

CLALLAM COUNTY PUD DROUGHT RESPONSE PLAN

Adopted: June 11, 2018

1.0 Introduction

This Plan was developed by PUD staff and approved by the PUD Board of Commissioners on the date noted above. The Plan will remain in effect until modified or rescinded by the Commissioners.

Clallam County PUD water systems rely on a variety of sources for water. Several systems use wells and two have surface water sources. The drought response depends largely on the source of water. Any declaration of a drought emergency by the Governor will trigger a drought response.

Drought responses for water systems with a surface water source consider streamflow patterns. Drought responses for water systems with a groundwater source consider aquifer level patterns. The Island View Water System has only a surface water source. The Evergreen, Carlsborg, Panoramic Heights and Clallam Bay/Sekiu Water Systems have only a groundwater source. The Fairview Water System has both ground and surface water sources. The drought response for this system considers both streamflow and aquifer levels. The District purchases from the City of Port Angeles (the City) for the Gales Addition, Monroe and Mt. Angeles Water Systems. Drought response in these water systems considers the drought response of the City.

The City has adopted a Water Shortage Response Plan and it is the intent of the PUD to cooperate and complement the City Plan for those systems supplied by water from the City. In addition, the PUD will coordinate with the City of Sequim in water shortage periods in the Evergreen Water System.

This drought response plan is divided into several stages. Each stage has its own level of activity. The actions taken in each stage are outlined first, and then criteria for triggering the raising and lowering of each stage are described.

2.0 General Progression of Drought Response

The early stages of the drought response are expected to be used during the late winter to early-summer period as drought conditions may emerge. The later stages are likely to be used during the summer through mid-fall period and possibly into early winter. Conservation goals are specified for each of Stages 2 through 5. Drought stages will not be lowered until demand is reduced to achieve these goals or until source water levels begin to rise consistently.

As the drought stage increases, the amount of demand reduction increases. The conservation goals are based on Washington Department of Health guidelines (DOH, 2005). The levels of demand reduction are based on these goals. Monitoring of demand (primarily using chlorination reports and customer meter data) will determine when and how long the goals are met.

Drought conditions starting in early spring and persisting into the fall would be severe. The 2015 drought is an example of an extreme drought. In this case, lowering of the drought response stage would not occur until source water levels rise to acceptable levels. Short-term emergency curtailment plans are not included in the drought response plan.

3.0 Stages of Drought Response

Stage 1—Forecast Alert

The key elements of Stage 1 are forecasts to alert utility commissioners and personnel to the risk of drought conditions and to prepare for a possible drought response. Forecasts are made during two periods. From January through May, the U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) provide forecast maps, at about the middle of each month, of streamflow during the upcoming spring-summer season (<http://www.wcc.nrcs.usda.gov/cgibin/sssfp.pl>). The forecast report shows a map of the percent of normal streamflow across the western states. District Staff will review the NRCS forecasts every month. The NRCS forecasts indicate both ground and surface water source availability because, in general, both sources are hydraulically connected.

Also, the alert will require PUD personnel to review the following hydrological monitoring station reports on at least a semi-monthly basis:

- Streamflow Forecast data: <http://www.wcc.nrcs.usda.gov/cgibin/bor.pl>
- SNOTEL snowpack data: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/or/home/?cid=nrcs142p2_046350
- Morse Creek: <https://fortress.wa.gov/ecy/eap/flows/station.asp?sta=18C150>
- Dungeness River: http://nwis.waterdata.usgs.gov/wa/nwis/uv?site_no=12048000
- Hoko River: http://waterdata.usgs.gov/nwis/uv?site_no=12043300

The snowpack data will be used to indicate when to begin reviewing streamflow data. The hydrographs will be examined to identify the beginning of a streamflow recession pattern. After 2 weeks from the beginning of streamflow recession, mean daily streamflow data from this 2-week period will be collected. These data will be analyzed using linear and log regression techniques. The results of the analysis will be used to predict streamflow recession. The predictions will be used to forecast the date when streamflow drops below critical levels. Forecasts will be updated weekly.

Stage 2—Voluntary Conservation

The key elements of Stage 2 are communication of public information and cooperation from customers. The goal of this stage is to notify customers to anticipate an increase in drought response later in the dry season and to begin taking voluntary conservation

measures. The following web-site describes how customers can conserve water:
<http://www.wateruseitwisely.com/100ways/nw.shtml>.

- The PUD prepares News Releases and distributes them to newspapers, radio stations, local television, PENCOM, and associated web pages.
- Water conservation information is made available to customers through News Releases, mail-outs, handouts, etc.
- The PUD will provide education for employees on cause and effect of the shortage and the message that should be conveyed to customers.
- The PUD will begin water conservation measures in its own facilities.
- Fire districts will be alerted to the shortage and requested to minimize unnecessary use of water.
- Begin semi-monthly well water level monitoring.
- One week before estimated date of Morse Creek streamflow dropping below 25 cfs, begin Deer Park Road Booster Pump System operations.
- When Morse Creek streamflow drops below 25 cfs cease creek diversion.

Stage 3—Outdoor Restrictions

The key elements of Stage 3 are to reduce and/or eliminate outdoor use of water. The goal of this stage is to reduce water consumption by 10 percent.

- Customers will be expected to comply with alternating days for outdoor watering. Even numbered addresses water only on even numbered days, odd numbered addresses water only on odd numbered days, and all customers minimize watering use. Minimizing total use will be emphasized.
- Customers will be provided information on outdoor watering requirements for lawns and landscaping such that only the amount absolutely necessary is used.
- News releases are released to indicate the need for greater reduction in water consumption.
- Information will be provided to customers on water efficient appliances.
- Vehicle washing will be prohibited except for safety related purposes.
- Water will not be available from PUD systems for construction projects to reduce dust or other routine County road surface preparation.
- Continue semi-monthly well water level monitoring.
- Continue Deer Park Road Booster Pump System operations.

Stage 4—Mandatory Outdoor Restrictions and Indoor Conservation

The key elements of Stage 4 will be to eliminate outdoor use and minimize indoor use by consumers. The goal of this stage is to reduce consumption by 10 to 20 percent.

- News releases are revised to communicate information applicable to this stage.
- A message is inserted with PUD bills or a direct mailing made.

- No outdoor use is permitted except in critical or emergency situations.
- Customers are asked to reduce indoor use of water.
- Door hangers or personal contact is used to notify violators.
- Repeat violations will subject the consumer to potential shutoff.
- Begin weekly well water level monitoring.
- Begin preparations for lowering well pumps and/or deepening shallow wells.
- Continue operation of Deer Park Road Booster Pump System.
- Begin water trucking operations for the Island View water system.

Stage 5 – Water Rationing

The key element of stage 5 is to ration a limited supply of water so as to serve only essential uses. The goal of this stage is to continue to reduce consumption from 20 percent upwards of 30 percent.

- News releases and other communications emphasize that only essential use of water is allowed.
- A direct mailing to customers is utilized to ensure that information about the severe nature of the situation is communicated.
- Non-critical accounts are turned off after notification to the customer.
- Penalties, such as monetary or shutoff, will be applied for violations.
- Water availability in areas may be reduced or other restriction applied by the PUD at its discretion.
- Continue weekly well water level monitoring.
- Lower pump intake levels and/or deepen shallow wells if they become inoperable due to low groundwater.
- Continue operation of Deer Park Road Booster Pump System.
- If Deer Park Road Booster Pump System is inoperable, set up water filling station at Old Olympic Well Site.
- Continue water trucking operations for the Island View water system.

Essential Use—water consumption associated with personal use only.

Examples: cooking, drinking, bathing, sanitation, personal hygiene.

Non-critical Account—irrigation, lawn watering, vehicle wash facilities.

4.0 Criteria Used to Determine Stage

The key criteria used to determine the stage of drought response are described in this section. These criteria are listed separately for water systems with surface water sources and groundwater sources. All District water systems are located in a watershed that drains to the Strait of Juan de Fuca. Water systems with surface water sources also differ from one another. The eastern watersheds extend into the Olympic Mountains. Here, the streamflow patterns are driven by both seasonal precipitation and snowpack. The two

western water systems are located in watersheds with streamflows primarily driven by seasonal precipitation. The levels of District groundwater sources are correlated to long-term trends in precipitation and snowmelt. Because of this hydrology, District groundwater systems are more resilient to short-term droughts.

The criteria for taking action to conserve or restrict water use apply primarily to the irrigation and early-fall seasons. The District does not own or operate any reservoir facilities capable of storing water for more than a few days of normal use. Conservation earlier than May 1 would not enable storage of surface water in the spring for use later in the season.

Aquifers could be considered a reservoir with seasonal storage capacity; however, District groundwater sources have shown little seasonal variation during droughts when use was not curtailed. Our groundwater sources are much more resilient to drought than our surface water sources.

These criteria are used as guidelines for issuing all drought response alerts. Fire risk and events, precipitation events, updated information on short-term and seasonal weather forecasts, customer comments made in response to District alerts, emergency management agency comments, and other factors deemed critical by the District, will be considered when applying these criteria.

4.1 Criteria for Both Ground and Surface Water Systems

The general criteria for all water systems are the NRCS streamflow forecasts and an emergency drought declaration by the Governor of the State of Washington. NRCS forecasts help in preparing for potential water shortages later in the summer.

NRCS forecasts of drought made in the spring indicate the need to issue a Stage 1 Alert for the District to initiate forecasting using data on local water sources:

- If the February NRCS forecast is 60 percent or less than normal or the Governor declares a drought emergency in March or April, then a Stage 1 alert is immediately issued.
- If the NRCS forecast is 90 percent or less in April, then a Stage 1 alert is immediately issued.
- If the NRCS forecast is 110 percent or less in May, then a Stage 1 alert is immediately issued.

After April, Any emergency drought declaration by the Governor immediately increases the drought response to Stage 2.

Later in the spring, snowpack is used as a criterion for water systems located in the east end of Clallam County. The NRCS operates SNOTEL sites that monitor snowpack in terms of depth (inches) of snow-water-equivalents (SWE). There are three SNOTEL sites in the north Olympic Mountains. The highest elevation site (named Waterhole) is

used to determine the date when the snowpack has completely melted (zero depth). See http://www.nrcs.usda.gov/wps/portal/nrcs/detail/or/home/?cid=nrcs142p2_046350. After a zero SWE is measured at the Waterhole SNOTEL Station, snowmelt runoff begins to decline. This typically happens during mid-June.

The end of snowmelt runoff season will be determined by monitoring daily average streamflow data from Morse Creek, Dungeness River and Hoko River gauges. Monitoring will begin two weeks after the date of zero snowpack. During the snowmelt runoff season, the streamflow will reach a seasonal peak and then decrease at an increasing rate. Later, the streamflow transitions to a recession pattern in which the streamflow decreases at a decreasing rate. The date of this transition marks the end of snowmelt runoff season.

The dates of zero snowpack and the end of snowmelt runoff season are used to determine drought response stages. Earlier dates result in higher stages than later dates.

4.2 Criteria for Only Surface Water Sources

The Fairview and Island View Water Systems have surface water sources. The Fairview Water System is located in a watershed that extends into the Olympic Mountains. The streamflow pattern of the water source is driven by seasonal snowpack and precipitation. The Island View Water System is located in a small watershed in the west end of Clallam County. The streamflow pattern of the water source is driven by seasonal precipitation and not by mountain snowpack.

Fairview Water System

The primary water source for Fairview Water System is Morse Creek. The water right for this source contains a condition to cease diversion when the streamflow drops below 25 cfs. The Washington Department of Ecology (Ecology) operates a streamflow gauge just downstream from the District's primary point of diversion. Ecology uses the data from this gauge to determine when the diversion must cease.

For the upper Fairview Water System, the 25 cfs limit is the main criteria for determining the drought response stage. The lower Fairview Water System also has three groundwater sources. These sources can fully replace Morse Creek as the primary source during droughts when the Deer Park Road Booster Pump System is operational. Only the upper Fairview Water System is subject to the 25 cfs criterion.

Two weeks after the end of snowmelt runoff season, District Staff will begin estimating the date when Morse Creek streamflow will drop below 25 cfs. One week prior to this date is used as the criterion for preparing the Deer Park Road Booster Pump System for emergency backup operations.

The following table shows the Alert Stage corresponding to the month in which these criteria occur. The highest stage indicated for each month is the stage for which an alert

would be issued. All actions of lower stages apply when an alert is issued. For instance, a Stage 2 alert would initiate forecasting actions per Stage 1. A Stage 5 Alert would be issued any time after May, if forecasts indicate that Morse Creek will drop below 25 cfs within a week and the Deer Park Road Booster Pump System is not operational. If the booster pump system is operational and a 1-week forecast in May, June or afterwards, the Stage will be 4, 3 or 2, respectively.

Table 1—Upper Fairview Stage Criteria

Criterion	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
NRCS Forecast 60% of Normal	1							
Governor's Declaration		1	1	2	2	2	2	2
NRCS Forecast 90% of Normal			1					
NRCS Forecast 110% of Normal				1				
Zero Snowpack				2	1			
End of Snowmelt Runoff Season				3	2	1		
Forecast 1-week before 25 cfs With Booster Pumps				4	3	2	2	2
Forecast 1-week before 25 cfs Without Booster Pumps				5	5	5	5	5

Island View Water System

The primary water source for the Island View Water System is Olsen Creek. The water right for this source contains a condition that limits the diversion to one half of the creek streamflow. The maximum diversion is approximately 35 gpm. Per the water right condition, the diversion must be reduced when streamflow drops below 70 gpm (0.156 cfs).

Olsen Creek streamflow is estimated from the Hoko River. There is no streamflow gauge on Olsen Creek. The closest river with a long-term gauge is the Hoko River. The gauge is operated by the U.S. Geological Survey (USGS). The Hoko River daily average streamflow data is multiplied by factor derived from the ratio of watershed areas of the creek and the river. The watershed area of Hoko River upstream from the gauge is 51.2 square miles. The watershed area of Olsen Creek upstream of the diversion is 0.93 square miles. The adjustment factor is 0.00539, which is the watershed area ratio raised to the 1.3 power.

The District will begin forecasting Olsen Creek streamflow when the Hoko River falls below minimum monthly level observed during the spring. These levels will be

determined by July 1st. The District will forecast the date when the estimated Olsen Creek streamflow drops below 0.077 cfs. This corresponds to a Hoko River streamflow of about 14.3 cfs.

The following table shows the Alert Stage corresponding to the month in which these criteria occur. The highest stage indicated for each month is the stage for which an alert would be issued. All actions of lower stages apply when an alert is issued. For instance, a Stage 2 alert would initiate forecasting actions per Stage 1.

Table 2—Island View Stage Criteria

Criterion	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
NRCS Forecast 60% of Normal	1							
Governor's Declaration		1	1	2	2	2	2	2
NRCS Forecast 90% of Normal			1					
NRCS Forecast 110% of Normal				1				
Forecast 5-week before 0.077 cfs				2	2	2	2	2
Forecast 3-week before 0.077 cfs				3	3	3	3	3
Forecast 1-week before 0.077 cfs With Emergency Trucking				4	4	4	4	4
Forecast 1-week before 0.077 cfs Without Emergency Trucking				5	5	5	5	5

Gales Addition, Monroe and Mount Angeles Water Systems

The water source for these three water systems is the Elwha River. The City of Port Angeles delivers treated Elwha River water to the Gales Addition Reservoir, which serves all three water systems. The District will issue the same drought alerts as the City of Port Angeles.

4.3 Criteria for Only Groundwater Sources

For the water systems with only groundwater sources, except Clallam Bay/Sekiu, routine District well monitoring data will be reviewed after the end of snowmelt runoff season on Morse Creek. The review will compare the routine depth to groundwater measurements with the average of historical measurements. A drought alert will be issued based on the depth to groundwater above the highest screened interval. The depths in the table represent 20, 40, 60 and 80 percent of the normal depth of groundwater above the highest screened interval for Stages 2 through 4, respectively.

Table 3—Depth to Groundwater for Stages 2 - 5

Water System	Well Name	Depth to Screen	Stage 2 Depth to SWL	Stage 3 Depth to SWL	Stage 4 Depth to SWL	Stage 5 Depth to SWL
Lower Fairview	BOBCAT HOLLOW WELL	383	318.3	321.5	324.7	327.8
Lower Fairview	OLD OLYMPIC WELL	291	236.1	247.1	258.2	269.2
Carlsborg	LUD #10	159	63.9	84.1	104.2	124.4
Evergreen	LOMA VISTA #3	120	82.2	84.6	87.0	89.4
Evergreen	HOLGERSON	135	92.0	100.7	109.4	118.1
Panoramic	PANORAMIC HTS.	150	112.9	122.2	131.5	140.7

The Hoko River Wellfield is the source of water for the Clallam Bay/Seki Water System. There is no well level monitoring system for this wellfield. The Hoko Pump Station uses a vacuum system to pull water from the wells to prime the pumps. The vacuum is monitored and is an indirect measurement of the depth to water in the wells. There has been no seasonal variation in vacuum observed. This indicates that the groundwater source is resilient to droughts.

In the absence of direct well level monitoring, the criteria used for Clallam Bay/Seki is Hoko River streamflow. Because of the greater of resiliency groundwater sources to drought, these criteria are less stringent than for a surface water source. The following table shows the Alert Stage corresponding to the month in which these criteria occur. The highest stage indicated for each month is the stage for which an alert would be issued. All actions of lower stages apply when an alert is issued. For instance, a Stage 2 alert would initiate forecasting actions per Stage 1.

Table 4—Clallam Bay/Seki Criteria

Criterion	Apr	May	Jun	Jul	Aug	Sep
NRCS Forecast 60% of Normal	1					
Governor's Declaration		1	2	2	2	2
NRCS Forecast 90% of Normal		1				
Forecast 3-week before 14 cfs			2	2	2	2
Forecast 1-week before 14 cfs			3	3	3	3

5.0 Criteria Used for Lowering or Ending a Drought Response

For the Gales Addition, Monroe and Mount Angeles Water Systems, the District will follow any City announcement lowering or ending a drought response. For all other District Water Systems, the District will determine when to lower or end a drought response.

After September 1st, District Staff will review streamflow, well level and precipitation data from gauges in Clallam County to determine when to end the drought response. The data from streamflow gauges and wells that were used to issue the alert will be used to determine when to end the alert. Precipitation and other factors deemed critical by the District will also be considered when ending a drought response.

Typically in mid-September, rains return and the alerts would be ended. If rains come earlier, then the drought stage indicated in that month would be lowered. If rains come later, then the drought stage indicated in September will continue later into the fall.

The Stage 1 monitoring would end upon an NRCS forecast of greater than 110 percent of normal on May 15, or zero snowpack reached after June 15, or the end of snowmelt runoff season after July 15.

A reduction in consumption of 5 percent since the beginning of the Stage 2 drought response, or consistently rising streamflow or well levels after September 15th would allow the District to end a Stage 2 alert or lower the stage by one.

A reduction in consumption of 10 percent since the beginning of the Stage 3 drought response, or consistently rising streamflow or well levels after October 1st would allow the District to end a Stage 3 alert or lower the stage by one.

A reduction in consumption of 20 percent since the beginning of the Stage 4 drought response, or consistently rising streamflow or well levels after October 15th would allow the District to end a Stage 4 alert or lower the stage by one.

A reduction in consumption of 30 percent since the beginning of the Stage 5 drought response, or consistently rising streamflow or well levels after November 1st would allow the District to end all alerts.

6.0 References

DOH, 2005 Guidance Document, Preparing Water Shortage Response Plans.
 Washington Department of Health. DOH PUB. #331-301 (Rev.). June
 2005. Olympia, Washington.