Technical Memorandum

Date: June 8, 2020

To: Rob Daykin, City Manager
City of Dundee

From: Lael Alderman, PE, Principal Engineer
Andy Szatkowski, PE, Senior Engineer
Jessica Cawley, PE

Re: City of Dundee -- Water Treatment Plant Conceptual Siting

Section 1, Introduction

The City of Dundee (City) contracted Murraysmith to develop a conceptual plan for increasing the City's drinking water supply through construction of a new water treatment plant. The conceptual plan is based on adding an initial firm capacity of 1.0 million gallons per day (MGD) of drinking water supply, with the facilities expandable to 2 MGD at build out. The analysis included the following items:

- Status and possible relocation of the City's current water right on the Willamette River
- Locations for a river intake structure
- Siting of a new water treatment plant (WTP)
- Evaluation of water treatment options
- Conceptual project costs
- Preliminary project timeline

Project cost estimates developed in this report are provided as the sum of construction costs, project engineering and construction management costs, and project administration and permitting costs. Construction cost estimates have been developed to be consistent with Association for the Advancement of Cost Engineering (AACE International) Class 4 standards with an expected accuracy range of +50% to -30% and include a 30 percent contingency based on a level of project definition for a conceptual study. Contingencies are based upon construction complexities, as well as potential risks associated with material costs and relative unknowns in excavation or state of existing infrastructure. Project and construction cost estimates are referenced to the Engineering (ENR) Construction Cost Index for Seattle, Washington at 12,145.67 (May 2020).

Section 2, Background

The City currently obtains its drinking water from several groundwater wells distributed throughout its water service area. The firm capacity of the City's existing groundwater well system is lowest in the winter when a total firm source capacity of 527 gpm is available. Based on data compiled for and presented in the Dundee Future Water Use Evaluation completed by Murraysmith, in 2014, the City served 3,335 customers and observed a maximum day demand (MDD) of 0.64 MGD. Anticipated growth within the City's water service area, and, in particular, within the new Riverside District east of Highway 99W, is anticipated, by 2035, to increase demands to 6,172 customers, and MDD is projected to increase to 1.27 MGD. The City will need to develop a secondary drinking water supply source to meet anticipated demands.

The City currently holds a water right on the Willamette River which may be used to develop a secondary or primary drinking water supply source. The water right's point of diversion (POD) is located within City limits, on the west bank of the Willamette River and east of Ash Island. Additionally, the POD is located approximately 3,000 feet downstream of the City's existing wastewater treatment plant (WWTP) outfall to the Willamette River. **Figure 1** provides area mapping showing the relationship of the City's current POD location relative to current City limits and its existing WWTP outfall to the Willamette River. The POD's placement within a side channel of the Willamette River, where lower flows may persist during summer months, has the potential to raise water quality concerns year-round as related to increased stagnation, higher temperatures, and increased siltation in the raw water surface water supply source.

Section 3, Status of Current Water Right

The City's existing water right is located on the Willamette River, at approximate river mile (RM) 51.5 on the west side of Ash Island. The water right's authorized point of diversion (POD) is 50 feet north and 770 feet east from the SW corner of Section 30, Township 3 South, Range 2 West. The City's water right is issued under Permit S-44462.

At the request of Murraysmith, GSI Water Solutions, Inc. (GSI) reviewed Permit S-44462 and evaluated multiple use opportunities associated with the permit, including the potential for relocating the right's point of diversion upstream from its current location. The water right under Permit S-44462 is in good standing, with the City in compliance with all conditions associated with the permit.

The City's Permit S-44462 authorizes the use of up to 4.0 cubic feet per second (cfs), approximately 2.58 MGD, from the Willamette River for municipal uses. The priority date for the permit is July 24, 1979. The completion date for the permit was originally October 1, 1981 and has been extended several times. The permit did not include any conditions on the use of water when it was issued in 1979.

3.1 Limited Access to Water Right

The City has been granted multiple time period extension requests by Oregon Water Resources Department (OWRD), the jurisdictional agency responsible for establishing, amending, and maintaining water rights within the state. In October 2009, the completion date for the water right was extended by OWRD to October 1, 2025 following application by the City. The 2009 permit extension final order precluded the diversion of water under Permit S-44462 until the City submitted a Water Conservation and Management Plan (WCMP) to OWRD. A copy of Permit S-44462 is provided as **Attachment 1a.** Extension of time orders and the 2009 final order approving the WCMP are in **Attachment 1b**.

3.1.1 Current allocation based on usage

In November 2012, OWRD approved the City's WMCP and authorized "access" to up to 1.55 cfs (1 MGD) based on the projections of future water needs. To access the full 4.0 cfs of the City's water right, demand for additional water would need to be demonstrated.

3.1.2 Fish protection

The 2009 permit extension of time also includes "fish persistence" conditions, which protect flows in the Willamette River for the benefit of fish listed under the federal and state Endangered Species Acts (ESA). The fish protection target flows vary throughout the year and are measured at USGS Gage #14191000 in Salem. When the fish persistence target flows are not met (based on a rolling 7-day average), access to water under the permit would be reduced in proportion to the percent by which the target flow is missed. For example, if the target flow is missed by 10 percent, then access to water under the permit would be reduced 10 percent. The reduction in access to

water under the permit will not, however, exceed 20 percent. The minimum fish flow needs on the Willamette River, as based on the 2009 extension of time for Permit S-44462, are provided in Table 1.

Table 1
Minimum Fish Flow Needs on the Willamette River (2009 Permit)

Month	Cubic Feet per Second
July 1 – October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000
April 16 – April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

Note: Measured at USGS Gage #1419100 Salem, Oregon

3.2 Relocation of Point of Diversion to Upstream Location

The existing POD is located in a side channel of the Willamette River, situated within City limits between the west bank of the river and Ash Island to the east. Relocation of the POD into the main channel of the river is likely to reduce the potential risks for consistent raw water supply that can typically be encountered in side channels, including lower water quality and reduced seasonal summer flows. The City may realize several benefits from relocating the POD upstream of its current location; in particular, if moved upstream of Ash Island, the POD would be out of the potential influence of the City's existing WWTP outfall.

An investigation of potential barriers to moving the POD upstream of its current location was conducted as part of this reporting. OWRD's online water rights database provided information on instream water rights for the Willamette River from the authorized POD of Permit S-44462 to approximately 24 river miles upstream, near the confluence of Mill Creek in Salem. There is only one in-stream water right in this reach (Certificate 80619), which authorizes the instream use of 0.08 cfs from June 19 to October 31 in the Willamette River from Windsor Island (Willamette Mission State Park) to Willamette Falls. OWRD's online Water Availability Reporting System indicates that at least 991 cfs of water is available for new appropriations year-round in the Willamette River in this reach; simply put, there is at least 991 cfs above the current demands from all existing established water rights. Since flows in the Willamette River are sufficient to meet the one existing instream water right and all other existing water rights, OWRD would likely find that the City's request to move the point of diversion upstream would not cause injury to any adjacent water rights.

To "injure" a water right means to prevent it from receiving the water to which it is fully entitled under its permit. For example, moving a POD upstream has the potential to impact the flows for those existing water users now located downstream from the relocated POD. This relocation

would result in injury if moving the POD will reduce the amount of water available to meet flows protected by the instream water right and, therefore, limit the downstream user's available water rights. OWRD will consider both instream and "out-of-stream" water rights located between the currently authorized and proposed POD when making determinations on allowable relocations of PODs.

In the City's case, moving the authorized POD upstream is not expected to cause injury to existing water rights. Consequently, OWRD would likely approve a Permit Amendment application moving the authorized POD for Permit S-44462 upstream of its current location. OWRD does not have extensive history of moving PODs long distances upstream. Accordingly, if the City intended to move the POD a significant distance upstream, it should communicate with OWRD staff in advance of considering such a permit amendment to ensure the agency did not have any concerns about the proposed change. However, with regards to the City's anticipated plans for moving its POD within one mile upstream of its current location, there are no apparent issues with this relatively minor relocation.

3.3 Amending Current Water Right Location

Relocating the City's current water right location requires submittal of a permit amendment application to OWRD. The permit amendment application would need to include a map and a land use information form. The land use form must be signed by the government entity with jurisdiction over the proposed POD location and must show that the proposed use is consistent with that jurisdiction's comprehensive plan. Following a completeness review of the application, OWRD will publish a public notice regarding the proposed permit amendment and initiate a 30-day public comment period. OWRD will consider any public comments as part of its review of the application. Additionally, Oregon Department of Fish and Wildlife (ODFW) will review the application and would be expected to require a fish screen at the proposed POD that meets current screening standards.

3.3.1 Process and timeline for amending current water right

The City may expect a processing period of 12-18 months between submitting the application and OWRD issuing a Final Order. Table 2 shows the anticipated timeline for amending the City's current water right, assuming work is initiated in the first quarter (Q1) of a given calendar year.

Table 2
Amending Current Water Right Timeline

Description	Year 1				Year 2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Submission of application								
Processing Period								
Final Order								

The permit amendment process has a five-page checklist. The checklist and estimated permit fees are included as **Attachments 2a and 2b**, respectively, to this memo. Required in the process are the following items:

- Permit number(s) and number of permits to be amended
- Permit Amendment Application Map, including but not limited to:
  - Tax lots
  - Major rivers, creeks, lakes, reservoirs, roads, and railroads
  - Major water delivery system from the point of diversion (i.e., pipelines)
  - Existing and proposed place of use
  - Existing points of diversion or wells with distance and bearing or coordinates from a recognized survey corner
  - Proposed location of new point of diversion
- Request for assignment form and statutory fee
- Oregon Water Resources Department's Land Use Information Form from each local land use authority in which water is to be diverted conveyed, and/or used
- Geologist report for a change from a surface water point of diversion to a ground water point of appropriation (well), if the proposed well is more than 500 feet from the surface water source and more than 1,000 feet upstream or downstream from the point of diversion.

3.3.2 Cost estimate for amending current water right

The permit application fees include a base application fee and then fees based on the number of proposed cubic feet per second to be diverted, the number of proposed uses for the appropriated water, and the number of proposed surface water points of diversion. For the full water right allocation of 4.0 cfs, the total estimated cost of the permit application is $2,850 to be submitted with the permit application. **Table 3** provides an anticipated breakdown of the permit application fee for the City to amend its current water right.

Table 3
Cost Estimate for Amending Current Water Right

Description	Fee
Base Application Fee	$930
Project Specific Fees (4.0 cfs, 1 point of diversion)	$1,460
Permit Recording Fee	$520
Total	**$2,910**

3.4 Point of Diversion Relocation Alternatives

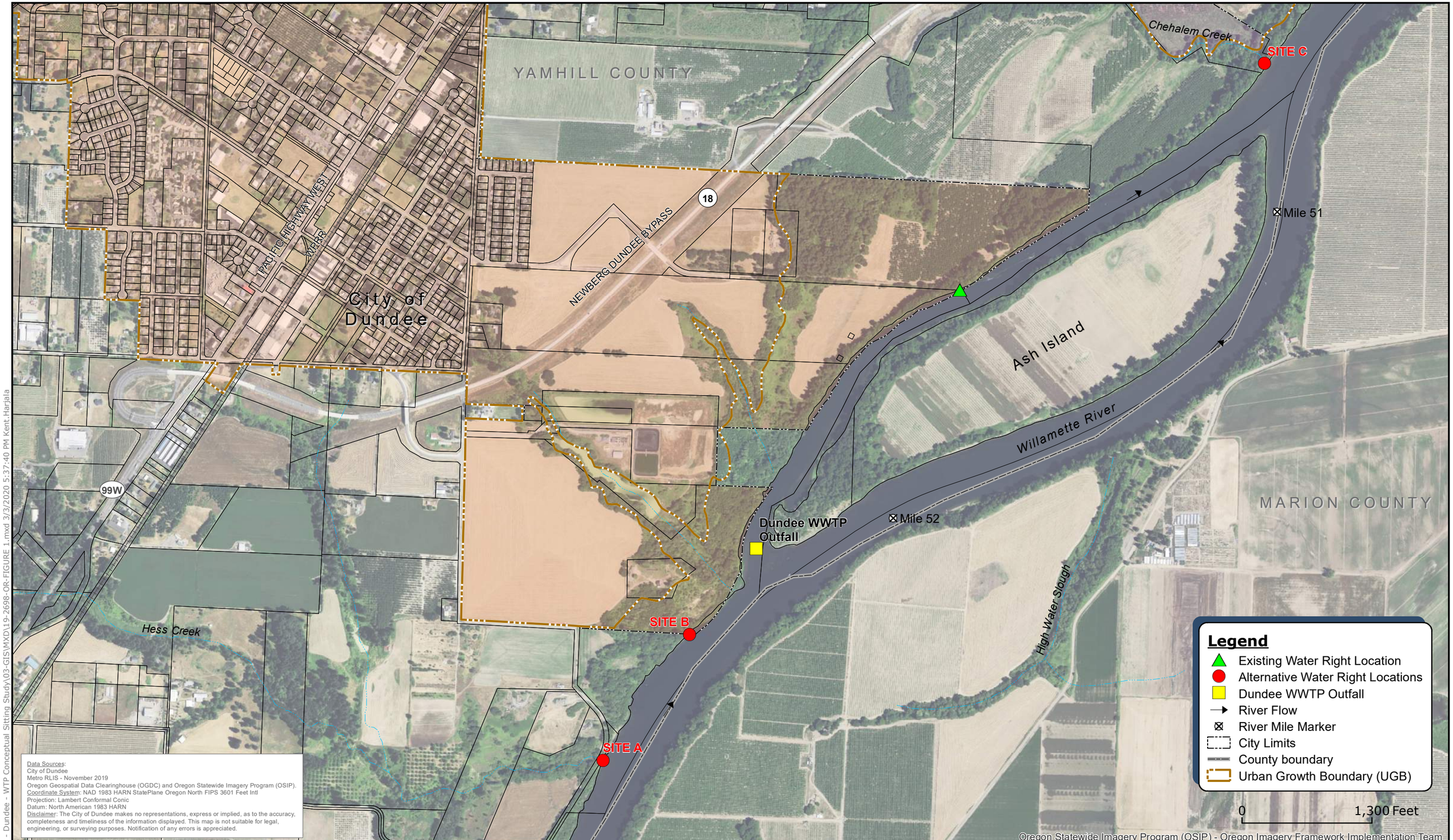
Alternatives for relocation of the City's current water right were considered in three locations. The sites selected as alternatives are shown in **Figure 1** and labeled Sites A, B and C. Potential siting alternatives were selected within approximately 1¼-mile from the existing POD location and along the western bank of the Willamette River. Sites A, B and C are in the main channel of the Willamette River, as opposed to remaining in the side channel west of Ash Island as the current POD does. It is assumed the main channel will have a more reliable base water flow and the same or better water quality than the side channel. Site locations were selected based on factors such as site access and required raw water pipeline length, as discussed in further detail later in this reporting under *WTP Site Location Alternatives*.

POD relocation alternatives, relative to the location of the City's existing POD, may be summarized as follows:

- Site A: Located upstream within the main channel of the Willamette River, at the river's confluence with Hess Creek

- Site B: Located upstream within the main channel of the Willamette River, south and clear of Ash Island's side channel

- Site C: Located downstream within the main channel of the Willamette River, near the confluence of Chehalem Creek, north and clear of Ash Island's side channel



Data Sources:
City of Dundee
Metro RLIS - November 2019
Oregon Geospatial Data Clearinghouse (OGDC) and Oregon Statewide Imagery Program (OSIP).
Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Projection: Lambert Conformal Conic
Datum: North American 1983 HARN
Disclaimer: The City of Dundee makes no representations, express or implied, as to the accuracy, completeness and timeliness of the information displayed. This map is not suitable for legal, engineering, or surveying purposes. Notification of any errors is appreciated.

murraysmith

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City of Dundee WTP Conceptual Sitting Study

Figure 1
Existing Water Right and 3 Alternative Locations
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3.5 Conveying Permit S-44462 to a Regional Partner

A final alternative available to the City is conveying Permit S-44462 to a potential regional partner. This would include assigning the permit to change the holder of the water right and completing a permit amendment to change the authorized POD.

3.5.1 Request for Assignment

To change the holder of Permit S-44462, the City would need to submit a Request for Assignment to OWRD. Note that OWRD will only assign a municipal use permit to a municipal corporation, such as the Yamhill Regional Water Association or to an incorporated city. The Request for Assignment requires a notarized signature from the entity conveying the permit and takes 2 weeks to 2 months for OWRD to process.

3.3.2 Permit Amendment for Permit S-44462

To divert water under the City's current permit at a regional partner's point of diversion, a Permit Amendment application would need to be submitted to OWRD. The authorized place of use in the permit would likely need to remain unchanged, which, in this instance, would be within Dundee's water service area. Note OWRD only allows a Permit Amendment to change a municipal use permit's authorized place of use if the proposed place of use is contiguous to the authorized place of use. A municipality can, however, serve water for municipal purposes outside of the authorized place of use, so long as it does not interfere with or impair prior vested rights. Therefore, water could potentially be used within the regional partner's place of use under the permit, even though the "authorized" place of use only covered the City of Dundee service area. Over time, steps can be taken based on the regional water provider's use of the water under Permit S-44462 to perfect the water right and receive a water right certificate.

The Permit Amendment application would need to include all the required elements and undergo a similar review process as described in *Amending Current Water Right Location* above, including a 30-day period for public comments. ODFW will review the application and would be expected to require a fish screen at any additional proposed PODs included in an application. Again, GSI expects a processing period of 12-18 months between submitting the application and OWRD issuing a Final Order.

Section 4, Raw Water Intake

Associated with the potential relocation of the City's POD is the construction of a new raw water intake from the Willamette River. A raw water intake would serve as the source for a new raw water pump station. The pump station would convey the raw water flows from the raw water intake to a new WTP. This study evaluated two options for a raw water intake: an intake screen in the river and a Ranney Collector situated along the bank of the river.

The intake screen would be located within the channel of the Willamette River and would withdraw water directly from the river through screens that comply with current fish protection criteria. The screens would be outfitted with an automated cleaning system to keep the screen free of debris. Construction of the river intake would require permitting for in-water work. Maintenance of the intake will require annual inspection of the screens with divers.

The conceptual design for the raw water intake provides for two inlet screens, each with a 1.0 MGD capacity, to provide for a total raw water intake capacity of 2 MGD. Installing a raw water intake with a total capacity of 2 MGD in the initial construction eliminates the need to undergo the extended and expensive permitting process when the associated WTP facilities are expanded to 2 MGD at build-out.

4.1 Permitting Requirements

The final location and the configuration of the intake are not yet known, but it is assumed there will be a permanent impact below the ordinary high water (OHW) of the Willamette River. The predominant regulatory agencies for constructing the water intake structure in the City of Dundee Water along the Willamette River include the following: U.S. Army Corps of Engineers (Corps), the Oregon Department of State Lands (DSL), the Oregon Department of Environmental Quality (DEQ), the National Marine Fisheries Service (NMFS), and the US Fish and Wildlife Service (UFWS).

The environmental permits anticipated for the City to construct a water intake structure in the Willamette River, as well as their anticipated approval timelines, are summarized in **Table 4**.

Table 4
Environmental Permits and Agency Review Timelines for a River Intake Structure

Lead Agency	Regulation	Requirements for Permits, Approvals or Review	Reason for Permit	Agency Review Timeline
U.S. Army Corps of Engineers (Corps) Nationwide Permit #7	Rivers and Harbors Act Section 10	Joint Permit Application Permit fee: no fee	Permanent impacts below the OHW of the Willamette River and potentially wetlands and other waters	Typically 4 to 6 months after submittal of JPA
Oregon Department of State Lands (DSL) Removal/Fill Permit – Individual Permit	Oregon's Removal-Fill Law (ORS 196.795-990)	Wetland Delineation Report Removal and or Fill within Willamette River (designated ESH) and adjacent wetlands, if present Permit Fee: approximately $1,000	Removal and/or fill within Willamette River	Within 120 days after submittal
Oregon Department of Environmental Quality (DEQ) Section 401 Certification – Nationwide Permit	Clean Water Act Section 401	Joint Permit Application Permit Fee: $985	Construction Activity below the OHW of the Willamette River	Reviewed during the same 4 to 6 months timeline of the Corps review
National Marine Fisheries Service (NMFS) Consultation triggered by Federal Lead Agency	Endangered Species Act	Biological Assessment Permit Fee: no fee	In-water work activities & reviews permanent alterations that impact endangered anadromous species	Within 130 days
US Fish & Wildlife Service (USFW) Consultation triggered by Federal Lead Agency	Endangered Species Act	Biological Assessment Permit Fee: no fee	Construction activities & permanent alterations that may impact endangered aquatic and terrestrial species	Similar to NMFS

The Oregon Department of Fish and Wildlife (ODFW) preferred in-water work window for the Willamette River is June 1st to September 30th. This timeline for in-water work matches most all jurisdictional agencies that would be associated with the river intake construction. ODFW and other agency reviews will examine the potential impacts to federally listed endangered species resulting from in-water and terrestrial construction activities, as well as the permanent alterations in the riverine and terrestrial ecosystems. The Willamette River is designated as Critical Habitat for the two federally listed fish species, Chinook Salmon and Steelhead Trout. The river also constitutes Essential Fish Habitat (EFH) as defined by the Magnuson-Stevens Act (MSA) and Essential Salmonid Habitat (ESH) as defined by the Oregon DSL. The river is a navigable waterway by the Corps of Engineers (Corps).

The estimated permitting fees are summarized in **Table 5.** Estimated fees do not include consultant fees to produce the required documentation for the permit. The permits require the development of supplemental documents whose costs are not also included here, as they are highly variable depending on the scope and provider. These supplemental documents include, but may not be limited to, the following:

- Wetland delineation and determination of the OHW
- On-site meeting with state and federal regulatory agencies to discuss the potential project and its potential impacts
- 30% Design Plans
- Completion of the Joint Permit Application (JPA) for submittal to the Corps and DSL
- Preparation of a Biological Assessment (BA)
- Formal or informal consultation with state and federal regulators using the BA as a basis for the consultation
- Cut and fill quantification

Table 5
Estimated Permitting Fees for River Intake Structure

Description	Fee
OWRD, Water Right Amendment Fee (per Table 3)	$2,910
Oregon DSL, Removal/Fill Permit Fee	$1,000
Oregon DSL & Corps, Joint Permit Application Fee	$985
Total	$4,895

4.2 Construction Sequencing and Cost Estimate

As previously noted, the construction of a raw water pipeline and pump station would be required to support the new river intake and City WTP. Raw water flows received through the river intake would provide suction supply for this new raw water pump station through new transmission piping. New raw water piping would also be required to connect the raw water pump station to the WTP.

The raw water transmission main, both from the river intake to the raw water pump station and from the pump station to the WTP, would also be sized at 2 MGD for full build-out capacity. The raw water pump station would be constructed for a firm capacity of 1 MGD initially and just under 2 MGD total capacity. Table 6 provides a conceptual cost estimate for the design and construction of the raw water intake and its supporting facilities using these assumptions stated here. A detailed breakdown of the conceptual project costs is provided in Attachment 3.

Table 6
Conceptual Project Cost Estimates for Raw Water Intake and Associated Facilities

Item No.	Item Description	COST
1	Intake and piping between intake and pump station [1]	$540,000
2	RW Pump Station	$1,400,000
3	RW Transmission Main to WTP [2]	$370,000
	Estimate of Probable Construction Cost	***$2,310,000***
	+ Engineering Design and Construction Management, 25%	$570,000
	+ Project Administration and Permitting, 10%	$230,000
	Estimated Total Project Cost	**$3,110,000**

Notes:
1. Construction cost estimates based upon 300 linear feet (LF) of 12-inch diameter restrained ductile iron (DI) pipe.
2. Construction cost estimates based upon 1,200 LF of 12-inch diameter restrained DI pipe.

Of primary concern to the facilities' construction sequencing, all in-water work on the raw water intake in the Willamette River will be dependent on the permitting schedule and ODFW in-water work windows, typically provided between June 1 and September 30th (approximately signified

by Q2 and Q3 in **Table 7**) for the Willamette River between Newberg and the outlet of the Yamhill River. **Table 7** provides a conceptual construction sequencing for the proposed river intake structure. This timeline includes construction of the river intake structure, raw water pipeline, and pump station and assumes initiation in Q1 of a calendar year. It is assumed that full construction and project commissioning will require approximately two years.

Table 7
Conceptual Construction Sequencing for River Intake Structure

Description	Year 1				Year 2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Bidding								
Raw Water Pipeline								
Raw Water Pump Station								
Treatment Facility								
Intake Structure								
Startup and commissioning								

4.3 Alternative Ranney Collection Well Evaluation

Based on recommendations provided in the City's 2016 Water System Master Plan, the installation of a Ranney Collector well may be a viable alternative to the construction of a river intake structure. The Ranney Collector, a specialized collector well, may be constructed along the bank of the Willamette River in a location where the hydraulic connection with the river supplements the groundwater extracted from the well. With the Ranney Collector installation along the riverbank, construction would not be impacted by ODFW or other jurisdictional agencies' in-water work windows. A memo evaluating the potential feasibility of a Ranney Collector alongside the banks of the Willamette River in Dundee, based on elementary desktop study procedures, is provided as **Attachment 4.** Note reported findings regarding the feasibility of Ranney Collector system in this area is conceptual in nature and requires extensive additional geological study at specific locations to confirm the ultimate feasibility of a Ranney Collector system for the City's raw water supply source.

Ranney Collection wells consist of several large concrete caisson rings about 13 to 15 feet in diameter that are sunk into the ground as soil is excavated inside the rings. The depth of the caisson is dependent on the groundwater level and thickness of water bearing material. Typical collector wells are less than 100 feet deep and are completed in at least 30 feet of water-bearing sands and gravels. Once the final caisson depth is reached the floor of the caisson is sealed, and 2 to 4 screen laterals with approximately 12-inch pipe area horizontally excavated with a hydraulic jack around 100 to 200 feet into the surrounding aquifer. Water from the laterals is collected in the caisson, where one or more pumps are used to remove the water to the water treatment plant.

A Ranney Collector may provide benefits to raw water quality by filtering raw water through the soils the river's hyporheic zone, the region of sediment and porous space beneath and alongside a river bed, where there is mixing of shallow groundwater and surface water. As a natural byproduct of the water filtering through the hyporheic zone, the Ranney Collector is expected to produce lower concentrations of total suspended solids, and possibly other contaminants, in the raw water. Furthermore, the Ranney Collector is less likely to be affected by potential adverse water quality concerns associated with the side channel flows and may not require relocation of the current POD.

The installation of a Ranney Collector would require the City to modify their current water right, transferring from a surface water to a groundwater POD. Oregon Revised Statute (ORS) 540.531 allows the transfer from a surface water to groundwater POD under certain conditions:

- If the new POD is located within 500 feet of the surface water source and, when the surface water source is a stream, is also located within 1,000 feet upstream or downstream of the original POD; *or*

- The holder of the water use submits to the department (ORWD) evidence prepared by a licensed geologist demonstrating the following:

    - The use of the groundwater at the new POD appropriates groundwater from an aquifer that is hydraulically connected to the authorized surface water source.

    - The proposed change will not result in enlargement of the original water right or in injury to other water right holders; and

    - The use of the new POD will affect the surface water source similarly to the authorized point of diversion.

The estimate of probable construction cost for a completed Ranney Collector system, including the raw water pumping, lengths of raw water piping similar to that presented for the river intake, and a Ranney Collector comprised of a well 13-15 feet in diameter, approximately 80 feet deep and with three 100-foot-long laterals, is $3,200,000. The estimated total project cost including design, construction management, administration and permitting is $4,160,000.

Four potential sites were evaluated using elementary desktop study procedures along the western banks of the Willamette River in the vicinity of the City. It was determined these locations may have subsurface deposits that are favorable for construction of a collector well. Additional work is required by a licensed geologist to determine the actual feasibility of a Ranney Collector at these locations. The conceptual evaluation of Ranney Collector sites, provided by Shannon and Wilson, is included as Attachment 5 to this memo.

4.4 Raw Water Intake Summary

Construction of an intake structure in the river or a Ranney Collector on the riverbank are the two options evaluated above. In summary, the river intake is less costly than the Ranney Collector. However, the Ranney Collector requires less permitting and will likely produce raw water with better water quality. The Ranney Collector may not require the relocation of the City's POD from the side channel west of Ash Island to the main Willamette River channel, but it will require the City to undergo the process of transferring the surface water point of diversion to a groundwater appropriation. **Table 8** provides a summary of the pros and cons of the two options.

Table 8
Summary Comparison of Raw Water Intake Structures

Items	River Intake		Ranney Collector	
	Pros	Cons	Pros	Cons
Feasibility	Known			Requires hydrogeological investigation to determine
Environmental	-	Extensive environmental permitting required + In-water work required	No in-water work window restrictions	-
Water Quality	-	-	Increased potential for Improved raw water quality	-
POD	-	Recommend POD to be moved to main channel	Potential for existing POD to be used	Requires ORWD review/approval for transfer of surface water POD to groundwater appropriation
Estimated Capital Costs	*$2.31 M*		*$3.2 M*	
Total Estimated Project Costs	$3.11 M		$ 4.16 M	

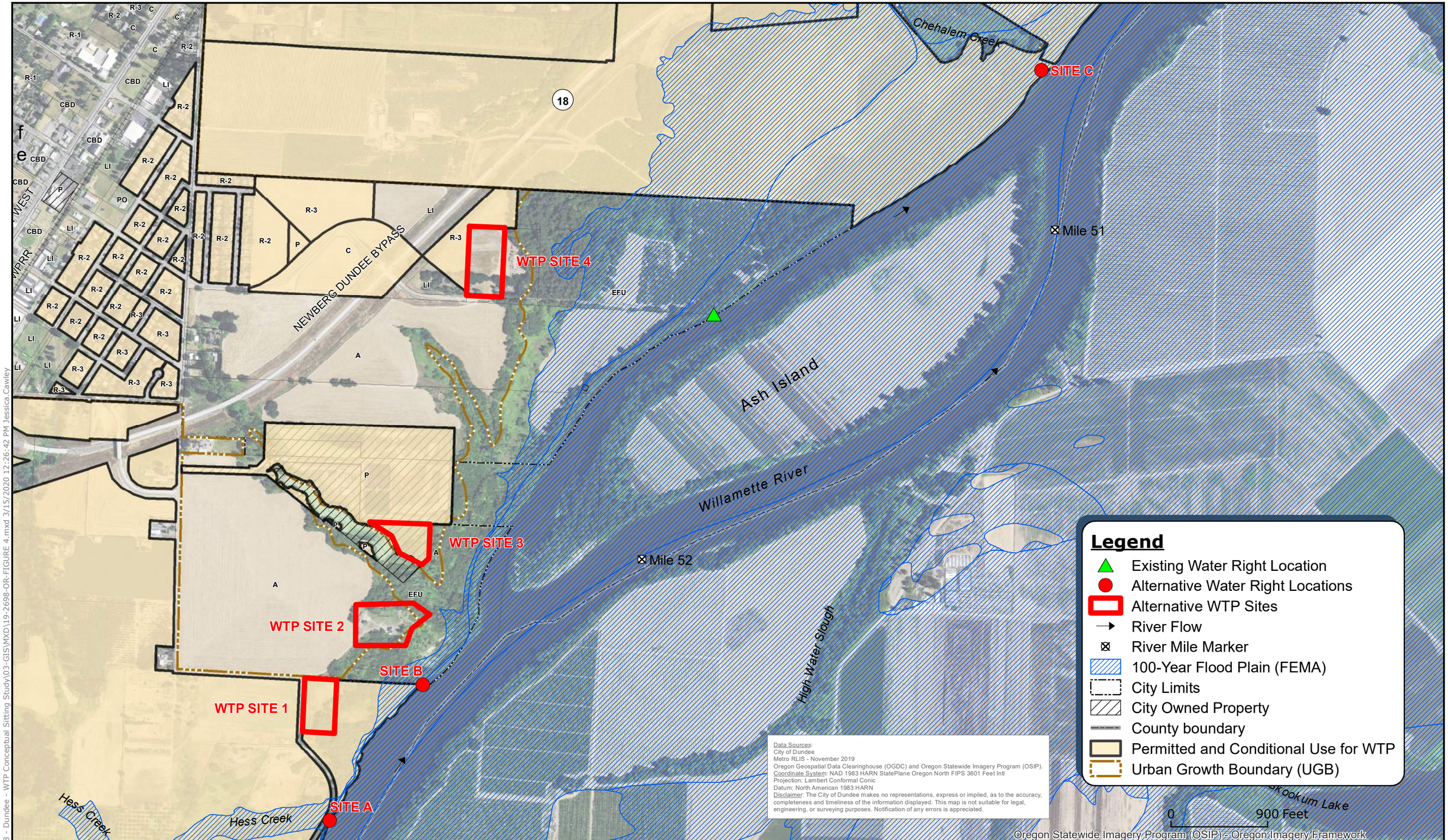
Section 5, Siting of Water Treatment Plant

A site at a minimum of 2 acres up to 5 acres is desirable for accommodating the footprint and associated facilities for a 1 MGD water treatment plant (WTP) with a build-out capacity of 2 MGD. Sites were evaluated based on the criteria described in the following section. The four potential WTP sites considered in this evaluation are shown in **Figure 2**. Criteria developed for the siting of the WTP and recommendations for the siting of the WTP are discussed below.

5.1 Criteria for Siting of WTP

WTP siting criteria developed for this study include the following items:

1. Site Ownership
2. Available Utilities
3. Site Accessibility
4. Land Use and Zoning
5. Routing of Raw Water Pipeline
6. Resilience (Seismic and Flooding Hazards)
7. Feasibility of installing a Ranney Collector Well



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City of Dundee
WTP Conceptual
Sitting Study

Figure 2
Conceptual Siting of WTP
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Site feasibility issues related to geotechnical and environmental aspects of the preferred site are recommended for further evaluation in subsequent phases of WTP facility siting.

5.1.1 Site Ownership

Properties currently owned by the City are given preference over those which require purchase or negotiations with existing owners.

5.1.2 Available Utilities

A new WTP will require access to three-phase electrical power. Although a new three-phase service can be extended to almost any property, preference is given to those sites which currently have proximity to three-phase power.

Similarly, following the processing of raw water to finished drinking water, the WTP will require access to existing distribution or transmission piping. Although existing water mains may be extended to most any WTP site, preference is given to those proposed sites which currently have proximity to existing water mains 8-inch diameter or greater.

5.1.3 Site Accessibility

Travel distance to the site via existing improved roadways may impact construction contractor mobilization costs and constructability. Similarly, site accessibility must consider the convenience for future operation and maintenance practices at the facility. Sites near existing paved roadways are preferred over sites with no improved surfaces for access.

Existing site topography determines the need for significant volumes of cut or fill to construct new facilities. Relatively flat sites are preferred over sites with steep grades. Sufficient space to site all facilities while providing circulation for emergency vehicles and chemical delivery is a minimum requirement.

5.1.4 Land Use and Zoning

Properties in which the siting of a public utility facilities are a permitted use, or a conditional use, are given preference over those for which a variance or change in zoning would be required. According to Zoning Use Table 17.202.020 in the Dundee Municipal code, “Utility area” uses are categorized under permitted use or conditional use for Residential, Commercial, or Public zones. Parks and Open Space, Agriculture, and Exclusively Farm Use properties would require a land use exception or changes to their zoning designation.

5.1.5 Routing of WTP Raw Water Intake Pipeline

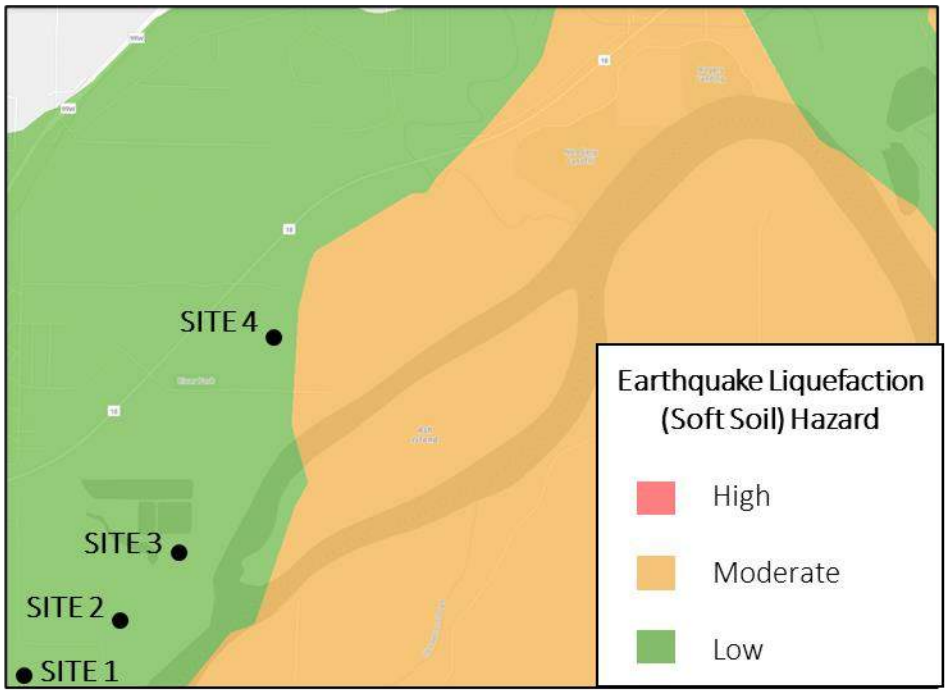
Alternatives with reduced piping requirements from the water intake to the WTP to the distribution system are preferable. Sites that require more technically challenging pipeline routes are less preferable. Steep topography and crossing open water bodies or wetlands increase the

technical complexity of the route. Properties located such that the raw water pipeline can be routed through existing right-of-way, existing City-owned easements, or City-owned property are given preference over those that would require new easements.

5.1.6 Resiliency

A potential WTP site's resiliency against flooding and earthquake damage included an evaluation of the Federal Emergency Management Agency's (FEMA) 100-year floodplain and the USGS liquefaction potential. Sites with greater vulnerability based on the Oregon Department of Geology and Mineral Industries (DOGAMI) liquefaction hazard mapping are less preferable in the evaluation. Low, moderate, and high earthquake liquefaction hazard zones are shown below in Figure 3.

Figure 3
DOGAMI Liquefaction Hazard Mapping (Accessed Feb. 2020)



5.1.7 Regional Partnership Opportunities

Properties closer to neighboring municipal water providers, and, thereby, present opportunities for cost sharing or other partnership opportunities, may be given preference over those which ae more distant from neighboring water providers.

5.2 WTP Site Location Alternatives

Potential WTP sites are labeled as WTP Sites 1 through 4. The advantages and disadvantages of each proposed WTP site is discussed below. Note the benefits provided by a WTP site are highly contingent upon the City's finalized location of its water right's POD.

5.2.1 WTP Site 1: On SE Fulquartz Landing

The proposed WTP Site 1 is in Yamhill County on SE Fulquartz Landing, north of the road's crossing with Hess Creek.

Site Ownership

WTP Site 1 is located on private property at the address of 23000 SE Fulquartz Landing. The Yamhill County parcel identification is R3336 01500. The property is located outside the southeastern edge of the Dundee urban growth boundary (UGB). The property would have to be acquired by the City.

Available Utilities

No existing City water service or distribution piping is the vicinity of this property. Overhead power is evident along SE Fulquartz Landing in front of the property. Available utility mapping does not provide the positive identification of other utilities at this site.

Site Accessibility

WTP Site 1 is accessible directly by SE Fulquartz Landing. Existing site topography is flat.

Land Use and Zoning

The property is zoned by Yamhill County as Exclusive Farm Use 40+ (EF-40). This land use zoning designation allows for the construction of a new public utility facility as a permitted use.

Routing of WTP Raw Water Intake Pipeline

Site 1 is in proximity to alternative POD location Sites A and B. Approximately 100 feet of new raw water piping installed down a steep embankment would be needed from a new river intake facility to an associated raw water pump. Following raw water pump station, a new raw water pipeline could be routed approximately 1,100 feet overland or along the existing road until reaching the proposed WTP Site 1.

Resiliency

Based on DOGAMI hazard mapping, proposed WTP Site 1 and the associated raw water pipeline route detailed above are in areas designated as low liquefaction hazard zones. The proposed site

is also located out of FEMA's mapped 100-year floodplain, though segments of raw water piping would be sited in FEMA's mapped 100-year floodplain.

Regional Partnership Opportunities

WTP Site 1 provides limited opportunities for regional partnership opportunities due, primarily, to its remote location from neighboring municipal water providers.

5.2.2 WTP Site 2: Upstream of Existing Wastewater Treatment Plant Outfall

The proposed WTP Site 2 is located at 23050 NE Fulquartz Landing. The proposed WTP Site 2 is located northeast SE Fulquartz Landing's sharp turn to the west along the Willamette River.

Site Ownership

The proposed WTP Site 2 is located on private property within Dundee City limits that would have to be acquired.

Available Utilities

No existing City water service or distribution piping is the vicinity of this property. Overhead power is evident along SE Fulquartz Landing in front of the property. Available utility mapping does not provide the positive identification of other utilities at this site.

Site Accessibility

The proposed WTP Site 2 is accessible directly by NE Fulquartz Landing. Existing topography is flat on this site.

Land Use and Zoning

The property is currently zoned for Agricultural (A) use, a zoning designation encouraging the continuation of productive farmland within the City. The construction of a new public utility facility is not a permitted use for the A zone. However, future zoning to be adopted for this property, as part the Riverside District, is Riverside Residential (RR). The construction of a new public utility facility is a conditional use in the future RR zone.

Routing of WTP Raw Water Intake Pipeline

Following SE Fulquartz Landing south, a new raw water pipeline could be routed from water intake POD Site B, although no site access is currently available to Site B. The raw water pipeline could be routed approximately 600 feet from Site B to Site 2.

Site 2 is in proximity to alternative POD location Site B; however, the use of alternative POD Site A is reasonable for WTP Site 2. Approximately 100 feet of new raw water piping installed down a steep embankment would be needed from a new river intake facility to an associated raw water

pump. Following raw water pump station, a new raw water pipeline could be routed approximately 600 feet overland to access the proposed POD Site B; alternatively, approximately 2,000 feet of new raw water pipeline could be routed overland and via SE Fulquartz Landing to access POD Site A.

Regional Partnership Opportunities

WTP Site 2 provides limited opportunities for regional partnership opportunities due, primarily, to its remote location from neighboring municipal water providers.

5.2.3 WTP Site 3: Wastewater Treatment Plant Property

The proposed WTP Site 3 is located at 23310 SE Fulquartz Landing.

Site Ownership

WTP Site 3 would provide for co-location of the proposed WTP on the City's existing WWTP site. This property is owned by the City of Dundee. The tax lot map number is R3336 00901.

Available Utilities

As the City owns and operates its WWTP located at this site, this property has adequate power, water, sewer, and communication networks required for a WTP.

Site Accessibility

The proposed WTP Site 3 is accessible directly from SE Fulquartz Landing. Existing topography is flat on this site. In discussions with City staff, it is noted that available space on the WWTP property is currently allocated for possible future expansion of the facility's treatment capacities and capabilities, as well as having land set aside for natural habitat and recreational uses.

Land Use and Zoning

The proposed WTP Site 3 is in Dundee City Limits on a property zoned Public. This zoning designation allowing for the construction of a new public utility facility as a permitted use.

Routing of WTP Raw Water Intake Pipeline

Site 3 is in proximity to alternative POD location Site B. Approximately 200 feet of new raw water piping installed down a steep embankment would be needed from a new river intake facility to an associated raw water pump. From the raw water pump station, a second raw water pipeline could be routed approximately 1,200 feet overland to reach WTP Site 3.

The use of alternative POD Site A is feasible for WTP Site 3, also, requiring the installation of approximately 4,500 feet of new raw water pipeline routed overland and via SE Fulquartz Landing between the two locations.

Finally, the use of the City's existing POD is feasible for WTP Site 4, though, it would require the installation of up to 9,000 feet of new water transmission if routed within existing roadways. The use of existing roadways would likely be required for the routing the new main, as there is a large depressed natural area between the riverbank and WTP Site 3.

Resiliency

Based on DOGAMI hazard mapping, the alignment of the raw water piping and WTP Site 3 are in areas designated as low liquefaction hazard zones. The proposed site is also located out of FEMA's mapped 100-year floodplain, though segments of raw water piping would be sited in FEMA's mapped 100-year floodplain.

Regional Partnership Opportunities

WTP Site 3 provides limited opportunities for regional partnership opportunities due, primarily, to its location relative to neighboring municipal water providers.

5.2.4 WTP Site 4: Site off Newberg Dundee Bypass

The proposed WTP Site 4 is located east of the Newberg-Dundee Bypass on the north side of SE 8th Street.

Site Ownership

The proposed WTP Site 4 is located on private property within Dundee City limits. The property is currently owned by the Chehalem Park and Recreation District, Inc.

Available Utilities

Existing 12-inch diameter ductile iron transmission main is located along the SE 8th Street frontage of this property. Available utility mapping does not provide the positive identification of other utilities at this site. It is noted that a private residence is located directly east of this proposed site, which provides an indication that some limited utilities are available.

Site Accessibility

The proposed WTP Site 4 is accessible directly from SE 8th Street. Existing topography is flat on this site.

Land Use and Zoning

The property is currently zoned for Agricultural (A) use, a zoning designation encouraging the continuation of productive farmland within the City. The construction of a new public utility facility is not a permitted use for the A zone. However, future zoning to be adopted for this property, as part the Riverside District, is Riverside Production (RP). The construction of a new public utility facility is a permitted use in the future RP zone.

Routing of WTP Raw Water Intake Pipeline

Site 4 is in proximity to the City's current POD. Approximately 200 feet of new raw water piping installed down a steep embankment would be needed from a new river intake facility to an associated raw water pump. From the raw water pump station, a second raw water pipeline could be routed approximately 1,800 feet directly west on SE 8th Street to reach WTP Site 4. This route would require an intermediate stream crossing at the east end of SE 8th Street.

The use of alternative POD Site C is feasible for WTP Site 4, also, requiring the installation of approximately 5,000 to 7,000 feet of new raw water pipeline routed overland and via local roadways between the two locations. Routing of the pipeline along the Newberg-Dundee Bypass is not readily feasible, as the Oregon Department of Transportation, the owner of the Bypass, infrequently allows for the installation of pipelines within its right-of-way.

Resiliency

Based on DOGAMI hazard mapping, WTP Site 4 is designated to be in a low liquefaction hazard zones, although the raw water pipeline route is in moderate liquefaction hazard zones. The proposed site is located out of FEMA's mapped 100-year floodplain, however, a large extent of raw water piping associated with the proposed facility would be sited within the mapped floodplain.

Regional Partnership Opportunities

WTP Site 4 provides the City with the best opportunities for regional partnership opportunities due, primarily, to its proximity to the neighboring municipal water provider in the City of Newberg.

5.3 Summary of Alternatives

Potential WTP sites were evaluated based on the several criteria. All sites evaluated are in DOGAMI-mapped low liquefaction hazard zones. Following an anticipated change in zoning within the Riverside District, all sites will be zoned for the construction of a WTP as an allowable or conditional permitted use.

The benefits provided by a WTP site are highly contingent upon the City's finalized location of its water right's POD. In determining a preferred WTP site location, the City may be best served by constructing its facility as close as possible to its preferred POD location, as the most variable cost related to WTP development is related to raw water piping.

Section 6, Treatment Technology Options

Water treatment technologies are selected based on their compatibility with the source water quality. This study did not include detailed analysis of the source water to determine water quality parameters. However, it did conduct a brief review of existing plants that treat Willamette River water as a basis for treatment technology selection and basis of design cost estimating. Currently, plants producing drinking water from the Willamette River rely on either slow sand filters or conventional treatment with some advanced treatment options.

Springfield Utility Board (SUB) treats Willamette River water using slow sand filters, while the cities of Corvallis and Adair Village treat Willamette River water using conventional treatment. The Wilsonville Water Treatment Plant, near River Mile 39, is the facility nearest to the City's POD, and it utilizes conventional treatment with two advanced processes: ballasted flocculation and ozonation. In addition, the Wilsonville WTP rapid sand filters use granular activated carbon (GAC) in place of anthracite. A discussion of the operational considerations, costs, and comparison of benefits between conventional versus membrane treatment is discussed in the sections below.

6.1 Treatment Technologies

The operational considerations of conventional water treatment versus the use of membrane filters for water treatment follows.

6.1.1 Conventional Water Treatment Plants

Conventional WTPs use a series of processes to remove contaminants from the drinking water. The processes, in operational order, that define conventional treatment are:

- Coagulation
- Flocculation
- Sedimentation
- Rapid sand filtration
- Primary disinfection

Suspended solids and pathogens are removed in the granular media of the sand filters through straining and adhesion. The pore size of the granular media in the sand filters is larger than the size of the target pathogens; therefore, the granular media in a rapid sand filter does not provide an "absolute barrier" to pathogens. The filters generally include instrumentation to monitor head loss across the filter and online monitoring of the filter effluent turbidity.

Operation of conventional WTPs generally requires a nuanced understanding of water chemistry to maintain the appropriate chemical dosing when raw water quality changes. The performance

of the granular media in the filters is maintained by judicious use of chemicals, by appropriate cleaning of the media during each backwash cycle and by re-establishing the desired media profile at the end of each backwash. Operators must conduct regular visual inspections of the rapid sand filters during backwash cycles and combine these visual observations with data from online instruments to assess changes in filter performance.

Table 9 provides the construction costs of for a conventional treatment plant with 1.0 MGD firm capacity, expandable to 2 MGD.

Table 9
Conceptual Project Cost Estimates for Conventional Treatment Plant

Item No.	Item Description	COST
1	Building, complete with HVAC & lighting	$900,000
2	Treatment equipment	$2,200,000
3	Yard piping, residuals management & other ancillary facilities	$700,000
4	Electrical, instrumentation and controls	$800,000
	Estimate of Probable Construction Cost	**$4,600,000**
	Engineering Design and Construction Management, 25%	$1,200,000
	Project Administration and Permitting, 5%	$250,000
	Estimated Total Project Cost	**$6,050,000**

6.1.2 Membrane Filtration Water Treatment Plants

A membrane filtration plant will use membrane filters to replace the conventional system's rapid sand filters, a final step in the conventional water treatment process. Membrane filters are often installed without the flocculation, sedimentation, and sedimentation pretreatment processes, although some membrane plants may include these pretreatment processes to reduce loading on the membranes. Membrane filters provide a physical barrier for water treatment, with membrane pore sizes smaller than most pathogens. Membrane pore size depends upon the type of membrane used. When the pore size is smaller than the target pathogen, the membrane is said to provide an "absolute barrier" to passage of that pathogen. The pressure across the membranes and membrane integrity are monitored and tested with online sensors which provide operation staff with data needed for troubleshooting. As a result, membrane filtration may provide for finer filtering of raw water constituents, however, it does come with a higher initial capital cost.

Long term performance of membranes is maintained not only by frequent cleaning to remove suspended solids, but also by regular chemical cleaning of the membranes to remove scale and other contaminants that can foul the membranes. This chemical cleaning is done in-place and often uses harsh chemicals that must be neutralized in temporary holding basins prior to discharge.

Membrane plants are generally more energy intensive than conventional WTPs, as membrane filtration often requires higher pumping heads to generate the necessary transmembrane pressure. The initial capital cost of the membranes is often higher than a conventional plant. Conventional plants may use more chemicals for pretreatment than membrane plants. However, membrane plants require chemicals for regular clean-in-place procedures not required for conventional rapid sand filtration.

Construction of a membrane treatment plant for the 1.0 MGD firm capacity, expandable to 2 MGD, is shown below in Table 10.

Table 10
Conceptual Project Cost Estimates for Membrane Treatment Plant

Item No.	Item Description	COST
1	Building, complete with HVAC & lighting	$800,000
2	Treatment equipment	$4,100,000
3	Yard piping, residuals management & other ancillary facilities	$850,000
4	Electrical, instrumentation and controls	$950,000
	Estimate of Probable Construction Cost	***$6,700,000***
	+ Engineering Design and Construction Management, 25%	$1,800,000
	+ Project Administration and Permitting, 5%	$350,000
	Estimated Total Project Cost	**$8,850,000**

6.2 Construction Methodology

Regardless of whether the City decides to construct a conventional WTP or employ the use of membrane filters, the facility may be constructed either under conventional construction methods or by the installation of a package system.

6.2.1 Conventional Construction

Conventional construction requires the contractor to construct concrete basins for the various unit operations and install the components for each unit operation in those basins. Some equipment may be packaged together, such as chemical feed skids. However, most of the equipment – mixers, flocculators, settling plates or tubes, launders, underdrains, and valves – is delivered separately and installed by the contractor in the basins constructed on-site. This approach allows for greater control and specification of the individual components within the WTP. However, due to economies of scale, the unit cost for constructing concrete basins rises as the size of the basins decreases.

Vendor information regarding the construction of a conventional WTP using minimal packaging of components is included in Attachment 6. This conventional treatment plant construction option

is used as the basis of conceptual design and facility cost estimates presented in Section 7 for the conventional treatment plant option.

6.2.2 Package Plant

For a package treatment plant, a manufacturer assembles and packages one or more unit-processes together in a controlled, industrial environment. The package includes all the internal components for the unit operations installed within a steel basin. It may also include valves with short sections of piping outside the basins for control of the flows into and out of the package. Manufacturing package plants in an industrial setting, with staff dedicated to production of a limited number of specific packages, introduces efficiencies that can result in lower costs for smaller scale facilities than if those facilities were constructed by installing the same equipment inside cast-in-place concrete basins. The package systems are built in modular units that can be shipped to the site. This generally limits the capacity of package plants to smaller facilities.

The advantage of package plants is the ability to save costs on both design and construction by selecting prefabricated systems. The disadvantage of package plants is some loss of customization, as the package manufacturer usually has a limited selection of equipment from certain manufacturers for the components that comprise the package.

Vendor package information for a membrane package system and an ultrafiltration pretreatment system are included in Attachment 7 and Attachment 8, respectively. This construction option is used as the basis of conceptual design and facility cost estimates presented in Section 7 for the membrane treatment plant option.

6.3 Summary of Treatment Technology Options

Based on the size of the proposed WTP facility and the staffing desires expressed by the City, we recommend the City consider a package treatment plant. The package plant approach is a cost-effective procurement method for a plant with an initial capacity of 1.0 MGD, expandable to 2.0 MGD. The package could be based on either conventional treatment with rapid sand filtration or on membrane filtration. The City's existing WWTP is a membrane facility, so City staff are already familiar with membrane technology. However, the high turbidities in the Willamette River at the City's POD could require some pretreatment prior to membrane filtration during the winter months. In addition, removal of total organic carbon (TOC) and treatment for taste and odor and other contaminants that may be present in low concentrations will vary between the two technologies. Therefore, the question of whether the treatment package should be based on rapid sand filters or membrane filters will likely require a treatability study to determine which approach will result in the lowest cost approach that achieves the City's treatment targets.

Section 7, WTP Phasing Plan

7.1 Conceptual Project Schedule

The conceptual project schedule for a new WTP includes permitting, design, bidding, construction, and start-up. These tasks are assumed to be in series and not occurring until the completion of the previous task. **Table 11** provides the construction sequencing timeline broken down in three-month quarters. Based on these assumptions, the City may anticipate a 5-year timeline from the start of project designs to placing the new WTP online.

Table 11
WTP Conceptual Project Timeline

Description	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
30% Design																				
Permitting																				
Final Design																				
Construction																				
Startup and commissioning																				

7.2 Project Cost Estimates

Two combined raw water supply and water treatment alternatives provided for comparison. Costs associated with the design, permitting, and construction of a new WTP are presented for the most logical combinations of alternatives. For example, since membrane filtration may not require pretreatment if the raw water has lower suspended solids, it is paired with the Ranney Collector, which naturally filters out some total suspended solids from the raw water. Property acquisition is not included in either combined alternative.

The two combined alternatives provide a probable range of project costs that the City should anticipate in developing its own finished water supply source from the Willamette River.

7.2.1 Combined Alternative 1: River Intake and Conventional Construction

Project costs associated with the construction of a river intake, raw water pump station, raw water piping, and conventional treatment plant for 1.0 MGD firm capacity, expandable to 2 MGD, is shown below in **Table 12**.

In this option, moving the existing POD to the main channel is recommended. The costs for preparation of the required documentation for moving the POD are not included in the cost estimate below.

Table 12
Conceptual Project Cost Estimates for River Intake and Conventional WTP

Item No.	Item Description	COST
1	Intake and piping between intake and pump station [1]	$540,000
2	Raw Water Pump Station	$1,400,000
3	Raw Water Transmission Main to WTP [2]	$370,000
4	Conventional Treatment Package Plant	$4,600,000
	Estimate of Probable Construction Cost	***$6,910,000***
	+ Engineering Design and Construction Management, 25%	$1,730,000
	+ Project Administration and Permitting, 10%	$690,000
	Estimated Total Project Cost	**$9,330,000**

Notes:
1. Construction cost estimates based upon 300 LF of 12-inch diameter restrained DI pipe.
2. Construction cost estimates based upon 1,200 LF of 12-inch diameter restrained DI pipe.

7.2.2 Combined Alternative 2: Ranney Collector and Membrane Package Plant

Project costs associated with the construction of a Ranney Collector, raw water pump station, raw water piping, and membrane treatment plant for 1.0 MGD firm capacity, expandable to 2 MGD, is shown below in **Table 13**. The costs for this combined alternative may be reduced if a hydrogeologic investigation indicates the Ranney Collector will provide sufficiently low suspended solids in the raw water to eliminate the need for pre-treatment. If pre-treatment is not required, the capital cost could be reduced by eliminating the clarification step and reducing the size of the building. For this option, a pilot test of the membranes and a hydrogeologic investigation for the Ranney Collector at the existing POD is recommended.

Table 13
Conceptual Project Cost Estimates for Ranney Collector and Membrane Package WTP

Item No.	Item Description	COST
1	Ranney Collector with raw water piping [1]	$3,200,000
2	Raw Water Pump Station	$1,400,000
3	Membrane Treatment Plant	$6,700,000
	Estimate of Probable Construction Cost	***$11,670,000***
	+ Engineering Design and Construction Management, 25%	$2,920,000
	+ Project Administration and Permitting, 10%	$1,170,000
	Estimated Total Project Cost	**$15,760,000**

Notes:
1. Construction cost estimates based upon 1,500 LF of 12-inch diameter restrained DI pipe.

7.3 Phased Implementation

The intake screen and raw water pipeline are sized for the anticipated 2.0 MGD total build-out capacity. The raw water pump station is sized for the initial 1.0 MGD firm capacity with space available for additional capacity upgrades. The treatment facility would be initially constructed with a firm capacity of 0.5 MGD with space allocated to increase the firm capacity to 1.0 MGD by installing additional treatment equipment.

Section 8, Summary and Recommendations

The City must expand its current drinking water supply to accommodate future growth. To do so and ensure successful water production with the greatest reliability, the City may initiate the design, permitting, and construction of a new WTP and an associated raw water intake structure within or along the banks of the Willamette River.

8.1 Next Steps

Murraysmith recommends the City consider conducting the following next steps in determining the final location of its POD, the feasibility of certain river intake types, locating of its water right's POD, and raw water treatment option:

1. Advance discussions with potential regional partners (City of Newberg, McMinnville Water & Light) to determine if opportunities exist for cost sharing, facilities operations, or other partnership opportunities. Economies of scale may be available and opportunities to share project costs proportionally with a large community in the construction of a larger WTP and associated facilities.

2. Advance the process of deciding which property or properties may be best to acquire for the siting for a raw water pump station and WTP. This work may be accompanied by a routing and feasibility study for the raw water pump station and pump station.

3. Steps to determine type of intake facility desired:

    a. In-river intake structure:

        i. Initiate permitting process to move the existing POD of the City's existing water right along the Willamette River upstream of its current location, out of the side channel to the west of Ash Island, and into the main channel of the Willamette River. This proposed relocation would also move the water right's POD upstream of the City's WWTP's outfall to the river.

    b. Ranney Collector system:

        i. Initiate a detailed hydrogeologic investigation, including soil borings and groundwater draw down tests, at the existing point of diversion during summer-season low flow conditions in the Willamette River. The desktop study provided in this evaluation determined locations along the Willamette River adjacent to the City may have subsurface deposits that are favorable for construction of a collector well. Additional work is required by a licensed geologist to determine the actual feasibility of a Ranney Collector at these locations.

ii. Should hydrogeologic investigations prove advantageous for siting of a Ranney Collector, apply to OWRD for the transfer of a surface water right to a groundwater right.

4. If desired, determined future feasibility of a membrane treatment facility.

   i. Conduct pilot test of a minimum of two membrane treatment manufacturers on water from the Willamette River. Pilot testing can be expensive, so the period for piloting is normally minimized for small membrane systems, focusing the testing on periods with the most challenging water quality conditions of concern. Spring rainfall and snow melt often generate the highest turbidities while summer testing is often best for obtaining an understanding of taste and odor issues and autumn testing may be beneficial if TOC values are highest during that period. The data collected from this investigation will determine the need for pre-treatment.

LLA:as:jc

Attachment 1a,
Permit S-44462

Application No. 58951 ( ) Permit No. (44462)

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OCT 23 1979
WATER RESOURCES DEPT
SALEM, OREGON

STATE OF OREGON WATER RESOURCES DEPARTMENT

Application for Permit to Appropriate Surface Water

I, City of Dundee (Name of Applicant)

of Box 201 (Mailing Address), Dundee (City)

State of Oregon, 97115 (Zip Code) Phone No. 538-3922 do hereby make application for a permit to appropriate the following described waters of the State of Oregon:

1. The source of the proposed appropriation is the Willamette River, a tributary of the Columbia River

2. The point of diversion is to be located 50 ft. North (N. or S.) and 770 ft. East (E. or W.) from the Southwest corner of Section 30, Township 3 South, Range 2 West (Public Land Survey Corner)

(If there is more than one point of diversion, each must be described)

being within the SW ¼ of the SW ¼ of Sec. 30 Tp. 3 S (N. or S.) R. 2 W (E. or W.), W. M., in the county of Yamhill

3. Location of area to be irrigated, or place of use if other than irrigation.

Township	Range	Section	List ¼ ¼ of Section	List use and/or number of acres to be irrigated
3S	3W	26	NE 1/4	
3S	3W	26	SE 1/4 of NW 1/4	
3S	3W	26	SE 1/4	
3S	3W	26	E 1/2 of SW 1/4	
3S	3W	35	N 1/2 of NE 1/4	
3S	3W	25	NW 1/4	
3S	3W	25	SW 1/4	
3S	3W	25	S 1/2 of SE 1/4	
3S	3W	36	N 1/2 of NW 1/4	
3S	3W	36	SE 1/4 of NW 1/4	

Form 690-1-0-1-77

Continued on attached sheet

30.00
15.00
6.00
41.00

4. *The amount of water which the applicant intends to apply to beneficial use is* 4.0 *cubic feet per second*

(If water is to be used from more than one source, give quantity from each)

5. *The use to which the water is to be applied is* Municipal

6. *DESCRIPTION OF WORKS*

Include dimensions and type of construction of diversion dam and headgate, length and dimensions of supply ditch or pipeline, size and type of pump and motor, type of irrigation system to adequately describe the proposed distribution system.

The City of Dundee is anticipating upgrading their municipal water system to meet demands of the growing population as the present well system will not meet the growing demand. An intake to obtain water from the Willamette River is planned. The existing transmission line to wells #1 and #2 will be extended to the proposed point of diversion.

If for domestic use state number of families to be supplied

7. *Construction work will begin on or before* September 1, 1980

8. *Construction work will be completed on or before* December 1, 1981

9. *The water will be completely applied to the proposed use on or before* November 1, 1981

Application No. 58951 *Permit No.* 44462

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SALEM, OREGON

Continued...

3. Location of area to be irrigated, or place of use if other than irrigation.

Township	Range	Section	List 1/4 1/2 of Section	List use and/or number of acres to be irrigated
3S	3W	36	NE 1/4 of SW 1/4	
3S	3W	36	N 1/2 of SE 1/4	
3S	3W	36	NE 1/4	
3S	3W	30	S 1/2 of SW 1/4	
3S	3W	31	NW 1/4 of NW 1/4	

Application No. 58951
Permit No. 44462

Remarks:.....

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For the City of Dundee Or

Signature of Applicant

Westech Eng

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for.....

.....

In order to retain its priority, this application must be returned to the Water Resources Director with corrections on or before ....., *19*.....

WITNESS my hand this ..... *day of*....., *19*.....

..... *Water Resources Director*

By .....

This instrument was first received in the office of the Water Resources Director at Salem, Oregon, on the ....24th.... *day of* ....July...., *19*..79...., *at* ..11:00.. *o'clock* ....A....*M.*

Application No.....58951.... *Permit No.*....44462....

Application No. 58951 Permit No. 44462

Permit to Appropriate the Public Waters of the State of Oregon

This is to certify that I have examined the foregoing application and do hereby grant the same SUBJECT TO EXISTING RIGHTS INCLUDING THE EXISTING FLOW POLICIES ESTABLISHED BY THE WATER POLICY REVIEW BOARD and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 4.0 *cubic feet per second measured at the point of diversion from the stream, or its equivalent in case of rotation with other water users, from* Willamette River

The use to which this water is to be applied is municipal

If for irrigation, this appropriation shall be limited to ..... of one cubic foot per second or its equivalent for each acre irrigated

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The priority date of this permit is July 24, 1979

Actual construction work shall begin on or before November 14, 1980 *and shall*
Extended to October 1987 Extended to October 1, 1992, 10-1-97
*thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19*81
Extended to October 1987 Extended to October 1, 1992, 10-1-97
*Complete application of the water to the proposed use shall be made on or before October 1, 19*82
Extended to October 1987 Extended to October 1, 1992, 10-1-97
WITNESS my hand this 14th *day of* November, *19*79

James E. Sexton
Resources Director

Attachment 1b,
Extensions of Time Limits for Permit S-44462

City of Dundee
Water Right
Permit S-44462

1983 Extension of Time Limit to 1987

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

YAMHILL COUNTY

IN THE MATTER OF AN APPLICATION FOR EXTENSION OF TIME TO BEGIN AND COMPLETE CONSTRUCTION AND MAKE COMPLETE APPLICATION OF WATER UNDER PERMIT 44462 IN THE NAME OF CITY OF DUNDEE	)	ORDER Extends Time Limits

The City of Dundee is the holder of Permit 44462 which grants the right to appropriate not to exceed 4.0 cubic feet per second of water from the Willamette River for municipal use.

The City has advised the Water Resources Director that the appropriation has not been made as described in the permit, but it is the City's desire to preserve the right for this development.

The City has further advised that the water study has been completed which indicates a need for this supply.

It is believed that it will be consistent with the public interest to grant said extension.

NOW, THEREFORE, it hereby is ORDERED that the time limits to begin and complete construction and make complete application of water under Permit 44462 be extended to October 1, 1987.

Dated at Salem, Oregon, this 4th day of May, 1983.

James E. Sexson
Director

6457B

City of Dundee
Water Right
Permit S-44462

1989 Extension of Time Limit to 1992

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

YAMHILL COUNTY

IN THE MATTER OF AN APPLICATION FOR EXTENSION OF TIME TO BEGIN AND COMPLETE CONSTRUCTION AND MAKE COMPLETE APPLICATION OF WATER UNDER PERMIT 44462 IN THE NAME OF CITY OF DUNDEE	)	O R D E R EXTEND TIME LIMITS

The City of Dundee is the owner of permit 44462 which allows the city to appropriate not more than 4.0 cubic foot per second of water from the Willamette River for the city's municipal purposes.

The Department has been advised by the City that construction of the facilities to make use of the water has not begun and the city has requested the time limits of the permit be extended. The city has demonstrated its intent to develop the proposed municipal use at a later date.

ORS 537.230 requires that actual construction of facilities to use the water must begin within one year from the date the permit is issued. However, municipal corporations which hold permits for the usual municipal purposes are exempt from this requirement.

In this instance, there are no apparent reasons why the request should be denied or conditioned. Granting the request for additional time to begin construction, complete construction, and to make use of the water as proposed by the city would be in the best interest of the public.

NOW, THEREFORE, it is hereby ORDERED that the time limits to begin construction, complete construction, and make complete application of water to beneficial use under the permit 44462 be extended to October 1, 1992.

Dated at Salem, Oregon this 9th day of January, 1989.

William H. Young

WILLIAM H. YOUNG
DIRECTOR

0378D

City of Dundee
Water Right
Permit S-44462

1995 Extension of Time Limit to 1997

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

MARION COUNTY

IN THE MATTER OF APPLICATION FOR)
EXTENSION OF TIME IN WHICH TO BEGIN)
AND COMPLETE CONSTRUCTION WORK AND) ORDER
MAKE COMPLETE APPLICATION OF WATER)
UNDER CERTAIN PERMITS)

The owners of the following water permits issued by the Water Resources Director have submitted applications for extensions of time limits within which to begin and/or complete the construction work and/or make complete application of water to beneficial use under their respective permits.

The Water Resources Director is authorized under the provisions of ORS 537.230 to grant extensions of time for good cause shown, within which to complete work to perfect a water right under a permit;

The statements in the applications for extensions filed regarding completion of the projects indicate that each has shown such reasonable diligence as entitles them to an extension of time; and

No protest or objections to the granting of an extension under any of the following permits have been filed by any subsequent permit holders;

NOW, THEREFORE, it is hereby is ORDERED that extensions of time are granted as follows:

				NEW TIME LIMITS TO:		
PERMITTEE	APPL. NUMBER	PERMIT NUMBER	BASIN NUMBER	START CONST.	COMPLETE CONST.	APPLY WATER
PERMITS TO USE GROUNDWATER:						
City of Arlington	G-1185	G-1201	6		10-1-99	10-1-99
City of Arlington	46891	35058	6	10-1-99	10-1-99	10-1-99
City of Fairview	G-5857	G-5594	3		10-1-98	10-1-98
City of Fairview	G-7563	G-7029	3		10-1-99	10-1-99
City of Dundee	G-6331	G-6017	2		10-1-97	10-1-97
City of Dundee	58951	44462	2	10-1-97	10-1-97	10-1-97
Harbor Rural Water District	G-9502	G-9438	15		10-1-99	10-1-99
City of Wallowa	G-11368	G-10569	8		10-1-98	10-1-98
F.M. Cook	G-11436	G-10733	13		10-1-95	10-1-95
Sunridge Water Systems, Inc.	G-11502	G-10617	7		10-1-99	10-1-99
Timberline Rim Water Company	G-11916	G-11165	3		10-1-98	10-1-98
KMB Enterprise	G-12042	G-11146	5		10-1-97	10-1-97

Deer Park Water Association	G-12096	G-11070	15		10-1-97	10-1-97
Brooks Resources Corporation	G-12156	G-11106	5		10-1-95	10-1-95
Richard Halliburton	G-12162	G-11388	17			10-1-95
Richard Halliburton	R-70462	R-11422	17			10-1-95
Richard Halliburton	70463	51380	17			10-1-95
Roy & Elaine Moore	G-12279	G-11185	2			10-1-95
Highland Subdivision Water District	G-12289	G-11347	5		10-1-98	10-1-98
Dennis Obrist	G-12372	G-11351	2			10-1-95
St. Paul Cemetery Trust	G-12379	G-11395	2			10-1-95
James & Loretta Ellett	G-12452	G-11399	4		10-1-94	
James & Loretta Ellett	G-12452	G-11399	4		10-1-95	10-1-95
Leonard G. Turner	G-12575	G-11561	17		10-1-95	
Rodrick Fraser II	G-12723	G-11595	17		10-1-95	

PERMITS TO CONSTRUCT RESERVOIRS AND USE SURFACE WATER:

Daniel E. Davis	R-69987	R-11237	17		10-1-95	10-1-95
Daniel E. Davis	69988	51033	17		10-1-95	10-1-95
Rudolph M. Bauder	R-69901	R-11164	1		10-1-95	10-1-95
Rudolph M. Bauder	69902	50760	1		10-1-95	10-1-95
Roy Peters	R-72031	R-11471	17		10-1-95	

PERMITS TO USE SURFACE WATER:

City of Brookings	37091	27610	15		10-1-99	10-1-99
City of Brookings	41805	31293	15		10-1-99	10-1-99
City of Rainier	44624	33386	1		10-1-97	10-1-97
Lakeside Water Dist.	46056	34393	17		10-1-99	10-1-99
City of Umatilla	54855	41444	7	10-1-99	10-1-99	10-1-99
Weiss Estates Water System Company, Inc.	60573	46099	17		10-1-98	10-1-98
West Extension Irrigation District	61797	45999	7		10-1-96	10-1-96
City of Rockaway	61833	46245	1		10-1-98	10-1-98
Coos Bay-North Bend Water Board	68795	50155	17		10-1-99	10-1-99

Coos County	69109	50938	17	10-1-95	10-1-95
Kenley R. Beachy	69400	50414	2		10-1-95
Rickreall Dairy	69936	50949	2		10-1-94
Vern & Alan Liesinger	70617	51115	16	10-1-95	10-1-95
Jock Jouvenat	70617	51115	16	10-1-95	10-1-95
Daioh International, USA	70620	51150	2	10-1-95	10-1-95
Gordon H. Hale	71217	51468	2	10-1-95	

Dated at Salem, Oregon this 2nd day of February, 1995.

Martha O. Pagel

Martha O. Pagel

Special Order Volume , Page

City of Dundee
Water Right
Permit S-44462

2009 Extension of Time to 2025

Oregon Water Resources Department
Water Rights Division

Water Rights Application
Number S-58951

Final Order
Extension of Time for Permit Number S-44462

Appeal Rights

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. A request for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either file for judicial review, or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Application History

The Department issued Permit S-44462 on November 14, 1979. The permit called for completion of construction by October 1, 1981, and complete application of water to beneficial use by October 1, 1982. On March 20, 1998, City of Dundee submitted an application to the Department for an extension of time for Permit S-44462. In accordance with OAR 690-315-0050(2), on August 4, 2009, the Department issued a Proposed Final Order proposing to extend the time to complete construction to October 1, 2025 and to extend the time to complete construction to October 1, 2025, and the time to fully apply water to beneficial use to October 1, 2025. The protest period closed September 18, 2009, in accordance with OAR 690-315-0060(1). No protest was filed.

At time of issuance of the Proposed Final Order the Department concluded that, based on the factors demonstrated by the applicant, the permit may be extended subject to the following conditions:

CONDITIONS

1. **Development Limitations**

   Diversion of any water under Permit S-44462 shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86.The required WMCP shall be submitted to the Department within 3 years of an approved extension of time application. Use of water under Permit S-44462 must be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 that is on file with the Department.

   The deadline established in this PFO for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the

requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. **Persistence of Fish Conditions**

A. Minimum Fish Flow Needs

Minimum fish flow needs on the Willamette River as recommended by ODFW are in Table 1, below; flows are to be measured on the Willamette River at Salem, Oregon (USGS Gage Number 14191000, or its equivalent).

Table 1

MINIMUM FISH FLOW NEEDS ON THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
Month	Cubic Feet per Second
July 1– October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000
April 16 –April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

B. Determining Water Use Reductions - Generally

The use of the undeveloped portion of Permit S-44462 that legally can be diverted must be reduced in proportion to the amount by which the flows shown in Table 2 are not met based on a seven day rolling average of mean daily flows measured on the Willamette River at Salem (USGS Gage Number 14191000, or its equivalent). This reduction will be adjusted by a Consumptive Use Percentage, when applicable, as per Item 2.C., below. The overall reduction to the maximum total amount of the undeveloped portion of the permit that legally can be diverted will not exceed 20%.

C. Consumptive Use Percentages

a. Initial Consumptive Use Percentages
The City of Dundee has not identified any Consumptive Use Percentages based on the return of flows to the Willamette River through effluent discharge. Thus, at this time the City may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped

portion of Permit S-44462 that can be diverted as a result of this fish persistence condition.

b. First Time Utilization of Consumptive Use Percentages
Utilization of Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit S-44462 that can be diverted as a result of this fish persistence condition may begin after the issuance of the Final Order for this extension of time.

First time utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting monthly Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages. Utilization of Consumptive Use Percentages is subject to an approval period described in 2.D.f., below.

Consumptive Use Percentages submitted to the Department for review must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The proposed Consumptive Use Percentages should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

c. Consumptive Use Percentages Updates
Continuing the utilization of Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit S-44462 that can be diverted as a result of this fish persistence condition beyond an approval period (as described in 2.D.f., below) is contingent upon the City submitting updated Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the Consumptive Use Percentages Updates. Utilization of Consumptive Use Percentages Updates is subject to an approval period described in 2.D.f., below.

The updates to the Consumptive Use Percentages must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The updates should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

d. Changes to Wastewater Technology and/or Wastewater Treatment Plant Practices
If there are changes to either wastewater technology or the practices at the City's waster water treatment facility resulting in 25% or more reductions in average monthly return flows to the Willamette River, then the Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the amount of the undeveloped portion of Permit

S-44462 that can be diverted as result of this fish persistence condition. The 25% reduction is based on a 10-year rolling average of monthly wastewater return flows to the Willamette River as compared to the average monthly wastewater return flows from the 10 year period just prior to date of the first approval period described in 2.D.f., below.

If such changes to either wastewater technology or the practices at the City's waster water treatment facility occur resulting in 25% reductions, further utilization of Consumptive Use Percentages is contingent upon the City submitting Consumptive Use Percentages Updates as per 2.D.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

e. Relocation of the Point(s) of Diversion(s) and/or Return Flows
If the point(s) of diversion(s) and/or return flows are relocated, Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the amount of the undeveloped portion of Permit S-44462 that can be diverted as result of this fish persistence condition.

After relocation of the point(s) of diversion(s) and/or return flows, further utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that any relocated withdrawal points and effluent discharge points are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting Consumptive Use Percentages Updates as per 2.D.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

f. Approval Periods for Utilization of Consumptive Use Percentages
The utilization of Consumptive Use Percentages for the purpose of calculating the maximum total amount of the undeveloped portion of Permit S-44462 that can be diverted as a result of this fish persistence condition may continue for a 10 year approval period that begins 10 years from the Water Resources Director's most recent date of concurrence with Consumptive Use Percentages Updates as evidenced by the record, unless sections 2.D.d., or 2.D.e. (above) are applicable.

D. Examples

Example 1:
On July 15, the last seven mean daily flows were 7000, 6500, 6000, 5500, 5250, 5000 and 4750 cfs. The seven day rolling average is 5714 cfs. The use of the maximum total amount of the undeveloped portion of the permit that legally could be diverted would not be reduced because the 7 day average of mean daily flows is greater than the 5,630 cfs target flow for July 15.

Example 2:

Step 1: If on July 15, the average of the last seven mean daily flows was 5011 cfs, the target flow would be missed by 11%. The use of the maximum total amount of the undeveloped portion of the permit that legally could be diverted would be reduced because the 7 day average of mean daily flows is less than the 5,630 cfs target flow for July 15.

$$(100 - [(5011 / 5630) \times 100\%]) = 11\%$$

Step 2: Assuming the Consumptive Use Percentage is 78.7%[9] during the month of July and the utilization of this percentage is authorized, and the target flow is missed by 11% (from Step 1), then the reduction to the maximum total amount of the undeveloped portion of the permit that legally can be diverted would be 8.7%.

$$([11\% \times 78.7\%] / 100) = 8.7\%$$

(If adjustments are not to be made by a Consumptive Use Percentage, the undeveloped portion would be reduced only by the % by which the target flow is missed – 11% in this example).

Step 3: If the maximum total amount of the undeveloped portion of the permit that legally can be diverted under a permit is 10.0 cfs, then in this example the reduction due to the missed target flow percentage adjusted by the Consumptive Use Percentage would be 0.87 cfs.

$$(10.0 \text{ cfs} \times [8.7\% / 100]) = 0.87 \text{ cfs}$$

Step 4: This 0.87 cfs reduction is 8.7% of 10.0 cfs (the maximum total amount of the undeveloped portion of the permit that legally can be diverted). This 8.7% does not exceed the 20% maximum overall reduction.

$$([0.87 / 10) \times 100\%]) = 8.7\%$$

Step 5: In this example, the maximum total amount of the undeveloped portion of the permit that legally could be diverted under the permit under this condition would be 9.13 cfs

$$(10.0 \text{ cfs} - .87 \text{ cfs}) = 9.13 \text{ cfs}$$

[9] Currently, the City of Dundee may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit S-44462 that can be diverted as a result of this fish persistence condition. The utilization of the Consumptive Use Percentage 78.7% is only for illustrative purposes in this example.

The applicant has demonstrated good cause for the permit extension pursuant to ORS 537.230, 539.010(5) and OAR 690-315-0080(3).

Order

The extension of time for Application S-58951, Permit S-44462, therefore, is approved subject to conditions contained herein. The deadline for completing construction is extended to October 1, 2025. The deadline for applying water to full beneficial use is extended to October 1, 2025.

DATED: October 6, 2009

Dwight French, Administrator of
Water Rights and Adjudications
for
Phillip C. Ward, Director

If you have any questions about statements contained in this document, please contact Scott Kudlemyer at (503) 986-0813.

If you have other questions about the Department or any of its programs, please contact our Water Resources Customer Service Group at (503) 986-0900

City of Dundee
Water Right
Permit S-44462

2012 Approval of WMCP For City of Dundee

BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON

In the Matter of the Proposed Water Management and Conservation Plan for City of Dundee, Yamhill County	)))	FINAL ORDER APPROVING A WATER MANAGEMENT AND CONSERVATION PLAN

Authority

OAR Chapter 690, Division 086, establishes the process and criteria for approving water management and conservation plans required under the conditions of permits, permit extensions and other orders of the Department. An approved water management plan may authorize the diversion and use of water under a permit extended pursuant to OAR Chapter 690, Division 315.

Findings of Fact

1. The City of Dundee (City) submitted a Water Management and Conservation Plan (plan) to the Water Resources Department (Department) on November 15, 2011. The plan was required by conditions set forth in the final orders approving extensions of time for Permits G-6017, G-12685, G-12736, G-13035 and S-44462.

2. The Department published notice of receipt of the plan on November 22, 2011, as required under OAR Chapter 690, Division 086. No comments were received.

3. The Department provided written comments on the plan to the City on February 9, 2012, and in response, the City submitted a final revised plan on Nov. 14, 2012.

4. The Department reviewed the final revised plan and finds that it contains all of the elements required under OAR 690-086-0125.

5. The projections of future water needs in the plan demonstrate a need of up to 1.55 cfs of surface water available under Permit S-44462 and/or up to 0.8 cfs of ground water under Permits G-12736 and G-13035 to help meet overall demands of 2.66 cfs (1.72 million gallons per day) anticipated in 20 years. These projections are reasonable and consistent with the City's land use plan. The development of the sources authorized under these permits is dependent upon budgetary issues, as well as the physical attributes of the surface water and ground water sources themselves.

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080, you may petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

6. The City's system is fully metered and has a rate structure that includes a base rate and volumetric charge. Unaccounted-for water is estimated at 18.6% percent.

7. The plan includes 5-year benchmarks for implementation and/or continuation of the following water conservation activities: full metering of the water system; replacement of small customer meters, as needed; performing annual water audits; maintaining a rate structure based on the amount of water used; budgeting funds annually toward replacement of aging water mains; and including water conservation information in the City's summer newsletter distributed to customers in July of each year and posted on the City's web site.

8. The plan includes 5-year benchmarks to develop: a maintenance and calibration methodology for production meters and large-size meters; a leak detection and repair methodology to work toward reducing annual water loss to 10 percent; and a systematic and documented methodology for tracking and/or estimating authorized and unauthorized unmetered water use. The plan also includes 5-year benchmarks to evaluate the feasibility of developing: a non-potable water supply as part of the new wastewater treatment facility; a financial and technical assistance program to encourage implementation of conservation measures; a supplier-financed fixture retrofitting and replacement program; and any other identified measures that would improve water use efficiency.

9. The plan identifies ground water, the Willamette River, Mossy Springs, Unnamed Springs and an Unnamed Stream formed by springs as the sources of the City's water rights. Additionally, the plan accurately and completely describes the listed fish species that occur in the Willamette River in the vicinity of the City's point of diversion, being Upper Willamette River Chinook *(federally-listed as Threatened)* and Upper Willamette River Steelhead *(state-listed as Sensitive-Vulnerable and federally-listed as Threatened)*. The plan also accurately and completely identifies the water quality parameters for which the Willamette River has been 303(d) listed by the Oregon Department of Environmental Quality.

10. The water curtailment element included in the plan satisfactorily promotes water curtailment practices and includes a list of three stages of alert with concurrent curtailment actions.

11. The diversion of water under Permits S-44462, G-12736 and/or G-13035 will be initiated and/or expanded during the next 20 years and is consistent with OAR 690-086-0130(7), as follows:

    a. As evidenced by the 5-year benchmarks described in Findings of Fact #7 and #8, the plan includes a schedule for development of conservation measures that would provide water at a cost that is equal to or lower than the cost of other identified sources;

    b. Considering that the water savings generated by the conservation measures established in this WMCP cannot fully meet the City's projected 20-year peak demand, and that the wholesale purchase of water from the nearby Cities of Dayton and/or Lafayette is not practical due to the cost of building infrastructure necessary to transport water and because excess water supply is not available from those cities, the increased diversion of water under Permits S-44462, G-12736 and/or G-13035 is the most feasible and appropriate water supply alternative available to the City; ***and***

c. As the City pursues future development of a surface water supply from the Willamette River, they will be required to address any mitigation issues that may arise as a result of the Federal Endangered Species Act, Clean Water Act and/or Safe Drinking Water Act. Additionally, the City is required to comply with conditions set forth in the Final Orders issued by the Department on October 6, 2009 approving Extensions of Time for Permits S-44462 and G-6017 to protect minimum fish flow needs in the Willamette River in order to maintain the persistence of listed fish species in the portions of the river affected by the City's water use under these permits.

Conclusion of Law

The Water Management and Conservation Plan submitted by the City of Dundee is consistent with the criteria in OAR Chapter 690, Division 086.

Now, therefore, it is ORDERED:

1. The City of Dundee Water Management and Conservation Plan is approved and shall remain in effect until November 21, 2022, unless this approval is rescinded pursuant to OAR 690 086-0920.

2. The limitation of the diversion of water under Permit S-44462 established by the Extension of Time approved on October 6, 2009 is removed and, subject to other limitations or conditions of the permit, the City of Dundee is authorized to divert up to 1.55 cfs under Permit S-44462.

3. The limitations of the diversion of water under Permits G-12736 and G-13035 established by the Extensions of Time approved on September 29, 2006 are removed and, subject to other limitations or conditions of the permits, the City of Dundee is authorized to divert a combined total of up to 0.8 cfs under Permits G-12736 and G-13035. This condition does not allow the use of water in excess of the quantity limitation specified in each permit, being no more than 0.5 cfs under Permit G-12736 and no more than 0.5 cfs under Permit G-13035.

4. The City of Dundee shall submit an updated plan meeting the requirements of OAR Chapter 690, Division 086 (effective November 1, 2002) within 10 years and no later than November 21, 2021.

5. The updated plan *(referenced in Condition #4 above)* shall provide a description of the City's development of Permits S-44462, G-12736 and/or G-13035. The description should identify: 1) actions taken to construct infrastructure necessary to develop the authorized source(s) of water under the permits; 2) compliance with any mitigation actions required as a result of development of the permits; and 3) the extent to which water has been diverted under each of the permits *(i.e., identify the maximum rate of diversion of water under each of the Permits S-44462, G-12736 and/or G-13035).*

6. The City of Dundee shall submit a progress report by November 21, 2017, containing the information required under OAR 690-086-0120(4) and information documenting the City's diligence in pursuing the development of water under Permits S-44462, G-12736 and/or G-13035 *(see Condition #5 above).*

7. The deadline established herein for the submittal of an updated Water Management and Conservation Plan (consistent with OAR Chapter 690, Division 086) shall not relieve the City of Dundee from any existing or future requirement(s) for submittal of a Water Management and Conservation Plan at an earlier date as established through other final orders of the Department.

Dated at Salem, Oregon this 21 day of November, 2012.

Dwight French, Water Right Services Administrator *for*
PHILLIP C. WARD, DIRECTOR

Mailing date: NOV 27 2012

Attachment 2a,
Application for Permit Amendment,
Minimum Requirements Checklist

State of Oregon
Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266
(503) 986-0900

Application for
Permit Amendment
Part 1 of 5 – Minimum Requirements Checklist

This permit amendment application <u>will be returned</u> if Parts 1 through 5 and all required attachments are not completed and included.
For questions, please call (503) 986-0900, and ask for Transfer Section.

Check all items included with this application. (N/A = Not Applicable)

☐ Part 1 – Completed Minimum Requirements Checklist.

☐ Part 2 – Completed Application Map Checklist.

☐ Part 3 – Application Fee, payable by check to the Oregon Water Resources Department, and completed Fee Worksheet, page 3. Try the new online fee calculator at: http://apps.wrd.state.or.us/apps/misc/wrd_fee_calculator. If you have questions, call Customer Service at (503) 986-0801.

☐ Part 4 – Completed Applicant Information and Signature.

☐ Part 5 – Information about Permits to be Amended: **Number of permits to be amended: _____**
List the Permits here:_____
Please include a separate Part 5 for each permit. (See instructions on page 6)

☐ Completed Permit Amendment Application Map (Does not have to be prepared by a Certified Water Right Examiner).

☐ ☐ N/A Request for Assignment Form and statutory fee. The request for assignment form has to be completed if the applicant is **not** the permit holder of record and needs to be assigned to the permit; **or** the landowner of the proposed place of use is **not** the permit holder of record and needs to be assigned to the permit (the Request for Assignment Form is available online at https://www.oregon.gov/OWRD/Forms/Pages/default.aspx). Assignment is not needed if the applicant is the permit holder of record.

☐ ☐ N/A Affidavit(s) of Consent are required from all permit holder(s) of record if the permit is not assigned to the applicant **or** other permit holders of record that are not listed as applicants.

☐ ☐ N/A Oregon Water Resources Department's Land Use Information Form with approval and signature (or signed land use form receipt stub) from each local land use authority in which water is to be diverted, conveyed, and/or used. Not required if water is to be diverted, conveyed, and/or used only on federal lands or if **all** of the following apply: a) a change in place of use only, b) no structural changes, c) the use of water is for irrigation only, and d) the use is located within an irrigation district or an exclusive farm use zone.

☐ ☐ N/A Water Well Report/Well Log for changes in point(s) of appropriation (well(s)) or additional point(s) of appropriation.

☐ ☐ N/A Geologist Report for a change from a surface water point of diversion to a ground water point of appropriation (well), if the proposed well is more than 500 feet from the surface water source and more than 1000 feet upstream or downstream from the point of diversion. (ORS 540.531(2) or (3)).

(For Staff Use Only)
WE ARE RETURNING YOUR APPLICATION FOR THE FOLLOWING REASON(S):
___ Application fee not enclosed/insufficient ___ Map not included or incomplete
___ Land Use Form not enclosed or incomplete
___ Additional signature(s) required ___ Part _____ is incomplete
Other/Explanation _____
Staff: _____503-986-0___ Date: _____/_____/_____

Your permit amendment application <u>will be returned</u> if any of the map requirements listed below are not met.

Please be sure that the map you submit includes all the items listed below and meets the requirements of OAR 690-380-3100, however, the map does <u>not</u> have to be prepared by a Certified Water Right Examiner. Check all boxes that apply.

☐ ☐ N/A If **more than three** permits are involved, separate maps for each permit.

☐ Permanent quality printed with dark ink on good quality paper.

☐ The size of the map can be 8½ x 11 inches, 8½ x 14 inches, 11 x 17 inches, or up to 30 x 30 inches. For 30 x 30 inch maps, one extra copy is required.

☐ A north arrow, a legend, and scale.

☐ The scale of the map must be: 1 inch = 400 feet, 1 inch = 1,320 feet, the scale of the county assessor map if the scale is not smaller than 1 inch = 1,320 feet, or a scale that has been pre-approved by the Department.

☐ Township, Range, Section, ¼ ¼, DLC, Government Lot, and other recognized public land survey lines.

☐ Tax lot boundaries (property lines) are required. Tax lot numbers are recommended.

☐ Major physical features including rivers and creeks showing direction of flow, lakes and reservoirs, roads, and railroads.

☐ Major water delivery system features from the point(s) of diversion/appropriation such as main pipelines, canals, and ditches.

☐ Existing place of use that includes separate hachuring for each water use permit, priority date, and use including number of acres in each quarter-quarter section, government lot, or in each quarter-quarter section as projected within government lots, donation land claims, or other recognized public land survey subdivisions. If less than the entirety of the permit is being changed, a separate hachuring is needed for the portion of the permit left unchanged.

☐ ☐ N/A If you are proposing a change in place of use, show the proposed place of use with hachuring that includes separate hachuring for each permit, priority date, and use including number of acres in each quarter-quarter section, government lot, or in each quarter-quarter section as projected within government lots, donation land claims, or other recognized public land survey subdivisions.

☐ Existing point(s) of diversion or well(s) with distance and bearing or coordinates from a recognized survey corner. This information can be found in your water use permit.

☐ ☐ N/A If you are proposing a change in point(s) of diversion or well(s), show the proposed location and label it clearly with distance and bearing or coordinates. If GPS coordinates are used, latitude-longitude coordinates may be expressed as either degrees-minutes-seconds with at least one digit after the decimal (example – 42°32’15.5”) or degrees-decimal with five or more digits after the decimal (example – 42.53764°).

FEE WORKSHEET for PERMIT AMENDMENT			
1	Base Fee (includes one type of change to one permit for up to 1 cfs)	*1*	$1,160
2	Types of change proposed: ☐ Place of Use ☐ Point of Diversion/Appropriation Number of above boxes checked = _____(2a) Subtract 1 from the number in line 2a = _____(2b) *If only one change, this will be 0* Multiply line 2b by $930 and enter » » » » » » » » » » » » » » »	*2*	
3	Number of permits included in Permit Amendment _____(3a) Subtract 1 from the number in 3a: _____(3b) *If only one permit this will be 0* Multiply line 3b by $520 and enter » » » » » » » » » » » » » » »	*3*	
4	Do you propose to add or change a well, or change from a surface water POD to a well? ☐ No: enter 0 » ☐ Yes: enter $410 »	*4*	
5	Do you propose to change the place of use? ☐ No: enter 0 on line 5 » ☐ Yes: enter the cfs for the portions of the permits to be amended (see example below*): _____(5a) Subtract 1.0 from the number in 5a above: _____(5b) If 5b is 0, enter 0 on line 5 » » » » » » » » » » » » » » » » » » » If 5b is greater than 0, round up to the nearest whole number: _____(5c) and multiply 5c by $350, then enter on line 5 » » » » » » » » »	*5*	
6	Add entries on lines 1 through 5 above » » » » » » » » » » Subtotal:	*6*	
7	Is this permit amendment: ☐ necessary to complete a project funded by the Oregon Watershed Enhancement Board (OWEB) under ORS 541.932? ☐ endorsed in writing by ODFW as a change that will result in a net benefit to fish and wildlife habitat? If one or more boxes is checked, multiply line 6 by 0.5 and enter on line 7 » If no box is applicable, enter 0 on line 7» » » » » » » » » » » » » » »	*7*	
8	Subtract line 7 from line 6 » » » » » » » » **Permit Amendment Fee:**	***8***	

<u>*Example for Line 5a calculation</u> to transfer 45.0 acres of Primary Permit S-12345 (total 1.25 cfs for 100 acres) and 45.0 acres of Supplemental Permit S-87654 (1/80 cfs per acre) on the same land:

1. For irrigation calculate cfs for each permit involved as follows:
   a. Divide total authorized cfs by total acres in the permit *(for S-12345, 1.25 cfs ÷100 ac)*; then multiply by the number of acres to be changed to get the application cfs *(x 45 ac= 0.56 cfs)*.
   b. If the water right permit does not list total cfs, but identifies the allowable use as 1/40 or 1/80 of a cfs per acre; multiply number of acres proposed for change by either 0.025 (1/40) or 0.0125 (1/80). *(For S-87654, 45.0 ac x 0.0125 cfs/ac = 0.56 cfs)*
2. Add cfs for the portions of permits on all the land included in the application; however **do not count cfs for supplemental permits on acreage for which you have already calculated the cfs fee for the primary permit on the same land**. The fee should be assessed only once for each "on the ground" acre included in the application. *(In this example, blank 5a would be only 0.56 cfs, since both permits serve the same 45.0 acres. Blank 5b would be 0 and Line 5 would then also become 0).*

Applicant Information

APPLICANT/BUSINESS NAME			PHONE NO.	ADDITIONAL CONTACT NO.
ADDRESS				FAX NO.
CITY	STATE	ZIP	E-MAIL	
BY PROVIDING AN E-MAIL ADDRESS, CONSENT IS GIVEN TO RECEIVE ALL CORRESPONDENCE FROM THE DEPARTMENT ELECTRONICALLY. COPIES OF THE FINAL ORDER DOCUMENTS WILL ALSO BE MAILED.				

Agent Information – The agent is authorized to represent the applicant in all matters relating to this application.

AGENT/BUSINESS NAME			PHONE NO.	ADDITIONAL CONTACT NO.
ADDRESS				FAX NO.
CITY	STATE	ZIP	E-MAIL	
BY PROVIDING AN E-MAIL ADDRESS, CONSENT IS GIVEN TO RECEIVE ALL CORRESPONDENCE FROM THE DEPARTMENT ELECTRONICALLY. COPIES OF THE FINAL ORDER DOCUMENTS WILL ALSO BE MAILED.				

Explain in your own words what you propose to accomplish with this permit amendment; and why:

If you need additional space, continue on a separate piece of paper and attach to the application as "Attachment 1".

☐ Check this box if this project is fully or partially funded by the American Recovery and Reinvestment Act. (Federal stimulus dollars)

Is the applicant the permit holder of record? ☐ Yes ☐ No

If NO, include either:

☐ A completed assignment form (with required statutory assignment fee), assigning all or a portion of the permit to the applicant(s), **OR**

☐ An affidavit of consent from the permit holder(s) of record that gives permission for the applicant to amend the permit.

Has the Completion ("C") Date of the permit(s) in this application expired? ☐ Yes ☐ No

If YES, this application will not be accepted by the Department.

If NO, what are the completion dates of the permit(s)? _____

- If the permit completion date expires while the Permit Amendment Application is pending, the Department will not approve the Permit Amendment Application until an Extension of Time Application is approved for the permit.
- You may consider using the Reimbursement Authority process to expedite the processing of this Permit Amendment Application if the completion date of the permit expires within 6 months of the date of filing this application.

By my signature below, I confirm that I understand:

- Prior to Department approval of the permit amendment, I may be required to submit payment to the Department for publication of a notice in a newspaper with general circulation in the area where the permit is located, once per week for two consecutive weeks. If more than one qualifying newspaper is available, I suggest publishing the notice in the following newspaper: _____.

I (we) affirm that the information contained in this application is true and accurate.

Applicant Signature	Print Name (and Title if applicable)	Date
Applicant Signature	Print Name (and Title if applicable)	Date

Check one of the following:

☐ The applicant is responsible for completion of change(s). Notices and correspondence should continue to be sent to the applicant.

☐ The permit holder(s) of record will be responsible for completing the proposed change(s) after the final order is issued. Copies of notices and correspondence should be sent to the permit holder(s) of record.

Check the appropriate box, if applicable:

☐ Check here if any of the permits proposed for amendment are or will be located within or served by an irrigation or other water district.

IRRIGATION DISTRICT NAME	ADDRESS	
CITY	STATE	ZIP

☐ Check here if water for any of the permits supplied under a water service agreement or other contract for stored water with a federal agency or other entity.

ENTITY NAME	ADDRESS	
CITY	STATE	ZIP

To meet State Land Use Consistency Requirements, you must list all local governments (each county, city, municipal corporation, or tribal government) within whose jurisdiction water will be diverted, conveyed or used.

ENTITY NAME	ADDRESS	
CITY	STATE	ZIP

ENTITY NAME	ADDRESS	
CITY	STATE	ZIP

ENTITY NAME	ADDRESS	
CITY	STATE	ZIP

INSTRUCTIONS for editing the Application Form

To add additional lines to tables within the forms or to copy and paste additional Part 5 pages, please **save the application form to your computer**. Unlock the document by using one of the following instructions for your Microsoft Word software version:

> Once the application has been unlocked, you may:
>
> - add additional rows to tables using the Table tools, and
> - select and copy the pages of Part 5 and paste as many additional sets of Part 5 pages as needed at the end of the application.
>
> After editing, re-lock the document to enable checkboxes to work.

Microsoft Word 2003

Unlock the document by one of the following:

- Using the **Tools** menu => click **Unprotect Document;**

OR

- Using the **Forms** toolbar => click on the **Protect/Unprotect** icon.

To relock the document to enable the checkboxes to work, you will need to:

- Using the **Tools** menu => click **Protect Document;**

OR

- Using the **Forms** toolbar => click on the **Protect/Unprotect** icon.

Microsoft Word 2007

- Unlock the document by clicking the **Review** tab, then click **Protect Document**, then click **Stop Protect**

- To relock the document, click **Editing Restrictions**, then click **Allow Only This Type of Editing**, select **Filling In Forms** from the drop-down menu, then check **Yes, Start Enforcing Protection**.

Microsoft Word 2010

- Unlock the document by clicking the **Review** tab, toggle the **Restrict Editing icon** at the upper right, then click **Stop Protect** at the bottom right. Then uncheck the "**Allow only this type of editing** in the document: **Filling in forms**" in the "Editing restrictions" section on the right-hand list of options.

- To relock the document, check the **Editing Restrictions**/**Allow Only This Type of Editing**/**Filling In Forms** box from the drop-down menu, then check **Yes, Start Enforcing Protection**. You do not need to assign a password for the editing restrictions.

Other Alternatives:

- Photocopy pages or tables in Part 5, ~~mark-through~~ any non-applicable information, insert/attach photocopied pages to document in the appropriate location, and manually amend page numbers as necessary (e.g. Page ~~5~~ 6 of ~~9~~ 10).

- You may refer to additional attachments that you may include, such as separately produced tables or spreadsheets to convey large numbers of rows of place of use listings, owner/property parcels, etc. You may contact the Department at 503-986-0900 and ask for Transfer Staff if you have questions.

Please use a separate Part 5 for each permit being changed**.** See instructions on page 6, to copy and paste additional Part 5s, or to add additional rows to tables within the form.

PERMIT # _____

Table 1. Location of Authorized and Proposed Point(s) of Diversion (POD) or Appropriation (POA)
(Note: If the POD/POA name is not specified in the permit, assign it a name or number here.)

POD/POA Name or Number	Is this POD/POA Authorized by the permit or is it Proposed?	If POA, OWRD Well Log ID# (or Well ID Tag # L-___)	Twp	Rng	Sec	¼ ¼	Tax Lot, DLC or Gov't Lot	Measured Distances (from a recognized survey corner)
	☐ Authorized ☐ Proposed							
	☐ Authorized ☐ Proposed							
	☐ Authorized ☐ Proposed							
	☐ Authorized ☐ Proposed							

Check all type(s) of change(s) proposed below (change "CODES" are provided in parentheses):

☐ Place of Use (POU)
☐ Point of Diversion (POD)
☐ Additional Point of Diversion (APOD)
☐ Point of Appropriation/Well (POA)
☐ Additional Point of Appropriation (APOA)
☐ Surface water POD to Ground Water POA (SW/GW)

Will all of the proposed changes affect the entire water use permit?

☐ Yes Complete only the proposed ("to" lands) section of Table 2 on the next page. Use the "CODES" listed above to describe the proposed changes.

☐ No Complete all of Table 2 to describe the portion of the permit to be changed.

For a change in place of use:

Does the permit holder of record own or control the land TO which the place of use is being moved?
☐ Yes ☐ No

If NO, the landowner of the land TO which the place of use is being **moved must be assigned to the permit as a permit holder of record** by submitting a completed Request for Assignment form and the required statutory fee for an assignment.

Is the proposed place of use contiguous to the authorized place of use? ☐ Yes ☐ No

The permitted place of use can be moved only to lands that are contiguous to the authorized place of use **unless** the change to non-contiguous lands is in furtherance of mitigation or conservation efforts undertaken for the purposes of benefiting a species listed as sensitive, threatened, or endangered under ORS 496.171 to 496.192 or the federal Endangered Species Act of 1973 (16 U.S.C. 1531 to 1544), as determined by the listing agency. Contiguous land being either adjacent land or land separated from the land to which a permit is authorized by roads, utility corridors, irrigation ditches or publicly owned rights of way.

Please use and attach additional pages of Table 2 as needed. See page 6 for instructions.	Do you have questions about how to fill-out the tables? Contact the Department at 503-986-0900 and ask for Transfer Staff.

Table 2. Description of Changes to Water Use Permit # _____

List the change proposed for the acreage in each ¼ ¼. If more than one change is proposed, specify the acreage associated with each change.
If there is more than one POD/POA involved in the proposed changes, specify the acreage associated with each POD/POA.

AUTHORIZED (the "from" or "off" lands) The listing that appears on the certificate BEFORE PROPOSED CHANGES List only that part or portion of the water right that will be changed.												Proposed Changes (see "CODES" from previous page)	PROPOSED (the "to" or "on" lands) The listing as it would appear AFTER PROPOSED CHANGES are made.											
Twp	Rng	Sec	¼ ¼		Tax Lot	Gvt Lot or DLC	Acres (if applicable)	POD(s) or POA(s) (name or number from Table 1)	Priority Date				Twp	Rng	Sec	¼ ¼		Tax Lot	Gvt Lot or DLC	Acres (if applicable)	POD(s) or POA(s) to be used (from Table 1)	Priority Date	
EXAMPLE																								
2	**S**	**9**	**E**	**15**	**NE**	**NW**	**100**		**15.0**	**POD #1 POD #2**		**POU/POD**	**2**	**S**	**9**	**E**	**15**	**NW**	**NW**	**100**	**1**	**10.0**	**POD #5**	
"	**"**	**"**	**"**	**"**	**"**	**"**	**"**	**"**	**EXAMPLE**	**"**		**"**	**2**	**S**	**9**	**E**	**15**	**SW**	**NW**	**200**		**5.0**	**POD #6**	
TOTAL ACRES													TOTAL ACRES											

Additional remarks: _____.

Are there other water rights certificates, water use permits or ground water registrations associated with the "from" or "to" lands? ☐ Yes ☐ No

If YES, list the other certificate, permit, or ground water registration numbers: _____

If the permit(s) are for irrigation or supplemental irrigation use, other water rights existing on the same land for irrigation that are subject to transfer must either change concurrently or be cancelled. Any change to a water right certificate or ground water registration must be filed separately in a water right transfer application or ground water registration modification application, respectively.

For a change in point(s) of appropriation (well(s)) or additional point(s) of appropriation:

☐ Well log(s) are attached for each authorized and proposed well(s) that are clearly labeled and associated with the corresponding well(s) in Table 1 above and on the accompanying application map. (**Tip**: You may search for well logs on the Department's web page at: http://apps.wrd.state.or.us/apps/gw/well_log/Default.aspx)

AND/OR

☐ Describe the construction of the authorized and proposed well(s) in Table 3 for any wells that do not have a well log. For *proposed wells not yet constructed or built*, provide "a best estimate" for each requested information element in the table. The Department recommends you consult a licensed well driller, geologist, or certified water right examiner to assist with assembling the information necessary to complete Table 3.

Table 3. Construction of Point(s) of Appropriation

Any well(s) in this listing must be clearly tied to corresponding well(s) described in Table 1 and shown on the accompanying application map. Failure to provide the information will delay the processing of your transfer application until it is received. The information is necessary for the department to assess whether the proposed well(s) will access the same source aquifer as the authorized point(s) of appropriation (POA). The Department is prohibited by law from approving POA changes that do not access the same source aquifer.

Proposed or Authorized POA Name or Number	Is well already built? (Yes or No)	If an existing well, OWRD Well ID Tag No. L-____	Total well depth	Casing Diameter	Casing Intervals (feet)	Seal depth(s) (intervals)	Perforated or screened intervals (in feet)	Static water level of completed well (in feet)	Source aquifer (sand, gravel, basalt, etc.)	Well - specific rate (cfs or gpm). If less than full rate of water right

Attachment 2b,
Application for Permit Amendment,
Estimated Permit Fees

FEE			
1	Base Fee (includes one type of change to one permit for up to 1 cfs)	*1*	
2	Types of change proposed: Place of Use [X] Point of Diversion/Appropriation [X] Number of above boxes checked = 2 (2a) Subtract 1 from the number in line 2a = 1 (2b) *If only one change, this will be 0* Multiply line 2b by $930 and enter » » » » » » » » » » » » » » »	*2*	$ 930.00
3	Number of permits included in Permit Amendment 1 (3a) Subtract 1 from the number in 3a: 0 (3b) *If only one permit this will be 0* Multiply line 3b by $520 and enter » » » » » » » » » » » » » »	*3*	$ -
4	Do you propose to add or change a well, or change from a surface water POD to a well? [ ] No: enter 0 » [X] Yes: enter $410 »	*4*	$ 410.00
5	Do you propose to change the place of use? [ ] No: enter 0 on line 5 » » » » » » » » » » » » » » » » » » Yes: enter the [X] cfs for the portions of the permits to be amended (see example below*): 4.0 (5a) Subtract 1.0 from the number in 5a above: 3.0 (5b) If 5b is 0, enter 0 on line 5 » » » » » » » » » » » » » » » » » » If 5b is greater than 0, round up to the nearest whole number: 3.0 (5c) and multiply 5c by $350, then enter on line 5 » » » » » » » » »	*5*	$ 1,050.00
6	Add entries on lines 1 through 5 above >>>>>Subtotal:	*6*	$ 2,390.00
7	Is this permit amendment: [ ] necessary to complete a project funded by the Oregon Watershed Enhancement Board (OWEB) under ORS 541.932? [ ] endorsed in writing by ODFW as a change that will result in a net benefit to fish and wildlife habitat? If one or more boxes is checked, multiply line 6 by 0.5 and enter on line 7 » If no box is applicable, enter 0 on line 7 » » » » » » » » » » » » » »	*7*	$ -
	Permit Recording Fee		$ 520.00
8	Subtract line 7 from line 6 » » » » » » » » **Permit Amendment Fee:**	***8***	$ 2,910.00

Attachment 3,
Cost Estimate for Raw Water Intake

Cost Estimate for Raw Water Intake (assumes WTP at Site A-1)

Item No.	Item Description	Unit	QTY	Unit Cost	Total
Intake Screen and Structure					
1	Intake Screen	LS	2	$19,500	$39,000
2	Bank Stabilization	LS	1	$23,400	$23,400
3	Screen Cleaning Equipment	LS	1	$58,500	$58,500
			Subtotal:		***$130,000***
Intake to Raw Water Pump Station					
4	Raw water intake piping, DI, cement lined, MJ, no fittings, 18' lengths, 12" diameter - RW PS	LF	300	$150	$45,000
5	3-inch 304 SS air piping RW PS to Intake	LF	300	$455	$136,500
			Subtotal:		***$190,000***
Raw Water Pump Station to WTP					
6	Water supply distribution piping, ductile iron pipe, cement lined, mechanical joint, no fittings, 18' lengths, 12" diameter - RW PS to WTP	LF	1200	$175	$210,000
7	Air release valve	EA	3	$1,235	$3,800
			Subtotal:		***$220,000***
Raw Water Pump Station					
8	CMU Building	SF	900	$225	$202,500
9	General Excavation	CY	335	$22	$7,372
10	Foundation - slab on grade	CY	17	$500	$8,333
11	Base Course Drainage and Foundation	SY	100	$16	$1,575
12	Form and place wet well - foundation and walls	LS	1	$234,000	$234,000
13	Elevated slab for wet well	CY	7	$850	$5,950
14	HVAC/Lighting	LS	1	$18,000	$18,000
15	VT Pumps	EA	2	$91,000	$182,000
16	Flow Meter	EA	1	$2,160	$2,160
17	Equipment Pad	CY	1	$500	$500
18	E&IC (25%)	LS	1	$165,598	$165,598
			Subtotal:		***$830,000***
			Construction Material & Labor Subtotal		**$1,370,000**
			Mobilization 10%		$137,000
			General Conditions 10%		$137,000
			Contractor O&P 15%		$205,500
			Contingency 30%		$411,000
			Estimated Bid Price		**$2,260,500**
			Engineering Design and Construction Management 25%		$566,000
			Project Administration and Permitting 10%		$230,000
			Estimated Total Project Cost		**$3,056,500**

Prepared by: Murraysmith
Prepared for: CIty of Dundee

Attachment 4,
Conceptual Feasibility Report for Ranney Collector System (Layne)

MEMO

Ranney Collector Wells
Columbus, Ohio
614.888.6263

To: **Jessica Cawley**

From: Henry Hunt

Date: **March 2, 2020**

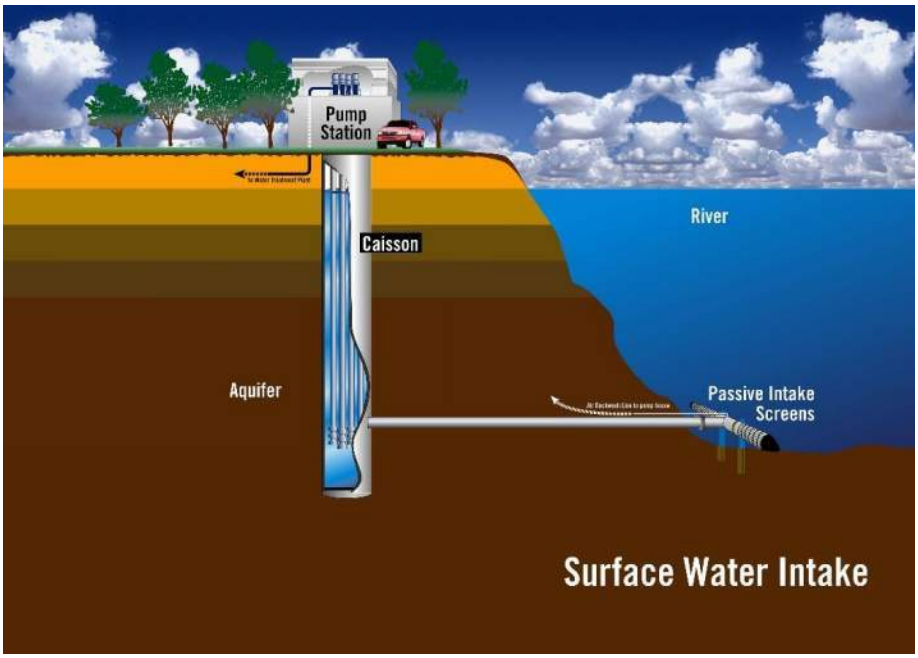
Subject: **Water Supply Feasibility – Dundee, OR**

Jessica, thanks for inquiring regarding a water supply in the vicinity of Dundee.

Being along the banks of the Willamette River, Dundee should have options to develop a water supply using either a direct surface water intake in the river, or to construct wells in the alluvial deposits along the river and withdraw a groundwater/infiltrated supply from the alluvial aquifer. We understand that initial demands are expected to be about 1 MGD, with expansion to 2 MGD in the near future. We have outlined herein several comments regarding possible development of a water supply to meet these needs using either a river intake or a collector well.

Surface Water Intake

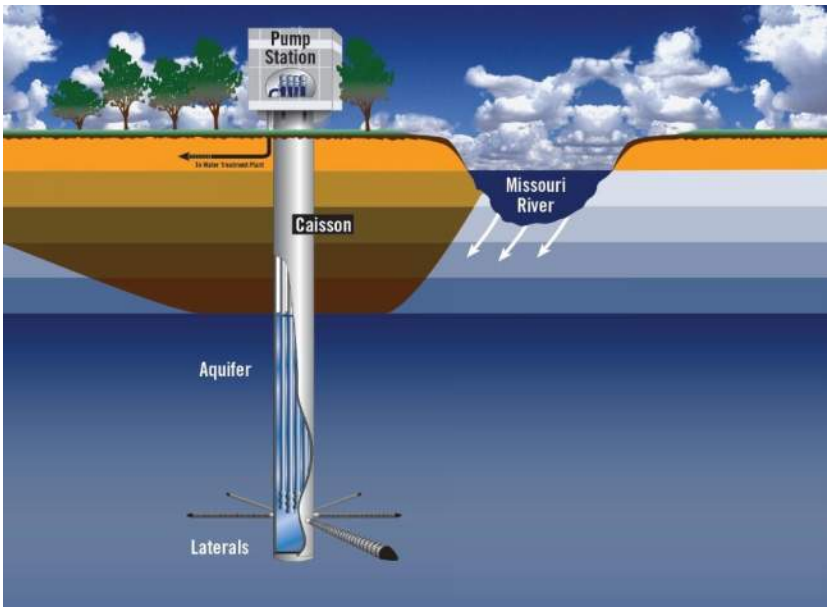
We have constructed simple, passive-screen river water intakes across the country that can be used in this setting. We typically construct a reinforced concrete wet well caisson (as shown below) from which we project one or more intake line out into the river. We then attach a passive intake screen assembly (e.g. a Johnson tee-screen) and mount that in the river. The screens are fitted with an automated air backwash system that helps keep the screens clear. The system can be installed in rock formations or in unconsolidated alluvial deposits. Lastly, pumps, controls, the screen backwash system and piping complete the pumping station.



The intake is constructed using the open-end caisson method and the intake lines are projected using trenchless methods so that environmental impacts are minimized over traditional methods such as trenching or cofferdams. The reduced impacts can sometimes simplify permitting. The passive screen intake system has few moving parts (e.g. a small air compressor for the backwash system) so that O&M needs and costs are minimized.

Radial Collector Well

We conducted subsurface investigations in the alluvial deposits across from Newberg that indicated saturated thicknesses in the range of 40 to 55 feet. Aquifer testing there suggested a well yield of 8 to 10 MGD was possible using a radial (horizontal) collector well (see diagram below). Based upon the topographic map showing the area, there appears to be alluvial sediments along the river near Dundee as well. Several years ago, we recommended that soil borings be made in that area to identify the potential for considering a water well or riverbank filtration system. If test drilling has been performed, we will be pleased to review this data and offer our comments regarding feasibility, potential well yields, conceptual well design, etc.



A collector well typically consists of a central reinforced concrete caisson (with bottom sealing plug) that serves as the wet well with a number of horizontal lateral well screens projected out into the aquifer from within the lower part of the caisson. The caisson is typically carried above grade to be above anticipated (e.g. 100- and 500-year) flood elevations for sanitary purposes. The well is completed with pumps, electrical controls and piping to form the pump station. The pump station can be finished in the open-air or housed with a building structure, as desired.

A collector well can be used to develop a groundwater supply or a supply through riverbank filtration. Riverbank filtration occurs when wells in alluvial deposits are hydraulically connected with the adjacent river and can induce infiltration into the alluvial aquifer as recharge to replace water pumped from the well. Pumping the well creates drawdown within the aquifer which typically lowers the water level in the ground, thus inducing recharge from the river to slowly infiltrate through the riverbed and riverbank. During this slow infiltration, suspended particulates in the source water (e.g. turbidity, organic matter, etc.) are usually filtered out providing a clean

raw water for the utility. There are a number of operating collector wells in Oregon that illustrate this capability.

It appears that either a surface water intake or a collector well should be able to develop a capacity of at least 2 MGD. Based on the evaluation completed near Newberg, a collector well should be able to produce a yield in excess of the forecast demand of 2 MGD, so that additional water may be available for sale to other users, such as neighboring utilities.

For preliminary purposes, a budget construction cost for a collector well would be about $ 2 million for the reinforced concrete caisson, installation and development of the lateral well screens and a top floor slab for mounting the pumps and electrical equipment. The cost does not include pumps, electrical controls, mechanical piping, etc. A budget cost for a surface water intake using basic passive-screen technology will likely be on the order of $ 2.5-3 million for the reinforced concrete caisson wet well, a single intake line projected out into the river, a passive intake screen mounted in the riverbed, an air backwash system for the screens and a top floor slab. Similar to the collector well, this pricing does not include the cost of pumps, electrical controls, mechanical piping, etc.

Attachment 5,
Conceptual Feasibility Report for Ranney Collector System (Shannon & Wilson)

SHANNON & WILSON
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

June 2, 2020

Jessica Cawley PE
Murraysmith
888 SW 5th Avenue, Suite 1170
Portland, OR 97204

RE: PRELIMINARY FEASIBILITY ASSESSMENT
DUNDEE COLLECTOR WELL
DUNDEE, OREGON

Dear Ms. Cawley,

This letter report presents a summary of our desktop feasibility analysis for constructing a new water supply source using a horizontal collector well system adjacent to the Willamette River in Dundee, Oregon. This assessment is being done to evaluate a potential 2 million gallon a day water supply source alternative to building a river intake structure for a new water treatment plant. The desktop study involved a review of existing documentation from the following sources:

- Potential sites for construction of a collector well provided by MurraySmith (see Attachment A: Figure 1);
- Review of City of Dundee's latest Water System Master Plan (CH2M, 2015);
- Available geologic maps and groundwater studies prepared by the United States Geologic Survey (USGS); and
- Subsurface data from local existing well construction reports and geotechnical studies.

COLLECTOR WELL SITES HYDROGEOLOGY

Using available information, Shannon & Wilson developed a conceptual understanding of subsurface conditions beneath three potential collector well sites adjacent to the Willamette River. The following sections summarizes the hydrogeologic units and water bearing potential at each of the four proposed sites.

Site A – Hess Creek

This site is located adjacent to Hess Creek where it discharges to the Willamette River near the southern boundary of Dundee's city limit and along SE Fulquartz Landing road. The site appears level with a surface elevation approximately 20 to 30 feet higher than the Willamette River level in late spring. Surficial geologic maps indicate the site is covered by

3990 Collins Way ▪ Suite 100 ▪ Lake Oswego, Oregon 97035-3437 ▪ 503 210-4750 ▪ Fax 206 695-6777
▪ www.shannonwilson.com ▪

deposits of gravel, sand, silt and clay (Troutdale Formation) that may be up to 450 feet thick. The Troutdale Formation is considered a significant water supply aquifer in this area and may provide yields up to 1,600 gallons per minute (gpm). The depth to groundwater at this site may range from 40 to 60 feet below ground surface.

Site B – Treatment Plant

Site B is located just south of the wastewater treatment plant outfall to the Willamette River and approximately 600 feet east of where SE Fulquartz Landing road makes a sharp turn to the west. There is currently no road access to the site. The site appears level with a surface elevation approximately 20 to 30 feet higher than the Willamette River level in late spring. Surficial geologic maps indicate the site is covered by deposits of the Troutdale Formation that may be up to 450 feet thick. Depth to groundwater at this site may range from 40 to 60 feet below ground surface.

Site C – Chehalem Creek

Site C is located across the Willamette River from the northwest corner of Ash Island where Chehalem Creek flows into the river. The closest main road access (Highway 18) is approximately 1600 feet to the northwest. The site appears level with a surface elevation approximately 10 to 20 feet higher than the Willamette River level in late spring. Surficial geologic maps indicate the site is covered by alluvial deposits of sand, gravel and silt that are generally less than 50 feet thick. These alluvial deposits likely sit directly on deposits of the Troutdale Formation that may be up to 450 feet thick. Like the alluvial deposits on Ash Island groundwater yields could be as high as 1000 gpm. Depth to groundwater at this site may range from 30 to 50 feet below ground surface.

COLLECTOR WELL FEASIBILITY ANALYSIS

All three potential sites may have subsurface deposits that are favorable for construction of a collector well. Typical collector well construction consists of several large concrete caisson rings about 13-15 feet in diameter that are sunk into the ground as soil is excavated inside the rings. The depth of the caisson is dependent on the groundwater level and thickness of water bearing material. Typical collector wells are less than 100 feet deep and are completed in at least 30 feet of water-bearing sands and gravels. Once the final caisson depth is reached, the floor of the caisson is sealed, and 2 to 4 screen laterals are horizontally excavated with a hydraulic jack around 100 to 200 feet into the surrounding aquifer. Water from the laterals is collected in the caisson, where one or more pumps are used to remove the water to the distribution system.

The estimated cost for a drilled and constructed collector well 80 feet deep, with three 100-foot-long laterals is between 1.5 and 2.5 million dollars.

Below is a feasibility ranking of the four potential sites based on the limited information we have reviewed. The ranking order is from highest to lowest and includes the criteria that was used for the ranking.

1. **Site B – Treatment Plant**
    a. Closest proximity to the water plant.
    b. Potentially favorable hydrogeologic conditions.
    c. Reasonably close road access.
2. **Site A – Hess Creek**
    a. Second closest site to the water plant.
    b. Potentially favorable hydrogeologic conditions.
    c. Easy road access.
3. **Site C - Chehalem Creek**
    a. Potentially favorable hydrogeologic conditions.
    b. Farthest site from the water plant.
    c. Large distance from road access.

RECOMMENDATIONS

The currently available site information indicates that a collector well might be a potential option as an additional water supply source at several of the preferred sites. The next required step in order to confirm a site's suitability is to drill up to two test borings at each preferred site. If the first test boring does not encounter favorable hydrogeologic conditions a second boring may not be necessary. If hydrogeologic conditions appear favorable, then we recommend completing one boring as a test pumping well and one as an observation well. We recommend that the test borings be drilled using the sonic drilling method in order to get a better picture of the subsurface soil conditions. If a test well is constructed it should be completed with a 12-inch diameter casing and screen. The observation well could be completed with a 4-inch casing and screen.

Once a test well is installed, a 24- to 72-hour pumping test should be run to collect hydraulic properties of the aquifer along with water quality conditions. This data would then be used to determine if a collector well is feasible and for developing a design and cost estimate for its construction.

SHANNON & WILSON

If you have questions regarding this letter report or desire us to modify its content, please contact me at (503) 210-4764 or ECM@shanwil.com. We appreciate your consideration of Shannon & Wilson for your project and your continued confidence in our firm.

Sincerely,

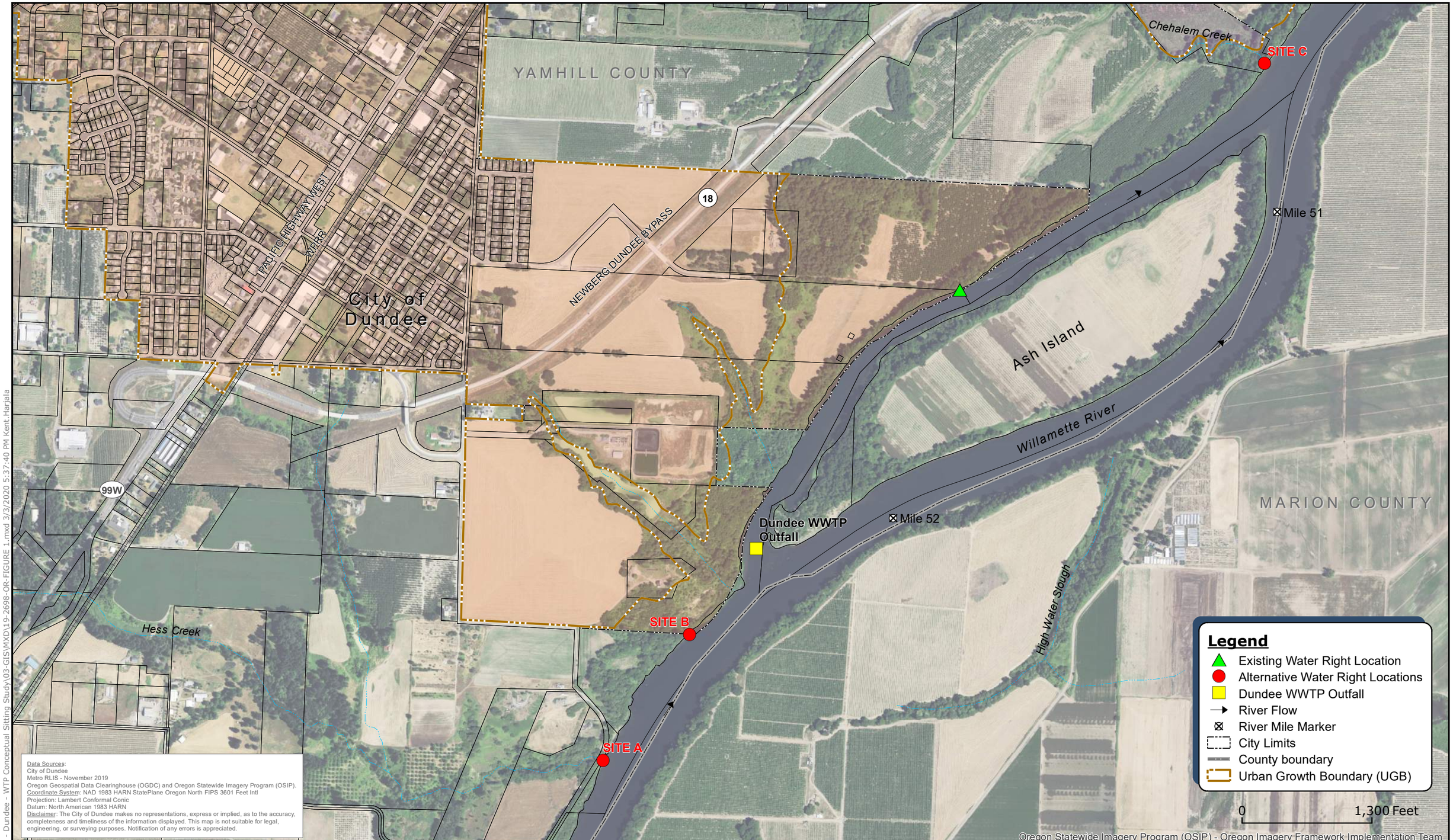
SHANNON & WILSON

Elliott Mecham, PE
Senior Associate

Jim Bailey
Senior Associate

ECM:JSB/wxp

Enc. Attachment A: Murraysmith provided Figure 1 – Site Plan



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murraysmith

CITY of DUNDEE Oregon

N W E S

City of Dundee WTP Conceptual Sitting Study

Figure 1
Existing Water Right and 3 Alternative Locations (Task 2.2)

March 2020

19-2698

Attachment 6, Conventional WTP Assembly (Basis of Conceptual Design for Costing)

Dundee WTP

Oregon

Engineer
MurraySmith

Furnished by
Adrian Williams
awilliams@westech-inc.com

Represented by
Doug Allie
Goble Sampson Associates
Issaquah, Washington
(425) 392-0491
dallie@goblesampson.com

WesTech Opportunity Number: 2030088
Wednesday, April 15, 2020

Item A – Two (2) Trident® HS Package Treatment Units, Model HS-700A

Design Criteria	
Application	Drinking Water Treatment
Design Project Flow	700 gpm
Number of Units	2
Design Flow per Unit	350 gpm (0.5 MGD)
Tube Settler Area	70 ft^2 per unit
Tube Settler Loading Rate	5 gpm/ft^2 (@ design flow)
Adsorption Clarifier® Area	23.3 ft^2 per unit
Adsorption Clarifier Loading Rate	15 gpm/ft^2 (@ design flow)
Adsorption Clarifier Water Flush Rate	233 gpm
Adsorption Clarifier Air Flush Rate	260 scfm
Filter Area	70 ft^2 per unit
Filter Loading Rate	5 gpm/ft^2 (@ design flow)
Backwash Method	MULTIWASH® simultaneous air & water
Low Rate Backwash Water Loading Rate*	5 gpm/ft^2
Low Rate Backwash Water Flow Rate	350 gpm
High Rate Backwash Water Loading Rate*	15 gpm/ft^2
High Rate Backwash Water Flow Rate	1050 gpm
Airwash Loading Rate	3.7 $scfm/ft^2$
Airwash Flow Rate	260 scfm
Backwash Water Source	External backwash supply
Backwash Control	Three valves in LR/HR loop configuration

* The design backwash rate listed is based on a temperature of 25 °C. The actual backwash water rate must be adjusted 2% up or down for each degree Celsius difference above or below from design temperature; i.e., above 25 °C increase by 2%, below 25 °C decrease by 2%.

Features and Benefits

The Trident® HS process consists of tube settling with external sludge recirculation, MMAC adsorption clarification, and Microfloc® Mixed Media filtration in a single tank. The addition of tube sedimentation combined with sludge recirculation greatly increases solids removal capacity. The Mixed Media Filter delivers excellent predictable finished water quality. The system also includes the MULTIBLOCK® underdrain with LaserShield™ direct retention air/water backwash underdrain system.

Standard two tank designs provide systems in increments from 700 gpm to 2800 gpm. Multi-tank modules can be supplied to accommodate flows of up to 6 MGD with three tanks. Standard tanks are sized to treat 350, 525, 700, 1,050, and 1,400 gpm per tank.

- Multiple barrier treatment performance.
- Capable of 4+ log removal credit for Crypto and Giardia.
- Treats water up to 400 NTU turbidity and 100+ color units.

- Increased organics (TOC) removal.
- Reduced waste volume.
- Pre-engineered design for tough to treat waters.
- Installation costs are less than that of conventional systems.
- The footprint is up to 25–50% smaller than conventional plants.
- Painted steel and 304 stainless steel options.

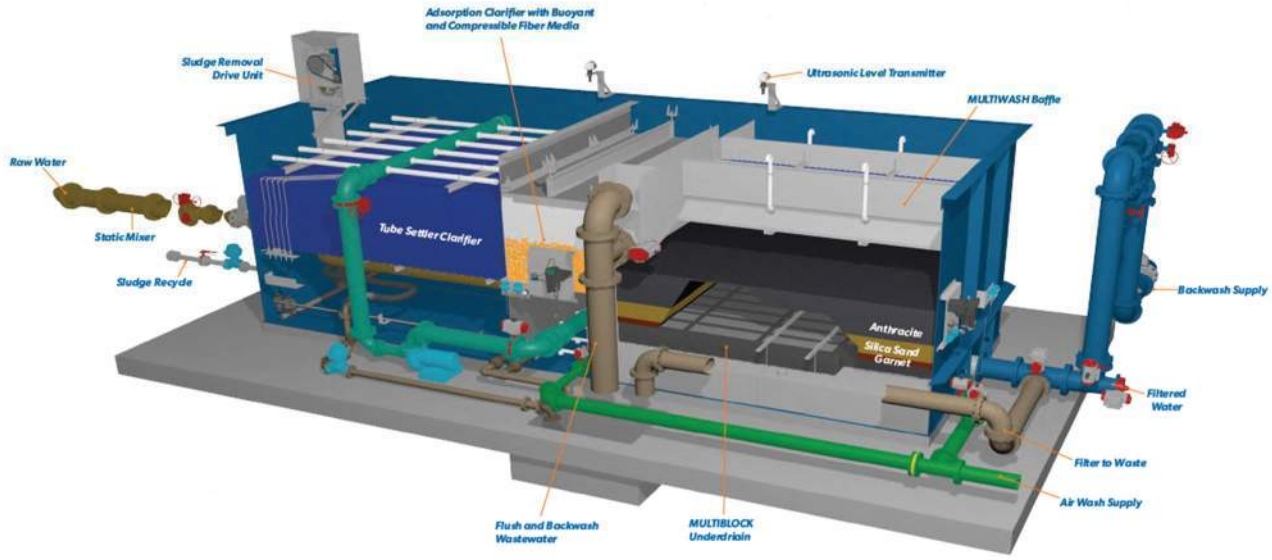


Figure 1 - Standard Trident HS one tank system. May not entirely reflect unit quoted.

Tankage Scope of Supply	
Item	Size
Tank Material	Carbon Steel
Tank dimensions	21 ft.-6 in. long x 9 ft.-1 in. wide x 10 ft.-1 in. tall
Estimated Wts. (per unit)	19,500 lbs. (shipping); 126,000 lbs. (operating)

Tank Connections	
Influent	6 in
Filter Effluent/Backwash Supply	8 in
Clarifier & Filter Waste	8 in
Overflow	8 in
Adsorption Clarifier Air	4 in
Filter Air	4 in

Tank Coatings	
Location	Description
Tank Interior	Prepared per paint manufacturer recommendations, painted with one coat of Tnemec #N140-1255 Pota-Pox primer and one coat of Tnemec #N140-15BL Pota-Pox finish paint.
Tank Exterior	Prepared per paint manufacturer recommendations, painted with one coat of Tnemec #N140-1255 Pota-Pox. Field finish to be applied by others.
Tank Bottom	Tank is unpainted on bottom exterior surface and designed for installation on coal tar or asphaltic type base mastic compound applied to concrete base pad by others.

Tube Settler Scope of Supply		
Feature	Quantity	Notes
Tubes	70 ft^2/unit	PVC hexagonal 60° settling tubes, with approximately 2" tube openings, 41 in. total vertical depth of tube settlers. Tube settlers are NSF Std. 61 approved.
Sludge Collector	1/unit	Drive assembly with ¼ hp, variable speed DC electric motor and 3 in. stainless steel sludge removal header
Inlet Distribution	1 Lot/unit	Steel header pipe system with supports (shop installed)
Effluent Collection	1 Lot/unit	PVC header-lateral pipe system with supports
Recirculation Piping	1 Lot/unit	PVC header-lateral pipe system with supports

Adsorption Clarifier Scope of Supply		
Feature	Quantity	Notes
Adsorption Clarifier Media	93.2 ft^3/unit	Media depth is 4 ft. Adsorption Clarifier media is 50% beads and 50% fiber balls. Beads are 50/50 R&S. All media is NSF Std. 61 approved.
Top AC Media Retention Screen	23.3 ft^2/unit	Stainless steel screen mesh under aluminum grating at the top
Bottom Retention Grating	23.3 ft^2/unit	Aluminum grating at the bottom
Collection Trough	1/unit	Rectangular trough across width of tank
Splash Guards	1 set/unit	For placement around the top tank perimeter of AC section on three sides; with support angles & attachment hardware
Inlet Distribution	1 Lot/unit	PVC header-lateral pipe system with supports
Air Distribution	1 Lot/unit	PVC header-lateral pipe system with supports

Filter Scope of Supply

Feature	Quantity	Notes
MULTIBLOCK® underdrain	70 ft^2/unit	Dual lateral blocks, 11" wide x 12" high x 36" long, designed to interlock with each other to form the overall lateral length. The underdrain system shall include a factory installed media-retaining Laser Shield™ plate constructed of 304 stainless steel.
Washtrough	1/unit	Steel with Low Profile media retaining baffles with velocity dissipation
Air/Water Distribution	1/unit	304 stainless steel plenum with air and water connections (factory installed)

All required hardware is supplied by WesTech for assembly of the tank internals at the jobsite by the contractor. Concrete fill of ~2.0 yd^3/unit to be placed in bottom of filter section for support of MULTIBLOCK laterals. Concrete fill and grout not by WesTech.

Media Scope of Supply

Type	Quantity (per unit)	Layer Depth	Effective Size	Uniformity Coefficient	Packaging
Anthracite	107 ft^3	18 in	1.0–1.1 mm	$\leq$1.7	1-ft^3 bags on pallets
Silica Sand	56 ft^3	9 in	0.35–0.45 mm	$\leq$1.4	1-ft^3 bags on pallets
Garnet	19 ft^3	3 in	0.2–0.32 mm	$\leq$1.7	50# bags on pallets

Media quantities include sufficient volume for skimming.

Recirculation Pump Scope of Supply

Quantity	Volume	Pressure	Type	Motor
1/unit	35–140 gpm	35 ft TDH	Centrifugal	3 hp, 230/460 V, 60 Hz, 3 ph, TEFC
Pump Accessories			• VFD in NEMA 12 enclosure	

Transfer Pump Scope of Supply

Quantity	Volume	Pressure	Type	Motor
1/unit	350 gpm	38 ft TDH	Centrifugal	5 hp, 230/460 V, 60 Hz, 3 ph, TEFC
Pump Accessories			• VFD in NEMA 12 enclosure • Sch. 40 steel connection pipe from Tube Settler effluent to Adsorption Clarifier influent	

Air Scour Blower Scope of Supply

Quantity	Volume	Pressure	Type	Motor
2	130 scfm (each)	4.1 PSG	Regenerative	6.2 hp, 230/460 V, 60 Hz, 3 ph, TEFC
Blower Accessories			• Air intake filter with dirty filter indicator • Pressure safety relief valve • Check valve • Blower pressure indicator; one per system	

*Note: Pressure gauge and switch to be place in main air supply line.

Valves Scope of Supply

Item	Size	Quantity	Type	Operator Type
Influent Valve	6 in	1/unit	Modulating	Electro-pneumatic
Backwash Inlet Valve	8 in	1/unit	Open/Close	Pneumatic
Backwash High Rate	8 in	1/system	Open/Close	Pneumatic
Waste Valve	8 in	1/unit	Open/Close	Pneumatic
Effluent	6 in	1/unit	Modulating	Electro-pneumatic
Filter to Waste	6 in	1/unit	Modulating	Electro-pneumatic
AC Air Scour	4 in	1/unit	Open/Close	Pneumatic
Filter Air Scour	4 in	1/unit	Open/Close	Pneumatic
Clarifier Transfer	6 in	1/unit	Open/Close	Pneumatic
Sludge Blowdown	3 in	1/unit	Open/Close diaphragm	Pneumatic
Sludge Recycle	3 in	1/unit	Open/Close diaphragm	Pneumatic
Influent Isolation	6 in	1/unit	Butterfly	Manual
Tube Settler Flush	6 in	1/unit	Butterfly	Manual
Backwash Low Rate Set	4 in	1/system	Butterfly	Manual
Backwash High Rate Set	8 in	1/system	Butterfly	Manual
Tube Settler Drain	3 in	2/unit	Ball	Manual
Adsorption Clarifier Drain	3 in	1/unit	Ball	Manual
Sludge Recirculation Inlet Isolation	3 in	1/unit	Ball	Manual
Sludge Recirculation Discharge Isolation	2 in	1/unit	Ball	Manual
Sludge Blowdown Rate Set	3 in	1/ unit	Plug	Manual
Clarifier Transfer Pump Suction Isolation Valve	6 in	1/unit	Butterfly	Manual
AC Air Check Valve	4 in	1/unit	Check	
Filter Air Check Valve	4 in	1/unit	Check	
Recirculation Check Valve	3 in	1/unit	Check	

All butterfly valves are Bray wafer style with cast iron body, nylon coated disc, EPDM seat and shaft seal. Manually controlled butterfly valves have lever or gear operated handwheel actuators. Automatic butterfly valves have double acting, weatherproof pneumatic cylinder actuators manufactured by Bray.

Inlet Static Mixer Scope of Supply

Description	Quantity	Size	Notes
Number of Mixers	1/system	8 in.	Hybrid; Mixer Tube with SST Mixing Elements

Instrumentation Scope of Supply

Description	Quantity	Type	Output Signal	Notes
Inlet Meter	1/unit	Magnetic Flow	4–20 mA	Endress+Hauser
Tube Settler Level Transmitter	1/unit	Ultrasonic	4–20 mA	Endress+Hauser
Filter Liquid Level Transmitter	1/unit	Ultrasonic	4–20 mA	Endress+Hauser
Sludge Recirculation Meter	1/unit	Magnetic Flow	4–20 mA	Endress+Hauser
Backwash Supply Meter	1/system	Magnetic Flow	4–20 mA	Endress+Hauser
Clarifier Pressure Transmitter	1/unit	Transmitter w/ Local Display	4-20 mA	Rosemount
Filter Pressure Transmitter	1/unit	Transmitter w/ Local Display	4-20 mA	Rosemount
Air Scour Blower Pressure Switch	1/system	0–9 psi	Discrete	Ashcroft
Inlet Turbidimeter	1/system	Surface Scatter 7	4–20 mA	HACH with calibration kit
Inter-Clarifier Turbidimeter	1/unit	TU5300 sc	To SC-200	HACH with calibration solution w/ syringe and power & communication cables
Effluent Turbidimeter	1/unit	TU5300 sc	To SC-200	HACH with calibration solution w/ syringe and power & communication cables
Turbidimeter Controller	2	SC-200	4-20 mA	HACH, one unit is used for each pair (two) turbidimeters
Effluent Turbidity Sample Pump	1/unit	1/16 hp Centrifugal	N/A	115 V, 60 Hz, 1 ph

Trident HS Master Control Panel Scope of Supply

Feature	Description	Notes
Number of Panels	1	
Housing	NEMA 12	Wall mounted
PLC	Allen Bradley	Includes Aquaritrol® program logic
OIT	Allen Bradley	10” color touchscreen interface
SCADA Interface		Communication protocol via Ethernet/IP

Unit Control Panel Scope of Supply

Feature	Description	Notes
Number of Panels	1/tank	
Housing	NEMA 12	Wall mounted
Interface	Emergency Stop	

Coagulant Feed Scope of Supply

Feature	Quantity	Notes
Tank	1	HDPE with cover
Chemical Feed Pump	1	Positive displacement diaphragm type, electronic control by Aquaritrol® PLC program
Mixer	1	Tank mounted, direct drive ¼ hp, 115/230 V, 60 Hz, single phase motor with stainless steel shaft and dual propellers. Support is included
Analog to Digital Converter	1	4–20 mA output
Calibration Column	1	1000 mL with connection nipple
Corporation Stop and Nozzle	1	¾ in NPT-bronze with CPVC nozzle
Ball Valves	3	1/2 in NPT, PVC
Misc. Hardware	1 lot	

Flocculant Aid Polymer Feed Scope of Supply

Feature	Quantity	Notes
Liquid Polymer Activation Unit	1/tank	Includes direct coupled, motor driven high energy mixing chamber, mechanically actuated diaphragm metering pump, water solenoid, electronic flow sensors and 304 stainless steel open chassis design
Controls	1/unit	NEMA 12 enclosure

Filter Aid Polymer Feed Scope of Supply		
Feature	Quantity	Notes
Tank	1	HDPE with cover
Chemical Feed Pump	1/unit	Positive displacement diaphragm type, electronic control by Aquaritrol® PLC program
Mixer	1	Tank mounted, direct drive ¼ hp, 115/230 V, 60 Hz, single phase motor with stainless steel shaft and dual propellers. Support is included
Chemical Disperser	1	Funnel for mixing tank
Calibration Column	1	1000 mL with connection nipple
Corporation Stop and Nozzle	1	¾ in NPT-bronze with CPVC nozzle
Ball Valves	4	1/2 in NPT, PVC
Misc. Hardware	1 lot	

WesTech Trips to the Site		
Total Trips	Total Days	Includes
4	13	Installation inspection, startup, instruction of plant personnel, and observation of filter installation

Comments/Clarifications

- The Trident HS system is based on WesTech's standard design.
- Settled sludge from tube section will periodically blowdown to waste the solids.
- The filter is periodically backwashed (using treated water). The Adsorption Clarifier is normally washed (using influent water) one or more times between filter backwashes. The waste holding system should be sized to handle two complete flush/wash volumes from each compartment.
- The influent pumping system should provide a range of 20–30 feet head at plant inlet. Pressure reducing measures should be in place if influent pressure exceeds this level.
- The high-rate water only backwash of the filter shall be 15–18 gpm/ft^2 with an available head of 13 feet at the tank connection. Additional headloss between the unit and the backwash pump(s) will need to be factored in for proper sizing of backwash pump(s).
- Both (2) blowers are used for the clarifier flush and the filter backwash process.
- A 50 percent duty cycle is recommended for the compressed air system.
- The control panel with operate the two Trident HS units. The blowers and chemical feeds will be used by both unit.
- Availability of equipment components specified may dictate substitutions of equal quality at the discretion of WesTech.
- All hardware is crated for assembly by the contractor.

Note: Any Item Not Listed Above to Be Furnished by Others.

Items Not Furnished by WesTech

1. Unloading of equipment from delivering carrier, protected storage of equipment
2. Installation, supervision of installation
3. All underground and interconnecting piping, filter face piping and fittings, pipe supports, wall inserts or sleeves, Dresser or flexible couplings, hangers, valves (not specifically listed), pneumatic tubing from air compressor to filter batteries, air release piping and valves, sampling lines and sinks, small pressure water supply piping, field work of piping (i.e., drilling and tapping for instrumentation) and flow meters (not specifically listed)
4. Electrical power, Interconnection field wiring and conduit, field connection to control panel
5. Walkways, handrails, stairways and ladders
6. Finish paint and intermediate field coats
7. Cathodic protection systems
8. All chemical feeders (not specifically listed), feed lines, chemicals, tanks (not specifically listed), labor and procedures for the disinfection of equipment, laboratory test equipment
9. Structural design, supply and installation of concrete pads, foundations, rebar, anchors, concrete, grout, sealant, sumps and concrete fill for filter underdrains
10. Motor control center, motor starters, disconnects, electrical wiring and conduit, telemetering equipment, turbidity monitoring equipment (not specifically listed), supports for controls
11. SCADA System
12. All pumps (not specifically listed), air compressors, dryers, operating and start-up lubricants
13. Any equipment or service not listed in this proposal

This proposal has been reviewed and is approved for issue by Gerry Baker on April 15, 2020.

Attachment 7,
Membrane WTP Assembly
(Basis of Conceptual Design for Costing)

Dundee WTP

Oregon

Engineer
MurraySmith

Represented by
Doug Allie
Goble Sampson Associates
Issaquah, Washington
(425) 392-0491
dallie@goblesampson.com

Furnished by
Adrian Williams
awilliams@westech-inc.com

Chelsea Stewardson
cstewardson@westech-inc.com

WesTech Opportunity Number: 2030088
Tuesday, April 14, 2020

Item A – One (1) Ultrafiltration System, Model UFT82A

Design Overview		
Description	Unit	Dimension/Capacity
Application	-	Municipal Drinking Water
WesTech System Model	-	UFT82A, Ultrafiltration System
Membrane Module	-	Toray HFUG-2020AN
Net Product Flow Rate	gpm	350 initial, 700 expansion
Redundancy and Unit Quantity	-	2 x 50%, (2) total units
Approximate Dimensions	Per Unit	17'-6" L x 5'-2" W x 11'-4" H
Number of Modules	Per Unit	7 installed, 14 capacity

WesTech is a leader in innovative membrane filtration system technology, including VersaFilter™ open-platform systems, AltaPac™ packaged systems, retrofit engineering solutions, intelligent controls and performance analysis technology. Systems are skid-mounted and factory-tested for ease of installation, straightforward operation, and long-term reliability. Major equipment and valves are pre-configured for efficient and error-free commissioning. Controls are fully automated and completed by in-house electrical engineers and process automation experts.

In addition to UF/MF equipment, WesTech is one of the only membrane system suppliers that offers pre- and post-treatment equipment for an integrated, complete process with consolidated equipment support. Notably, WesTech has more pretreatment equipment to UF/MF systems than any supplier. Our membrane filtration team has provided more than 100 membrane systems throughout North America with UF/MF installations in excess of 10 MGD. As a company, WesTech has 530 employees, 190 degreed engineers, and more than 15,000 process equipment installations throughout the world. This significant experience translates into reliable, time-tested equipment.

A WesTech Ultrafiltration System rated for 3 MGD capacity.

Design Information

Water Quality

WesTech UF/MF systems will consistently produce high purity treated water even with variation in the feed source due to a small nominal pore size in an absolute barrier configuration.

Feed Water Quality*		
Description	Unit	Concentration
Source	-	Surface Water
pH	-	6.5 – 8.5
Temperature Range	°C	5 - 25
Turbidity	NTU	< 30 continuous (or 95% of the time), occasional spikes up to 100 (or < 5% of the time)
Total Suspended Solids	mg/L	< 5
Total Organic Carbon	mg/L	< 3
Iron	mg/L	< 0.3
Manganese	mg/L	< 0.05

*Values are assumed and should be verified. It is noted that the use of charged polymeric flocculant aids increases risk of irreversible membrane fouling and should be discussed with WesTech, and this risk is applicable to all polymeric MF/UF membrane manufacturers. The presence of oil and grease in the source water should also be minimized.

Treated Water Quality		
Description	Unit	Concentration
Turbidity	NTU	≤ 0.10 NTU 95% of the time with a maximum turbidity of 0.3 NTU
Total Suspended Solids	mg/L	< 1
Silt Density Index	-	≤ 3
Giardia Removal*	-	≥ 4 log (99.99%)
Cryptosporidium Removal*	-	≥ 4 log (99.99%)
Virus Removal*	-	≥ 1.0 log removal (90.00%)
Certification Standards		NSF 61, NSF 419, UL 508A Listed

*Challenge-testing certification is provided by independent evaluation through NSF/ANSI 419. Typical removal levels exceed the certification level and are often on the order of 6-log. Additionally, the UF membranes achieve 1.5 log removals of viruses, though virus removal certification is only recognized up to 1.0 log by CDDW for any membrane filter.

Process Description

Described in this proposal is the preliminary process and design of the WesTech membrane filtration system for the Willamette River Water Treatment Plant project. The preliminary system design consists of two (2) membrane filtration units sized to achieve a net production capacity of 350 gpm with expansion capacity up to 700 gpm simply by the addition of modules. Each unit has capacity for up to 14 modules, with 7 installed.

The filtration process is an outside/in, pressure-driven process to remove suspended solids and turbidity, and to achieve 4-log reduction of pathogens like *Giardia* and *Cryptosporidium*. Ultrafiltration membranes can also achieve >1.5 log reduction of waterborne viruses. Raw water from the water source is directly fed to the membrane system. On-skid, VFD-controlled feed pumps direct the source water to a 200 µm pre-strainer for removal of larger debris.

Filtrate is sent to the backwash supply tank (by others). Backwashing is used to remove accumulated foulants by reversed inside/out flow at an interval of 20 - 60 minutes with air scour for increased agitation. A drain or filter-to-waste step is used to remove any additional accumulated material. Membrane integrity testing is conducted automatically once every 24 hours. The pressure decay test (PDT) is capable of detecting a single fiber break.

Maintenance cleans (MCs)/chemically-enhanced backwashes (CEBs) and clean-in-place (CIP) procedures are automated chemical cleaning processes used to recover membrane permeability. MCs/CEBs are typically performed with NaOCl once per day to once per week. The automated clean-in-place procedure is designed to occur no more frequently than once per month, is conducted with either NaOCl or acid, and is initiated when membrane permeability decreases to a specified value.

Following chemical cleaning procedures, the membrane units are drained by gravity or a pressurized drain-to-waste, and waste is subsequently sent to the discharge location. A rinse step and backwashing are used to remove residual chemical prior to resuming production. If desired, chemical cleaning waste can be captured and neutralized prior to discharge.

Process Design Summary

Detailed Design Summary

Parameter	350 gpm Initial	700 gpm Expansion
Number of Units in System	2	
Number of Units in Operation	2	
WesTech System Model	UFT82A, WesTech Ultrafiltration	
Installed Modules per Unit	7	14
Total Module Capacity per Unit	14	14
Module Model	Toray HFUG-2020AN	
Membrane Area per Module	969 ft²	90 m²
Membrane Area in Operation	13,566 ft²	27,132 ft²
Design Temperature	50.0 °F	
Production Cycle Time	30 min	
Flux Rates		
Instantaneous Flux at Design Temp.	42.6 gfd	
Normalized Flux (20°C) at Design Temp.	55.7 gfd	
Flow Rates		
Instantaneous Flow Rate	401 gpm	802 gpm
Average Gross Flow Rate	364 gpm	728 gpm
Average Net Filtrate	350 gpm	700 gpm
Backwash Flow Rate	221 gpm	441 gpm
Approx. Net Filtrate Production per Day	504,000 gpd	1,008,000 gpd
Backwash Waste Volume per Day	9,528 gpd	19,056 gpd
Influent Used for Rinsing/Draining per Day	10,539 gpd	21,077 gpd
Water Recovery	> 96 %	
Estimated Maintenance Clean Frequency	Daily to Weekly	
Estimated Clean-In-Place Frequency	30 days	

Scope of Supply

Scope of Supply - Ultrafiltration System			
Item	Quantity	Description	Brand (or Equal)
Membrane Modules	7/unit 14/system	Hollow-fiber, outside-in UF, PVDF/TIPS, 0.01 µm	Toray
Skid Frames	2 x 50%	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Schedule 80 PVC/HDPE 6” feed/filtrate connections	-
Feed Pump	1 x 100%	Vertical style, mounted on-skid, VFD by WesTech	Goulds
Backwash Pump	1 x 100%	Horizontal style, shipped loose	Goulds
Pre-strainer	1 x 100%	200-micron, automatic backwashing, on-skid	Valve and Filter
Compressed Air System	By Others	Plant air assumed available for valve actuation and air scour	By Others
Turbidimeter	1 common feed 1/unit filtrate 3 total	TU5300 sc TU5300 sc	Hach Hach
Flow Meters	1/unit 2 total	Bi-directional magnetic flow meter with transmitter	Siemens
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika, Ashcroft
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 Master Panel 2 Local Panels	NEMA 4, 480 V, 3 ph, PLC, HMI	-
Tanks	By Others	Feed, backwash HDPE with level measurement	-

Scope of Supply – Clean-in-Place System			
Item	Quantity	Description	Brand (or Equal)
Skid Frames	1	Welded carbon steel, baked powder-coat	-
Manifold and Supply Piping	-	Schedule 80 PVC 4" supply/return connections	-
Recirculation Pump	1 x 100%	End-suction centrifugal Close-coupled	Goulds
Heater	1	18 kW	Chromalox
Pre-Strainer	1	Superleader	Arkal
Chemical Metering Pumps			
Sodium Hypochlorite	1 x 100%	CIP/MC process	ProMinent
Citric Acid	1 x 100%	CIP/MC process	ProMinent
Instrumentation			
pH Sensor/Transmitter	1	-	GF Signet
Temperature Transmitter	1	-	Dwyer
Flow Switch	1	-	IFM Efector
Pressure Instrumentation	-	Transmitters, switches, gauges	Wika, Ashcroft
Valves / Actuators	-	Manual and actuated valves	Bray
Electrical Controls	1 CIP Panel	NEMA 4, 480 V, 3 ph	-
Tank	By WesTech	Off-skid HDPE with level measurement	Norwesco

Additional Services

On-Site Technical Assistance and Training

WesTech has included on-site technical assistance during construction, pre-commissioning and start-up to ensure the equipment is installed and commissioned per WesTech's and sub-suppliers' requirements. All service visits will be completed by certified field technicians that are qualified and have experience working with WesTech equipment.

Any additional trips that the customer may request can be purchased at the standard WesTech daily rates plus travel and living expenses.

On-Site Technical Service		
Service	Number of Trips	Number of Days
Installation and Start-Up Commissioning Assistance, Operator Training	3	15
Total Included Service	3	15

To supplement the above noted technical assistance, WesTech will provide the additional services.

- Technical support during WesTech office hours with a direct phone number to reach a qualified and involved project representative during the equipment warranty period.
- Access to a 24-hour on-call emergency support line.

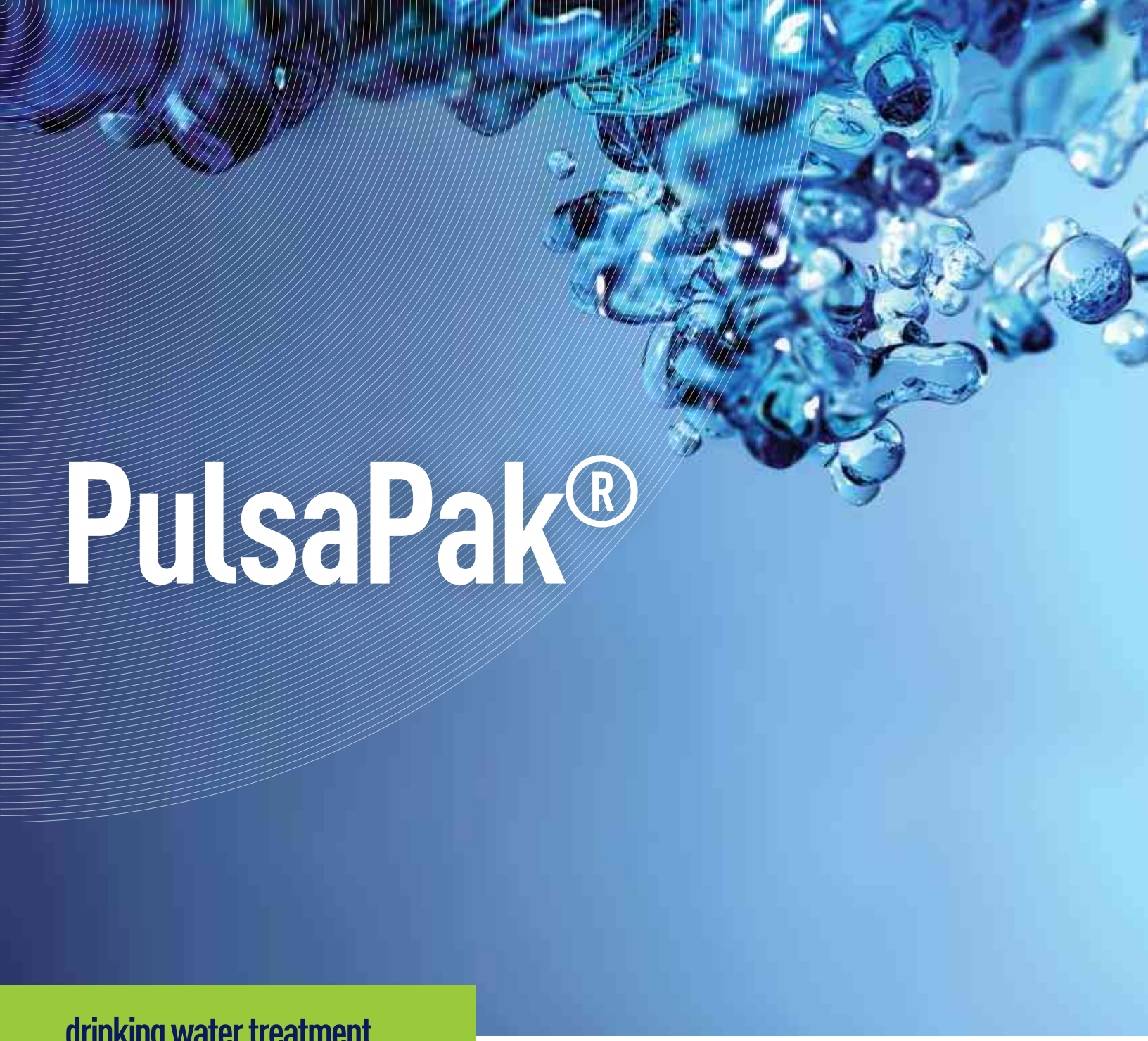
Optional Items

WesTech can provide the following optional items in addition to the scope of supply outlined above to meet any required local or state regulations:

- Block and bleed valving and controls
- Neutralization skid for neutralizing chemical cleaning solutions prior to discharge
- Hach TU5400 low range filtrate turbidimeter

This proposal has been reviewed and is approved for issue by Chelsea Stewardson on April 14, 2020

Attachment 8, Pretreatment Assembly for Membrane WTP Assembly (Basis of Conceptual Design for Costing)



PulsaPak®

drinking water treatment

The PulsaPak® is a package steel tank version of our Pulsator® sludge blanket technology. It is a prefabricated, shop assembled, clarifier system that combines basic chemical principles and the proven pulsating sludge blanket process. The unique design combines flocculation and clarification functions in one basin for optimal use of space and simple operation. The process is driven by flow pulsations that create a homogenous sludge blanket - resulting in excellent effluent quality. Optional package gravity media filters are available to provide a complete clarifier and filter solution. The PulsaPak® is available in eight standard sizes that can treat flows up to 1 MGD.

APPLICATIONS

- drinking water clarification
- membrane pretreatment
- TOC and color removal
- industrial process water

ready for the resource revolution

suez

how it works:

1. **rapid mix:** Raw water is pumped with a coagulant into a rapid mix system prior to the package unit to ensure proper coagulation. Coagulated water then flows through a splitter box where polymer is added to aid in settling and blanket cohesion.

2. **vacuum system:** The pulsating operation of the clarifier, which provides the mixing energy for flocculation, is accomplished by the vacuum chamber, vacuum pump, and vacuum vent system. The water leaving the vacuum chamber is distributed evenly throughout the clarifier by carefully designed distribution laterals.

3. **sludge blanket:** A sludge blanket of well flocculated water forms in the clarifier between the distribution laterals and the tube settlers. Clarified water flows upward through the sludge blanket, is polished by the tube settlers, and is collected uniformly by submerged orifice laterals. Excess sludge overflows an internal weir and is discharged periodically.

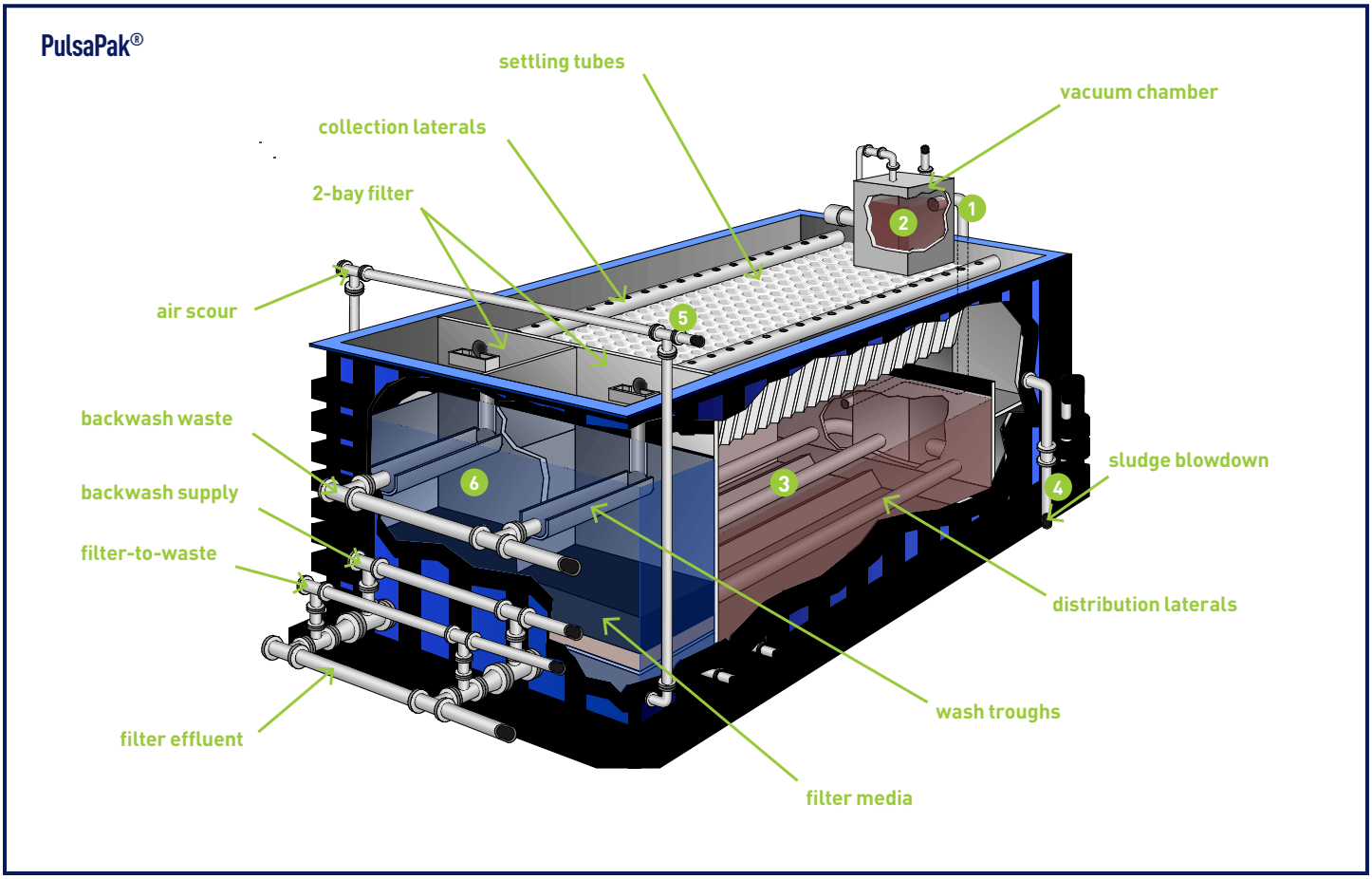
4. **sludge removal:** An internal sludge concentrator collects sludge upon sludge blanket expansion. Each sludge collector header is automatically opened upon a prescribed frequency and duration in the control panel. The operating head over the sludge pipes allows the sludge to be removed by gravity.

5. **collection:** Clarified water passes through settling tubes and is collected uniformly across the length of the settling area. Submerged orifice laterals convey clarified water out of the unit or to the option filter inlet boxes.

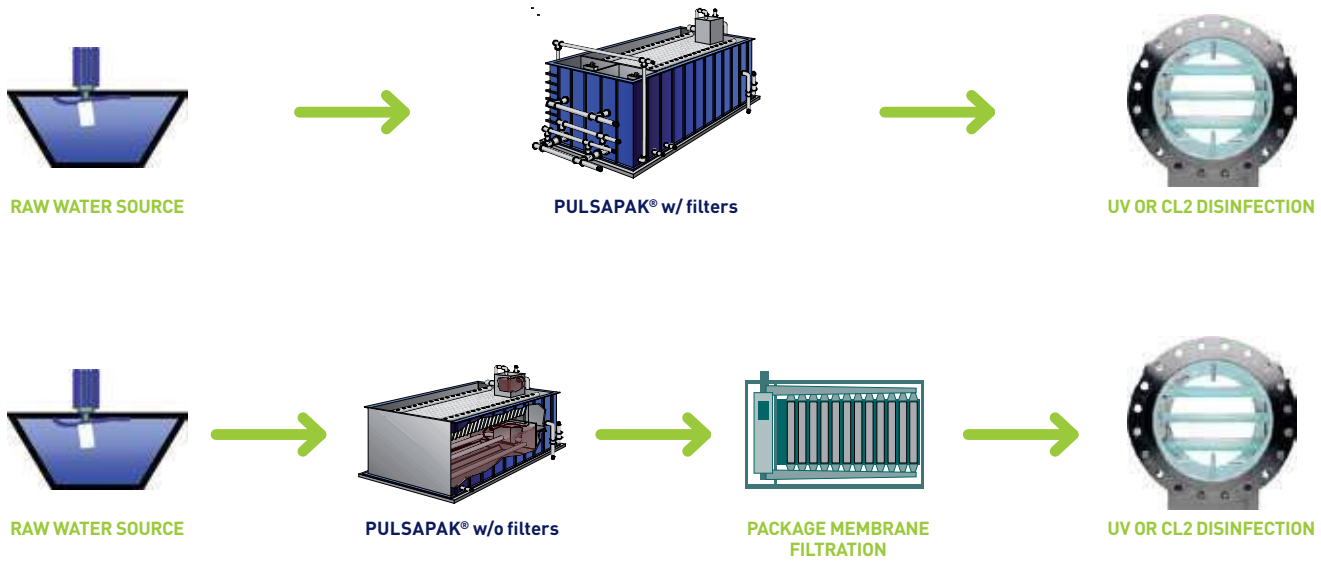
6. **optional gravity filter:** Each filter inlet box receives the clarified water and conveys the water into one of two filter cells. The filters operate under a constant head condition with the filter rate being controlled by a modulating valve. Each filter cell operates independent of the other.

   The filters may be designed with either a mono, dual, or GAC media configuration. The underdrain is equipped with our D-20 series nozzles, which collect the filtered water. The optional gravity filter is designed for either conventional water-only backwashing, sequential air scour/water or with optional surface sweeps.

   All filter sequencing and clarifier operation is automatically controlled through a local control panel.



application options



performance advantages

- Clarified turbidity less than 1-2 NTU
- Filtered turbidity less than 0.1 NTU
- Ability to handle high raw solids (0 to 1000+ NTU)
- Up to 60% TOC removal
- Low energy requirement (~1 HP per MGD)

technical features

- Prefabricated tanks, shop assembled components
- Available with or without package filters
- Any media configuration (Mono, dual, GAC)
- Proven: Hundreds of installations in the Pulsator® family
- Simple operation

design specifications

PULSAPAK® MODEL	Unit Capacity	Unit Dimensions (Clarifier only)	Unit Dimensions (Clarifier + Filter)
	gpm	(l x w x h)	(l x w x h)
P-09	125	10'-6" x 12'-0" x 12'-0"	14'-6" x 12'-0" x 12'-0"
P-12	150	13'-0" x 12'-0" x 12'-0"	18'-0" x 12'-0" x 12'-0"
P-15	200	16'-0" x 12'-0" x 12'-0"	22'-0" x 12'-0" x 12'-0"
P-18	230	19'-0" x 12'-0" x 12'-0"	26'-6" x 12'-0" x 12'-0"
P-24	300	24'-0" x 12'-0" x 12'-0"	34'-0" x 12'-0" x 12'-0"
P-30	350	29'-0" x 12'-0" x 12'-0"	40'-0" x 12'-0" x 12'-0"
P-34	525	39'-0" x 12'-0" x 12'-0"	Clarifier + 15-6" x 12'-0" x 12'-0"
P-100	695	49'-0" x 12'-0" x 12'-0"	Clarifier + 21'-0" x 12'-0" x 12'-0"

PulsaPak®
clarifier system

integrated treatment solutions

As a full treatment line specialist, SUEZ draws upon a broad portfolio of proven technologies to assist industries and municipalities meet their water and waste water treatment challenges. We provide integrated equipment solutions and services for a wide range of applications:

- **industrial water and wastewater**
- **municipal drinking water**
- **municipal wastewater**
- **biosolids management**

We also offer global expertise in the design, build, operation and maintenance of water treatment plants and systems, all delivered to your specific demands.

piloting

SUEZ in North America offers pilot systems and services for this and many other of our product offerings. Pilot studies are a practical means of optimizing physical-chemical and biological process designs and offer the client several benefits, such as:

- **proof of system reliability**
- **optimal design conditions for the full-scale system**
- **raw water lab analysis**
- **regulatory approval**

Please contact us if you would like to learn more about pilot studies.

services

Aftermarket

SUEZ in North America sells parts and components for most SUEZ brand equipment as well as parts for demineralizers, thickeners, nozzles, pressure filters, and valves. We offer reliable spare parts at competitive prices. We maintain records of previous installations to quickly identify your requirements. Many items are shipped directly from stock for quick delivery.

Rebuilds, Retrofits and Upgrades

SUEZ in North America offers cost-effective rebuilds and upgrades for SUEZ provided systems, no matter what year they were built. If you are interested in an economical alternative to installing a whole new system, contact us for a proposal.

If interested in this product, check out some of our complementary products:

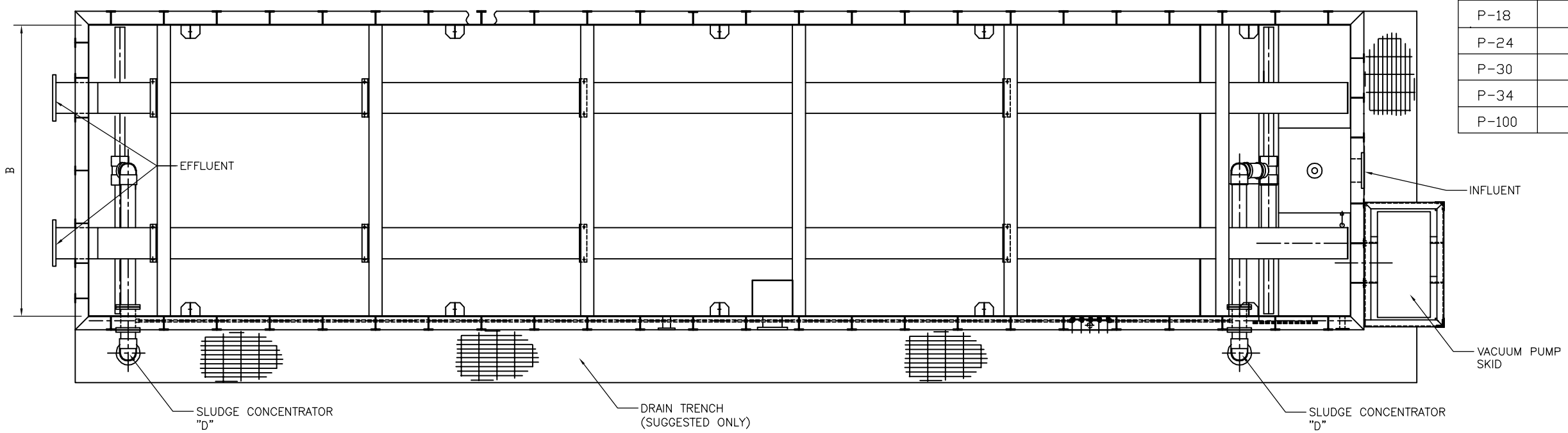
- **SuperPulsator® Clarifier**
- **ABW® Automatic Backwash Filter**
- **AquaDAF® Clarifier**
- **Accelator® Clarifier/Softener**
- **Cleargreen™**
- **Densadeg® Clarifier/Thickener**
- **Ferazur® / Mangazur®**
- **Meteor® IFAS/MBBR**
- **Greenleaf® Filter System**
- **Monoflor® Filter Underdrain System**
- **Climber Screen®**
- **Cannon® Mixer**
- **2PAD**
- **Thermylis® HTFB**
- **AquaPak® DAF - Package Clarifier/ Filter Systems**
- **AccelaPak® - Package Clarifier/ Softener/Filter**

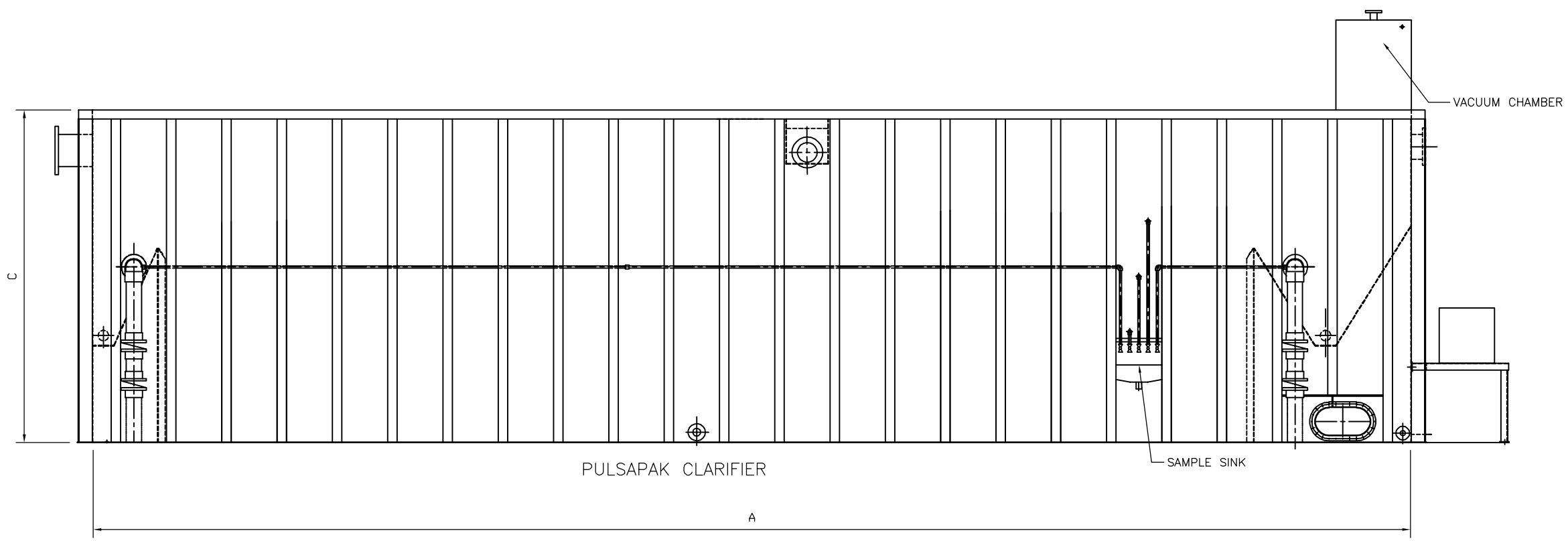
contact

SUEZ
8007 Discovery Drive
Richmond, VA 23229 USA
Tel. : +1 804 756 7600
Fax : +1 804 756 7643
sales.usa@suez-na.com

032017

DIMENSIONAL REFERENCES						
MODEL	Flow (gpm)	Flow (MGD)	A (ft)	B (ft)	C (ft)	D (#)
P-09	125	0.18	9.50	10.00	12.00	1
P-12	155	0.22	12.00	10.00	12.00	1
P-15	195	0.28	15.00	10.00	12.00	1
P-18	230	0.33	18.00	10.00	12.00	1
P-24	295	0.42	23.00	10.00	12.00	1
P-30	355	0.51	28.00	11.00	12.00	2
P-34	525	0.76	38.00	11.00	12.00	2
P-100	695	1.00	47.75	11.00	12.00	2





PULSAPAK CLARIFIER

NOTES:

1. DRAWING IS PRELIMINARY AND NOT FOR CONSTRUCTION.
2. DESIGN OF CONCRETE PAD/CIVIL STRUCTURES IS NOT BY SUEZ
3. LOCATION OF ACCESS LADDER, DRAINS & SLUDGE WASTE CONNECTION MAY BE CUSTOMIZED TO SUIT SITE LAYOUT. CONSULT SUEZ.
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suez
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PH: (800) 446-1150

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PULSAPAK CLARIFIER

GENERAL LAYOUT

SIZE D

DWG. NO. PULSAPAK

REV.