September 6, 2022

City of Nehalem, OR
P.O. Box 143
Nehalem, OR 97131

Attn: City Manager, Melissa Thompson-Kiefer

Re: Water Moratorium Justification Technical Evaluation

Dear Melissa,

The City of Nehalem has requested a letter detailing the water system and associated pressure and flow issues located along the North Fork Road water main. Along with North Fork Road, the water main extends east along McDonald Road to Highway 53 and heads south terminating at the Nehalem Bay Fire & Rescue Hwy 53 facility.

In order to assess the water system, we must define what makes an adequate water system. A water system is considered an adequate and sufficient water supply if it can maintain a pressure of at least 20 pounds per square inch (psi) at all service connections at all times. Also, a water system is considered meeting City fire flows requirements when 1,000 gallons per minute (gpm) can be measured and sustained for a minimum of 1-hour. These parameters have been set forth by OAR 333-061-0200(150) for minimum pressure and the 2015 City of Nehalem Water Master Plan for minimum fire flow. A system that cannot meet these thresholds creates a shortfall.

We know from 2 sets of recent hydrant flow tests, that when the hydrants along North Fork Road, McDonald Road or HWY 53 are operated, the pressure at nearby water services above elevation 110' are adversely affected and cannot sustain the required 20 psi. This includes all water services located in Riverview Meadows and other elevated services, primarily west of North Fork Road.
As mentioned above, these tests were conducted twice, once contracted by the City of Nehalem and once contracted by the developers of Riverview Meadows, with the same results of less than 20 psi for both sets of tests. These tests indicate that the system is currently operating beyond its capacity.

NORTH FORK WATER MAIN

Nehalem has a significant number of houses already connected to the very long water pipe running out North Fork Road, running east along McDonald Road to Highway 53 and heading south and terminating at the Nehalem Bay Fire & Rescue Hwy 53 facility. This eastern portion of the City is only served by this single water line that is not looped. For this reason, flow and pressure for this portion of the City are more susceptible to rapid drops in pressure resulting from high demands than other parts of the system.

MCDONALD ROAD & HWY 53 WATER MAIN

The water main within North Fork Road is an 8-inch PVC & HDPE water main. This main branches out to the east along McDonald Road and reduces down to a 6-inch PVC & HDPE after the large dairy farm. In 2012, the Nehalem Bay Fire & Rescue District funded and contracted for the construction of an extension of the 6-inch water main down HWY 53 for the purpose of supplying domestic water to the remote Fire Station structure to allow them to fill their tankers from the end-of-main fire hydrant.

It is important to understand that the testing performed per Oregon Health Authority (OHA) and American Water Works Association (AWWA) standards when the waterline was installed did not provide any certification that the water line has adequate pressure. This is not a certification that the pressures or flows meet a certain limit, but rather that the new water line has been isolated (between 2 shut valves at each end of the new pipeline) and that the water line can withstand holding pressure, that was introduced by a mechanical pump, for a certain duration without leaking. The testing requirement is defined within

(AWWA), Section C651, to determine the strength of the pipe, but this test offered no evaluation on the effect such a draw would have on the broader system.

After this line was installed, it was observed that during the times the end-of-main fire hydrant was flowing full, water pressure and flow dropped significantly and dangerously at Riverview Meadows. It is for this reason that the Fire District no longer fills its tankers at this location.

RIVERVIEW MEADOWS WATER MAIN

Within Riverview Meadows, pressure can be maintained if only a few customers are using water at the same time. High flows at certain times of day (like supper time demands) will lower the actual pressure to the services at higher elevations. In fact, so much water can be used in a high flow situation that the water pressure at these services will fall below the required 20 psi mark. If a flow is high enough for a sustained duration, as seen during hydrant testing along North Fork Road, water pressure at high elevations will result in negative pressure. Negative pressure within a water system is very dangerous and could result in the siphoning of toxins into the City water system or could result in collapsing water main lines. Both situations listed could cause severe health and safety issues for residents within this area or even to the entire community served by the City's water system. This substantial risk to health and safety creates an inadequacy such that the service is operating beyond its capacity.

Due to these possibilities, the City is currently in the process of installing a Pressure Sustaining Valve on the highest water main that serves Riverview Meadows. This special valve acts as a Check-Valve when high flows are detected within the North Fork water main. The valve will not allow the pressure to be "siphoned" from water demands occurring at the higher elevations, eliminating the possibility of negative pressure for a sustained amount of time. Once the flows return to within a "normal" range, the valve with then open again and continue to supply water to the highest services. This Valve is only a temporary, partial fix for this low-pressure situation. This valve will only serve as a partial fix due to the limited functionality of only allowing protection to the existing small number of users at the high elevation level. The valve will allow the existing static pressure within the pipeline to be temporarily "stored" until the pressure is replenished by the waterline on North Fork Road. If more services are allowed in this high elevation level, the added demands of these services would not allow the pressure to return to "normal" and the stored pressure in the line would bleed under 20 psi and eventually to zero.

WATER SERVICE MORATORIUM

While discussing the stated pressure problem and possible solution, Oregon Health Authority, Drinking Water Services (OHA-DWS), was contacted to discuss this further. In conversations with Evan Hofeld from OHA-DWS, he states "A moratorium is an effective tool to ensure future demands do not exceed the capacity of the existing infrastructure and has been used in other communities (e.g. Youngs River Lewis and Clark Water District in Clatsop County and Falcon Cove at the northern end of Tillamook County come to mind)".

Until the time that those seeking a new connection add the required storage and pump system to provide the required pressure and flow to this upper water system creating the necessary additional system capacity, no additional connections should be allowed to connect to the City's water mains as shown in the Water Connection Moratorium map.

CONCLUSION

We recommend that the City monitor the effect of the newest service connections as they become active. Simultaneous to this monitoring, it is recommended that the pressure sustaining valve be installed on the water main that services the Riverview Meadow subdivision. Any unanticipated impacts should be evaluated and reported and re-analyzed in the Water System Model immediately to minimize further stress on the water system.

The primary goal of a municipal water system is to provide safe drinking water to residents and adequate fire flow to serve the community. We recommend additional fire flow analysis to determine how fire flow events will impact the water system as a whole. As future planning continues, in order to remedy the

pressure and flow issues on the North Fork water main, coordination with Nehalem Bay Fire and Rescue will be critical. Fire protection is paramount and determining a solution that provides additional hydrant flows and pressure is an important next step.

Sincerely,
North Coast Civil Design, LLC

Kyle Ayers, PE
Principle in Charge