Gray & Osborne, Inc.
CONSULTING ENGINEERS

December 23, 2020

Mr. Richard Rodriguez
Regional Planner
Washington State Department of Health
Northwest Drinking Water Operations
20425 72nd Avenue South, Building 2, Suite 310
Kent, Washington 98032-2358

SUBJECT: FOLLOW-UP COMMENT RESPONSES FOR WATER SYSTEM PLAN
CITY OF NORTH BEND, KING COUNTY, WASHINGTON
G&O #19473.00

Dear Mr. Rodriguez:

Thank you for your follow-up comments regarding the City of North Bend (City) Water System Plan (WSP) provided via letter on December 9, 2020. In August 2020, the North Bend City Council approved a Water System Plan (WSP). On September 14, 2020, the Department of Health (DOH) was sent copies of the August Plan along with a response letter addressing DOH's initial comments from June 11, 2020.

In October 2020, the Plan received minor updates which included expanding the Retail Service Area (RSA) and modifying the duty-to-serve criteria in response to comments received from the Tulalip Tribes. All plan references in this letter refer to the October 2020 WSP. An electronic copy of the most up-to-date plan along with two sets of inserts which include updated figures and modifying the duty-to-serve criteria to replace those in the August version of the plan, which was previously provided to DOH, are included with this letter.

In order to more easily respond to the comments provided in DOH's December 9 letter, we have repeated your comments in italics followed by our responses below.

1. *We understand that the City is requesting approval for a five-year period. Provide a revised executive summary that clearly states that the City is requesting a five-year planning period. As it is now the executive summary indicates this is a ten-year plan.*

   An updated executive summary has been provided in the Plan and is attached. The updated summary clarifies that the WSP is a 5-year

planning document and highlights parameters based on that planning horizon.

2. *Provide an annual 5-year water supply and demand forecast and a capital improvement plan which includes firm mitigation projects to support the 5-year demand forecast. Provide a best case, expected case, and a worst-case supply scenario that considers in-stream flow mitigation needs. Provide the number of new connections that can be supported in each of these scenarios.*

Demand Projections

The October 2020 Plan includes water use projections which are included below in Table 1. Table 1 omits the Sallal wholesale demands since, at this time, an agreement within the 5-year planning period does not appear likely. The projection includes a total of 1,066 ERUs in new connections between 2019 and 2025, equivalent to an average yearly annual increase of 213 ERUs. These connections were projected based upon growth estimates rather than specific projects. Consequently, the project ERUs are adequate to include some of the anticipated larger projects, such as the National Guard project that was added into the RSA as shown on Figure 1-2. The National Guard project, specifically, is projected to add 175 ERUs by the end of 2025.

TABLE 1

Projected Demands in the Water Service Area Through 2025 (1)

Year	RSA Population	Single-Family Cons. (gpd)	Multi-Family Cons. (gpd)	Comm/ Ind/Gov Cons. (gpd)	Total Cons. (gpd)	DSL (gpd)	PHD (gpm)	Number of ERUs	Average Day Production (gpd)	Peak Day Production (gpd)
2020	6,791	286,952	91,901	184,069	562,922	136,986	1,991	4,440	699,908	1,399,816
2021	6,961	293,872	132,554	167,405	609,062	136,986	2,122	4,733	746,048	1,507,142
2022	7,135	303,002	132,980	165,861	616,585	136,986	2,143	4,780	753,571	1,546,072
2023	7,313	309,922	136,113	174,859	636,050	136,986	2,199	4,904	773,036	1,599,377
2024	7,496	317,489	139,425	188,757	662,702	136,986	2,275	5,073	799,689	1,662,549
2025	7,683	329,097	143,321	204,450	694,288	136,986	2,364	5,273	831,274	1,724,471

(1) All values from Table 2-15.

Best-Case Scenario

The City's best-case mitigation scenario involves the following conditions:

1. Mount Si Springs is prioritized for water production and is used whenever the 3 cfs bypass can be satisfied.

2. Instream Snoqualmie River flows trigger mitigation requirements intermittently.

3. The Centennial Well is used whenever Mount Si Springs is not available and mitigated as required.

4. The City's Water Shortage Plan automatically enters Stage 1 on August 15.

5. Hobo Springs (with the help of the Cascade Well by 2022) has ample mitigation capacity to meet the City's need.

Under this scenario, all of the City's water rights are available to provide water throughout the year. As shown in Table 3-18 of the October 2020 Plan, the capacity of all sources is over 15,000 ERUs, well in excess of what is projected in the 5-year horizon.

Expected-Case Scenario

The City's expected-case scenario more or less reflects the mitigation challenges of a typical or slightly drier summer and fall. This mitigation scenario involves the following conditions:

1. Mount Si Springs is out of service for extended portions of August and September, but still prioritized for water production and used intermittently whenever the 3 cfs bypass can be satisfied.

2. Instream Snoqualmie River flows trigger mitigation requirements sporadically, though a sizeable fraction of overall production must be mitigated.

3. The Centennial Well is used whenever Mount Si Springs is not available and mitigated as required.

4. The City's Water Shortage Plan automatically enters Stage 1 on August 15. Stage 2 may or may not be triggered.

5. Hobo Springs and the Cascade Well by 2022 are capable of meeting maximum day mitigation demands when in Stage 1 or average day demands when in Stage 2.

In general, the City is able to use their sources per the water rights, with the exception of later summer when the flows of Mount Si Springs and Hobo Springs reach a seasonal minimum. Hobo Springs is influenced by the level of Seattle Public Utilities' (SPU's) Masonry Pool and usually produces about 4.0 cfs at the end of August and approximately 2.0 cfs at the end of September before reaching a minimum at the end of October. The most recent minimum Hobo Springs flow that was accurately quantified was approximately 1.0 cfs in late October 2018. During most years, the City has to manage their sources during this time. Mount Si Springs usually reaches a minimum around August which lasts through September before water becomes available again in October.

If Stage 2 of the Water Shortage Plan is triggered, water demands are anticipated to be dampened to average day demand (ADD). In this scenario, the City should be able to deliver adequate mitigation water to meet the 831,000 gpm average demand required and support the 5,273 ERUs projected for 2025.

Through a combination of using all of the water available above 3.0 cfs at Mount Si Springs and managing the Centennial Well, with some use of Mount Si Springs and only having to mitigate intermittently, the 1.0 cfs available from Hobo Springs (plus the 0.27 cfs available from the Cascade Well starting in 2022) provide adequate capacity for intermittent but large mitigation demands.

Worst-Case Scenario

It is possible that the City could face a situation where the minimal flows in Mount Si Springs and Hobo Springs converge and instream flows trigger continuous mitigation requirements. This represents the worst-case scenario and includes the following conditions:

1. Mount Si Springs cannot be used due to less than 3 cfs of bypass flows.

2. Instream Snoqualmie River flows trigger mitigation requirements for consecutive days.

3. The Centennial Well has been in use long enough to require one-to-one mitigation (i.e., all of the production must be mitigated).

4. Hobo Springs is limited to a minimum of 1.0 cfs, similar to 2018.

5. Cascade Golf Course is online within the 5-year period and capable of delivering 120 gpm or 0.27 cfs of mitigation water.

6. The City's Water Shortage Plan has been triggered, reducing water demand to projected ADD or below. Projected ADD for 2025 will be used in the analysis below.

Hobo Springs flow is proportional to the surface water level of the Masonry Pool. The Masonry Pool is typically connected to Chester Morse Lake; however, when the surface elevations of both water bodies dip below 1,551 feet they are no longer connected. As SPU can only pull its own water supply water from the Masonry Pool, Chester Morse Lake effectively becomes dead storage. During the 2015 drought, SPU was forced to use its emergency pumping equipment for the first time. Despite these efforts, the Masonry Pool surface elevation dropped to 1,511 feet, Hobo Springs experienced its lowest measured flows, and the City was unable to meet its mitigation obligation.

Two significant changes since 2015 make a repeat of those conditions unlikely. First, the City enacted a new Water Shortage Plan via Ordinance 1723. This plan has three stages of conservation, the first of which is triggered automatically on August 15 of every year. When the Masonry Pool reaches 1,523 feet or lower, Stage 2 measures are enforced. When the Masonry Pool decreases below 1,517 feet, Stage 3 measures will be enforced. The measures limit outdoor and nonessential water use. Because these measures are tied to the level in the Masonry Pool, they will be in place well before the minimum flows in Hobo Springs occur. The Water Shortage Plan is designed to minimize maximum day demands to levels at or below average day demand.

Second, SPU installed new pumping equipment to make pumping water from Chester Morse Lake to the Masonry Pool easier and more reliable. The equipment was under construction in 2015 and was not available for

use until early 2016. It can be argued that if the new pumping system had been available in 2015, the level of the Masonry Pool would not have dropped as low as it did.

A capacity analysis can be performed for the worst-case scenario assuming the minimum for Hobo Springs flow will coincide with the minimum level of the Masonry Pool or slightly thereafter, which would occur in October. As a result, with the Water Shortage Plan activated, demand will be sufficiently dampened to match typical October ADD. Table 2 contains a calculation for the typical October ADD to annual ADD comparison from the 2009 through 2019 data showing that October ADD averages 0.94 of the annual ADD. This factor is then used to estimate the 2025 October ADD based on the annual ADD in the October 2020 Plan.

TABLE 2

Projected October ADD

	October ADD	**Yearly ADD**
2009–2019 (gpd)	420,299	447,394
October-to-Yearly Ratio	0.94	
Projected 2025 (gpd)	780,932	831,274

Since it is likely that the worst-case mitigation scenario would occur in October when Hobo Springs is likely at a minimum, the City would have to fully mitigate 780,932 gpd of October production to meet the projected 5-year demands.

Since 2015, the next lowest SPU reservoir level in recent years occurred in 2018 when the Masonry Pool dipped down to 1514 feet, just 3 feet above the 2015 minimum. At the time, Hobo Springs reached its minimum flow, producing approximately 1.0 cfs at the end of October. Thanks to the changes in SPU's pumping capacity and pond/lake management described earlier, it is not expected that the minimum Hobo Springs flow will be below 1.0 cfs in the next 5 years. It is also assumed that the Cascade Mitigation facility will be operational by 2022. Given these parameters, the City's mitigation capacity and requirements are summarized in Table 3 below.

TABLE 3

Worst-Case Mitigation Capacity and Requirements

	Available/Required Flow	
	gpm	**cfs**
Cascade Golf Course	172,800.00	0.27
Hobo Springs	650,000.00	1.00
Hobo Springs Improvements	TBD	TBD
Total	822,800	1.27
Project October ADD 2025	780,932	1.21
Surplus/(Deficit)	**41,868**	**0.06**

In the worst-case scenario, the City should have adequate mitigation capacity through the end of the 2025 planning period.

3. *We are supportive of the City's stated actions in aggressively pursuing projects that address the high distribution system leakage rate.*

The City recognizes and agrees that this has a high priority.

4. *The City's DSL is running at 22-25 percent of total water use. Convert the water loss volume to ERUs (equivalent residential units) in order to quantify how many connections may be available and when in the 5-year planning period these additional connections could be realized if DSL is reduced.*

Table 4 below presents historic DSL from the October 2020 Plan's Table 2-8 and projected DSL in Table 3-15 in ERUs as well as DSL under WUE Goal 2 (decreasing DSL by 1.5 percent per year) in terms of both percentage and ERUs, as well as the possible yearly savings. DSL for 2019 was the highest in the previous 10 years. As a result, a constant baseline DSL of 867 ERUs was chosen for the projections in Table 2-15 and the table below. This projected DSL is closer to the average of 2018 and 2019, which was also much more conservative than the 686 ERU average DSL over the past 10 years.

TABLE 4

Distribution System Leakage in ERUs

Year	DSL (ERUs)	DSL Under WUE Goal 2 (ERUs)	DSL Under WUE Goal 2 (Percentage)	Potential Yearly Savings (ERUs)
2017	667	—	—	—
2018	838	—	—	—
2019	924	—	—	—
2020	867	842	19.0%	25
2021	867	826	17.5%	41
2022	867	763	16.0%	104
2023	867	709	14.5%	158
2024	867	658	13.0%	209
2025	867	605	11.5%	262

5. *Respond to issues regarding mitigation raised by the Tulalip and Snoqualmie Tribes, both in their written correspondence and any follow-on communications. Any agreed upon mitigation plans and resulting mitigation projects must be included in the WSP.*

Comments receive from the Snoqualmie and Tulalip Tribes as well as the City's responses are attached for inclusion in Appendix U.

6. *We understand the City has changed the priority of developing additional mitigation improvements since the draft plan received on March 18, 2020. In order to better understand the City's position in the near future, we advise evaluating the impact of the Hobo Springs Improvement project in your water supply and mitigation forecast.*

The prioritization of mitigation projects in the Capital Improvements Program (CIP) has changed between the March and October versions of the Plan. Mitigation projects included in the October 2020 Plan for the 5-year horizon are summarized in Table 5 below.

TABLE 5

Five-Year Mitigation CIP Projects [1]

Project No.	Project Name	Year	Cost
MT-1	Golf Course Well Improvements	2020	$371,000
MT-2	Hobo Springs Improvement	2021	$302,000
MT-4	Sallal Mitigation Intertie	2025	$312,000

(1) Values from Table 7-2.

The Cascade Golf Course well improvements are already well underway with engineering near 70 percent complete and construction slated for 2021. This will add an additional 120 gpm and 33 acre-feet per year of mitigation water and will be online by 2022. The City is limited to withdrawing 2.7 acre-feet in October by the water right but intends to use the pond to store water withdrawn during periods when mitigation is not required so it can be used to augment the flows from the well when mitigation is required.

The Hobo Springs Improvement project would construct a second catch basin in order to capture water which flows over the weir of the existing collection box. This project has been redesignated as one of the highest priorities and is set to begin in 2021. The City has engaged Landeau Associates to begun modeling and quantify the available additional flows which could be captured. This work will inform engineering and design which will begin in 2021.

Though, in the present climate, the construction of the Sallal Mitigation Intertie does not appear likely, the project still remains in the Plan. Should an agreement be reached between North Bend and Sallal within the 5-year planning period, the mitigation intertie should be given high priority.

At present, the City has also undertaken three feasibility studies for projects which would occur outside of the 5-year planning period. These include a large mitigation reservoir (MT-5) which would store water during the wet season and release it later as mitigation, a deep mitigation well (MT-4) which would draw water from a deeper aquifer, and a new SPU pipeline which would bring mitigation water directly from Chester Morse Lake or the Masonry Pool. Any one of these projects being investigated would greatly increase the City's mitigation capacity and will be taken up in the next plan.

7. *DOH is not in a position to deal with arguments or discussions on the legal access that a water purveyor may or may not have regarding its water rights. We do, however, have the responsibility and ability to question and discuss source reliability issues. We recognize that there is no such thing as a 100% reliable source anywhere and we are obligated to evaluate a utility's ability to respond to events (natural and man-made) that may cause any given source to become unavailable. We consider the following: Is a utility's preparation and available actions credible responses to a loss of a particular source? Unlike legal water availability, this is an arena in which we can act as an authoritative participant. Droughts, and in North Bend's case, a requirement to provide mitigation water can cause significant reductions in source capacity. DOH rightfully requires a utility to develop reasonable contingency or emergency response plans to deal with that very real possibility. The bottom line, we believe, is risk management on the part of a utility. Perhaps the best question to a water system would be one which forces a utility to determine a level of risk it is willing to accept. The City's WSP is the appropriate vehicle to make these risk assessments and support its conclusions by identifying firm actions and projects that can mitigate the identified level of risk to its sources. Please address your source reliability issues and highlight actions to mitigate risk to your water sources.*

The City agrees that the WSP is the appropriate vehicle to provide risk assessments and discuss strategies for mitigation and reducing risk. One of the notable differences between to March 2020 and October 2020 Plan is the four-point action plan the City has adopted to manage both the supply and demand for mitigation water in hopes of improving system resiliency. This action plan is the conclusion of Chapter 3 and can be found on pages 3-31 and 3-32, and the four-point action plan is described below:

1. Continue to improve system efficiency and flexibility. The City installed variable frequency drives (VFDs) at the Mount Si Springs Booster Station in 2017 in order to increase flexibility and better manage bypass requirements. These VFDs allow the City to vary the pumping rate and has allowed the City to better comply with water rights requirements when total spring flows fall below 2,000 gpm. Seasonal low flows at Mount Si Springs typically occur in September which coincides with days of near maximum water demand. As part of the Capital Improvement Plan (CIP) in

Chapter 7, the City plans to add a VFD to the Centennial Well for improved efficiency and flexibility as well.

2. Control and lower DSL through targeted capital improvement projects. These projects are outlined in Chapter 7 and will replace aging asbestos-concrete mains and other suspected leaking pipes. Reducing DSL will lower the overall water production and the mitigation requirements associated with well withdrawal in the summer and fall.

3. Decrease the magnitude of maximum day water demand during periods of low mitigation capacity. The June 2020 adoption of City Ordinance 1723 and the accompanying Water Shortage Plan by the City Council gives the City the ability to impose and enforce conservation measures during times of water shortage. Three tiers have been identified based on the elevation of the Masonry Pool which is hydraulically connected to the City's mitigation source, Hobo Springs. The ordinance and Water Shortage Plans can be found in Appendix R.

4. Increase and diversify the number of mitigation sources and overall capacity. The City has created a Mitigation Capacity Action Plan which will be executed either in tandem or in lieu of a wholesale water agreement with Sallal. The action plan includes the following steps:

    a. The Cascade Golf Course water mitigation system becomes operational in 2021. The Cascade Golf Course well and its associated water rights were purchased in 2018 with the intent to supplement Hobo Springs mitigation water. This project is listed in Chapter 7 of the WSP as Project MT-1. This project will add a second mitigation source, thereby increasing capacity and adding redundancy to the City's mitigation system.

    b. Hobo Springs Improvements will increase mitigation supply by 2022. This project is listed in Chapter 7 of the WSP as Project MT-2. A new catchment basin will capture excess water which currently flows over the existing weir. This project will increase the available mitigation capacity at Hobo Springs.

c. The City will begin discussions with SPU regarding the purchase of additional mitigation water.

d. Further assessment and refining of the Mitigation Reservoir. This project is listed in Chapter 7 of the WSP as Project MT-5. The City has already funded feasibility studies which have assessed perspective sites for a large 10 MG Mitigation Reservoir. The City will continue to assess and refine the design but such a project will likely be largely grant funded. The WSP projects possible construction around 2031.

Thank you, once again, for your review comments. We have done our best to incorporate your past comments and the comments of other agencies into the final Plan. Though this letter contains a great deal of information, it is largely a synthesis of what is already present in the October 2020 version of the WSP. Upon your approval of the Plan, we will provide you with a final Plan in hard copy and electronically for your files. Please contact me if you have any additional questions or concerns.

Sincerely,

GRAY & OSBORNE, INC.

Russell Porter, P.E.

RLP/hh
Encl.

cc: Mr. Mark Rigos, P.E., Public Works Director, City of North Bend
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