference between static and residual test pressures.
(5) Difference between static test pressure and 20 psi.
(6) Flow available at a residual pressure of 20 psi, per equation: $Q_{20} \times \Delta_t^{0.54} = Q_t \times \Delta_{20}^{0.54}$

B3.5 Water Quality Compliance Review

Table B3-7 provides a summary of LCC's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, LCC has maintained compliance with water quality regulations in recent years. Minor incidents of noncompliance since 2005 include violation of the Total Coliform Rule on December 4, 2012, December 6, 2012, and May 6, 2014.

Table B3-7 Water Quality Monitoring – LCC	
Parameter	**Monitoring Frequency**
Bacteriological	Once per month
Lead & Copper	Once every 3 years
D/DBP [2]	Once every year
Nitrate	Once every year
IOC	Waiver through 2017
VOC	Waiver through 2014
SOC (H,I,P) [1]	H- Waiver through 2014
	P and I- Wavier in place – DOH has not established the next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years
	Radium 226- Once every 3 years (Well No. 4)
Asbestos	None established

(1) H = Herbicides; I = Insecticides; P = Pesticides
(2) Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B3.6 Water Conservation

In order to accurately track water production and usage, LCC has installed source meters on the wells, as well as demand meters on all buildings, including those where water use intensive activities take place such as the laundry, kitchen, and showers. Water usage is tracked for DOC and DNR facilities separately.

The DOC has established a goal to reduce offender consumption to 125 gpd. LCC has exceeded this goal by reducing daily offender consumption to 90 gpd (based on metered consumption, as compared to 121 gpd per offender based on meter water production by the wells), saving an estimated 12,775 gallons annually. These savings are attributed to the installation of low-flow toilets, reduction of lawn irrigation, and implementation of other general water conservation practices. In 2012, distribution system leakage was estimated to be 34.5 percent of total water purchases, with a three year average of 18.5 percent. LCC established a goal to reduce the percentage of unaccounted for water to less than 10 percent. In order to achieve this goal, LCC is in the process of evaluating all service meters for accuracy and working to replace the leaking 30,000 gallon storage tank, as noted previously.

B3.7 Source Protection

LCC's wellhead protection plan was developed in 1997. The entire document is included in Part C. Since development of the wellhead protection plan, the facility's sources and pumping regime have changed. The delineated wellhead zones of contribution (i.e., time-of-travel zones) have been updated to reflect these changes. Exhibit B3-4 depicts the zones of contribution for Wells No. 3 and 4, the two active wells at the site. Details regarding the wells are provided in Section B3.2. The susceptibility assessment for Well No. 4, which was drilled since the development of the wellhead protection plan, is included in Appendix C.

An update to the contaminant source inventory was also conducted in conjunction with this Water System Plan update. The Department of Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within LCC's wellhead protection area. None were identified. The discussion presented in the wellhead protection plan regarding potential contaminants and contaminant sources located at the facility remain valid in light of this review.

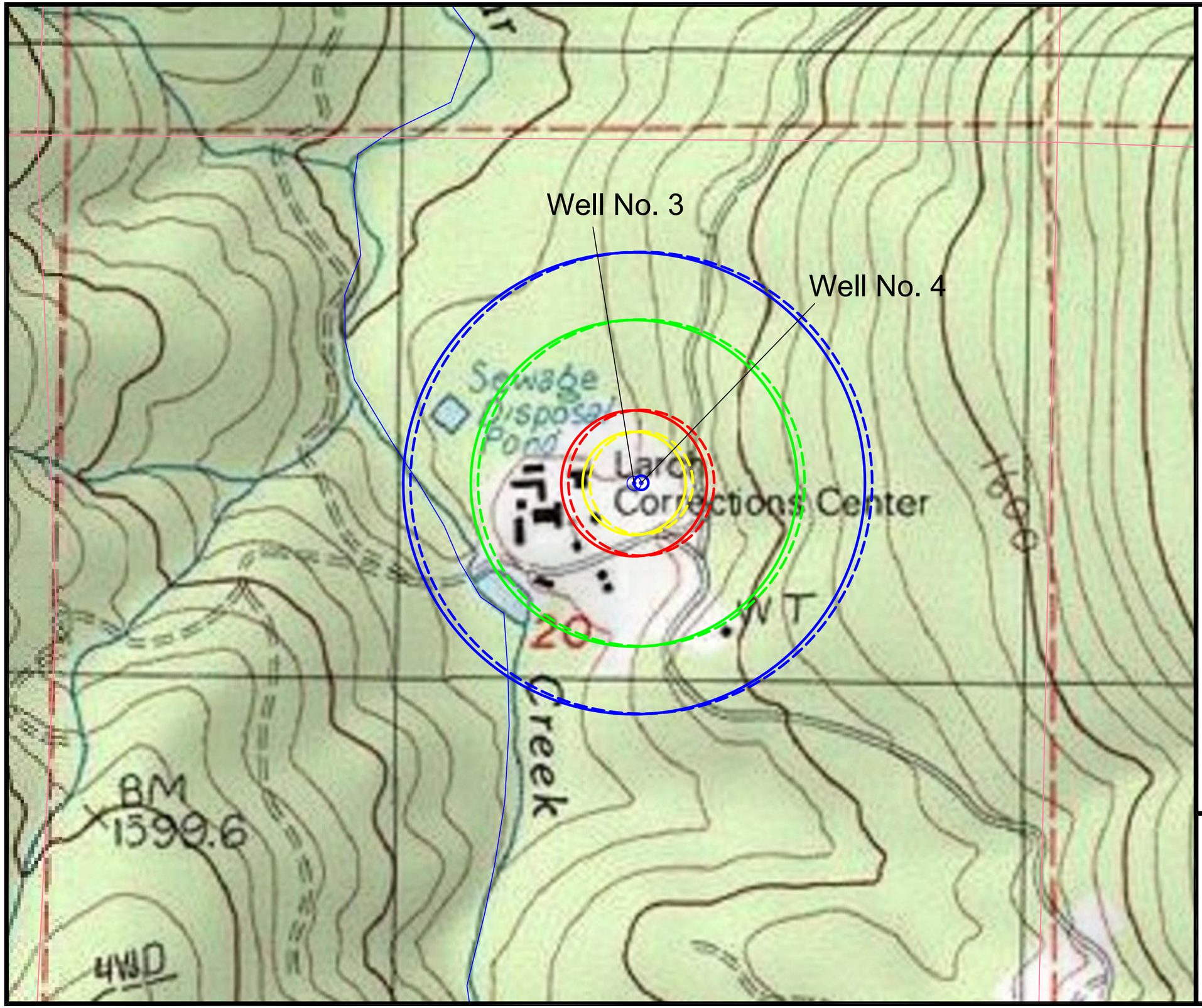
The primary sources of potential contamination at the facility, as previously documented in the wellhead protection plan and recently confirmed by staff, include the following:

- Oils and fuels stored at the DNR warehouse and garage
- Gasoline and diesel fuel at the DNR fueling station
- Gasoline and diesel fuel stored in underground storage tanks at the DNR fueling station
- DNR oil/water separator
- Diesel fuel in boiler room aboveground fuel storage tanks
- Paints and solvents in paint and flammables storage shed
- Garbage can wash
- Accidental spills and herbicide application along entrance road
- Boiler room sump
- Fuels and oils at DNR shops
- Welding repair shop.

B3.8 Operations and Maintenance

B3.8.1 Certified Operators

LCC currently has one certified operator, Aaron Markham (WDM 2, WTPO 1, CCS, No. 011417).



Legend

Well Location

Well No. 3 WHP Zone of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

Well No. 4 WHP Zones of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

N

0 500 1000

SCALE IN FEET

EXHIBIT B3-4

Washington Department of Corrections

LCC - Wellhead Zones of Contribution

June 2014

HDR

B3.8.2 Emergency Call-up List

Table B3-8 provides the emergency call-up list for LCC.

Table B3-8
Emergency Call-up List - LCC

Personnel/Agency	Working Hours Number	Off-Duty Number
Plant Manager – Terry Hettinger	(360) 260-6300 ext 291	
Water System Manager – Aaron Markham	(360) 260-6300 ext 284	(253) 876-4985
Superintendent – Stefani Meusborn-Marsh	(360) 260-6300 ext 200	
DOC Project Manager – Ed Hampton	(360) 725-8345	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water – SWRO	(360) 236-3030	1-877-481-4901
Clark County PUD –Electrical Utility	(360) 992-8000	
Parts Supplier – Hall & Sons 24-hour message phone	(360) 892-0611 (360) 892-33 68	
Emergency Water Supplier – Bob Jones Water Truck Services Mountain View Trucking	 (360) 825-5445 (541) 298-1943	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	300 (Major Control)	
Fire Department	300 (Major Control)	
Emergency Medical	300 (Major Control)	

B3.8.3 Water Quality Testing Laboratories

LCC uses the following laboratory for water quality testing:

Pyxis Laboratories
12423 NE Whitaker Way
Portland, OR 97230

B3.8.4 Contingency Plan

LCC has arranged for water to be delivered to the facility by tanker trucks (Water Truck Services) in case of an emergency, per the trucked water plan presented in Section A6.3.3. The nearest community is the Town of Yacolt, which is provided water by Clark Public Utilities (CPU). CPU could also be contacted in the event of an emergency.

B3.9 Cross-Connection Control

LCC has installed 13 double check valve backflow prevention assemblies and five reduced pressure backflow assemblies. All assemblies are tested on an annual basis by a certified backflow assembly tester.

B3.10 Capital Improvement Program

LCC-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be

$20,000. Therefore, the total 10-Year planning period estimated cost is $200,000. **Priority Ranking = 2.**

LCC-2: Reservoir Replacement. This refers to replacement of the aging, leaking 30,000 gallon reservoir with three 120,000 gallon reservoirs. The budgeted funding to cover this project in 2014 is $981,277. **Priority Ranking = 1.**

Section

B4

Mission Creek Corrections Center for Women

Section B4
Mission Creek Corrections Center for Women

B4.1 Facility Description

Mission Creek Corrections Center for Women (MCCCW) is located in an unincorporated portion of Mason County, approximately four miles northwest of the City of Belfair. The facility is situated on 19.5 acres of land leased from the Washington State Department of Natural Resources (DNR).

MCCCW was opened in the early 1960s as the Mission Creek Youth Camp, originally under the management of the Department of Social and Health Services (DSHS). At that time, the facility was used as a detention facility for juvenile offenders, housing 60 to 90 youth. In 2003, the facility was transferred to the Washington State Department of Corrections (DOC) and became the MCCCW. The first 80 offenders were transferred to MCCCW in April 2005. Since then, the institution has been expanded to accommodate approximately 300 offenders.

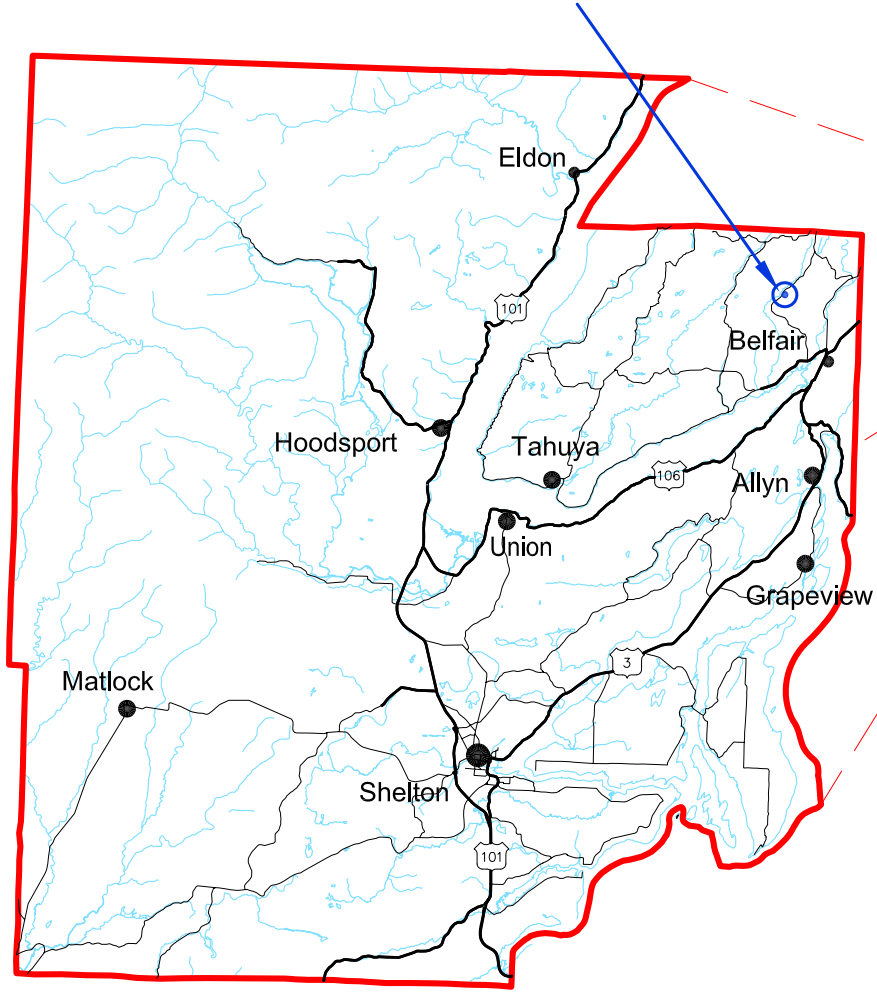
Exhibit B4-1 provides a location map for the facility.

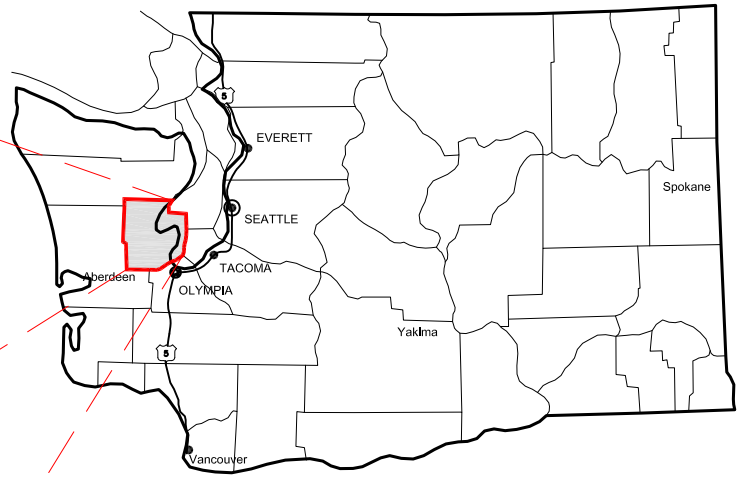
B4.2 Water System Description

Table B4-1 provides a summary of MCCCW's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B4-2 depicts the service area of the water system, and Exhibit B4-3 provides a schematic of key water system features. Detailed monthly water production data for 2012-2013 are provided in Appendix C-13.

MCCCW's water supply is obtained from two wells, Well Nos. 1 and 3. Water is pumped from these wells to a 225,000 gallon reservoir. A booster pump pulls water from the reservoir and feeds the distribution system which serves as both fire suppression as well as drinking water. The reservoir has been outfitted with a water stirrer to reduce stagnation problems. The reservoir was last inspected in 2011 with no issues being noted. An older 30,000 gallon storage tank, which provided the backup reserve for domestic water, was taken out of service and removed in 2010. Water distribution piping consists primarily of 4-inch diameter mains and an outer fire suppression loop. The water system at MCCCW is not chlorinated but has been outfitted with pumps and injection points for future chlorination.

Mission Creek Corrections Center for Women





Mason County

EXHIBIT B4-1

Washington Department of Corrections

MCCCW - Vicinity Map

June 2014

HDR

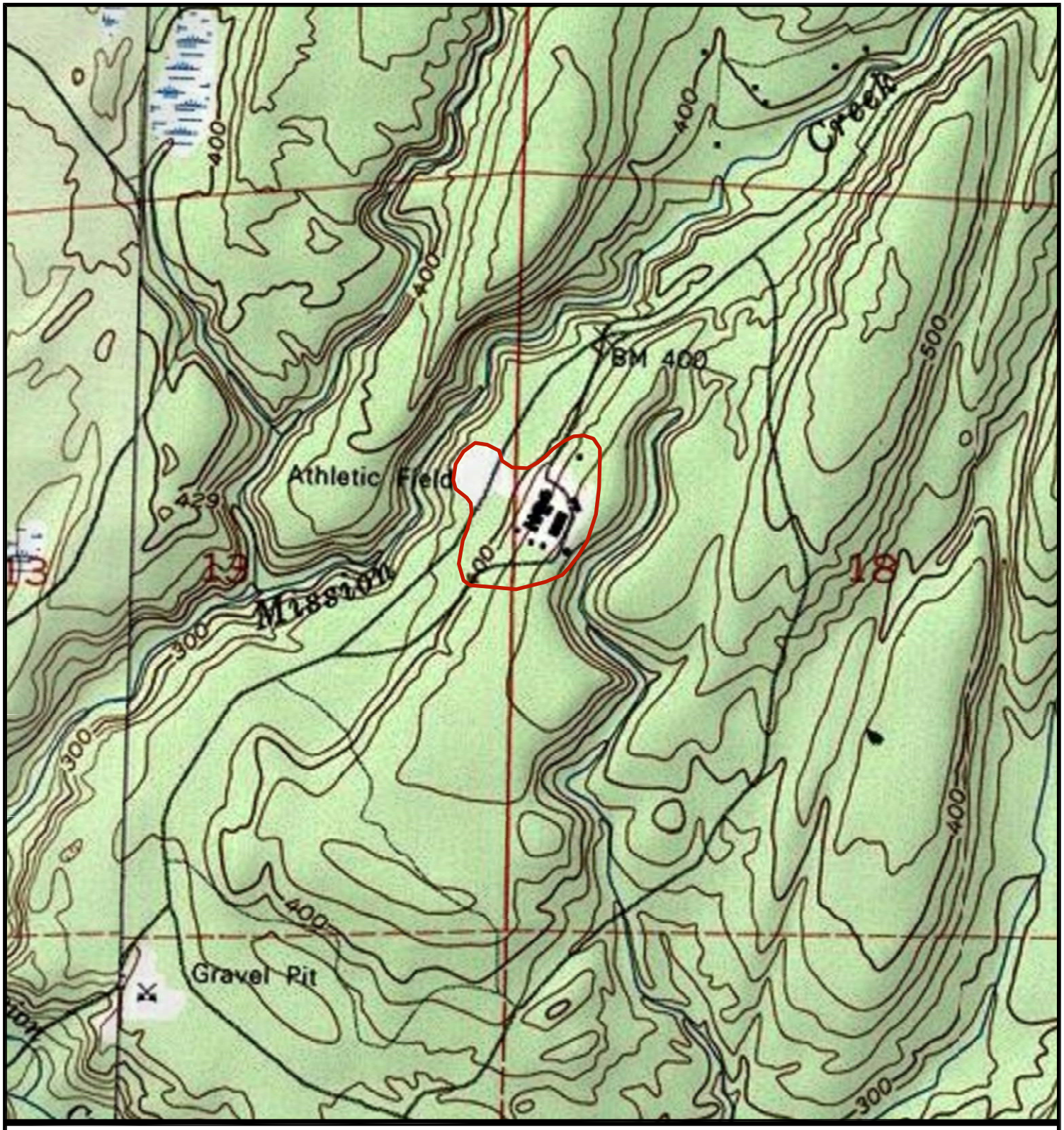


EXHIBIT B4-2

Washington Department of Corrections

MCCCW - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

SCALE IN FEET

June 2014

HDR

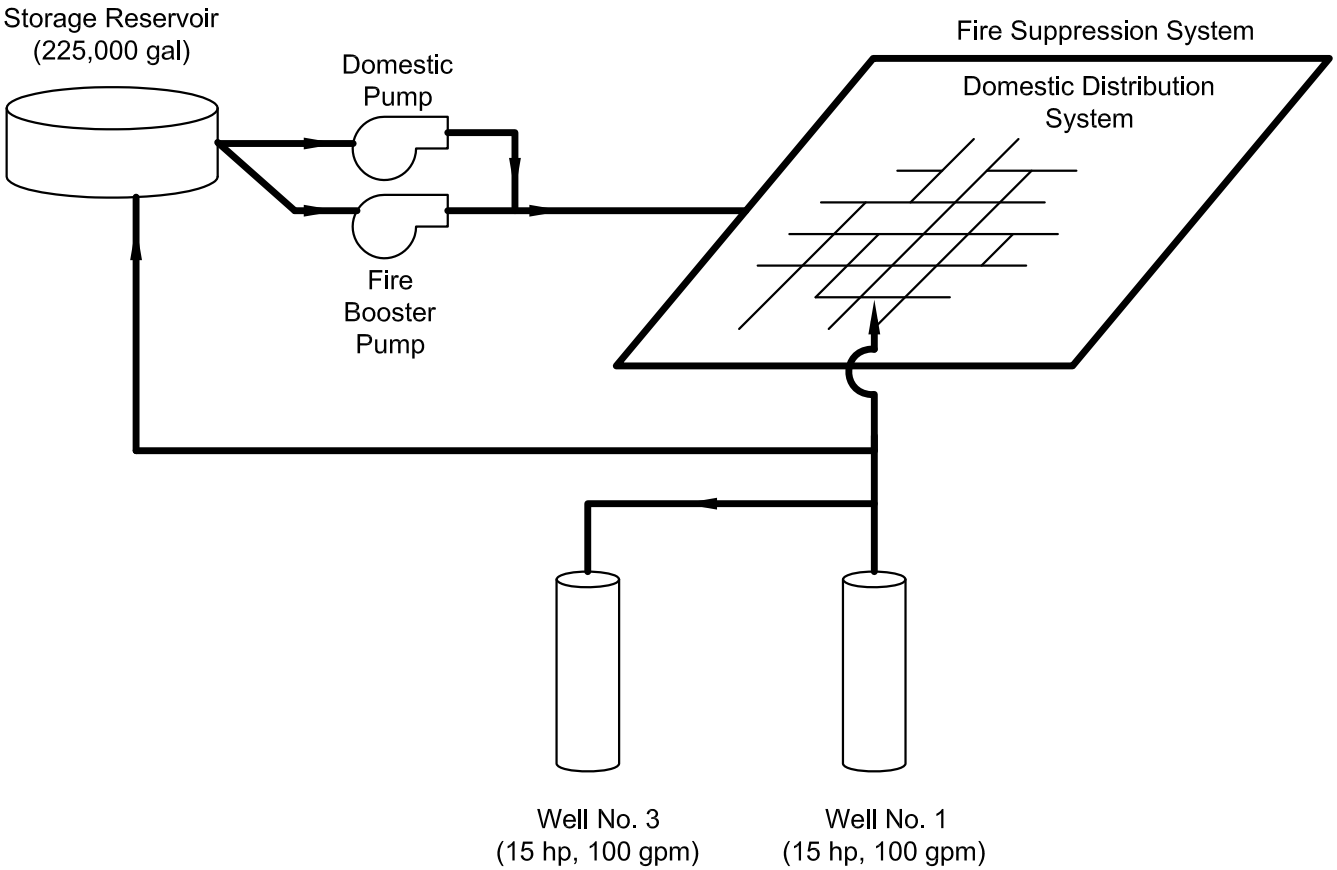


EXHIBIT B4-3

Washington Department of Corrections

MCCCW - Water System Schematic

June 2014

HDR

Table B4-1
Water System Summary - MCCCW

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum (gpd) [2]	Peaking Factor	Average (gpd)	Maximum (gpd)
2012-2013	19,680	39,360	2.0	63	126

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
5724-A	Well 1	10/10/60	8.0	125
G2-21634C	Well 1	10/24/73	27.3 (7.3 domestic, 20 irrigation)	100

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Well 1	Depth = 160 ft	15	100
Well 3	Depth = 168 ft	15	125

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Ground-level Tank	225,000	1998

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
ND	4, 6, 8 (fire)	ND	ND

NA = Not Applicable; ND = Insufficient Data. ; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

[1] Calculated as facility water-use divided by February 2014 offender population (314).

[2] Based on an assumed peaking factor of 2.0.

B4.3 Population and Water Demand Forecast

Table B2-2 provides a summary of the 2014 and projected 2024 offender population and water demand. No offender population growth is assumed to occur at this facility in the next 10 years. As such, the water demand is projected to remain constant. Future water conservation activities may decrease the facility's water use factor over time.

Table B4-2
Water Demand Forecast - MCCCW

	2014	2024
Offender Population	**314**	**314**
Average Day Demand (gpd)		
Facility	19,680	19,680
Per Offender	63	63
Maximum Day Demand (gpd)		
Facility	39,360	39,360
Per Offender	126	126
ERUs [1]	**86**	**86**

[1] Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B4.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B4.4.1 Water Rights

The total annual water right available for MCCCW is 35.3 acre-feet per year (afy), based on the two existing water rights. Initially, only 15.3 afy of this total was allocated to domestic use. The remaining 20 afy was specified for irrigation use. In 2004, DOC filed an application for change of water rights with the Mason County Conservancy Board, requesting that the purpose of use associated with irrigation be changed to domestic supply. The Conservancy Board approved this change in March 2005, and in May 2005, the Washington State Department of Ecology (Ecology) confirmed the change. The full water right is now available to MCCCW for domestic use.

Table B4-3
Water Right Analysis - MCCCW

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)		
5724-A (8 afy)	7,141	7,141
G2-21634C (27.3 afy)	24,359	24,359
Total	31,500	31,500
Average Day Demand (gpd)	19,680	19,680
Water Right Surplus/(Deficiency) (gpd)	**11,820**	**11,820**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)		
5724-A (125 gpm)	180,000	180,000
G2-21634C (100 gpm)	144,000	144,000
Total [(1)]	180,000	180,000
Maximum Day Demand (gpd)	39,360	39,360
Water Right Surplus/(Deficiency) (gpd)	**140,640**	**140,640**

(1) The total instantaneous withdrawal is assumed to be the greater of that associated with the two rights (i.e., 125 gpm).

B4.4.2 Source Capacity

Table B4-4 provides a comparison of source capacity with maximum day demand.

Table B4-4
Source Capacity Analysis - MCCCW

	2014	2024
Available Source (gpd)		
Well No. 1 (100 gpm)	144,000	144,000
Well No. 3 (125 gpm)	180,000	180,000
Total [(1)]	180,000	180,000
Maximum Day Demand (gpd)	39,360	39,360
Source Capacity Surplus/(Deficiency) (gpd)	**140,640**	**140,640**

(1) Total source is the greater of the two wells, since they both utilize the same water right, and thus can not pump together.

The existing wells have adequate capacity to meet projected demands at MCCCW.

B4.4.3 Storage Capacity

MCCCW is currently served by one storage reservoir. A 30,000 gallon elevated tank which had previously provided domestic storage was taken out of service and removed in 2010. A 225,000 gallon ground-level reservoir now provides both domestic and fire suppression storage.

Storage requirements are driven primarily on a fire flow requirement of 1,800 gpm for two hours, as established by the Mason County Fire Marshal. This equates to a required fire suppression volume of 216,000 gallons.

As shown in Table B2-5, the existing storage is sufficient to meet projected needs.

Table B4-5
Storage Capacity Analysis – MCCCW

	Year	
	2014	**2024**
Projected Population and Demand [1]		
Population (offenders)	80	80
Per Offender Usage (gpod)	63	63
Projected Demand (gpd)		
Average Day	19,680	19,680
Peak Day	39,360	39,360
ERUs	86	86
Available Source (gpd) [2]		
Well No. 1 (100 gpm)	144,000	144,000
Well No. 3 (125 gpm)	180,000	180,000
Total Available Source (gpd) (largest of two sources)	180,000	180,000
Required Storage Calculations		
Standby Storage (gal)[3]	39,360	39,360
Equalizing Storage (gal)[4]	1,968	1,968
Fire Flow Storage (gal)[5]	216,000	216,000
Total Required Storage [6]	**217,968**	**217,968**
Existing Available Storage (gal)		
Ground-level Reservoir (225,000 gallons)	225,000	225,000
Total Available Storage	**225,000**	**225,000**
Storage Surplus/(Deficiency)	7,032	7,032

(1) See Section B4.3 for details.
(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.
(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or (200 gpd/ERU).
(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)
(5) Required fire flow storage = Flow * duration = 1,800 gpm * 2 hrs * 60min/hr.
(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B4.4.4 Distribution System Analysis

Fire hydrant flow tests were conducted at MCCCW on March 1, 2005, to examine the fire suppression piping loop. The results of these tests are summarized in Table B4-6.

Details are provided in Part C. Both tests resulted in a calculated available flow greater than 1,800 gpm, the required fire flow for the facility, at a residual pressure of 20 psi. Because there have been no significant changes to the fire suppression loop piping and the fire pump, these results remain a valid indication of available fire flow. Therefore, the distribution system appears to provide sufficient fire flows while maintaining residual pressure requirements.

Table B4-6
Distribution System Analysis - MCCCW

Test	Hydrant Flow (Q_t, gpm) [1]	Static Pressure (psi) [2]	Residual Pressure (psi) [3]	Δ_t (psi) [4]	Δ_{20} (psi) [5]	Q_{20} (gpm) [6]
1	1,020	100	98	2	80	7,477
2	1,070	103	95	8	83	3,785

(1) Measured flow at flowing hydrant during test.
(2) Static pressure at residual hydrant during test.
(3) Residual pressure at residual hydrant during test.
(4) Difference between static and residual test pressures.
(5) Difference between static test pressure and 20 psi.
(6) Flow available at a residual pressure of 20 psi, per equation: $Q_{20} \times \Delta_t^{0.54} = Q_t \times \Delta_{20}^{0.54}$

B4.5 Water Quality Compliance Review

Table B4-7 provides a summary of MCCCW's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, MCCCW has maintained compliance with water quality regulations in recent years. Minor incidents of noncompliance since 2005 include:

- Violation of the Total Coliform Rule for E. Coli in April 2008
- Violation of the Total Coliform Rule in April 2008
- Violation of the Total Coliform Rule in January 2012

Table B4-7
Water Quality Monitoring – MCCCW

Parameter	Monitoring Frequency
Bacteriological	Once per month
Lead & Copper	Once every 3 years
D/DBP [2]	None established
Nitrate	Once every year
IOC	Waiver through 2021 (Well No. 1)
	Once every 3 years (Well No. 3)
VOC	Waiver through 2016 (Well No. 1)
	Once every 3 years (Well No. 3)
SOC (H,I,P) [1]	H - Waiver through 2019 (Well No. 1)
	P and I – Waiver in place – DOH has not established next sample date (Well No. 1)
	H and P – Waiver through 2021 (Well No. 3)
	I - Waiver through 2014 (Well No. 3)
SOC (Other)	None established
Radionuclides	Once every 6 years (Well No. 1)
	Once every 3 years (Well No. 3)
Asbestos	None established

[1] H = Herbicides; I = Insecticides; P = Pesticides
[2] Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B4.6 Water Conservation

Although a formal conservation plan has not been developed for MCCCW, potential water conservation measures have been identified in an analysis of facility activities. Documentation of this effort is provided in Part C. Potential activities that have been identified include installation of low-flow showerheads and toilets, installation of flow restrictors in bathroom and kitchen sinks, and shipping of all laundry to another facility for washing.

MCCCW was also part of a statewide metering project. Six water meters were installed in the following locations in early 2005: pump house, main building, gymnasium, classroom, maintenance building, and DNR building. The intent of these meters is to track water use for specific applications, evaluate trends over time, and identify appropriate water savings activities.

In 2012, MCCCW achieved its goal to reduce water consumption by 5 gpd per offender. Water savings are, in part, attributed to the following measures: restrictions on vehicle washing and landscape irrigation, vegetable garden irrigation using rain water capture, improved maintenance of plumbing systems, and monthly water use monitoring. Distribution system leakage is estimated to be zero percent of total water supply, with a three-year average of 65.6 percent, as reported to DOH on its latest Water Use Efficiency Rule report.

B4.7 Source Protection

MCCCW's wellhead protection plan (WHPP) was developed as a part of the 2005 Water System Plan. WHPP information is provided below.

B4.7.1 Background

The goal of the WHPP is to protect MCCCW's water supply by identifying and managing potential sources of ground water contamination that could impact the facility's well. MCCCW currently uses one production well and a backup well completed in confined glacial till. The depth to the top of the screened interval is approximately 170 feet.

The objectives of the WHPP are to delineate a wellhead protection area around Well Nos. 1 and 3, establish and maintain an inventory of potential sources of ground water contamination, and outline emergency spill response and contingency plans. The WHPP is also a formalized process to notify business owner/operators and educate the public about wellhead protection.

B4.7.2 Delineation of the Wellhead Protection Area

The following five zones of the wellhead protection area were delineated:

1. Sanitary control area
2. Six-month time of travel zone
3. One-year time of travel zone
4. Five-year time of travel zone
5. Ten-year time of travel zone.

The six-month through ten-year time of travel zone boundaries, or wellhead zones of contribution, are displayed on Exhibit B4-4. The Calculated Fixed Radius method was used to determine the radii for these zones, as documented in the Susceptibility Assessment Survey Form completed for Well No. 1. This form is included in Part C. The sanitary control area consists of a 100-foot radius around the well, as required by WAC 246-290-135 (2).

B4.7.3 Contaminant Inventory in the Wellhead Protection Area

A review of Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within MCCCW's wellhead protection area. In addition, facility staff were interviewed to obtain information regarding potential contaminant sources from within or near the facility.

No sites were listed in the Ecology database as being within the MCCCW wellhead protection area. The primary sources of potential contamination at the facility include the following:

- Septic system drainfield (planned for modification or replacement as a part of a wastewater system overhaul to accommodate the anticipated increase in offender population)
- Oil/water separator at the Maintenance Shop (currently not in use)
- Grease trap at kitchen
- Accidental spills on roadways.

In general, Well Nos. 1 and 3 are located between Sandhill and Delmore Roads, at a higher elevation than the drainage basins that are to the east and west of the facility. Most of the area within the ten-year time of travel zone is State forest land. There are a small number of private residences. Septic systems associated with these homes represent a potential source of contamination.

Accidental spills on the roadways near MCCCW are another potential source of contamination.

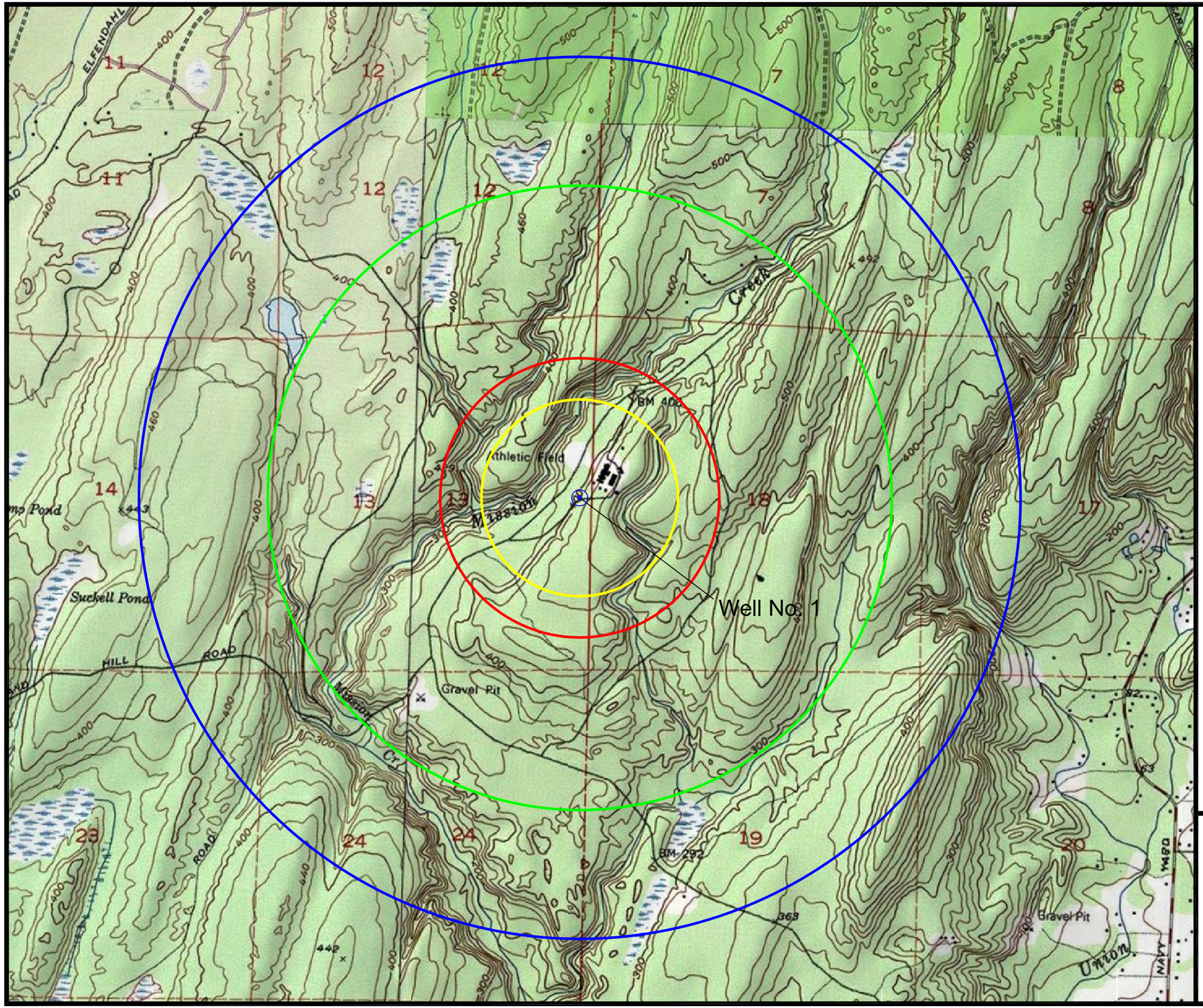
B4.7.4 Management Program for the Wellhead Protection Area

The susceptibility of Well Nos. 1 and 3 is moderate. MCCCW has adopted management strategies including contingency planning and spill response planning in order to protect the wells.

In the event that water from the wells is unfit for consumption, MCCCW plans to have water delivered to the facility by tanker truck, as described within Section B4.8.4 (Contingency Plan) of the water system plan.

In the event of an accidental spill, MCCCW facility staff will notify the Plant Manager/Water Operator. The Plant Manager or switchboard operator would in turn notify Mason County Fire Dispatch (360-275-2888) as a first responder. The 24-hour Ecology spill response hotline would also be contacted.

Public education is not a major component of the MCCCW WHPP since the water system serves a correctional facility. Water quality information will be periodically posted on the facility bulletin board.


Well No. 1
Well Location
Well No. 1 WHP Zones of Contribution
6 Month Time of Travel
1 Year Time of Travel
5 Year Time of Travel
10 Year Time of Travel
Note: Well No. 3 is located in proximity to Well No. 1.
0
1500
3000
SCALE IN FEET
EXHIBIT B4-4
Washington Department of Corrections
MCCCW - Wellhead Zones of Contribution
June 2014
HDR

B4.8 Operations and Maintenance

B4.8.1 Certified Operators

MCCCW currently has one certified operator (Leo Gleason, WDS, No. 12678).

B4.8.2 Emergency Call-up List

Table B4-8 provides the emergency call-up list for MCCCW.

Table B4-8
Emergency Call-up List - MCCCW

Personnel/Agency	Working Hours Number	Off-Duty Number
Plant Manager – Leo Gleason	(360) 277-2483	(360) 769-0989
Superintendent – Wanda McRae	(360) 277-2400	
DOC Project Manager – Dan Moore	(360) 586-8534	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water – SWRO	(360) 236-3030	1-877-481-4901
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
Electrical Utility- Mason County PUD #3	(360) 275-2833	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	911	
Fire Department	911	
Emergency Medical	911	

B4.8.3 Water Quality Testing Laboratories

MCCCW uses the following laboratories for water quality testing:

Edge Analytical
11525 Knudson Road
Burlington, WA 98233

Bremerton-Kitsap County Health District
109 Austin Drive
Bremerton, WA 98312

Twiss Analytical Laboratories
26280 Twelve Trees Lane, Suite C
Poulsbo, WA 98370

B4.8.4 Contingency Plan

Water will be delivered to the facility by Water Truck Services in the event that reservoir storage is not adequate to address emergency situations, per the trucked water plan presented in Section A6.3.3. The nearest large water purveyor is Belfair Water District No. 1, which could also be contacted in the event of an emergency.

B4.9 Cross-Connection Control

There are three double check valve backflow assemblies (one at the ball field and two at the kitchen) and five reduced pressure backflow assemblies (one in the dental dark room, one in the gymnasium, and three in the boiler room) installed at MCCCW. There are also air gaps and atmospheric vacuum breakers at many hose bib locations. All assemblies are tested on an annual basis by a certified backflow assembly tester.

B4.10 Capital Improvement Program

The following capital improvement project is planned for implementation at MCCCW within the ten year planning period.

MCCCW-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $20,000. Therefore, the total 10-Year planning period estimated cost is $200,000. **Priority Ranking = 2.**

Section

B5

McNeil Island Corrections Center

Section B5
McNeil Island Corrections Center

B5.1 Facility Description

The facility that used to contain the McNeil Island Corrections Center (MICC) is located on McNeil Island, which is owned by the state of Washington. McNeil Island is in the south Puget Sound area, directly west of the City of Steilacoom and approximately 12 miles south of the City of Tacoma. The island is approximately 4,445 acres in size, of which about 100 acres has been developed for correctional facilities. The penal institution on the island was originally operated as a federal prison; however, in 1981 it was transferred to the state and began operation as an adult correctional institution.

The facility ceased operation as a Washington State Department of Corrections (DOC) facility in 2011[1]. However, the Washington State Department of Social and Health Services (DSHS) continues to maintain the Special Commitment Center (SCC) and the Secure Community Transition Facility (SCTF) on the north end of the island, which together house approximately 270 offenders. DOC has retained the responsibility to operate and maintain the water and wastewater facilities that serve the island, which is why this facility is included in this Water System Plan update, although there are no DOC offenders housed on the island.

Nearly three-quarters of the island is covered by woodlands, with nearly another quarter of the area in pastureland. Deed conditions attached to the transfer of the island from federal to state control allow the Department of Corrections to use about 1,000 acres for agriculture. Most of the island, (about 3,300 acres), is controlled by the Washington Department of Fish and Wildlife, and is to be managed as a wildlife refuge. Today DOC farm and pasture land is not in active production. Agreements between Corrections and Fish and Wildlife intend to assure that Corrections activities do not impinge on the wildlife values.

MICC consists of the Main Institution and the North Complex. The Main Institution is where a medium custody facility used to be located on the southeast side of the island. It comprises approximately 89 acres and is within walking distance of the passenger ferry dock.

The North Complex is located in the center of the island about two miles north of the Main Institution. The SCC and SCTF are located here.

Exhibit B5-1 provides a location map for the facility.

B5.2 Water System Description

Table B5-1 provides a summary of MICC's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B5-2

[1] For simplicity, and in order to maintain continuity with respect to the 2005 Plan, the term MICC is used in this Plan to refer to the water system located on the island, even though MICC is no longer a functioning DOC facility housing offenders.

depicts the service area of the water system, and Exhibit B5-3 provides a schematic of key water system features.

MICC obtains its water from surface sources on the island. A water treatment facility is located on Eden Creek Reservoir, an impoundment of approximately 100 acre-feet, located in the south central portion of the island. Eden Creek Reservoir is located downstream of and is fed by Butterworth Reservoir, an impoundment of 2,200 acre-feet. Four other small impoundments, Anderson Pond, Luhr Creek, Floyd's Cove, and Bradley Creek are located throughout the island. Water from these impoundments used to be pumped to Butterworth Reservoir. However, with the closure of MICC and the corresponding reduction in water demands, these four small impoundments are not currently in use, with the exception of Anderson Pond which can aid in supplying fire suppression water if needed. In addition, the Luhr Creek impoundment (including the pump house and dam) is scheduled to be removed in 2015 by the Washington State Department of Fish and Wildlife, as part of a project to replace road culverts that block fish passage with newer “fish friendly” culverts. This project will restore a historic steelhead and chum salmon run back into the island.

Presently, the Eden Creek Reservoir is also not used as an impoundment. Water is pumped directly from Butterworth Reservoir to the water treatment facility.

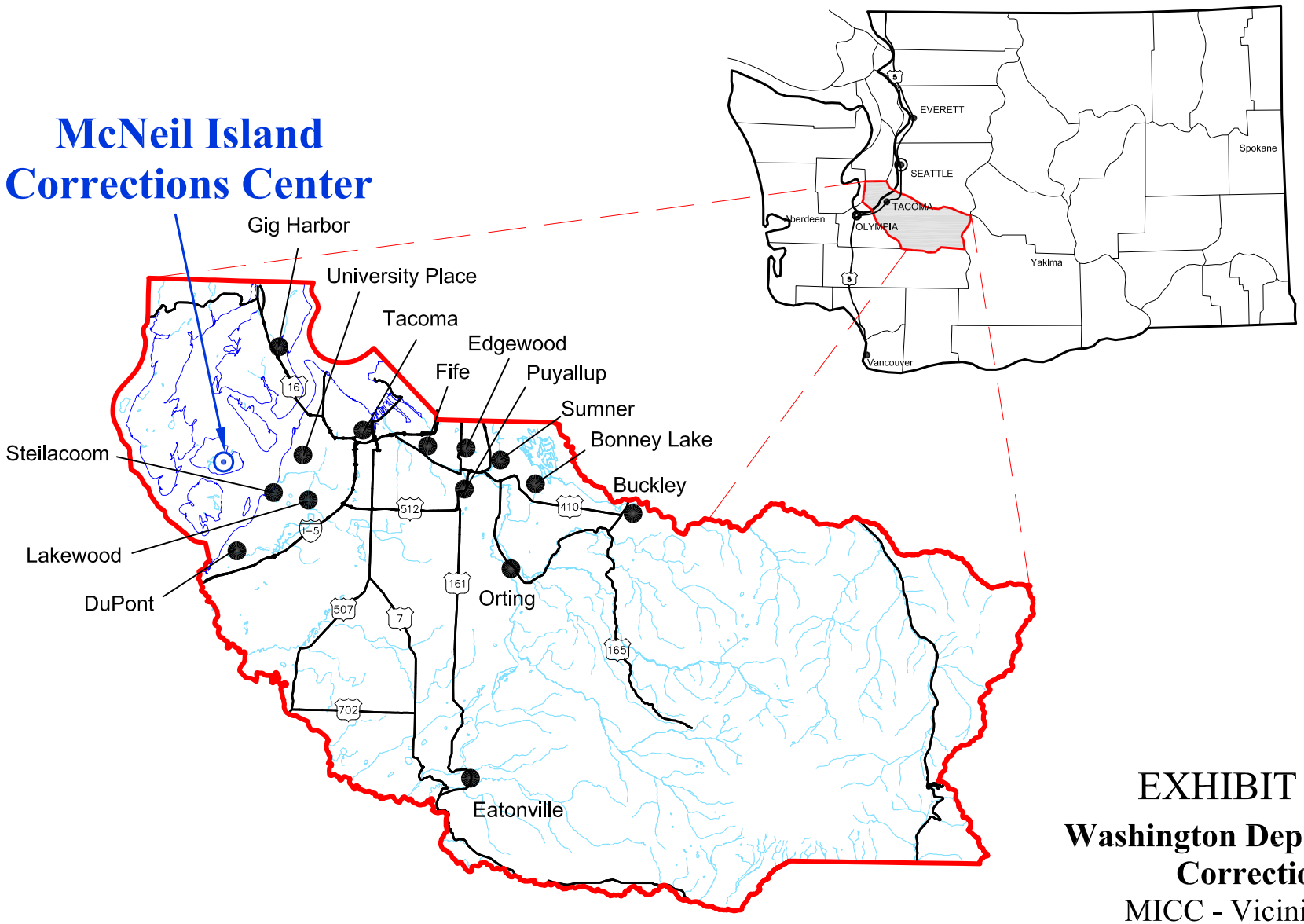


EXHIBIT B5-1

Washington Department of Corrections

MICC - Vicinity Map

June 2014

HDR

EXHIBIT B5-2

Washington Department of Corrections

MICC - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 5000 10000

SCALE IN FEET

June 2014

HDR

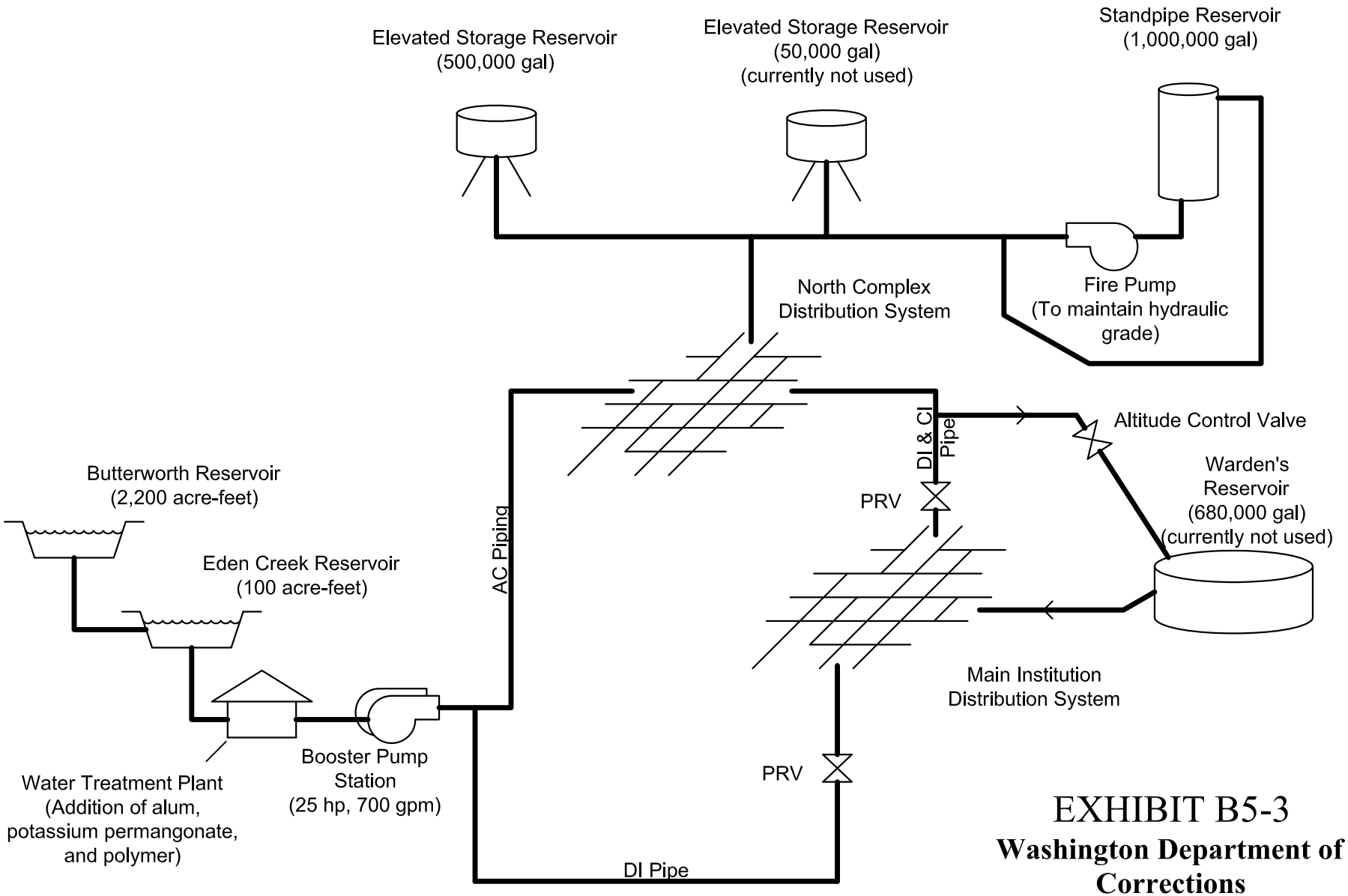


EXHIBIT B5-3

Washington Department of Corrections

MICC - Water System Schematic

Not to Scale

June 2014

HDR

Table B5-1
Water System Summary - MICC

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum (gpd)	Peaking Factor	Average (gpd)	Maximum (gpd)
2012-2013	180,710	361,419	2.0	677	1,354

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
S2-27135	Eden Creek/ Butterworth Reservoirs	02/25/87	1,329 (485.5 institutional & domestic; 843.5 irrigation and stockwater)	696
S2-29875	Eden Creek/ Butterworth Reservoirs	10/21/99	1,329	1,050

Source of Supply

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Eden Creek/ Butterworth Reservoirs	Surface water impoundment	25 (to treatment plant) 75 (to distribution)	700

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Elevated Steel Reservoir	500,000	1938
Elevated Steel Reservoir	50,000 (not currently used)	1933
Ground Level (Warden's) Reservoir	680,000 (not currently used)	1930
1.0 MG Standpipe	1,000,000	2002

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
PVC, AC, DI, CI	ND	ND	ND

NA = Not Applicable; ND = Insufficient Data; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

[1] Calculated as facility water-use divided by average 2014 population of the SCC/SCTF (267).

The water treatment facility is a conventional flocculation and filtration plant. In a chemical feed building, alum, potassium permanganate, and polymer are added to the raw water from Butterworth Reservoir. The water proceeds through flocculation basins, vertical upflow clarifiers, and sedimentation basins before filtration. The filters are of sand and anthracite. Chlorine is added for disinfection and soda ash is added for pH adjustment. Water is stored in a clearwell at the treatment plant to achieve the required chlorine contact time prior to being pumped into the distribution system.

Treated water is distributed through a looped network of piping of various material and vintage. Asbestos cement (AC) piping provides transmission from the treatment plant to the North Complex area. Relatively new ductile iron (DI) and older, unlined cast iron (CI) piping provide transmission from the North Complex to the Main Institution, and a relatively new DI project

from the Main Institution to the treatment plant completes the loop. The distribution system piping at the North Complex and the Main Institution consists of various sizes of DI, CI, galvanized steel, PVC, and AC pipe. The Main Institution is fed off the loop's two pressure reducing valves (PRVs) making the Main Institution a lower pressure zone than the remainder of the island.

Water storage for the island is provided by a 1,000,000 gallon storage reservoir, located at the North Complex, and a 680,000 gallon reservoir, commonly referred to as the Warden's Reservoir (which is currently not is use), which serves only the lower pressure zone. A booster pump station located near the 1,000,000 gallon standpipe reservoir aids the system in maintaining hydraulic grade. Two older elevated reservoirs are located at the North Complex, with only the larger one currently in service.

B5.3 Population and Water Demand Forecast

Table B5-2 provides a summary of 2014 and projected 2024 SCC/SCTF population and water demand. The current SCC/SCTF population of 267 is expected to remain fairly constant over the next 10 years. There are no known plans for expansion of those facilities.

Table B5-2
Water Demand Forecast - MICC

	2014	2024
Offender Population [(1)]	**267**	**267**
Average Day Demand (gpd)		
Facility	180,710	180,710
Per Offender	677	677
Maximum Day Demand (gpd)		
Facility	361,419	361,419
Per Offender	1,354	1,354
ERUs [(2)]	**786**	**786**

(1) SCC/SCTF resident population.
(2) Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B5.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B5.4.1 Water Rights

The certificated water right for MICC allows up to 1,329 acre-feet per year (afy) of withdrawal. Of this total, 485.5 afy is allowed for institutional and community domestic supply. The remainder is associated with irrigation and stock watering. The maximum instantaneous withdrawal rate allowed under the water right is 696 gallons per minute (gpm).

A temporary use permit was granted in 1999, authorizing a maximum withdrawal rate from Eden Creek Reservoir of 1,050 gpm, thereby matching the capacity of the vertical turbine pumps that convey water from Eden Creek Reservoir to the water treatment facility. The authorized annual withdrawal was not affected by this temporary use permit. A formal permit has not been issued regarding this higher instantaneous withdrawal rate.

Table B5-3 provides a comparison of existing water rights with current and projected levels of water demand. Existing water rights are sufficient to meet projected demands.

Table B5-3
Water Right Analysis - MICC

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)	433,095	433,095
Average Day Demand (gpd)	180,710	180,710
Water Right Surplus/(Deficiency) (gpd)	**252,385**	**252,385**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)	1,512,000	1,512,000
Maximum Day Demand (gpd)	361,419	361,419
Water Right Surplus/(Deficiency) (gpd)	**1,150,581**	**1,150,581**

(1) Only institutional and domestic water rights are included in this analysis. Irrigation rights are excluded, as they are not currently available to meet domestic water needs.

B5.4.2 Source Capacity

Table B5-4 provides a comparison of source capacity with maximum day demand. The water treatment facility has a pumping capacity of 700 gpm. The facility's pumping capacity is sufficient to meet current and projected future needs.

Table B5-4
Source Capacity Analysis - MICC

	2014	2024
Available Source (gpd)	***1,008,000***	***1,008,000***
Maximum Day Demand (gpd)	361,419	361,419
Source Capacity Surplus/(Deficiency) (gpd)	**646,581**	**646,581**

B5.4.3 Storage Capacity

MICC is currently served by two storage reservoirs located in the North Complex. Therefore, total system storage currently in use is 1,500,000 gallons. Total required storage is 513,000 gallons, based primarily on standby storage requirements. Fire suppression storage is based on fire flow requirements of 2,750 gpm for three hours, as established by the Pierce County Fire Marshal. As depicted in Table B5-5, existing storage is adequate to meet present and future needs.

Table B5-5
Storage Capacity Analysis – MICC

	Year	
	2014	**2024**
***Projected Population and Demand*[1]**		
Population (offenders)	267	267
Per Offender Usage (gpod)	677	677
Projected Demand (gpd)		
Average Day	180,710	180,710
Peak Day	361,419	361,419
ERUs	726	726
***Available Source (gpd)*[2]**		
Water Treatment Facility (700 gpm)	1,008,000	1,008,000
Total Available Source (gpd)	1,008,000	1,008,000
Required Storage Calculations		
Standby Storage (gal)[3]	361,420	361,420
Equalizing Storage (gal)[4]	18,071	18,071
Fire Flow Storage (gal)[5]	495,000	495,000
Total Required Storage [6]	**513,071**	**513,071**
***Existing Available Storage (gal)*[7]**		
Standpipe Reservoir	1,000,000	1,000,000
Elevated Steel Reservoir	500,000	500,000
Total Available Storage	**1,500,000**	**1,500,000**
Storage Surplus/(Deficiency)	***986,929***	***986,929***

(1) See Section B5.3 for details. Includes DSHS offenders at the SCC/SCTF.

(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.

(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or 200 gpd/ERU.

(4) Required equalization storage = Greater of 5% of MDD or DOH equation.

DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)

(5) Required fire flow storage = Flow * duration = 2,750gpm * 3 hrs * 60min/hr.

(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

(7) Excludes two elevated tanks scheduled for decommissioning in 2005.

B5.4.4 Distribution System Analysis

The MICC distribution system was analyzed using a hydraulic model. This section presents a description of the general setup of the model, followed by discussion of the modeling results. A map of the hydraulic model, including node locations, is provided in Part C.

Because there have been no major changes to the system, aside from the closure of the MICC and the associated decrease in demands, no update has been made to the hydraulic modeling analysis conducted previously. The results of that prior work are described below.

History of Hydraulic Model

A hydraulic model of the water distribution system for MICC existed from a previous project involving the design of the new water tank in 2003. The model incorporated the operation of Butterworth Reservoir, the existing storage reservoirs, and the water distribution network.

Two key operational characteristics of the distribution system, which are incorporated in the model, are:

- Pressure Zones. There are two pressure reducing valves (PRVs) located near the Main Institution that convey water from the higher pressure zone within which the remainder of the distribution system exists, to the lower zone of the Main Institution. The hydraulic grade line (HGL) of the higher zone is approximately 293 feet, while the grade of the lower zone if approximately 198 feet. The PRVs are set at the same downstream hydraulic grades, so as to achieve a consistent HGL within the Main Institution.
- Warden's Reservoir. The Warden's reservoir is located within the lower pressure zone, but is fed from the higher pressure zone through an altitude control valve. The altitude control valve is opened and closed depending on the water level within the reservoir, and the reservoir helps to supplement the demand within the lower pressure zone of the Main Institution

Additional modifications were required to ensure the system operated as it currently does, taking into account any recent and planned improvements. The following are the changes that were made to the model before proceeding with hydraulic modeling:

- There are some infrastructure improvements being made to the distribution system in 2005. Many of them involve upsizing water lines that serve specific buildings, but one project improves the distribution network as it relates to the model. The existing 6-inch water line from the Main Institution to the Warden's Reservoir is being replaced with a 12-inch water line.
- The two elevated reservoirs are still in operation in conjunction with the new reservoir. However, they are expected to be taken out of service in the near future, so all modeling was done with only the new 1,000,000 gallon standpipe in operation.
- A booster pump station downstream of the new reservoir was equipped with controls so that it only turns on when the water level in the new reservoir drops to 280 feet. The pump then turns back off when the water level reaches 290 feet. The purpose of this pump station is to maintain hydraulic grade in the system.
- A Pressure Sustaining Valve (PSV) was installed on the inlet of the new reservoir to simulate the effect of a dedicated inlet pipe that discharges into the reservoir at a hydraulic grade line of 293 feet.
- A pipe downstream of the Butterworth Reservoir was equipped with controls to better simulate its current operation. Due to DOH restrictions placed on operations at MICC, this source is only allowed to pump during hours in which someone is present

at the treatment plant. Therefore, controls have been put on the pipe so that it is only open during normal treatment plant operation times (e.g., between the hours of 8:00 am and 4:00 pm) for extended period simulations.

- Controls were placed on a pipe upstream of the Warden's Reservoir so that it would cycle as the water was being used in the Main Institution. The controls are to open and close the pipe based on the water level within the reservoir.

There are a number of improvements within the MICC water distribution system that have already been identified in previous water supply studies that are incorporated into this hydraulic model for future growth scenarios, as it is assumed they will be implemented within the 10-year time horizon. These improvements have been identified as follows (and are described in more detail in Section B5.10 of the 2005 Plan):

- Removal of aging and deteriorated AC pipe along North 20th and replacement with 12" DI pipe.
- Replacing unlined cast iron pipe along West 10th Street and replacement with 12" DI pipe.
- Replacement of aging and deteriorating AC pipe from Butterworth Reservoir to the North Complex with 12" DI pipe.
- Replacement of unlined cast iron pipe along North 16th Place with 8" DI pipe.

Extended Period Simulation (EPS), 2005 and 2015 Demands

The MICC water distribution system was evaluated under present and future conditions during peak day demands, to which a diurnal curve was applied to simulate peak hour demands. During the 24-hour model period, the system pressures are at their lowest during times of high demand. Analysis of the system indicated that only two out of the 69 operating nodes within the water distribution system were unable to maintain a pressure of at least 30 pounds per square inch (psi). Both of these nodes, J-37 and J-38, are located near the Warden's Reservoir at significantly higher elevations than those which can be served adequately by the tank. In addition, there are no services located at these nodes, so the pressure requirements do not apply.

One significant operating condition noted during the extended period simulations was that the new standpipe reservoir would draw down considerably during the day due to the fact that the treatment facility and finished water distribution pumps ceased operation after 4:00 pm due to the DOH operational restrictions discussed earlier. Since some of the highest demand hours during the peak day are between 6:00 – 8:00 pm, all of the water to supply these demands comes from the reservoir and no water is being pumped into the reservoir to replenish the supply. During the end of a peak day, the water level within the reservoir drops to below 230 feet. This could pose a serious problem if there were a fire during the highest demand hours of the peak day, or if there were two peak day demand scenarios that occurred consecutively. This issue would be addressed if the DOH operating restrictions were lifted and the treatment facility could operate throughout the entire day.

Fire Flow Analysis, 2005 and 2015 Demands

The fire flow requirement for MICC varies throughout the island. In general, it is 2,750 gpm for three hours with these exceptions: residential areas are 1,000 gpm for one hour, and the Community Center and the area just north of the Main Institution are 2,000 gpm for two hours.

Fire flow modeling for 2005 demands showed that there were 17 nodes out of the 69 that could not meet the fire flow requirements. The locations of these nodes varied, with some in the North Complex, at the Community Center, at the area to the north of the Main Institution, and at the end of dead-end pipes. The reason for most of the inadequacy is due to undersized water lines around the main loop of the island that are unable to convey large quantities of flow to the fire flow location.

Fire flow modeling for the 2015 demand scenario showed an additional 13 nodes were not able to meet the requirement, bringing the total to 30 out of 69 total nodes. Inadequate water line size was the main reason for not meeting fire flow requirements.

However, by including the four water distribution system upgrades that are described above, the modeling indicated that the number of inadequate nodes was reduced to 15 out of 69 total nodes. The system improvements allowed for greater conveyance in the main piping loop around the island. The nodes that could not meet fire flow were high demand node locations near the Main Institution and at the Community Center, and nodes at the end of undersized lines in the North Complex and near the Warden's Reservoir (i.e., locations at the extremities of the system). No significant improvements in the distribution system would serve to solve the remaining fire flow deficiencies, due to locations relative to the main loop. In many cases, although the 2,000 gpm requirement is not met, flows of 1,500 gpm or more are available. Nodes having less than 1,000 gpm of available flow are at the end of dead-end lines where there are no hydrants.

Table B5-6 provides a summary of the fire flows for 2005 and for 2015, with system improvements incorporated. As mentioned earlier, nodes J-37 and J-38 are located near the Warden's reservoir and no longer have any service requirements, therefore the fire flow requirements do not apply. Also, nodes J-43, J-44 and J-45 are located east of the Main Institution and have been assigned a fire flow requirement of 2,000 gpm. However, depending on the type of water use in this area, the requirement could be lowered to 1,000 gpm.

As shown in the table, the distribution system improvements would serve to improve the fire flow in residential areas where the requirement is 1,000 gpm and near the Main Institution where the requirement is 2,000 gpm. At the North Complex, there are no significant improvements that increase the available flow much more than already is available, as deficient nodes are located at the end of dead-end lines.

Table B5-6 Fire Flow Analysis Summary - MICC			
Node	**Fire Flow Requirement**	**2005 Fire Flow (gpm)**	**2015 Fire Flow (gpm)**
J-3	2,000	1,046	1,585
J-19	2,750	1,119	1,113
J-21	2,750	2,552	2,605
J-22	2,750	2,451	2,496
J-23	2,750	1,465	1,468
J-24	2,750	288	286
J-29	1,000	878	898
J-33	1,000	428	1,567
J-35	1,000	965	1,146
J-37	1,000	182	254
J-38	1,000	106	128
J-43	2,000	1,098	1,440
J-44	2,000	1,110	1,258
J-45	2,000	543	576
J-47	2,000	1,098	1,737
J-50	2,000	1,095	1,728
J-52	2,000	1,098	1,737

B5.5 Water Quality Compliance Review

Table B5-7 provides a summary of MICC's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, MICC has maintained compliance with water quality regulations in recent years. Minor incidents of noncompliance since 2005 include the following:

- Violation of the Total Trihalomethane Rule with 87.7 micrograms per liter detected in March 2014
- Violation of the Total Coliform Rule in September 2013

Table B5-7 Water Quality Monitoring – MICC	
Parameter	**Monitoring Frequency**
Bacteriological	Once per month
Lead & Copper	Once every 3 years
D/DBP [(2)]	Quarterly
Nitrate	Once every year
IOC	Waiver through 2019
VOC	Waiver through 2016
SOC (H,I,P) [(1)]	Once every 3 years I – Waver in place- DOH has not established next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years
Asbestos	Once every 9 years

(1) H = Herbicides; I = Insecticides; P = Pesticides

(2) Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B5.6 Water Conservation

MICC was part of a statewide metering project. Four water meters were installed in the following locations in 2004: the hot and cold water lines supplying the Correctional Industries laundry facilities, the service line to the Correctional Industries Meat Plant, and the service line to the Special Commitment Center kitchen. The intent of these meters is to track water use for specific applications, evaluate trends over time, and identify appropriate water savings activities.

In the 2005 DOH sanitary survey for MICC, it was noted that there are a limited number of service meters installed in the distribution system. Additional service meters, as well as a master meter at the Special Commitment Center, would aid in tracking water use and leakage quantities.

The DOC developed a Sustainability Plan which outlines goals for reducing non-reclaimed water use up to 20% by 2009, 40% by 2014, and 60% by 2029 for each of its' facilities. Proposed strategies to achieve this goal included continued installation of water meters, leak detection and repair, implementation of water recycling systems, and installation of low-flow fixtures.

Due to the lack of meters, MICC is unable to estimate distribution system leakage. However, between 2003 and 2009 MICC has worked to fix leaks upon detection and replace faulty water lines as funding allows. In 2009, MICC established the goals to become fully metered, initiate system monitoring, and meet the 10% Water Use Efficiency leakage standard. The schedule for achieving these goals varies for each building and is subject to available funding. DOC will need to update its Water Use Efficiency Rule goals in light of the closure of MICC and the decrease in demands related solely to the SCC and SCTF.

B5.7 Source Protection

MICC's watershed control plan was developed in 1995. The document is included in Part C.

The majority of the watershed control plan does not require updating, as MICC's water system and associated activities have not changed significantly since development of the plan. Two sections that do require updating are the discussions of agricultural activities and the emergency strategy, both contained within Chapter 3 of the watershed control plan. The updates to these sections are provided below.

B5.7.1 Agricultural Activities

Agricultural activities on McNeil Island are restricted with respect to the water supply in the following ways:

- The use of agricultural chemicals, such as pesticides and herbicides, in the water supply watersheds is to be limited. DOC presently applies a limited amount of herbicide to the watersheds to control a tansy infestation.
- Fertilizer can only be applied sparingly.
- Prior to use of fertilizers or other agricultural chemicals, DSHS is to obtain approval from the MICC Environmental Services Manager.

- Biosolids-based soil amendments or fertilizers (such as Tagro, a product obtained from Tacoma Public Utilities) must be approved for use by the MICC Environmental Services Manager prior to use.

B5.7.2 Emergency Strategy

In the event of an emergency concerning the source reservoirs, such as a contaminant spill, the following should be contacted:

- Water Operator (Mike Trust) – 253-254-1143

MICC maintains its own fire department and hazardous materials team. Items for hazardous materials cleanup such as absorbent material and vermiculite are stored and ready on MICC. MICC has a Spill Contingency Plan, last updated in 2004, which outlines emergency procedures.

In the event that a spill occurs in the Bradley Creek, Floyd's Cove, Luhr Creek, or Anderson Pond Reservoirs, water from the contaminated reservoir(s) will not be pumped until the contaminant is removed by cleanup or flushing. Water from unaffected reservoirs will be pumped to Butterworth Reservoir for use.

In the event that a spill occurs in Butterworth or Eden Creek Reservoirs, cleanup and/or flushing will commence immediately. If the cleanup activities will last less than 3 days, MICC will institute strict water conservation requirements and rely upon standby storage. If cleanup is to last more than 3 days, DOC will:

- Utilize bottled water for drinking and cooking
- Import water via truck (e.g., Water Truck Services)

B5.8 Operations and Maintenance

B5.8.1 Certified Operators

MICC currently has two certified operators:

- Mike Trust (WTPO III and WDM I, No. 7896)
- William Platt (WTPO II, No. 9611)

A water distribution manager (WDM) position is currently vacant.

B5.8.2 Emergency Call-up List

Table B5-8 provides the emergency call-up list for MICC.

Table B5-8 Emergency Call-up List - MICC		
Personnel/Agency	**Working Hours Number**	**Off-Duty Number**
Water Treatment Plant Operator – Michael Trust	(253) 254-1143	
DOC Project Manager – Demar Holtz	(360) 359-4141	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water – NWRO	(253) 395-6750	1-877-481-4901
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
Electrical Utility- Tacoma Power	(253) 502-8762	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	1223 (Command Control)	
Fire Department	1223 (Command Control)	
Emergency Medical	1223 (Command Control)	

B5.8.3 Water Quality Testing Laboratories

MICC uses the following laboratory for water quality testing:

Water Management Laboratories, Inc.
1515 80th St. E.
Tacoma WA 98404

B5.8.4 Contingency Plan

In the event that MICC's water sources are compromised (e.g., via contamination), MICC will follow the emergency strategy presented in Section B5.7.2. In the event that the water treatment plant is inoperable, MICC will rely upon bottled water for drinking water and import of water via truck, per the trucked water plan presented in Section A6.3.3 until a more permanent alternative is identified.

B5.9 Cross-Connection Control

There are approximately 50 backflow prevention assemblies located throughout MICC. These assemblies are tested on an annual basis by a contracted certified backflow assembly tester.

B5.10 Capital Improvement Program

The following are capital improvement projects planned for implementation at MICC within the ten year planning period.

MICC-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $40,000. Therefore, the total 10-Year planning period estimated cost is $400,000. **Priority Ranking = 2.**

MICC-2: Updated Distribution System Capital Improvement Plan. The distribution system at this facility is quite old, and many portions are not in routine use with the closure of MICC. It is recommended that an analysis be conducted to identify and prioritize distribution piping upgrade and replacement projects that would support improved efficiency of the system and maintain reliable service to the SCC and SCTF. Total estimated project cost is $75,000. **Priority Ranking = 2**.

Section

B6

Olympic Corrections Center

Section B6
Olympic Corrections Center

B6.1 Facility Description

The Olympic Corrections Center (OCC) is located in Jefferson County about 25 miles south of the City of Forks, in a rural area in close proximity to Octopus Mountain on the Olympic Peninsula. OCC opened in 1967 and is a minimum security adult correctional institution. The facility consists of two clusters of buildings (Olympic Camp and Clearwater Camp) situated on the east side of the Snahapish River Valley. The entire valley and surrounding area is owned and controlled by the Washington State Department of Natural Resources. Logging and gravel pit operations are the only commercial activities that take place in the valley.

Currently, the facility houses approximately 380 male offenders, and employs approximately 100 staff.

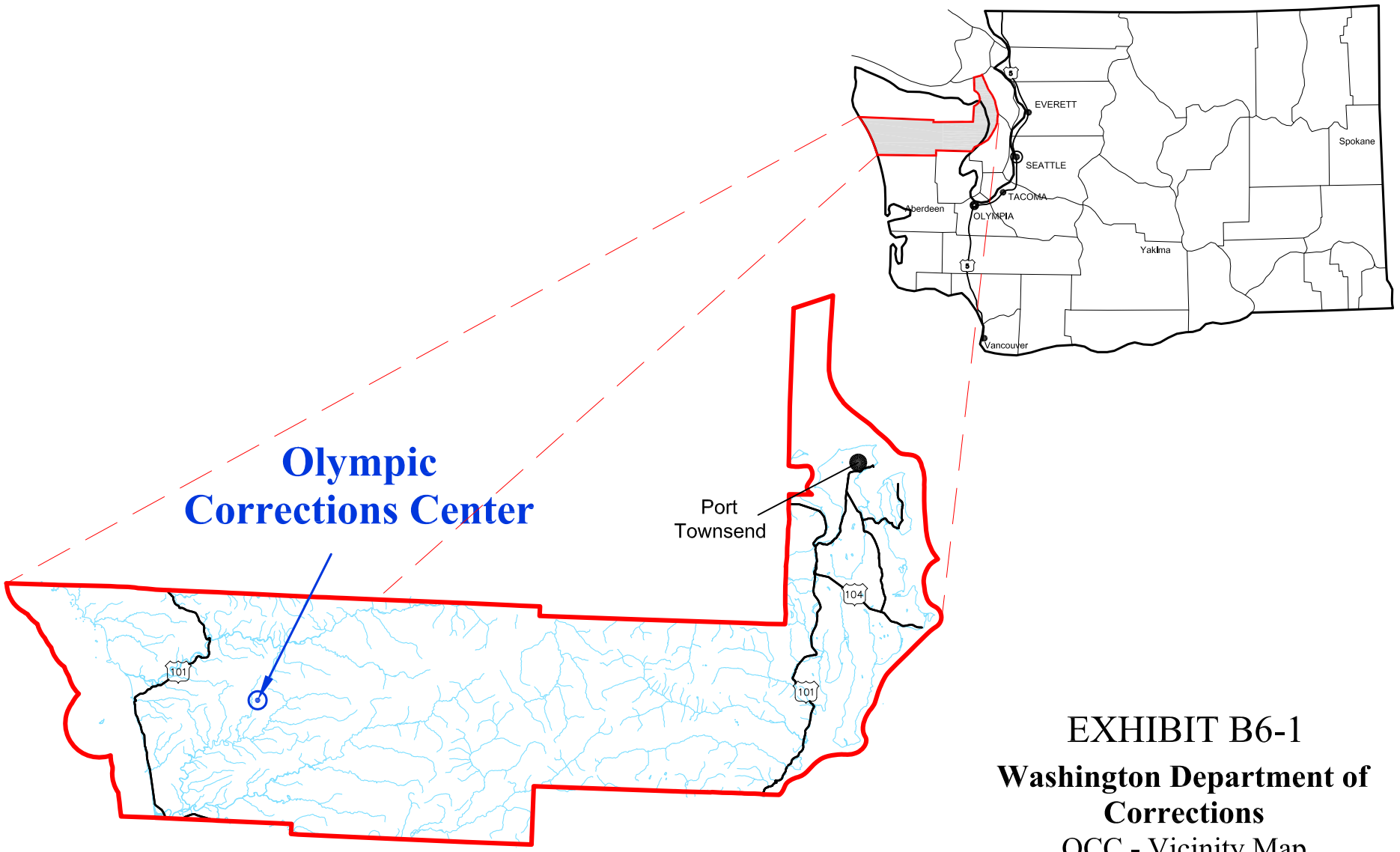
Exhibit B6-1 provides a location map for the facility.

B6.2 Water System Description

Table B6-1 provides a summary of OCC's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B6-2 depicts the service area of the water system, and Exhibit B6-3 provides a schematic of key water system features. Detailed monthly water production data for 2012-2013 are provided in Appendix C-13.

Currently, OCC has three operational wells. Well No. 1 was drilled in 1980 to a depth of 76 feet. This well is equipped with a 20 hp submersible pump. Well No. 2 was drilled in 1980 to a depth of 80 feet. The well is also equipped with a 20 hp submersible pump. Well No. 3 was drilled in 1994 to a depth of 76 feet and is equipped with a 20 hp submersible pump. Well No. 3 is presently used as a standby emergency supply.

Water is conveyed from the wells to Olympic Camp via three 3-inch PVC lines. These lines connect to an 8-inch loop around Olympic Camp. A 10-inch PVC line connects this loop to the Clearwater Camp and also ties into a 12-inch line coming from two storage tanks. The distribution system within the camps consists primarily of 4-, 6-, and 8-inch PVC lines. Individual pressure reducing valves (PRVs) are provided at each building in Olympic Camp, while a single PRV vault serves the Clearwater Camp.



Jefferson County

EXHIBIT B6-1

Washington Department of Corrections

OCC - Vicinity Map

June 2014

HDR

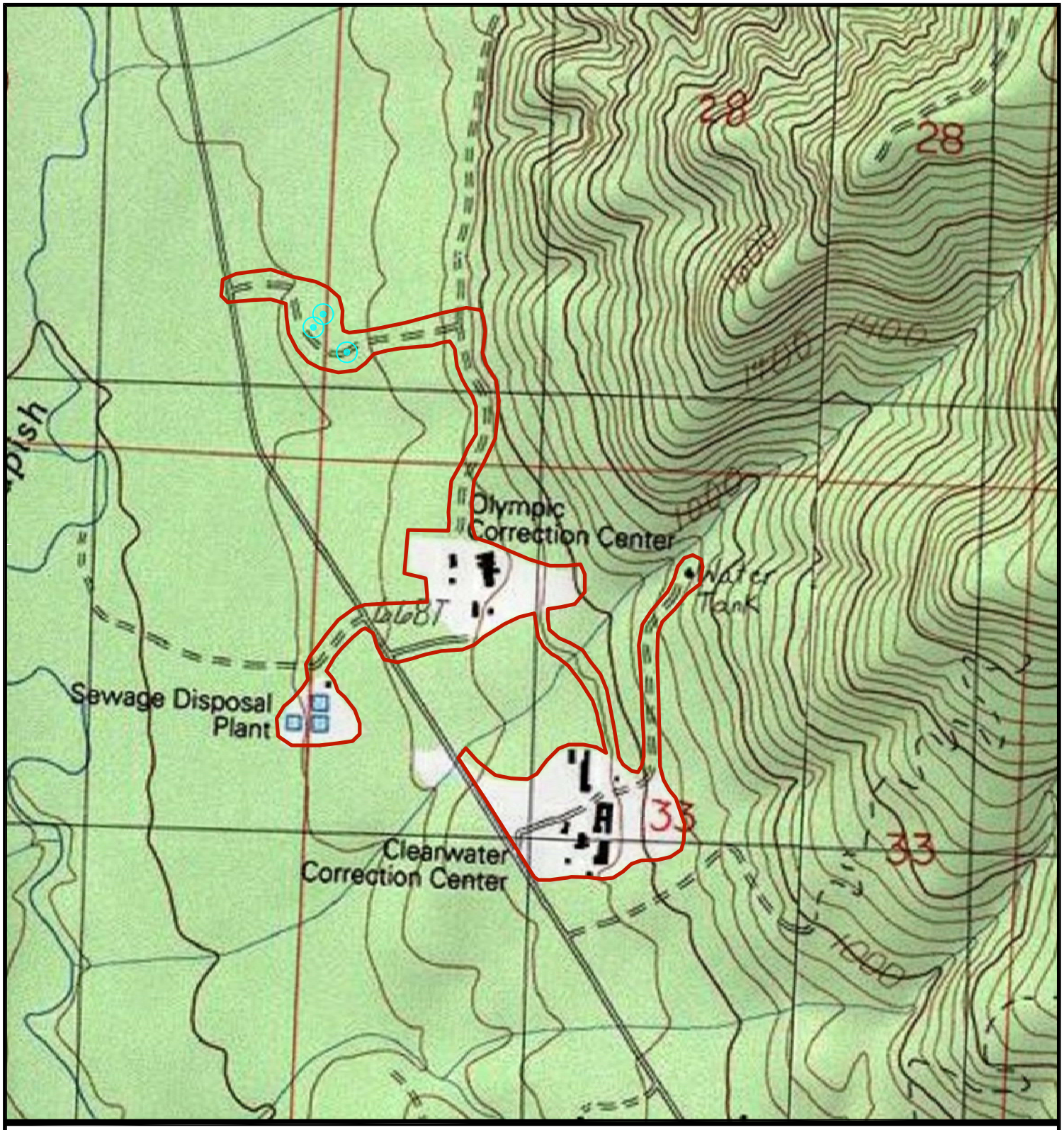


EXHIBIT B6-2

Washington Department of Corrections

OCC - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

SCALE IN FEET

June 2014

HDR

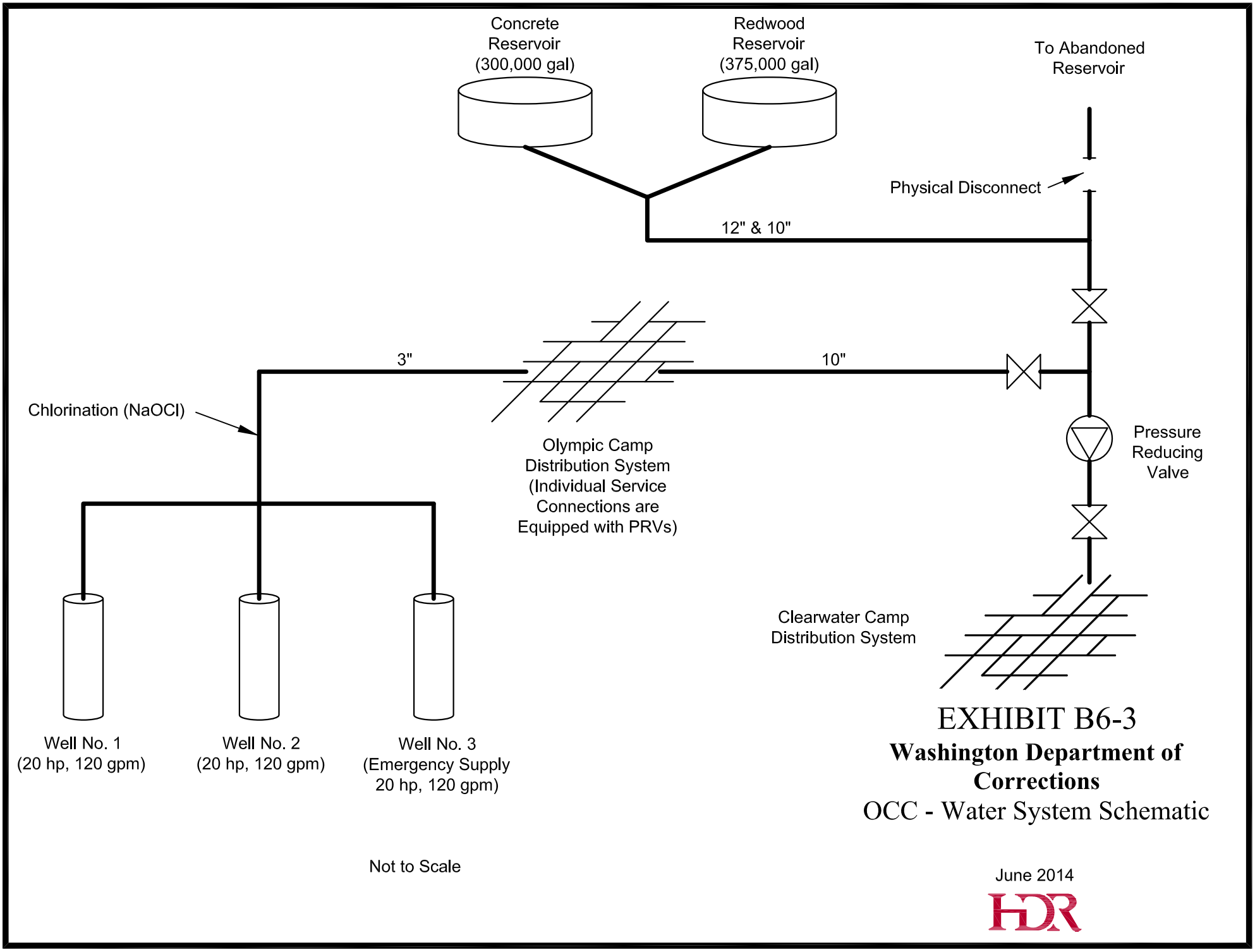


EXHIBIT B6-3

Washington Department of Corrections

OCC - Water System Schematic

June 2014

HDR

Table B6-1
Water System Summary - OCC

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum (gpd) [2]	Peaking Factor	Average (gpd)	Maximum (gpd)
2012-2013	60,921	74,841	1.3	160	196

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
G2-26035C	Wells 1 & 2	10/14/81	50	100
G2-29403	All wells	07/19/05	100	220

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Well No. 1	Depth = 76 feet	20	120
Well No. 2	Depth = 80 feet	20	120
Well No. 3	Depth = 76 feet	20	120
Treatment Process	Chlorination	NA	NA

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Redwood Reservoir	375,000	1981
Concrete Tank	300,000	1995

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
PVC	3-12	12,000	1980-1995

NA = Not Applicable; ND = Insufficient Data. ; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

(1) Calculated as facility water-use divided by average February 2014 offender population (381).

(2) Based on average daily usage during the peak water production week of 2012.

B6.3 Population and Water Demand Forecast

Table B2-2 provides a summary of the 2014 and projected 2024 offender population and water demand. No offender population growth is assumed to occur at this facility in the next 10 years. As such, the water demand is projected to remain.

Table B6-2
Water Demand Forecast - OCC

	2014	2024
Offender Population	**381**	**381**
Average Day Demand (gpd)		
Facility	60,921	60,921
Per Offender	160	160
Maximum Day Demand (gpd)		
Facility	74,841	74,841
Per Offender	196	196
ERUs [1]	**264**	**264**

(1) Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B6.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B6.4.1 Water Rights

The facility's total annual water right is 150 afy. This is sufficient to support current and projected future levels of demand. The instantaneous right of 220 gpm is also sufficient to support the water demands of the facility.

Table B6-3
Water Right Analysis - OCC

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)		
G2-26035C (50 afy)	44,600	44,600
G2-29403 (100 afy)	89,200	89,200
Total	133,800	133,800
Average Day Demand (gpd)	***60,921***	***60,921***
Water Right Surplus/(Deficiency) (gpd)	**72,879**	**72,879**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)		
G2-26035C (100 gpm)	144,000	144,000
G2-29403 (220 gpm) [(1)]	316,800	316,800
Total	316,800	316,800
Maximum Day Demand (gpd)	74,841	74,841
Water Right Surplus/(Deficiency) (gpd)	**241,959**	**241,959**

(1) This represents the total Qi for both rights.

B6.4.2 Source Capacity

Table B6-4 provides a comparison of source capacity with maximum day demand.

Table B6-4
Source Capacity Analysis - OCC

	2014	2024
Available Source (gpd)		
Well No. 1 (120 gpm)	172,800	172,800
Well No. 2 (120 gpm)	172,800	172,800
Well No. 3 (120 gpm)	172,800	172,800
Total [(1)]	518,400	518,400
Maximum Day Demand (gpd)	***74,841***	***74,841***
Source Capacity Surplus/(Deficiency) (gpd)	***443,559***	***443,559***

The OCC wells have adequate capacity to meet projected demands.

B6.4.3 Storage Capacity

OCC is currently served by two storage reservoirs. Total system storage is 675,000 gallons. Total required storage is 635,000 gallons, based primarily on a fire flow

requirement of 3,500 gpm for 3 hours, as established by the Jefferson County Fire Marshal. As depicted in Table B6-5, existing storage is adequate to meet present and future needs.

Table B6-5
Storage Capacity Analysis – OCC

	Year	
	2005	**2015**
Projected Population and Demand [1]		
Population (offenders)	381	381
Per Offender Usage (gpod)	160	160
Projected Demand (gpd)		
Average Day	60,921	60,921
Peak Day	74,841	74,841
ERUs	264	264
Available Source (gpd) [2]		
Well No. 1 (120 gpm)	172,800	172,800
Well No. 2 (120 gpm)	172,800	172,800
Well No. 3 (120 gpm)	172,800	172,800
Total Available Source (gpd)	518,400	518,400
Required Storage Calculations		
Standby Storage (gal)[3]	52,800	52,800
Equalizing Storage (gal)[4]	3,742	3,742
Fire Flow Storage (gal)[5]	630,000	630,000
Total Required Storage [6]	**633,742**	**633,742**
Existing Available Storage (gal)		
Redwood Reservoir	375,000	375,000
Concrete Tank	300,000	300,000
Total Available Storage	**675,000**	**675,000**
Storage Surplus/(Deficiency)	***41,258***	***41,258***

(1) See Section B6.3 for details.
(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.
(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or (200 gpd/ERU).
(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)
(5) Required fire flow storage = Flow * duration = 3500gpm * 3 hr * 60min/hr.
(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B6.4.4 Distribution System Analysis

(Note: The following information is based on hydrant flow test conducted in 2005. Because there have been no significant changes to the distribution system, the information contained herein remains a valid description of the distribution system capacity.)

Fire hydrant flow tests were conducted at OCC on March 4, 2005. The results of these tests are summarized in Table B6-6. Details are provided in Part C. The four tests resulted in calculated available flows ranging from 2,460 to 3,366 gpm, at residual pressures of 20 psi. In all cases, this is less than the required fire flow for the facility (3,500 gpm). For Tests 1 and 2, performed at the Olympic Camp, the available fire flows were 3,227 and 3,366 gpm, respectively. This is four to eight percent less than the required fire flow.

In Tests 3 and 4, performed at the Clearwater Camp, the available fire flows were 2,460 and 2,613 gpm, respectively. This is 25 to 30 percent less than the facility required fire flow rate. However, water is conveyed from the reservoirs to the Clearwater Camp through a pressure reducing valve (PRV). Adjustments to the settings of this PRV may provide higher flows at a pressure residual of 20 psi. Furthermore, the structures near these hydrants may not require a fire flow as high as 3,500. DOC, in consultation with the Jefferson County Fire Marshall, will determine the specific fire flow requirements of buildings in the Clearwater Camp, and make minor PRV adjustments if necessary, to ensure adequate fire flows are being provided. Adjusting the PRV may also require installation of PRVs on building service lines to accommodate higher pressures. The potential need for such additional PRVs will be considered as DOC moves forward with addressing this issue. A CIP project has been included in Section B6.10 to account for this effort.

Static pressures throughout the facility ranged from 88 to 110 psi, indicating that the facility is capable of meeting system demands while maintaining pressure requirements. It is also noted that all buildings in the Olympic Camp have PRVs on their service lines, due to the higher distribution system pressure in this lower elevation portion of the facility.

Table B6-6
Distribution System Analysis - OCC

Test	Hydrant Flow (Q_t, gpm) [1]	Static Pressure (psi) [2]	Residual Pressure (psi) [3]	Δ_t (psi) [4]	Δ_{20} (psi)[5]	Q_{20} (gpm)[6]
1 – Olympic	1,353	110	92	18	90	3,227
2 – Olympic	1,429	108	90	18	88	3,366
3 – DNR	1,126	88	72	16	68	2,460
4 – Clearwater	993	92	80	12	72	2,613

(1) Measured flow at flowing hydrant during test
(2) Static pressure at residual hydrant during test
(3) Residual pressure at residual hydrant during test
(4) Difference between static and residual test pressures
(5) Difference between static test pressure and 20 psi
(6) Flow available at a residual pressure of 20 psi, per equation: $Q_{20} \mathbf{x} \Delta_t^{0.54} = Q_t \text{ x } \Delta_{20}^{0.54}$

B6.5 Water Quality Compliance Review

Table B6-7 provides a summary of OCC's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, OCC has maintained compliance with water quality regulations in recent years.

Table B6-7 Water Quality Monitoring –OCC	
Parameter	**Monitoring Frequency**
Bacteriological	Once per month
Lead & Copper	Once every 3 years
D/DBP [2]	Once every year
Nitrate	Once every year
IOC	Waiver through 2018
VOC	Waiver through 2017
SOC (H,I,P) [1]	Waiver in place -DOH has not established next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years
Asbestos	None established

[1] H = Herbicides; I = Insecticides; P = Pesticides
[2] Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B6.6 Water Conservation

A water conservation plan was developed for OCC in 1995. This document is provided in Appendix C. Since then, many conservation activities have been implemented. These include installation of low-flow showerheads and faucets, wastewater effluent reuse for in-plant uses, and a leak detection survey (which resulted in identification and fixing of transmission line leaks).

In order to accurately track water production and usage, OCC has installed source meters on the wells and six demand meters on buildings. The demand meters are located at living units, food services, and the warehouse/laundry.

DOC will continue to evaluate the feasibility of additional water conservation measures, with the goal of reducing per-offender usage by five gpd over five years. In 2012, OCC achieved a one percent decrease in system leakage. Distribution system leakage is estimated to be 33.3 percent of total water production, with a three-year average of 34.4 percent.

B6.7 Source Protection

OCC's wellhead protection plan (WHPP) was been developed as a part of the 2005 Water System Plan. WHPP information is provided below.

B6.7.1 Background

The goal of the WHPP is to protect OCC's water supply by identifying and managing potential sources of ground water contamination that could impact the facility's wells. OCC currently uses three production wells completed in sand and gravel, overlain with gritty sandy clay. The depth to the top of the screened interval ranges from 60 to 67 feet.

The objectives of the WHPP are to delineate a wellhead protection area around the wells, establish and maintain an inventory of potential sources of ground water contamination, and outline the emergency spill response and contingency plans. The WHPP is also a

formalized process to notify business owner/operators and educate the public about wellhead protection.

B6.7.2 Delineation of the Wellhead Protection Area

The following five zones of the wellhead protection area were delineated for each well:

1. Sanitary control area
2. Six-month time of travel zone
3. One-year time of travel zone
4. Five-year time of travel zone
5. Ten-year time of travel zone.

The six-month through ten-year time of travel zone boundaries, or wellhead zones of contribution, are displayed on Exhibit B6-4. The Calculated Fixed Radius method was used to determine the radii for these zones, as documented in the Susceptibility Assessment Survey Forms completed for the well. These forms are included in Part C. The sanitary control area consists of a 100-foot radius around the wells, as required by WAC 246-290-135 (2).

B6.7.3 Contaminant Inventory in the Wellhead Protection Area

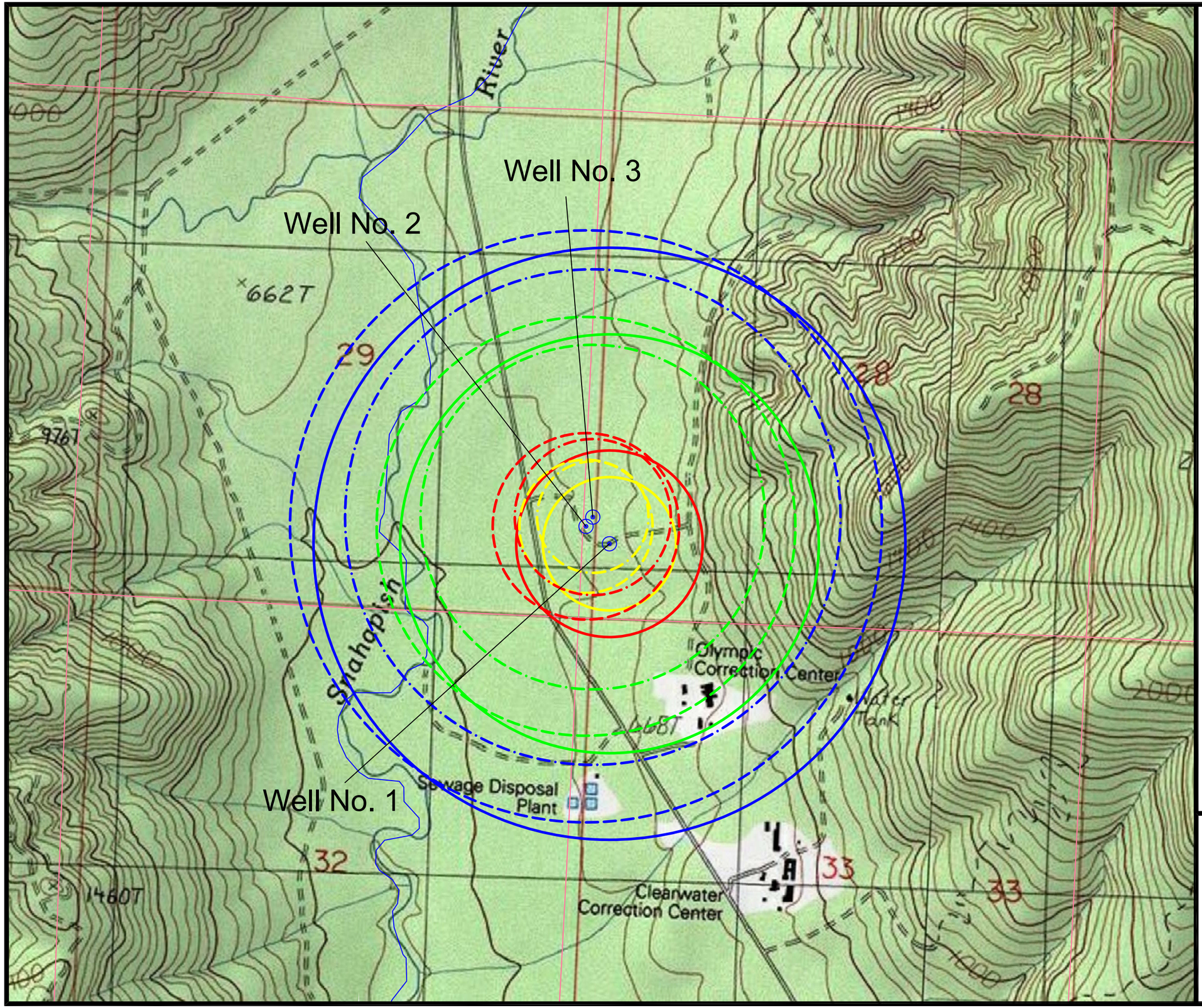
Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within OCC's wellhead protection area. In addition, facility staff were interviewed to obtain information regarding potential contaminant sources from within or near the facility.

There are four leaking underground storage tank sites listed in the Ecology database as being within the OCC wellhead protection area. However, these tanks were removed, and the sites were cleaned up in the early 1990s.

The primary sources of potential contamination at the facility include the following:

- Fuel stored in an above ground fuel storage tank
- Oils in the maintenance shop
- Paints in the carpentry shop
- Wastewater treatment plant (located approximately one mile downgradient of wells)
- Accidental spills on roadways.

DNR activities take place at the Clearwater Camp, which is located outside of the wellhead protection area.



Legend

Well Location

Well No. 1 WHP Zones of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

Well No. 2 WHP Zones of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

Well No. 3 WHP Zones of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

N

0 1000 2000

SCALE IN FEET

EXHIBIT B6-4

Washington Department of Corrections

OCC - Wellhead Zones of Contributions

June 2014

HDR

B6.7.4 Management Program for the Wellhead Protection Area

The susceptibility of the OCC wells is moderate. OCC has adopted management strategies including contingency planning and spill response planning in order to protect the wells.

In the event that water from one of the wells is unfit for consumption, OCC would rely upon the other wells. If all wells become contaminated, OCC plans to have water delivered to the facility by tanker truck, as described within Section B6.8.4 (Contingency Plan) of this Plan.

In the event of an accidental spill, OCC facility staff will notify the Plant Manager. The Plant Manager or switchboard operator would in turn notify the fire departments in the communities of Forks and Clearwater as first responders. The 24-hour Ecology spill response hotline would also be contacted.

Public education is not a major component of the OCC WHPP since the water system serves a correctional facility. Water quality information is periodically posted on the facility bulletin board.

B6.8 Operations and Maintenance

B6.8.1 Certified Operators

OCC currently has one certified operator, Howard "Mike" Henry (WDM 1, No. 7644).

B6.8.2 Emergency Call-up List

Table B6-8 provides the emergency call-up list for OCC.

Table B6-8
Emergency Call-up List - OCC

Personnel/Agency	Working Hours Number	Off-Duty Number
Plant Manager – Greg Banner	(360) 374-8232	
Superintendent – John Aldana	(360) 374-8314	
Wastewater Treatment Plant Operator - Mike Henry	(360) 374-8327	
DOC Project Manager – Ed Hampton	(360) 725-8345	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DNR Representative - vacant	(360) 374-8218	
DOH Office of Drinking Water – SWRO	(360) 236-3030	1-877-481-4901
Parts Supplier – Keller Supply Co	(800) 285-3309	
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
Electrical Utility- Clallam County PUD	(360) 374-6201	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	334 (Major Control)	
Fire Department	334 (Major Control)	
Emergency Medical	334 (Major Control)	

B6.8.3 Water Quality Testing Laboratories

OCC uses the following laboratories for water quality testing:

Edge Analytical
11525 Knudson Road
Burlington, WA 98233

Twiss Analytical Laboratories
26280 Twelve Trees Lane, Suite C
Poulsbo, WA 98370

B6.8.4 Contingency Plan

OCC has arranged for water to be delivered to the facility by Water Truck Services in the event that reservoir storage is not adequate to address emergency situations, per the trucked water plan presented in Section A6.3.3. The facility also has an additional 1,000 gallon potable water tank onsite. The nearest water purveyor is the City of Forks, which could also be contacted in the event of an emergency.

B6.9 Cross-Connection Control

There are three cross-connection control devices installed at the facility, consisting of double-check backflow preventers at the fire sprinkler supply lines for each living unit.

B6.10 Capital Improvement Program

The following are capital improvement projects planned for implementation at OCC within the ten year planning period.

OCC-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $20,000. Therefore, the total 10-Year planning period estimated cost is $200,000. **Priority Ranking = 2.**

OCC-2: Reservoir Liner. This refers to installation of a liner in the 375,000 gallon redwood reservoir. This tank has required several leaks over the past ten years. A liner is recommended to extend the life of this facility. The total estimate cost is $200,000. **Priority Ranking = 2.**

OCC-3: Well 2 Pump Replacement. The pump in Well No. 2 is over 30 years old and is therefore likely at the end of its service life. This project involves replacement of the well. The total estimate cost is $75,000. **Priority Ranking = 2.**

OCC-4: Cross-Connection Control at DNR Facilities. An 8-inch line conveys water from OCC's 12-inch reservoir line to DNR's shop facilities near the Clearwater Camp. Staff indicated

that DNR frequently uses its hydrants for wash-down purposes. This project involves the design and installation of a double-check cross-connection control assembly and water meter at the location where DNR's water line connects to the OCC system, for protection of OCC's system and to monitor DNR usage. The total estimated cost is $48,000. **Priority Ranking = 2.**

OCC-5: Fire Flow Improvements. As discussed in Section B6.4.4, hydrant flow tests indicated fire flow deficiencies in the distribution system. This project consists of addressing these deficiencies in phases. First, the fire flow requirements for the OCC buildings will be reassessed to determine if the 3,500 gpm minimum is appropriate. This effort will be done in consultation with the Jefferson County Fire Marshal. If the result of this reassessment is that available flows and pressures are still deficient in the Clearwater Camp, DOC will make adjustments to the PRVs serving this part of the system in order to increase pressures during fire flow events. If additional improvements are needed at the Clearwater Camp, and/or if further improvements are warranted at the Olympic Camp, a more detailed hydraulic analysis of the distribution system will be conducted. Such an analysis has not yet been performed, as the need for one is not anticipated. The total estimated cost is $10,000 (not including the additional hydraulic analysis). **Priority Ranking = 2.**

B7

Washington Corrections Center

Section B7
Washington Corrections Center

B7.1 Facility Description

The Washington Corrections Center (WCC) is located approximately five miles northwest of the City of Shelton in Mason County. WCC was opened in 1964 under the management of the Department of Social and Health Services. In 1981, WCC was transferred to DOC and is currently a multi-custody correctional institution. Other correctional facilities at WCC include the Reception Center for processing all newly-interned individuals, a Training Center, and an Intensive Management Unit (IMU).

WCC temporarily houses all adult male offenders receiving prison sentences. With the exception of death row offenders, offenders are initially tested and classified at the Reception Center, which is a close (Level IV) security facility. After classification, offenders are transferred to the Training Center or the IMU. The Training Center is a medium (Level III) security facility. The IMU, a maximum (Level V) security facility, is utilized for offenders who cannot be managed in the general population. These are temporary assignments prior to offenders being transferred to other correctional centers across the state.

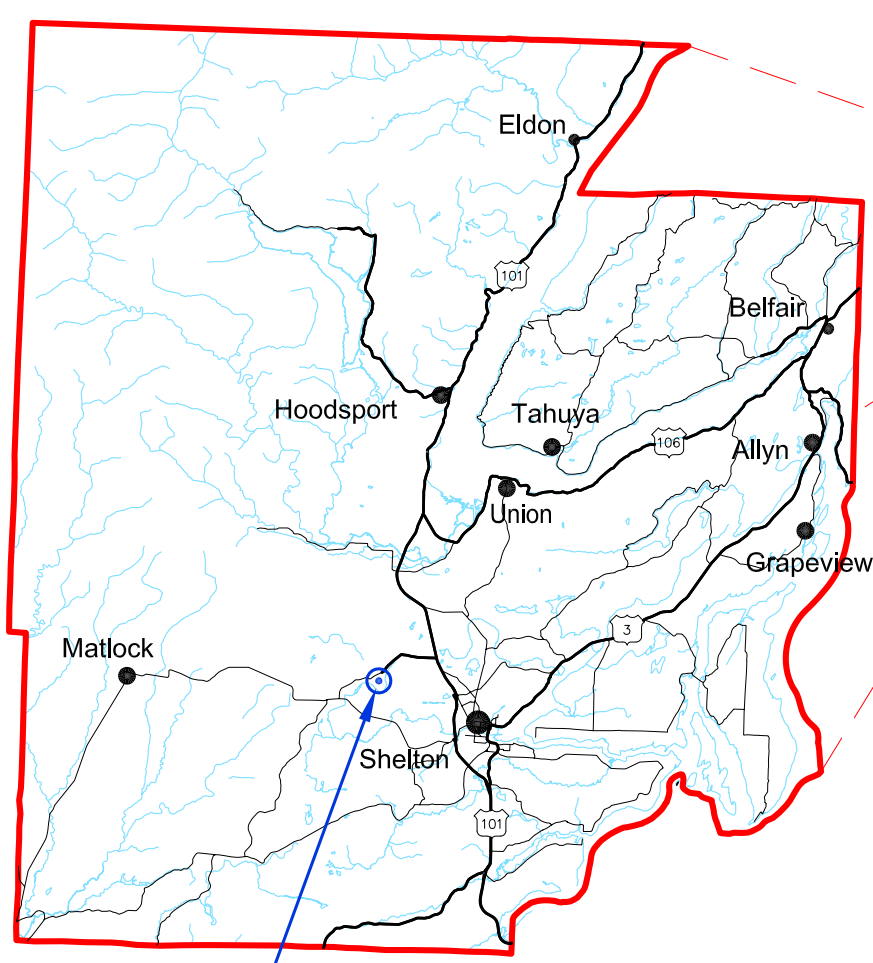
WCC's total acreage is approximately 455 acres, with 125 acres developed for correctional facilities. The remainder of the property consists of timberland and grassed areas. In February 2014, WCC's offender population was 1,678.

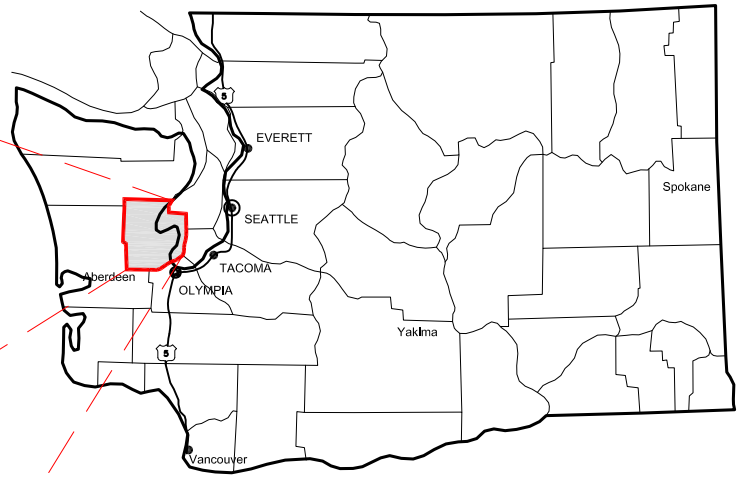
Exhibit B7-1 provides a location map for the facility.

B7.2 Water System Description

Table B7-1 provides a summary of WCC's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B7-2 depicts the service area of the water system, and Exhibit B7-3 provides a schematic of key water system features. Detailed monthly water production data for 2012-2013 are provided in Appendix C-13.

WCC's water supply system consists of four wells, two storage reservoirs, and the distribution system. The primary water supply comes from Well No. 4, with supplemental supply from Wells No. 2 and No. 3. Well No. 4 was drilled to a depth of 56 feet in 1984, and Well No. 2 was drilled to a depth of 46 feet in 1963. Well No. 3 was drilled to a depth of 184 feet in 1962. The rated capacities of Wells No. 4, 3, and 2 are 640 gpm, 144 gpm, and 320 gpm, respectively. Well No. 1, drilled to a depth of 177 feet in 1962, is currently inactive and is dedicated as an emergency source for plant boiler makeup water. The line connecting Well No. 1 to the distribution system has been disconnected, so it is not presently a source for domestic water supply.





Mason County

Washington Corrections Center

EXHIBIT B7-1

Washington Department of Corrections

WCC - Vicinity Map

June 2014

HDR

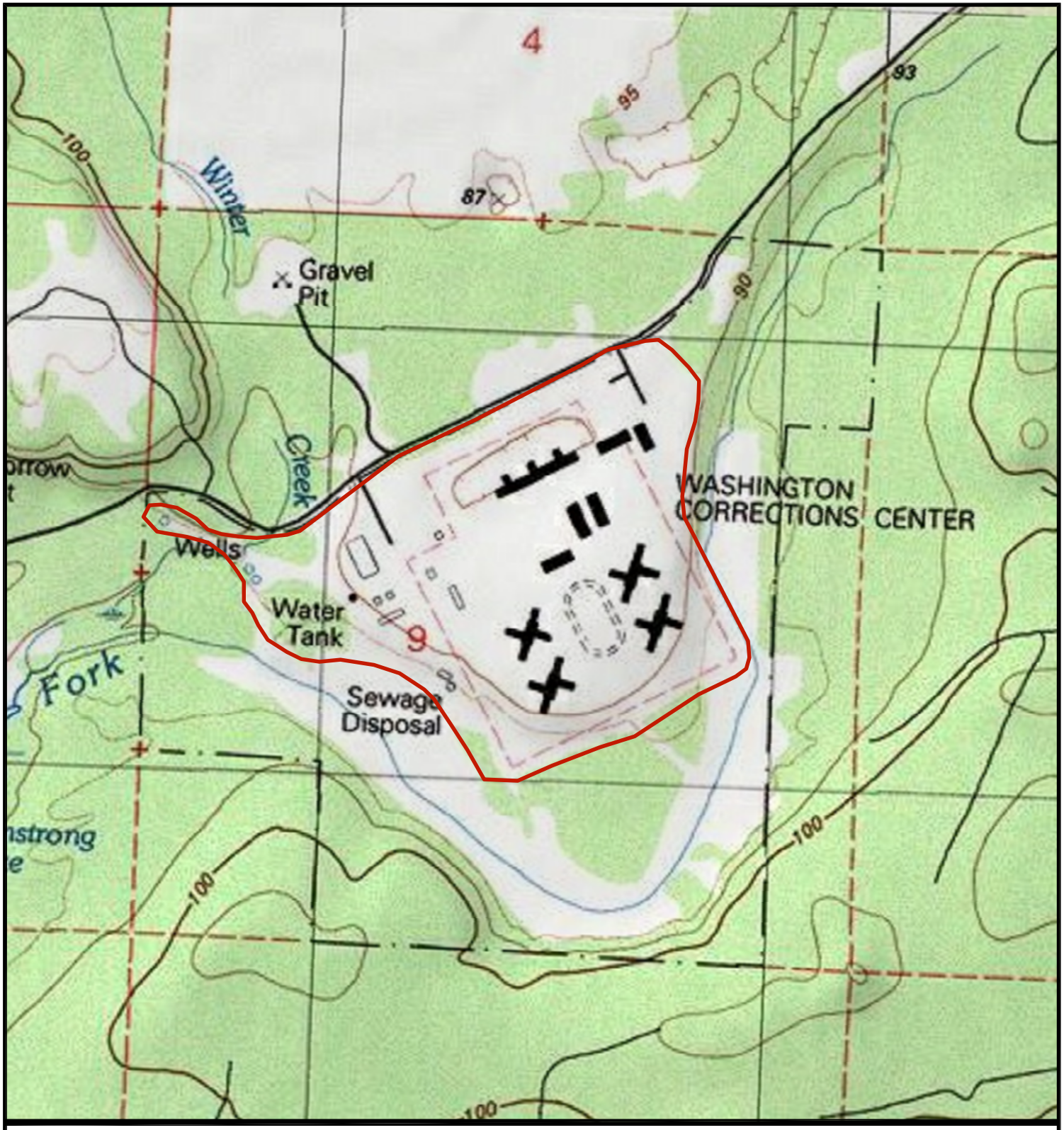


EXHIBIT B7-2

Washington Department of Corrections

WCC - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

SCALE IN FEET

June 2014

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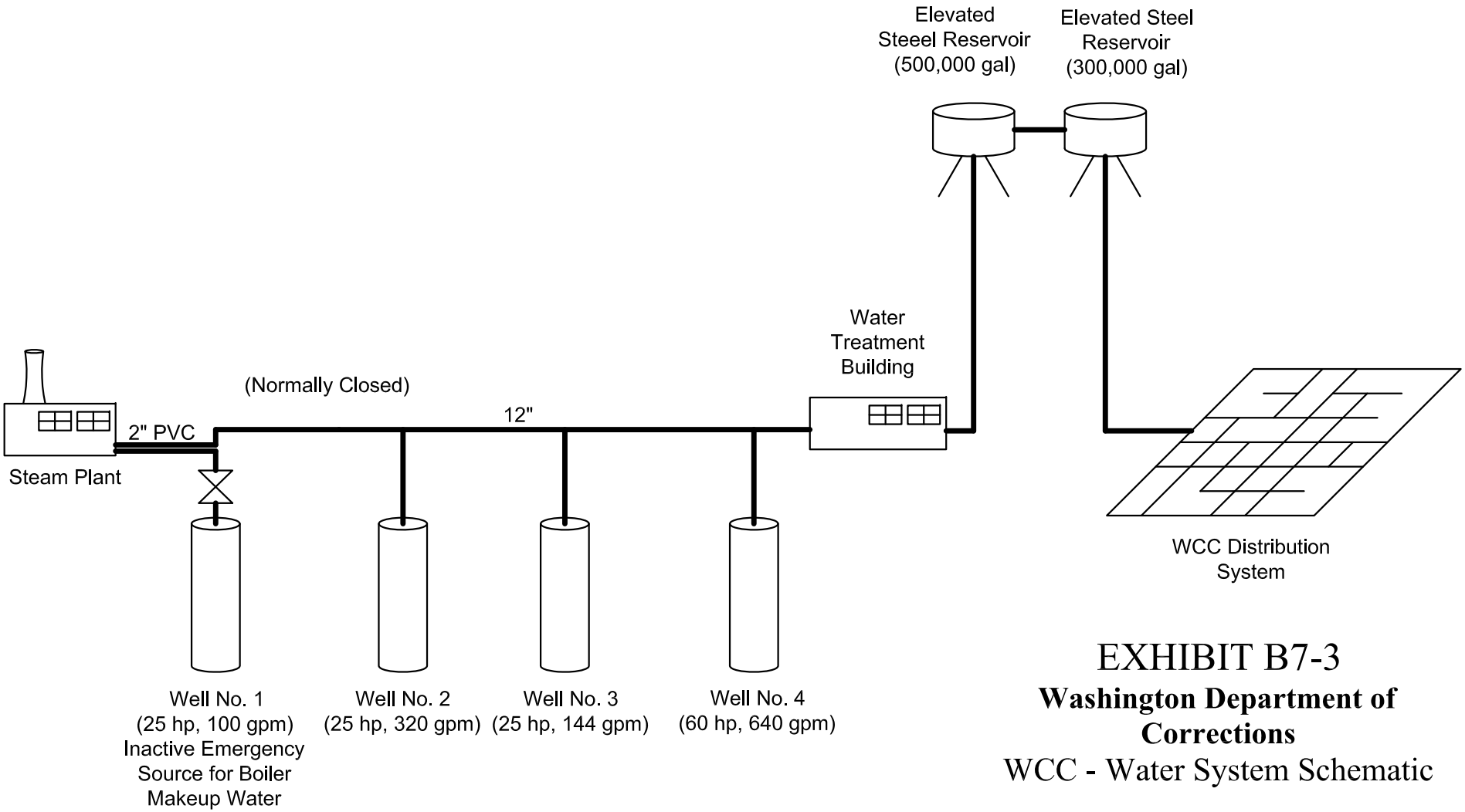


EXHIBIT B7-3

Washington Department of Corrections

WCC - Water System Schematic

June 2014

Not to Scale

HDR

Table B7-1
Water System Summary - WCC

Water Use

Year	Facility (gpd)			Per Inmate (gpd) [1]	
	Average (gpd)	Maximum (gpd) [2]	Peaking Factor	Average (gpd)	Maximum (gpd)
2012-2013	219,513	248,050	1.13	131	148

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
4789-A	Well 1	11/11/61	224	140
5376-A	Wells 2&3	04/02/64	268 (minus quantity withdrawn from 4789-A)	563

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Well No. 1	Depth = 177 feet Boiler Make-up Water	25	100
Well No. 2	Depth = 46 feet	25	320
Well No. 3	Depth = 184 feet Emergency Supply	25	144
Well No. 4	Depth = 56 feet	60	640
Treatment Processes	Chlorination (Onsite Hypochlorite) Soda Ash Addition	NA	NA

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Elevated Steel Reservoir	300,000	1962-1963
Elevated Steel Reservoir	500,000	2003

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
Ductile Iron, PVC	2.5-8	NA	1962-1963

NA = Not Applicable; ND = Insufficient Data; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

[1] Calculated as facility water-use divided by February 2014 offender population (1,678).

[2] Based on a peaking factor of 1.13, consistent with the 2005 WSP.

Water pumped from Wells No. 2, 3, and 4 is conveyed to a water treatment building, which contains soda ash feed equipment for use in increasing the pH of the water, as well as an on-site sodium hypochlorite generation system for disinfection. Well No. 1 water is pumped directly to the steam plant untreated and is used exclusively for boiler make-up water.

Except for recent additions at the facility, the distribution system was installed during 1962 and 1963 prior to the opening of the WCC in 1964. Water is pumped directly from the wells, through the treatment building, to the 500,000 gallon reservoir via a dedicated inlet pipe. Water is then conveyed to the 300,000 gallon reservoir which "floats" on the system.

Service lines range in size from 2.5 inches to 8 inches with the majority consisting of 4-inch PVC pipe. Water system static pressure averages about 67 psi throughout the system.

B7.3 Population and Water Demand Forecast

Table B7-2 provides a summary of 2014 and projected 2024 offender population and water demand. An expected offender population increase of 300 within the next 10 years (per DOC's 10-year planning) translates to an increase in average day water demand from 201,374 gallons per day (gpd) to 302,810 gpd. This assumes that per-offender water usage (131 gpd per offender) remains constant through the planning period. Future water conservation activities may reduce this water use factor over time.

Table B7-2
Water Demand Forecast - WCC

	2014	2024
Inmate Population	**1,678**	**1,978**
Average Day Demand (gpd)		
Facility	219,513	259,118
Per Inmate	131	131
Maximum Day Demand (gpd)		
Facility	248,050	292,744
Per Inmate	148	148
ERUs [(1)]	**954**	**1,127**

[(1)] Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B7.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B7.4.1 Water Rights

The total annual water right available for WCC is 268 acre-feet per year (afy), based on the two existing water rights. Well No. 1 is attached to Certificate 4789-A and Wells No. 2, 3, and 4 are attached to Certificate 5376-A, and additional withdrawals from Nos. 2 and 3 are allowed supplemental to Certificate 4789-A. However, Well No. 4 was not initially covered under either certificate. To correct this situation, in October 1997, DOC filed an application for change of water rights to include Well No. 4 as an additional point of withdrawal. In July 2006 it was determined that a change of water right was not needed since Well No. 4 was an additional well drawing from the same body of public groundwater and does not enlarge the water right conveyed by the original water right. Therefore the application for change was withdrawn and Well No. 4 is in production. The water rights remain at 268 afy.

As depicted in Table B7-3, the existing water rights are sufficient to support present demands. However, they are likely not sufficient to support the full projected increase in population of 300 offenders (assuming per-offender usage remains the same). At current

water consumption levels, only approximately one-half of the projected growth could be supported by existing water rights.

DOC plans to address this situation via its participation in the Shelton Area Regional Water and Sewer Plan. The goal of this effort is to develop a long-term regional solution for water supply and wastewater management in the Shelton area. The envisioned plan would include provision of water to WCC from a regional supply source located in the City of Shelton. This would have the effect of eliminating the limitations imposed upon WCC due to its water right constraints.

Alternatively, it is possible for WCC to receive Class A reclaimed water from the City via a stubout located near the facility. Connecting WCC to the reclaimed water system is not currently funded, but is a potential solution to lessen the facility's reliance on its limited potable water supplies to meet non-potable demands.

Table B7-3
Water Right Analysis - WCC

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)		
G2-06107C (224 afy)	199,822	199,822
G2-07086C (268 afy) (1)	239,072	239,072
Total	239,072	239,072
Average Day Demand (gpd)	219,513	259,118
Water Right Surplus/(Deficiency) (gpd)	**19,559**	**(20,046)**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)		
G2-06107C (140 gpm)	201,600	201,600
G2-07086C (563 gpm) (1)	810,720	810,720
Total	810,720	810,720
Maximum Day Demand (gpd)	248,050	292,744
Water Right Surplus/(Deficiency) (gpd)	**562,670**	**517,976**

(1) This represents the total allowed under both rights.

B7.4.2 Source Capacity

Table B7-4 provides a comparison of source capacity with maximum day demand.

Table B7-4
Source Capacity Analysis - WCC

	2014	2024
Available Source (gpd)		
Well No. 2 (320 gpm)	460,800	460,800
Well No. 3 (144 gpm)	207,360	207,360
Well No. 4 (640 gpm)	921,600	921,600
Total	1,589,760	1,589,760
Maximum Day Demand (gpd)	**248,050**	**292,744**
Source Capacity Surplus/(Deficiency) (gpd)	**1,341,710**	**1,297,016**

The WCC wells have adequate capacity to meet projected demands. However, it is noted that the facility's future supply may change significantly with the development of a

Shelton Regional Water System, as discussed in Section B7.4.1. Regardless, future supply capacity is adequate to meet projected needs.

B7.4.3 Storage Capacity

WCC is currently served by two storage reservoirs. Total system storage is 800,000 gallons. Total required storage is 686,000 gallons, based primarily on a fire flow requirement of 3,750 gpm for 3 hours, as established by the Mason County Fire Marshal. As depicted in Table B7-5, existing storage is adequate to meet present and future needs.

Table B7-5
Storage Capacity Analysis – WCC

		Year	
		2014	**2024**
Projected Population and Demand [1]			
	Population (offenders)	1,678	1,978
	Per Inmate Usage (gpod)	131	131
	Projected Demand (gpd)		
	Average Day	219,513	259,118
	Peak Day	248,050	292,744
	ERUs	954	1,127
Available Source (gpd) [2]			
	Well No. 2 (320 gpm)	460,800	460,800
	Well No. 3 (144 gpm)	207,360	207,360
	Well No. 4 (640 gpm)	921,600	921,600
Total Available Source when operating together (gpd)		1,589,760	1,589,760
Required Storage Calculations			
	Standby Storage (gal) [3]	190,800	225,400
	Equalizing Storage (gal) [4]	12,403	14,637
	Fire Flow Storage (gal) [5]	675,000	675,000
	Total Required Storage [6]	**687,403**	**689,637**
Existing Available Storage (gal)			
	Old Reservoir	500,000	500,000
	New Reservoir	300,000	300,000
	Total Available Storage	**800,000**	**800,000**
Storage Surplus/(Deficiency)		***112,598***	***110,363***

(1) See Section B7.3 for details.
(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.
(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or 200 gpd/ERU.
(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)
(5) Required fire flow storage = Flow * duration = 3,750 gpm * 3 hr * 60min/hr.
(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B7.4.4 Distribution System Analysis

The WCC distribution system was analyzed using a computer model. This section presents a description of the general setup of the model, followed by discussion of the modeling results. A map of the hydraulic model, including node locations, is provided in Part C.

Because there have been no significant changes to the distribution system since the modeling was done for the 2005 Plan, the hydraulic modeling was not updated. Thus, the results documented in the 2005 Plan were retained in this update and are assumed to accurately depict the hydraulic capabilities of the distribution system.

History of Hydraulic Model

A hydraulic model of the water distribution system for WCC existed from a previous project involving the design of the new elevated water tank in 2003. The model included all four wells, both the new and old elevated water tanks, and the water distribution network. The only modification that was made to the model for purposes of the water system plan analysis involved changing the configuration of the piping around the two elevated water tanks so that the two active wells could pump directly into the new tank via a dedicated inlet pipe, while the existing tank floated on the hydraulic grade of the distribution system, thus representing current system operations.

The model is set up such that either Well No. 2 pumps at 320 gpm or Well No. 4 pumps at 640 gpm. The hydraulic grade of the two water tanks and the distribution system is set at 456 feet.

Extended Period Simulation (EPS), 2005 and 2015 Demands

The WCC water distribution system was evaluated under present and future conditions during peak day demands to which a diurnal curve was applied to simulate peak hour demands. During the 24-hour model period, the system pressures are at their lowest during times of high demand. Analysis of the system indicated that all of the nodes within the water distribution system are able to maintain a pressure of at least 30 pounds per square inch (psi).

Fire Flow Analysis, 2005 and 2015 Demands

The fire flow requirement for WCC is 3,750 gpm for 3 hours. The existing distribution system was evaluated for 2005 and 2015 peak day demands, along with the fire flow requirements at each node. The analysis showed all of the 51 system nodes were able to achieve pressures of at least 20 psi during modeled fire flow events. All distribution system nodes serving fire hydrants were able to provide flows of at least 3,750 gpm at these minimum pressures. Eighteen nodes, located at the end of smaller diameter building service lines on which there are no fire hydrants, were not able to provide flows of 3,750 gpm. This is of no concern, however, as fire flows are not required of these service lines.

B7.5 Water Quality Compliance Review

Table B7-7 provides a summary of WCC's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, WCC has maintained compliance with water quality regulations in recent years.

Table B2-7 Water Quality Monitoring – WCC	
Parameter	**Monitoring Frequency**
Bacteriological	Twice per month
Lead & Copper	Once every 3 years
D/DBP [2]	Once every year
Nitrate	Once every year
IOC	Once every 3 years (Well No. 3)
	Waiver through 2014 (Well Field SO2, SO4)
VOC	Waiver through 2018 (Well No. 3)
	Waiver through 2015 (Well Field SO2, SO4)
SOC (H,I,P) [1]	H - Waiver through 2015 (Well No. 3)
	H - Waiver through 2019 (Well Field SO2, SO4)
	P and I - Waiver in place- DOH has not established next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years
Asbestos	None established

[1] H = Herbicides; I = Insecticides; P = Pesticides
[2] Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B7.6 Water Conservation

A conservation plan was developed for WCC in 2002. This document is provided in Part C. Since then, many of the identified conservation activities have been implemented and WCC continues to improve its water conservation measures. Two large projects which have been implemented are the construction of a food waste compost facility, which was completed in 2010, and the reclaimed water system which is part of the Shelton Regional Water System described in Section B7.4.1. As noted previously, the WCC system is not yet connected to the regional reclaimed water system, but a stub-out is in close proximity to the facility.

WCC aims to reduce offender consumption to 115 gpd by 2020. However, with the closing of MICC, WCC is now receiving laundry from WCCW and MCCCW. As such, it's likely the 115 gpd goal will be unattainable without upgrades to the facility's infrastructure or the elimination of laundering for other DOC facilities.

As of 2012, WCC was approximately 75 percent metered. WCC aims to be fully metered by June 2015, subject to available funding. Between 2011 and 2012, WCC reduced their water use by six percent. Distribution system leakage is estimated to be zero percent of total water supply. These achievements are attributed to diligent system monitoring and leak repair, reductions in lawn irrigation, and use of low-flow showerheads.

B7.7 Source Protection

WCC's wellhead protection plan (WHPP) was developed as a part of 2005 Plan. As there have been no significant changes to the sources or the water system, the WHPP remains valid. WHPP information is provided below.

B7.7.1 Background

The goal of the WHPP is to protect WCC's water supply by identifying and managing potential sources of ground water contamination that could impact the facility's wells. WCC currently uses four production wells. Wells No. 2, 3, and 4 are used for the domestic water system. Well No. 1 is used solely for plant boiler makeup water. Wells No. 2 and 4 are completed in coarse sand, overlain with clay and hard sand. The depths of the wells are 46 and 56 feet, respectively. Wells No. 1 and 3 are deeper, at 177 and 184 feet below ground surface, respectively.

The objectives of the WHPP are to delineate a wellhead protection area around the wells, establish and maintain an inventory of potential sources of ground water contamination, and outline emergency spill response and contingency plans. The WHPP is also a formalized process to notify business owner/operators and educate the public about wellhead protection.

B7.7.2 Delineation of the Wellhead Protection Area

The following five zones of the wellhead protection area were delineated for each well:

1. Sanitary control area
2. Six-month time of travel zone
3. One-year time of travel zone
4. Five-year time of travel zone
5. Ten-year time of travel zone.

The six-month through ten-year time of travel zone boundaries, or wellhead zones of contribution, are displayed on Exhibit B7-4. The Calculated Fixed Radius method was used to determine the radii for these zones, as documented in the Susceptibility Assessment Survey Forms completed for the well. These forms are included in Appendix C. The sanitary control area consists of a 100-foot radius around the wells, as required by WAC 246-290-135 (2).

Well No. 3

Well No. 4

Well No. 2

Well No. 1

Gravel Pit

Borrow Pit

Wells

Water Tank

Sewage Disposal

WASHINGTON CORRECTIONS CENTER

Armstrong Lake

Winter Creek

South Fork

RAILROAD

ROAD

Legend

- Well Location
- Potential source of contamination located beyond WHP Management Area (1)

Well No. 1 WHP Zones of Contribution
- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

Well No. 2 WHP Zones of Contribution
- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

Well No. 3 WHP Zones of Contribution
- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

Well No. 4 WHP Zones of Contribution
- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

(1) Source of Data:
Washington State Department of Ecology
Facility Site Identification (F/SID) System.

N

0 1000 2000

SCALE IN FEET

EXHIBIT B7-4

Washington Department of Corrections

WCC - Wellhead Zones of Contribution and Potential Sources of Contamination

June 2014

HDR

B7.7.3 Contaminant Inventory in the Wellhead Protection Area

Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within WCC's wellhead protection area. In addition, facility staff were interviewed to obtain information regarding potential contaminant sources from within or near the facility.

There are no potential contaminant source sites listed in the Ecology database as being within WCC's wellhead protection area. The Mason County solid waste transfer station and landfill is located northeast of WCC but outside the wellhead protection area.

The primary sources of potential contamination at the facility include the following:

- Wastewater treatment plant, treated effluent sprayfield (in forest across the road from the facility), and sludge application (at back of facility and near the front entrance to the facility)
- Firing range (near the water storage reservoirs)
- Above ground storage tanks (14) for generator fuel storage (located throughout the facility)
- Two above ground storage tanks including drainage system and oil/water separator, at the fueling station
- Herbicides and solvents stored in the Maintenance Shop
- Chemicals stored at the nursery
- Kitchen grease trap
- Chemicals stored at Correctional Industries
- Chemicals and forestry products stored at the wood shop
- Accidental spills on Dayton Airport Road.

B7.7.4 Management Program for the Wellhead Protection Area

The susceptibility of the WCC wells is high. WCC has adopted management strategies including contingency planning and spill response planning in order to protect the wells.

In the event that water from one of the wells is unfit for consumption, WCC would rely upon the other wells. Due to its greater depth, Well No. 3 is less susceptible to contamination, and may be fit for use if Wells No. 2 and 4 become contaminated. If all wells become contaminated, WCC plans to have water delivered to the facility by tanker truck, as described within Section B7.8.4 (Contingency Plan) of the Water System Plan, or use City water once the Shelton Regional Water System is completed.

In the event of an accidental spill, WCC facility staff will notify the Plant Manager. The Plant Manager or switchboard operator would in turn notify the 24-hour Ecology spill response hotline.

Public education is not a major component of the WCC WHPP since the water system serves a correctional facility. Water quality information is periodically posted on the facility bulletin board, and staff are informed of the potential for their activities to impact source water quality.

B7.8 Operations and Maintenance

B7.8.1 Certified Operators

WCC currently has two certified operators:

- Dwight Johnson (WDM 2/CCS, No. 12430)
- Daniel McGrady (WDM 1/CCS, No. 6240)

B7.8.2 Emergency Call-up List

Table B7-7 provides the emergency call-up list for WCC.

Table B7-7
Emergency Call-up List - WCC

Personnel/Agency	Working Hours Number	Off-Duty Number
Plant Manager – Dwight Johnson	(360) 432-1508	(360) 490-4441
Superintendent – Scott Russell	(360) 427-4696	
DOC Project Manager – Ed Hampton	(360) 725-8345	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water – SWRO	(360) 236-3030	1-877-481-4901
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	4260 (Major Control)	
Fire Department	4260 (Major Control)	
Emergency Medical	4260 (Major Control)	

B7.8.3 Water Quality Testing Laboratories

WCC uses the following laboratories for water quality testing:

Thurston County Environmental Health
Water Quality Testing Lab
2000 Lakeridge Drive SW
Olympia, WA 98502

Dragon Analytical Laboratory
530A Ron Lee Lane NW
Olympia, WA 98502

B7.8.4 Contingency Plan

WCC has two 300 gallon water trailers once owned by the U.S. Army. If these are brought into service, they will first be disinfected using a concentrated chlorine solution. WCC has also arranged for water to be delivered to the facility by Water Truck Services in the event that reservoir storage is not adequate to address emergency situations, per the

trucked water plan presented in Section A6.3.3. The nearest water purveyor is the City of Shelton, which could also be contacted in the event of an emergency.

B7.9 Cross-Connection Control

There are approximately 45 cross-connection control devices located throughout the facility, consisting of both double-check and reduced pressure backflow preventers.

B7.10 Capital Improvement Program

The following are capital improvement projects planned for implementation at WCC within the ten year planning period.

WCC-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $30,000. Therefore, the total 10-Year planning period estimated cost is $300,000. **Priority Ranking = 2.**

WCC-2: System Modifications to Connect to Regional Reclaimed Water System. This involves modifications to WCC's existing water system associated with connection to the Shelton Regional Reclaimed Water System. Such modifications include installation of valves and additional piping as necessary to ensure proper separation of the reclaimed water and potable water system. Total estimated project cost is $150,000. This includes engineering analyses to determine the optimal configuration of system modifications, and to investigate other potential system concerns. **Priority Ranking = 2.**

WCC-3: Maintenance of 300,000 gallon Reservoir. This involves inspection, repair, and repainting of the 300,000 gallon reservoir. Total cost budgeted for in the 2013-2015 biennium is $502,000. **Priority Ranking = 1.**

WCC-4: Maintenance of 500,000 gallon Reservoir. This involves inspection, repair, and repainting of the 500,000 gallon reservoir. Total cost planned for in the 2015-2017 biennium is $440,000. **Priority Ranking = 1.**

WCC-5: Address Water System Leaks. This involves repairing water system leaks as needed. Total estimated cost projected for the 2019-2021 biennium is $239,000. **Priority Ranking = 1.**

Section

B8

Washington Corrections Center for Women

Section B8
Washington Corrections Center for Women

B8.1 Facility Description

The Washington Corrections Center for Women (WCCW) is located in Pierce County, near the City of Gig Harbor. The institution houses female offenders, and consists of the main institution and a minimum-security compound.

The main institution consists of one maximum security, two close custody and one medium security housing units, a Special Need Unit, a segregation unit, and a close custody reception unit. The minimum security compound is located adjacent to the main institution and consists of three general population housing units (100, 100, and 104 beds). Other structures at the WCCW include central control and administration building, a health clinic, education building, gymnasium, chapel, industries buildings, food service, and support facilities.

Currently, the facility houses approximately 920 female offenders and employs 400 staff.

Exhibit B8-1 provides a location map for the facility.

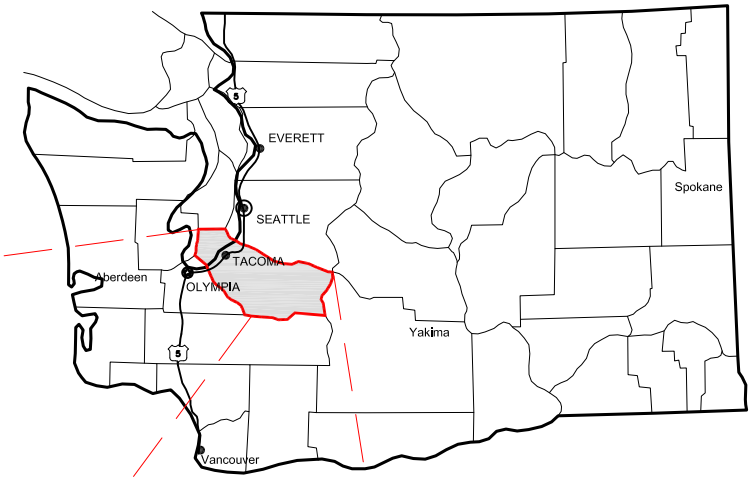
B8.2 Water System Description

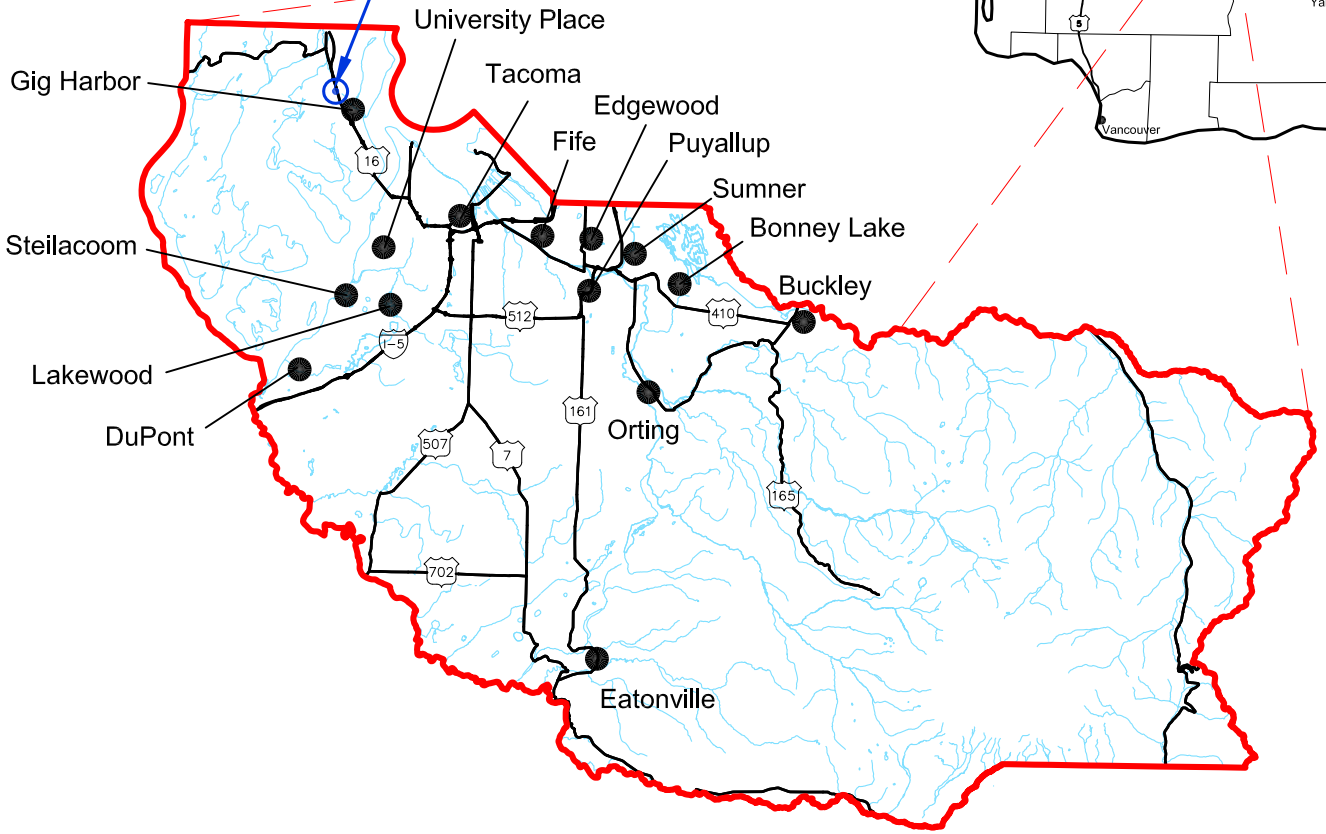
Table B8-1 provides a summary of WCCW's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B8-2 depicts the service area of the water system, and Exhibit B8-3 provides a schematic of key water system features. Detailed monthly water production data for 2012-2013 are provided in Appendix C-13.

WCCW currently obtains water from one onsite well (Well No. 1) and from the City of Gig Harbor (City). A second well (Well No. 2R) was decommissioned since development of the 2005 Plan. Water from the City comes through a 16-inch water main located along the institution's eastern perimeter. Presently, WCCW pumps approximately 15-20 percent of its water from Well No.1, with the remainder of its needs provided by the City.

An agreement between DOC and the City defines the minimum quantity of water supply the City commits to providing WCCW. This minimum quantity is 80,000 gpd (average day) and 210,000 gpd (peak day), as outlined in the original agreement dated October 11, 1994. A copy of the agreement is provided in Part C.

Washington Corrections Center for Women





Pierce County

EXHIBIT B8-1

Washington Department of Corrections

WCCW - Vicinity Map

June 2014

HDR

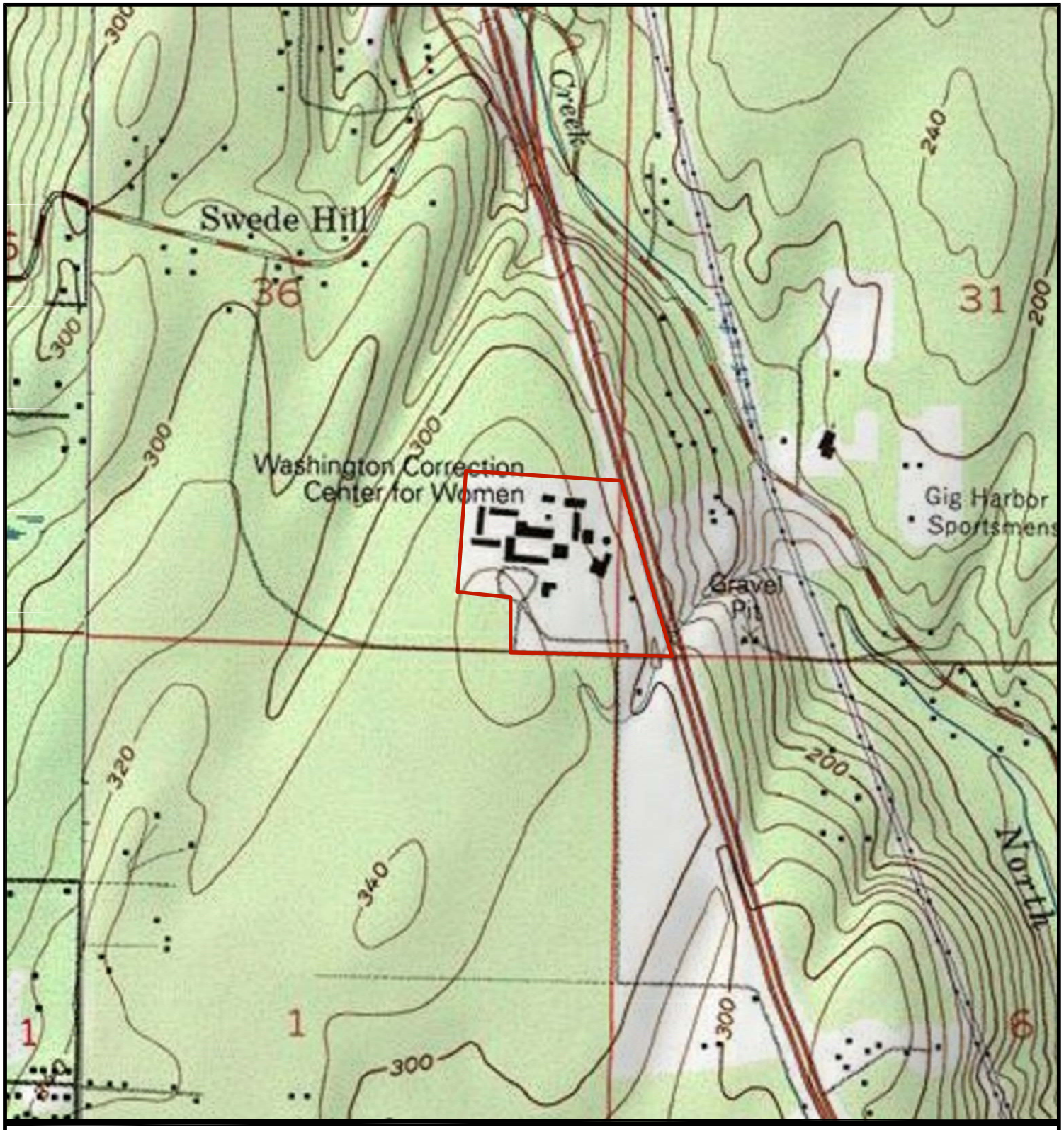


EXHIBIT B8-2

Washington Department of Corrections

WCCW - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

SCALE IN FEET

June 2014

HDR

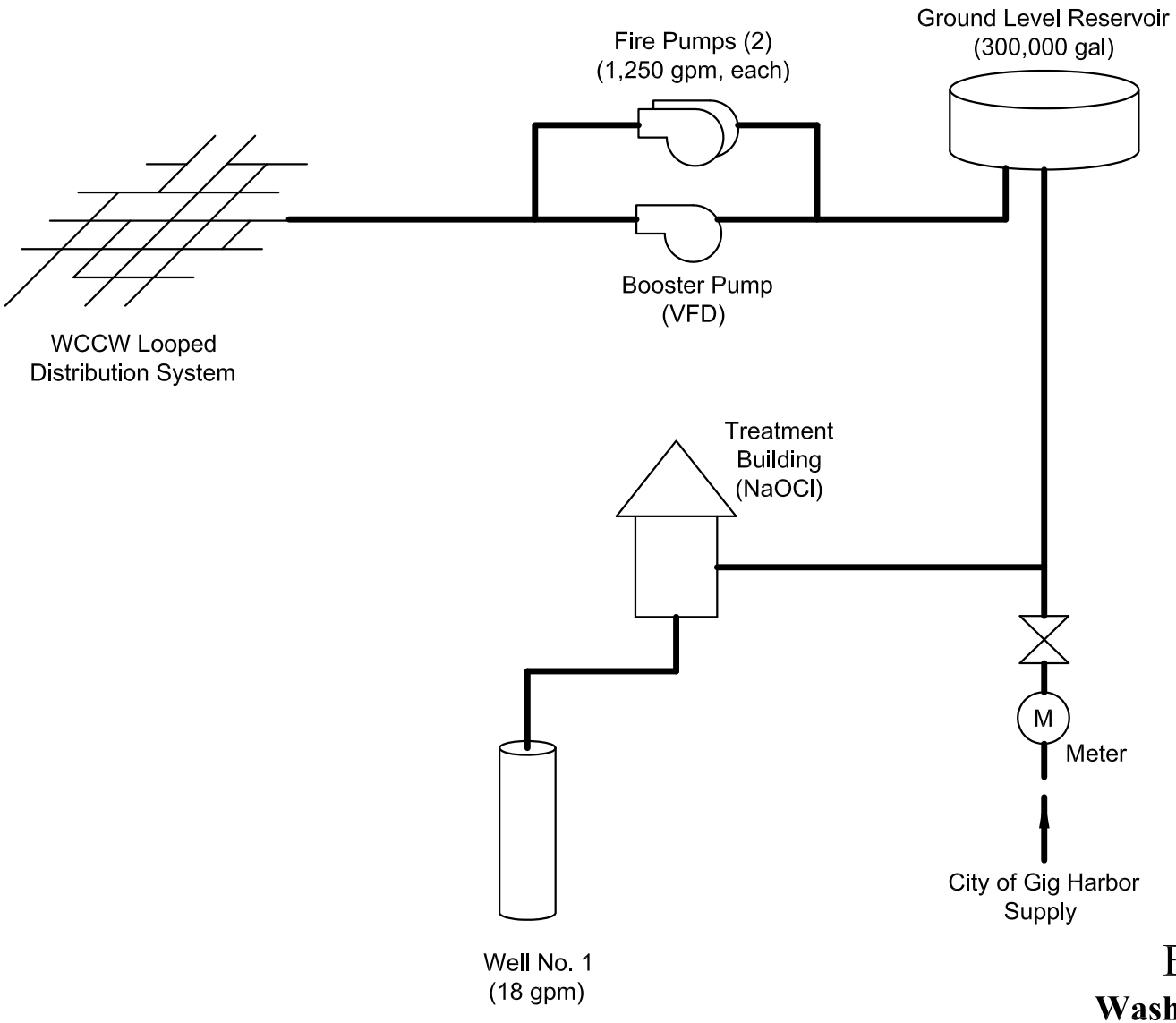


EXHIBIT B8-3

Washington Department of Corrections

WCCW -Water System Schematic

Not to Scale

June 2014

HDR

Table B8-1
Water System Summary - WCCW

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum (gpd)	Peaking Factor [2]	Average (gpd)	Maximum (gpd)
2012-2013	84,978	127,467	1.5	93	139

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
7311-A	Well No. 1	10/03/68	135	107
G2-24678C	Wells No. 1&2	08/24/77	100 (total of 140 afy, when combined with prior right)	100

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Well No. 1	Depth = 341feet	10	18
City of Gig Harbor	Back-up Supply	NA	56 (minimum)
Treatment Process	Chlorination	NA	NA

Booster Pump Station Inventory

Pump	Year Installed	Pump Horsepower (hp)	Production Capacity (gpm)
Pony Pump – Variable speed	ND	7.5	100
Fire Pumps (2)	ND	60 (each)	1,250 (each)

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Ground-level Storage Tank	300,000	ND

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
DI, PVC	2, 8	5,100	1969-1971

NA = Not Applicable; ND = Insufficient Data; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

(1) Calculated as facility water-use divided by February 2014 offender population (918).

(2) The peaking factor of 1.5 is based on the peak day consumption in 2013.

Under normal operation, water from the well is pumped into the 300,000 gallon storage tank, from which it is then pumped into the institution via a pump station located adjacent to the tank. The pump station consists of one variable-speed pony pump and two 60 hp pumps. The 60 hp pumps are capable of producing in excess of 1,500 gallons per minute (gpm). The pumps are driven by a variable frequency drive system which maintains the system pressure at a constant 60 pounds per square inch (psi). Three emergency generators dedicated to the pump station are located next to the pump building.

B8.3 Population and Water Demand Forecast

Table B8-2 provides a summary of current (2014) and projected future (2024) offender population and water demand. An expected offender population increase of 96 within the next 10 years translates to an increase in average day water demand from 84,978 gallons per day (gpd) to 105,576 gpd. This assumes that per-offender water usage (106 gpd per offender)

remains constant through the planning period. Future water conservation activities may reduce this water use factor over time.

Table B8-2
Water Demand Forecast - WCCW

	2014	2024
Offender Population	**918**	**1,014**
Average Day Demand (gpd)		
Facility	84,978	94,302
Per Offender	93	93
Maximum Day Demand (gpd)		
Facility	127,467	140,946
Per Offender	139	139
ERUs [(1)]	**369**	**410**

(1) Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B8.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B8.4.1 Water Rights

The total annual water right available for WCCW is 135 acre-feet per year (afy), based on the original water right associated with Well No. 1. As depicted in Table B8-3, these rights are sufficient to support present and projected demands. This does not take into account the additional supply provided by the City.

Table B8-3
Water Right Analysis - WCCW

	2014	2024
Average Day Basis		
Available Water Rights (Qa) (gpd)		
7311-A (135 afy)	120,428	120,428
G2-24678C (100 afy)	89,206	89,206
Total [(1)]	120,428	120,428
Average Day Demand (gpd)	84,978	94,302
Water Right Surplus/(Deficiency) (gpd)	**35,450**	**26,126**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)		
7311-A (107 gpm)	154,080	154,080
G2-24678C (100 gpm)	144,000	144,000
Total [(1)]	154,080	154,080
Maximum Day Demand (gpd)	127,467	140,946
Water Right Surplus/(Deficiency) (gpd)	**26,613**	**13,134**

(1) For this analysis, only the original water right associated with Well No. 1 (7311-A) is considered, as it is the only well existing and in use.

B8.4.2 Source Capacity

Table B8-4 provides a comparison of source capacity with maximum day demand.

Table B8-4 Source Capacity Analysis - WCCW		
	2014	**2024**
Available Source (gpd)		
Well No. 1 (18 gpm)	25,920	25,920
City of Gig Harbor Supply [(1)]	210,000	210,000
Total	235,920	235,920
Maximum Day Demand (gpd)	127,467	140,946
Source Capacity Surplus/(Deficiency) (gpd)	**108,453**	**94,974**

(1) Based on the existing agreement between the City and DOC, which notes that on a peak day basis, the minimum supply available to WCCW is 210,000.

Well No. 1 is not sufficient by itself to meet facility demands. However, additional supply from the City supports the ability of the facility to meet current and projected future demands.

B8.4.3 Storage Capacity

WCCW is currently served by one 300,000 gallon storage reservoir. Total required storage is 143,000 gallons, based primarily on a fire flow requirement of 1,500 gpm for 1.5 hours, as established by the Pierce County Fire Marshal. As depicted in Table B8-5, existing storage is adequate to meet present and future needs.

Table B8-5 Storage Capacity Analysis – WCCW		
	Year	
	2014	**2024**
Projected Population and Demand[(1)]		
Population (offenders)	918	1,014
Per Offender Usage (gpod)	93	93
Projected Demand (gpd)		
Average Day	84,978	94,302
Peak Day	127,467	140,946
ERUs	369	410
Available Source (gpd)[(2)]		
Well No. 1 (18 gpm)	25,920	25,920
City of Gig Harbor	210,000	210,000
Total Available Source when operating together (gpd)	235,920	235,920
Required Storage Calculations		
Standby Storage (gal)[(3)]	82,400	91,800
Equalizing Storage (gal)[(4)]	6,373	7,047
Fire Flow Storage (gal)[(5)]	135,000	135,000
Total Required Storage [(6)]	**141,373**	**142,047**
Existing Available Storage (gal)		
300,000 Gallon Reservoir	300,000	300,000
Total Available Storage	**300,000**	**300,000**
Storage Surplus/(Deficiency)	***158,627***	***157,954***

(1) See Section B8.3 for details.
(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.
(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or 200 gpd/ERU.
(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)
(5) Required fire flow storage = Flow * duration = 1,500gpm * 1.5 hr * 60min/hr.
(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B8.4.4 Distribution System Analysis

The WCCW distribution system was analyzed using a hydraulic model. This section presents a description of the general setup of the model, followed by discussion of the modeling results. A map of the hydraulic model, including node locations, is provided in Part C.

Because there have been no significant changes to the distribution system since the modeling was done for the 2005 Plan, the hydraulic modeling was not updated. Thus, the results documented in the 2005 Plan were retained in this update and are assumed to accurately depict the hydraulic capabilities of the distribution system.

History of Hydraulic Model

A hydraulic model of the water distribution system for WCCW existed from previous efforts and was modified and updated for use in this analysis. The existing model included Well No. 1, Well No. 2R, the connection to the City of Gig Harbor, the ground level storage tank, the booster station and the distribution system for the northern half of the facility. Based on utility mapping of the facility, the remainder of the water distribution system was added to the model. In addition, the arrangement and operating conditions for the well pumps and the booster station were modified to more correctly simulate current operating conditions of the water system.

The modifications to the model are as follows:

- Added Flow Control Valve (FCV) – A flow control valve was added downstream of the wells prior to the water entering the storage reservoir. This allows the flow from each of the wells to be controlled so that neither well is pumping beyond its set water right or pump curve. The FCV is set for 160 gpm, which is suitable for 100 gpm from Well #2R and 60 gpm from Well #1. Having a flow control on the amount of water entering the reservoir will more accurately simulate the current operating condition of the wells.
- Added Pressure Reducing Valve (PRV) – A pressure reducing valve was added downstream of the booster pumping station so that the variable speed drive booster pump could be simulated. The booster pump is able to adjust its speed so that it will maintain 60 psi within the distribution system regardless of the system demand. In order for the model to simulate this, a PRV is used and set at 60 psi. During an extended period simulation, the system demand follows the American Water Works Association pattern and the booster pump changes speed to keep up with the flow.

Extended Period Simulation (EPS), 2005 and 2015 Demands

The WCCW water distribution system was evaluated under present and future conditions during peak day demands to which a diurnal curve was applied to simulate peak hour demands. During the 24-hour model period, the system pressures are at their lowest during times of high demand. Due to the operation of the variable speed booster pump, all of the nodes within the water distribution system are able to maintain at least 30 psi.

Fire Flow Analysis, 2005 and 2015 Demands

The fire flow requirement for WCCW is 1,500 gpm for 1.5 hours. The existing distribution system was evaluated for 2005 and 2015 peak day demands, along with the fire flow requirements at each node. The analysis indicated that all of the 47 system nodes were able to achieve pressures of at least 20 psi during modeled fire flow events. All distribution system nodes serving fire hydrants were able to provide flows of at least 1,500 gpm at these minimum pressures. Seven nodes, located along or at the end of smaller diameter service lines, upon which there are no fire hydrants, were not able to provide flows of 1,500 gpm. This is of no concern, however, as fire flows are not required of these service lines.

B8.5 Water Quality Compliance Review

Table B8-7 provides a summary of WCCW's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, WCCW has maintained compliance with water quality regulations in recent years. Minor incidents of noncompliance since 2005 include violation of the Total Coliform Rule in October 2008 and October 2013.

Table B8-7
Water Quality Monitoring – WCCW

Parameter	Monitoring Frequency
Bacteriological	Twice per month
Lead & Copper	Once every 3 years
D/DBP (2)	Once every year
Nitrate	Once every year
IOC	Waiver through 2021
VOC	Waiver through 2018
SOC (H,I,P) (1)	Waiver through 2021
	I – Waiver in place- DOH has not established the next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years
Asbestos	None established

(1) H = Herbicides; I = Insecticides; P = Pesticides
(2) Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B8.6 Water Conservation

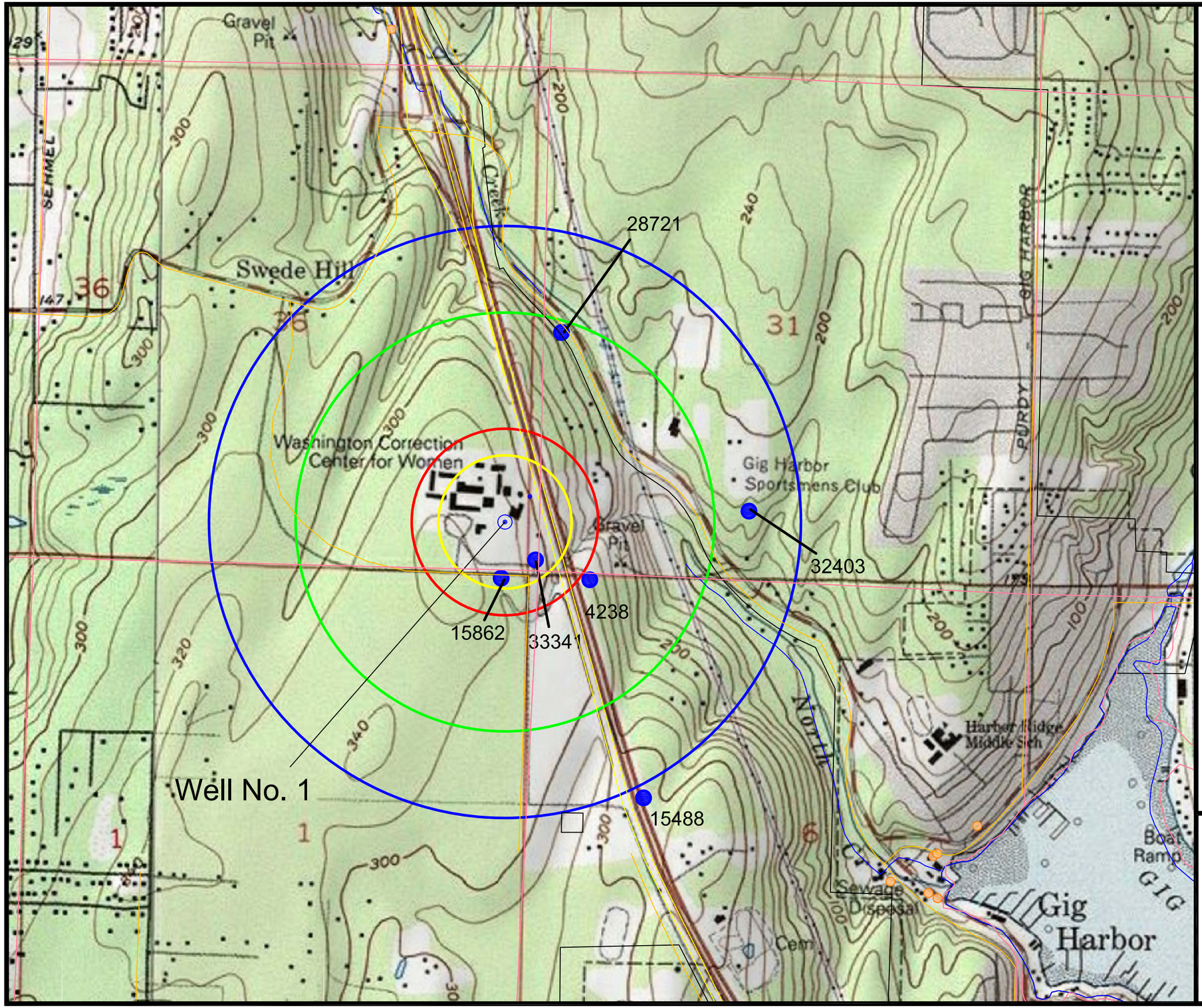
A water conservation audit was conducted for WCCW in 2001. Documentation of this effort is provided in Part C. Conservation activities underway prior to and as a result of the audit include landscape irrigation with the use of an automated, timed system, installation of low-flow toilets, and installation of low-flow shower heads (some of which have since been removed due to maintenance needs).

WCCW was part of a recent statewide metering project. Eleven water meters were installed at the following locations in 2004: the clinic, the kitchens, medium security unit, close custody unit, Building M, minimum security compound Living Unit No. 1, the maintenance and administration buildings, the school building, and the main irrigation line. The intent of these meters is to track water use for specific applications, evaluate trends over time, and identify appropriate water saving activities.

WCCW has reduced offender consumption to 93 gpd, well below their established goal of 115 gpd. This achievement is attributed to the installation of low-flow showerheads on the MCS campus. Distribution system leakage is estimated to be zero percent of total water supply.

B8.7 Source Protection

WCCW's wellhead protection plan was developed in 2001. Documentation is included in Part C. An update to the contaminant source inventory was conducted in conjunction with this Water System Plan update. Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within WCCW's wellhead protection area. Table B8-7 provides a list of all such sites located within the protection area and Exhibit B8-4 depicts site locations. All sites listed were identified previously in the 2001 wellhead protection plan, with the exception of the Gig Harbor Sportsmen's Club and Rainbow Burham, LLC. DOC will follow the notification process described in the wellhead protection plan and send notification letters to the owners of these sites.



Legend

- Well Location
- Potential source of contamination within or adjacent to WHP Management Area (1)
- Ecology-listed facilities located beyond WHP Management Area

Well No. 1 WHP Zones of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

(1) Source of Data:
Washington State Department of Ecology Facility Site Identification (F/SID) System.

N

0 1000 2000

SCALE IN FEET

EXHIBIT B8-4

Washington Department of Corrections

WCCW - Wellhead Zones of Contribution and Potential Sources of Contamination

June 2014

HDR

In addition, the following represent other sources of potential contamination at and near the facility, as documented in the wellhead protection plan:

- Paint stored in the paint shed
- Septic systems and pesticide applications associated with area residences
- Accidental spills and pesticide application along Highway 16.

All other elements of the wellhead protection plan are retained as a part of this Water System Plan update.

Table B8-7
Updated Inventory of Potential Ground Water Contaminant Sources [1]

Exhibit Number [2]	Facility Name	Type [3]	Status	Source	Industrial Classification
4238	WCCW	Hazardous Waste Generator	Active		Non Classifiable Establishments
15862	WCCW – Hazardous Waste Tier 2	Hazardous Waste Tier 2	Active		
28721	Conans Fuel Daniel H Root	Toxics State Cleanup & UST	Active	Service Station	Automotive Dealers and Service Station
32403	Gig Harbor Sportsman Club	Toxics Voluntary Cleanup Site	Active	Bullets and Shot	Membership Sports and Recreation Clubs
15488	Pape and Sons Construction	Toxics LUST & UST	Active		Soils and Groundwater
33341	Rainbow Burham	Water Quality General Permit Industrial	Active	Sand and Gravel	Construction Sand and Gravel

(1) Source of data: Washington Department of Ecology Facility/Site Identification System database.
(2) See Exhibit B8-4 for site location. Some sites have multiple entries due to multiple activities being listed.
(3) UST = Underground Storage Tank; LUST = Leaking Underground Storage Tank.

B8.8 Operations and Maintenance

B8.8.1 Certified Operators

WCCW currently has one operator, Joseph Schrum (WDM1, No. 13376).

B8.8.2 Emergency Call-up List

Table B8-8 provides the emergency call-up list for WCCW.

Table B8-8
Emergency Call-up List - WCCW

Personnel/Agency	Working Hours Number	Off-Duty Number
Operator – Joseph Schrum	(253) 858-4200 ext 452	
WCCW Facilities Manager – John Kessler	(253) 858-4200 ext 234	(253) 255-7997
Plant Manager 3– Rod Coberly	(253) 858-4643	(253) 509-3622
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water - NWRO	(253) 395-6750	1-877-481-4901
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
Electrical Utility- Peninsula Light	(253) 857-1510	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	222 (Major Control)	
Fire Department	222 (Major Control)	
Emergency Medical	222 (Major Control)	

B8.8.3 Water Quality Testing Laboratories

WCCW uses the following laboratory for water quality testing:

Water Management Laboratories, Inc.
1515 80th St. E.
Tacoma WA 98404

B8.8.4 Contingency Plan

If Well No. 1 is taken off-line in an emergency situation, WCCW will use water from the City of Gig Harbor as the source of supply. If the reservoir needs to be taken off-line, WCCW could direct water from the City of Gig Harbor into the distribution system and bypass the reservoir altogether. However, water pressure may be inadequate in this scenario since the booster pump station would not be available to provide adequate pressures to the distribution system. If the entire system were shutdown, then WCCW could transport potable water from a nearby municipality or private water company with tanker trucks, per the trucked water plan presented in Section A6.3.3. Tanker trucks would need to be disinfected and equipped with a supply fitting prior to use. The nearest water purveyor is the City of Gig Harbor.

B8.9 Cross-Connection Control

There are approximately 40 cross-connection control devices located throughout WCCW, consisting of both double-check and reduced pressure backflow preventers. A list of device locations is retained at the facility.

B8.10 Capital Improvement Program

The following capital improvement projects are planned for implementation at WCCW within the ten year planning period.

WCCW-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $30,000. Therefore, the total 10-Year planning period estimated cost is $300,000. **Priority Ranking = 2.**

Section

B9

Maple Lane Corrections Center

Section B9
Maple Lane Corrections Center

B9.1 Facility Description

The Maple Lane Corrections Center (MLCC) is located in Thurston County, near Grand Mound. The facility was originally constructed in 1913, by the Washington State Department of Social and Health Services (DSHS). For almost 100 years the facility went by the name of Maple Lane School. Ownership of the facility changed in 2012, when the Washington State Department of Corrections (DOC) acquired the facility from DSHS.

Currently there are no offenders being housed at this facility and DOC has minimal staff (15) onsite to maintain the property. DOC has funding authorized to establish a centralized pharmacy at the facility, at which point the population served by the water system will increase to 30. DOC's 10-Year plan includes eventually housing 946 offenders at a reception center at the facility. However, such use has not yet been funded by the legislature, so there is uncertainty regarding the timing of when the facility will be put into full use for housing offenders.

Exhibit B9-1 provides a location map for the facility.

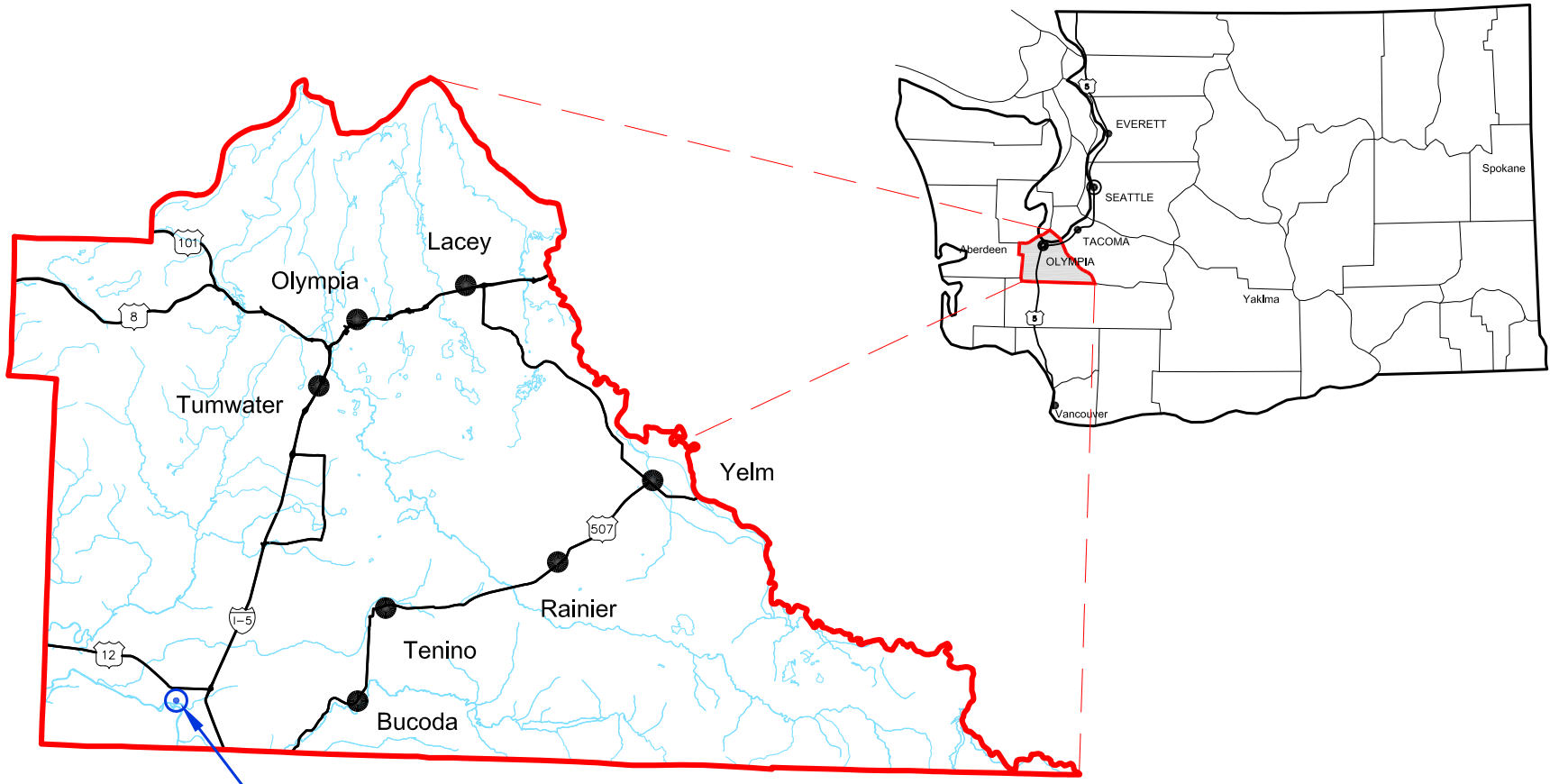
B9.2 Water System Description

Table B9-1 provides a summary of MLCC's water system, including information pertaining to water usage and water rights, as well as an inventory of system components. Exhibit B9-2 depicts the service area of the water system, and Exhibit B9-3 provides a schematic of key water system features.

Prior water system evaluations and documentation have been submitted to the Washington State Department of Health (DOH). The most recent comprehensive analysis of the system is contained within the document titled "Maple Lane School – Water System Evaluation; State Project No. 98-406A (February 18, 1998)." The information provided in this section references that information where it is still applicable and provides updates where appropriate.

Originally, the water supply for the school facility was a shallow spring. Due to water quality concerns, a well was drilled in 1939 and connected to the system. A second well was drilled within 20 feet of the first one and connected to the system in 1949 to increase reliability. Storage and pumping were later installed to complete the system.

Under normal operation, water from the wells is pumped and treated prior to delivery into the ground level storage tank, from which it is then pumped into the facility distribution system via a pump station located in proximity to the tank.



Thurston County

Maple Lane Corrections Center

EXHIBIT B9-1

Washington Department of Corrections

MLCC - Vicinity Map

June 2014

HDR

EXHIBIT B9-2

Washington Department of Corrections

MLCC - Water Service Area

Legend

Water Service Area Boundary (Approximate)

0 1000 2000

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June 2014

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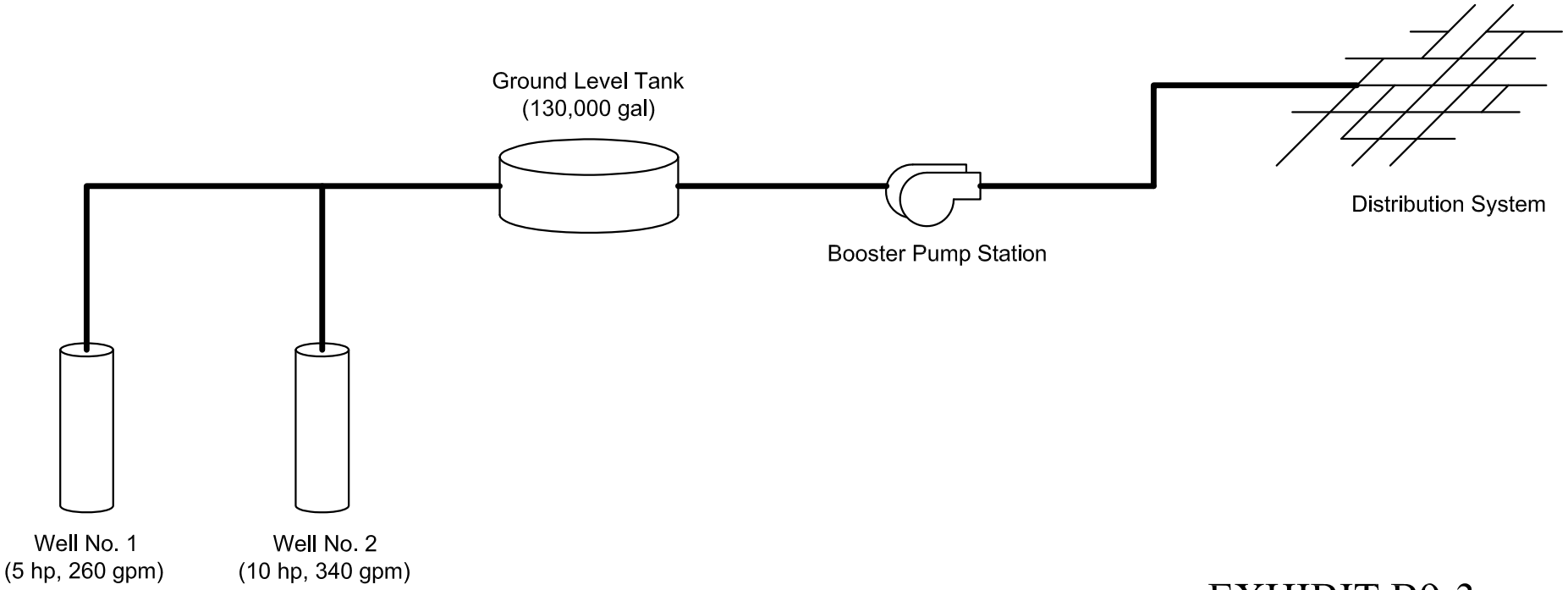


EXHIBIT B9-3

Washington Department of Corrections

MLCC -Water System Schematic

Not to Scale

June 2014

HDR

Table B9-1
Water System Summary - MLCC

Water Use

Year	Facility (gpd)			Per Offender (gpd) [1]	
	Average (gpd)	Maximum (gpd)	Peaking Factor [2]	Average (gpd)	Maximum (gpd)
2012-2013	8,950	17,900	2.0	NA	NA

Water Rights

Certificate Number	Source	Priority Date	Qa (afy)	Qi (gpm)
Claim 300076	Well Nos. 1&2	1939	96	310

Source Inventory

Source	Description	Pump Horsepower (hp)	Production Capacity (gpm)
Well No. 1	Depth = 80 feet	5	260
Well No. 2	Depth = 75 feet	10	340
Treatment Process	Chlorination	NA	NA

Booster Pump Station Inventory

Pump	Year Installed	Pump Horsepower (hp)	Production Capacity (gpm)
Booster pumps (2)	ND	3	90-765
Booster pumps (3)	ND	30	2,500 (total all running)

Storage Inventory

Reservoir	Capacity (Gallons)	Year Built
Ground level tank	130,000	1992

Distribution System Inventory

Pipe Material	Diameters (inches)	Estimated Length (ft)	Year(s) Installed
CI, PVC, AC	4, 6, 8, 10, 12	6,600	1939-1992

NA = Not Applicable; ND = Insufficient Data; Qa = Maximum Allowed Annual Withdrawal; Qi = Maximum Allowed Instantaneous Withdrawal

(1) As of June 2014, there are no offenders housed at this facility. Water usage is for domestic uses by staff and facility maintenance and irrigation.

(2) Based on an assumed peaking factor of 2.0.

B9.3 Population and Water Demand Forecast

Table B9-2 provides a summary of current (2014) and projected future (2024) offender population and water demand. As noted previously, there are no offenders currently housed at the facility. DOC has plans to eventually house 946 offenders at a reception center at this location. That has not yet been funded by the legislature. However, this is assumed to occur within the 10-year planning horizon for the purposes of water system planning. Using an average per-offender water use of 120 gallons per day (gpd), based on typical usage at other western Washington DOC facilities, potential average day water demands associated with 946 offenders is projected to be 113,520 gpd.

Table B9-2 Water Demand Forecast - MLCC		
	2014	**2024**
Offender Population	**0**	**946**
Average Day Demand (gpd)		
Facility	8,950	113,520
Per Offender	NA	120
Maximum Day Demand (gpd)		
Facility	17,900	227,040
Per Offender	NA	240
ERUs [(1)]	**39**	**493**

(1) Equivalent Residential Units (ERUs) are calculated as the average day demand divided by 230 gpd.

B9.4 Water System Analysis

The following sections describe the ability of key features of the water system to meet future needs. The methodologies used in the following analyses are described in Section B1.

B9.4.1 Water Rights

The total annual water right available for MLCC is 96 acre-feet per year (afy). As depicted in Table B9-3, these rights are not sufficient to support the projected demands associated with 946 offenders on an annual basis. The existing instantaneous water right is sufficient to support the projected needs.

If DOC does elect to house 946 offenders at this facility in the future, the intent is to receive water from Thurston County's Grand Mound system to supplement its own available supplies.

Table B9-3 Water Right Analysis - MLCC		
	2014	**2024**
Average Day Basis		
Available Water Rights (Qa) (gpd)		
Claim 300076 (96 afy)	85,500	85,500
Total	85,500	85,500
Average Day Demand (gpd)	8,950	113,520
Water Right Surplus/(Deficiency) (gpd)	**76,550**	**(28,020)**
Maximum Day Basis		
Available Water Rights (Qi) (gpd)		
Claim 300076 (310 gpm)	446,400	446,400
Total	446,400	446,400
Maximum Day Demand (gpd)	17,900	227,040
Water Right Surplus/(Deficiency) (gpd)	**428,500**	**219,360**

B9.4.2 Source Capacity

Table B9-4 provides a comparison of source capacity with maximum day demand.

Table B9-4 Source Capacity Analysis - MLCC		
	2014	**2024**
Available Source (gpd)		
Well No. 1 (260 gpm)	374,400	374,400
Well No. 2 (340 gpm)	489,600	489,600
Total	864,000	864,000
Maximum Day Demand (gpd)	17,900	227,040
Source Capacity Surplus/(Deficiency) (gpd)	**846,100**	**636,960**

The facility's existing sources are sufficient to meet the projected future demands. Each source alone can support maximum day demands, thereby providing redundancy by having the two wells. However, as noted in the previous section, water rights limit the amount of water that can be provided by the facility's wells. Thus, additional supplies from the nearby Grand Mound system are anticipated to support future of the facility for housing 946 offenders.

B9.4.3 Storage Capacity

MLCC is currently served by one 130,000 gallon storage reservoir. Total required storage in the future, with offenders housed at the institution is approximately 110,000 gallons, based primarily on a fire flow requirement of 90,000 gallons, as established by the Thurston County Fire Marshal. As depicted in Table B9-5, existing storage is adequate to meet present and future needs.

Table B9-5 Storage Capacity Analysis – MLCC		
	Year	
	2014	**2024**
Projected Population and Demand [1]		
Population (offenders)	15	946
Per Offender Usage (gpod)	120	120
Projected Demand (gpd)		
Average Day	8,950	113,520
Peak Day	17,900	227,040
ERUs	39	493
Available Source (gpd) [2]		
Well No. 1 (260 gpm)	374,400	374,400
Well No. 2 (340 gpm)	489,600	489,600
Total Available Source when operating together (gpd)	310,400	864,000
Required Storage Calculations		
Standby Storage (gal) [3]	7,800	98,600
Equalizing Storage (gal) [4]	895	11,352
Fire Flow Storage (gal) [5]	90,000	90,000
Total Required Storage [6]	**90,895**	**109,952**
Existing Available Storage (gal)		
130,000 Gallon Reservoir	130,000	130,000
Total Available Storage	130,000	130,000
Storage Surplus/(Deficiency)	***39,105***	***20,048***

(1) See Section B9.3 for details.
(2) Available source assumes source pumps are on for 24 hours in a day, at the maximum production rate.
(3) Required standby storage for existing source = Greater of (2*ADD-multi-source credit) or 200 gpd/ERU.
(4) Required equalization storage = Greater of 5% of MDD or DOH equation.
DOH equation = (Peak Hour Demand - Total Available Source) * (150 min.)
PHD : (Maximum Day Demand per ERU / 1440) * [(C) * (N) + F] + 18
(C & F values obtained from Table 5-1 in DOH August 2001 WSDM.)
(5) Required fire flow storage = Flow * duration = 1,500gpm * 1.5 hr * 60min/hr.
(6) Total Required Storage = Equalizing Storage plus the greater of Standby or Fire Flow Storage.

B9.4.4 Distribution System Analysis

The MLCC distribution system has been analyzed in the past using a hydraulic model. Details of that analysis have been provided in Appendix C-9. Because there have been minimal modifications to the system since that prior analysis, except for piping improvements as indicated in that plan, no updates to the distribution system analysis have been conducted.

That prior analysis indicated that the system was capable of providing peak hour demands while meeting a minimum pressure requirement of 30 psi. Recommended fire flows of 1,500 gpm were not able to be met at certain locations throughout the facility. This led to the identification of recommended piping improvements, including the extensions of 10-inch and 8-inch waterlines, which have been completed and support delivery of 1,500 gpm throughout the facility.

B9.5 Water Quality Compliance Review

Table B9-6 provides a summary of MLCC's monitoring requirements. Detailed water quality information is available in DOH's online Sentry database.

Overall, MLCC has maintained compliance with water quality regulations in recent years.

Table B9-6
Water Quality Monitoring – MLCC

Parameter	Monitoring Frequency
Bacteriological	Once per month
Lead & Copper	Once every 3 years
D/DBP (2)	Once every year
Nitrate	Once every year
IOC	Waiver through 2015
VOC	Waiver through 2016
SOC (H,I,P) (1)	H - Waiver through 2014
	P and I – Waiver in place- DOH has not established next sample date
SOC (Other)	None established
Radionuclides	Once every 6 years
Asbestos	None established

(1) H = Herbicides; I = Insecticides; P = Pesticides
(2) Disinfection byproducts refer to trihalomethanes and haloacetic acids.

B9.6 Water Conservation

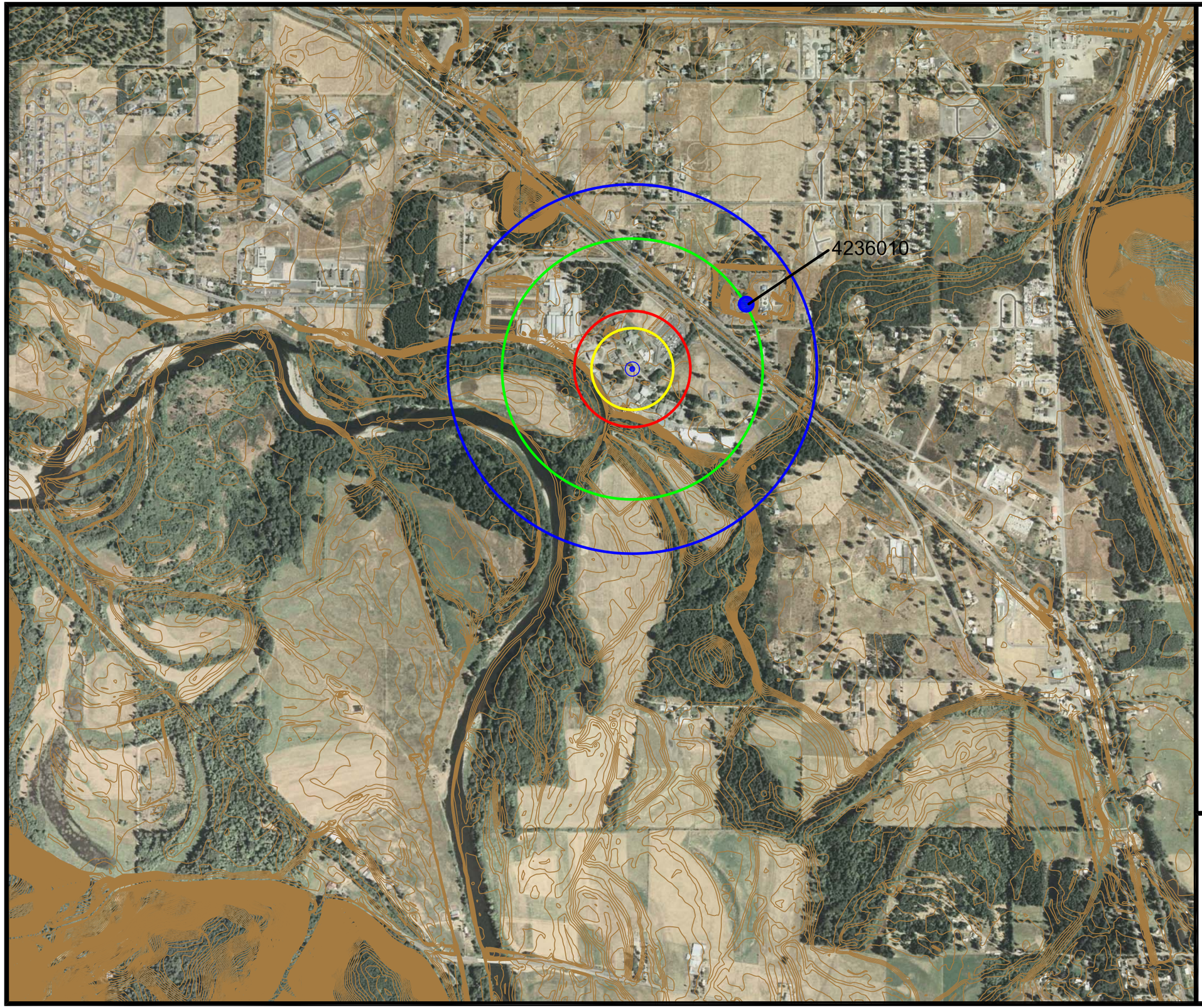
The DOC acquired the MLCC property in April 2012. Future use of the facility is pending based on legislative action. Currently, the facility is being operated under a warm closure scenario. Once a final decision on the use of the facility is known and funding becomes available, goals relating to the Municipal Water Law will be established.

Distribution system leakage is estimated to be zero percent of total water supply.

B9.7 Source Protection

MLCC's wellhead protection plan was developed in 1998. Documentation is included in Part C. An update to the contaminant source inventory was conducted in conjunction with this Water System Plan update. Ecology's Facility/Site Identification System database was reviewed to identify any known or potential sources of contamination within MLCC's wellhead protection area. One site was identified, with its location depicted on Exhibit B9-4. This single site is the Grand Mound Municipal Wastewater Treatment Facility, located just northeast of MLCC.

All other elements of the wellhead protection plan are retained as a part of this Water System Plan update.



Legend

- Well Locations
- Potential source of contamination within or adjacent to WHP Management Area (1)
- Ecology-listed facilities located beyond WHP Management Area

WHP Zones of Contribution

- 6 Month Time of Travel
- 1 Year Time of Travel
- 5 Year Time of Travel
- 10 Year Time of Travel

(1) Source of Data:
Washington State Department of Ecology
Facility Site Identification (F/SID) System.

0 1000 2000

SCALE IN FEET

EXHIBIT B9-4

Washington Department of Corrections

WCCW - Wellhead Zones of Contribution and Potential Sources of Contamination

June 2014

HDR

B9.8 Operations and Maintenance

B9.8.1 Certified Operators

MLCC currently has one operator, Mark Riddell (WDS, No. 13248).

B9.8.2 Emergency Call-up List

Table B9-7 provides the emergency call-up list for MLCC.

Table B9-7
Emergency Call-up List - MLCC

Personnel/Agency	Working Hours Number	Off-Duty Number
Operator – Mark Riddell	(360) 489-5357	
DOC Project Manager – Demar Holtz	(360) 359-4141	
DOC Environmental Specialist – Eric Heinitz	(360) 725-8397	
DOH Office of Drinking Water – SWRO	(360) 236-3030	1-877-481-4901
Emergency Water Supplier – Water Truck Services	(360) 825-5445	
Electrical Utility- Peninsula Light	(253) 857-1510	
24-Hour Spill Response – Ecology	(360) 407-6000	
Police/Security	222 (Major Control)	
Fire Department	222 (Major Control)	
Emergency Medical	222 (Major Control)	

B9.8.3 Water Quality Testing Laboratories

MLCC uses the following laboratory for water quality testing:

Water Management Laboratories, Inc.
1515 80th St. E.
Tacoma WA 98404

B9.8.4 Contingency Plan

If either Well No. 1 or Well No. 2 is taken off-line in an emergency situation, MLCC will use water from the other well as the source of supply. If the entire system were shutdown, then MLCC could transport potable water from a nearby municipality or private water company with tanker trucks, per the trucked water plan presented in Section A6.3.3. Tanker trucks would need to be disinfected and equipped with a supply fitting prior to use. The nearest water purveyor is the Grand Mound water system.

B9.9 Cross-Connection Control

Cross-connection control devices have been installed throughout MLCC, consisting of both double-check and reduced pressure backflow preventers. A list of device locations is retained at the facility.

B9.10 Capital Improvement Program

The following capital improvement projects are planned for implementation at MLCC within the ten year planning period.

MLCC-1: Annual Renewal and Replacement. This refers to annual distribution system maintenance and upgrade activities necessary to maintain reliable operation of the water system. This includes activities such as leak detection and repair, replacement of aging lines and valves, installation of service meters and backflow preventers, etc. The annual cost is estimated to be $30,000. Therefore, the total 10-Year planning period estimated cost is $300,000. **Priority Ranking = 2.**

MLCC-2: Updated Distribution System Hydraulic Evaluation. If DOC obtains legislative funding to proceed with opening a reception center at this facility, it is recommended than an updated hydraulic analysis be conducted of the distribution system, to confirm its abilities to meet fire flow requirements while also supporting increased peak hour demands, since such an analysis was not conducted as part of this Water System Plan update (due to the uncertainties of the future use of the facility). The cost of this effort is estimated to be $50,000. **Priority Ranking = 2.**