Appendix D:

Alternative Reasonable Potential Analyses and Wasteload Allocations

These alternatives assume a different receiving stream and/or a different permitted effluent flow than those developed as part of the TMDL. These WLAs were developed in the event the given facility decides to change its permitted discharge.

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Table D-1. Input parameters and results for alternative Reasonable Potential Analyses for the Diamond Fruit Growers Parkdale facility: Scenarios 1-5
Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations for Scenarios 2-5 which apply during the critical period (included in Table 14 of the TMDL document). Scenario 1 represents the current condition wasteload allocation (shown in Table C-2 and Table 13).

Diamond-Parkdale facility							
		Ditch as receiving stream				Wishart Creek as receiving stream	
	Variable	Design flows	Cooling Water flows only			Design flows	Cooling Water flows only
		Scenario 1	Scenario 4	Scenario 5		Scenario 2	Scenario 3
Fish Use Designation		Salmon & Trout Rearing & Migration				Salmon & Trout Rearing & Migration	
Critical period		May 1-September 30				May 1-September 30	
Applicable Temperature Criterion (^{o}C)	T_C	18.0	18.0	18.0		18.0	18.0
Maximum Effluent Temp (^{o}C)	T_E*	21.0	21.0	21.0		21.0	21.0
Minimum Stream Flow (cfs)	Q_R*	0.1	0.1	0.1		0.2	0.2
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.22	0.004	0.003		0.22	0.004
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.34	0.01	0.005		0.34	0.01
Dilution Ratio with 100% of stream flow	S**	1	17	23		2	33
Human Use Allowance (^{o}C)	HUA_{PS}	0.18	0.18	0.18		0.18	0.18
Calculated Change in Ditch/Creek Temperature under Current Operations (^{o}C)	ΔT_R**	2.3	0.17	0.13		1.9	0.09
Current Thermal Load (gcals/day)	CL**	2.5	0.05	0.03		2.5	0.05
Wasteload Allocation Thermal Load (gcals/day)	WLA**	0.2	0.05	0.05		0.2	0.1
Load reduction needed to meet WLA (gcals/day)		2.3	--	--		2.3	--
Load reduction needed to meet WLA (%)		92%	--	--		92%	--
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	18.2	21.1#	22.1#		18.3	24.0#
Maximum Allowable Effluent Flow to meet WLA (MGD)	Q_{WLA}****	0.004	--	--		0.008	--

* *Measured data*
** *Calculated data*
*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*
**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*
\# *When effluent temperatures are greater than 21°C, a thermal plume analysis is required during permit renewal to prevent or minimize adverse effects to salmonids within the mixing zone (OAR 340-041-0053(2)(d)).*

Table D-2. Input parameters and results for alternative Reasonable Potential Analyses for the Diamond Fruit Growers Odell facility (cooling water discharge)

Variables indicated in the second column of this table refer to variables used in Equations 3-6 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the most stringent alternative WLA which apply during the critical period (Scenario 7, included in Table 14 of the TMDL document). Results from the alternative Odell Creek cumulative effects analysis are included in this table and show the less stringent wasteload allocation for this facility associated with that analysis.

Diamond-Odell facility: McGuire Creek as receiving stream (cooling water discharge) (Scenario 7)															
	Variable*	Jan	Feb	Mar	Apr 1-14^	Apr 15-30^	May^	June^	July^	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Core Cold Water Habitat												
Critical period						April 15-September 30								
Applicable Temperature Criterion (°C)	T_C	16.0				16.0						16.0		
Maximum Effluent Temp (°C)	T_E*	16.6	17.3	19.0	19.6	19.6	19.6	19.6	19.6	20.2	17.9	16.8	16.1	16.8
Minimum Stream Flow (cfs)	Q_R*	1.6				1.6						1.6		
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.004				0.004						0.004		
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.01				0.01						0.01		
Dilution Ratio with 100% of stream flow	S**	259				259						259		
Human Use Allowance (°C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18						N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (°C)	ΔT_R**	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00
Current Thermal Load (gcals/day)	CL**	0.01	0.02	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.03	0.01	0.00	0.0
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	0.7	0.7	0.7	0.7	0.7	0.7	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	N/A	N/A	N/A
Maximum Allowable Effluent Temperature (°C)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #						N/A	N/A	N/A
From Odell Creek cumulative effects analysis (from Table D-5)														
	Variable	Jan	Feb	Mar	Apr 1-14^	Apr 15-30^	May 1-15^	May 16-31^	June^	July^	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Steelhead Spawning						Core Cold Water Habitat							
Critical period						April 15-September 30									
Applicable Temperature Criterion (°C)	T_C	13.0				13.0		16.0					16.0		
Minimum Stream Flow (cfs)	Q_R*	7.1	8.9	11.2	14.1	12.0	11.6	9.8	8.9	8.9	9.1	8.5	4.6	3.2	5.6
Human Use Allowance (°C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09							N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (°C)	ΔT_R**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Current Thermal Load (gcals/day)	CL**	0.05	0.07	0.09	0.10	0.10	0.10	0.05	0.05	0.05	0.06	0.03	0.01	0.00	0.01
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	2.6	2.6	2.2	2.0	2.0	2.0	1.9	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	N/A	N/A	N/A
Maximum Allowable Effluent Temperature (°C)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #							N/A	N/A	N/A

* *Measured data* ** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

^ *This plant does not discharge cooling water in April-July, but a wasteload allocation was calculated since they are allowed to discharge all months in their permit.*

\# *The calculated maximum allowable effluent temperature under allocated conditions is greater than is physically possible to generate at the facility (>62.7*C). The calculated value of T_{WLA} does not allow a facility to discharge effluent at these high temperatures; T_{WLA} needs to comply with thermal plume limitations in this OAR.*

Table D-3. Input parameters and results for alternative Reasonable Potential Analyses for the Odell Wastewater Treatment Plant alone (no Diamond-Odell facility discharge)

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. This analysis assumed there was no longer a Diamond-Odell facility discharge, so the Odell Creek cumulative effects analysis was not needed. Shaded cells indicate variables and values associated with the alternative wasteload allocation for Scenario 9 for Odell WWTP (included in Table 14 of the TMDL document): cells in purple apply during the core cold water habitat season and cells in blue apply during the spawning season.

Odell WWTP: Odell Creek as the receiving stream, no Diamond-Odell discharge (Scenario 9)															
	Variable	Jan	Feb	Mar	Apr 1-14	Apr 15-30	May 1-15	May 16-31	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Steelhead Spawning						Core Cold Water Habitat							
Critical period						April 15 -September 30									
Applicable Temperature Criterion (^oC)	T_C	13.0				13.0		16					16.0		
Maximum Effluent Temp (^oC)	T_E*	15.3	14.6	14.8	14.7	15.7	17.4	17.8	19.5	21.5	22.5	22.2	21.5	19.5	16.2
Minimum Stream Flow (cfs)	Q_R*	7.1	8.9	11.2	14.1	12.0	11.6	9.8	8.9	8.9	9.1	8.5	4.6	3.2	5.6
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.42				0.42							0.42		
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.65				0.65							0.65		
Dilution Ratio with 100% of stream flow	S**	12	15	18	23	19	19	16	15	15	15	14	8	6	10
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18							N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.19	0.11	0.10	0.07	0.14	0.23	0.11	0.24	0.37	0.43	0.44	0.68	0.59	0.02
Current Thermal Load (gcals/day)	CL**	3.7	2.5	2.9	2.7	4.3	7.0	2.9	5.6	8.7	10.3	9.9	8.7	5.6	0.3
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	5.6	5.4	4.6	4.2	4.2	4.3	4.0	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	--	1.6	--	1.4	4.5	6.0	5.8	N/A	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	--	23%	--	24%	52%	58%	59%	N/A	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	16.5	16.4	18.9	18.6	18.6	18.7	18.5	N/A	N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	--	0.32	--	0.31	0.19	0.17	0.16	N/A	N/A	N/A

* *Measured data*
** *Calculated data*
*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*
**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*

Table D-4. Input parameters and results for alternative Reasonable Potential Analyses for the Odell Wastewater Treatment Plant discharge directly into Hood River.

Variables indicated in the second column of this table refer to variables used in Equations 3-6 in the 2018 WHS TMDL Revision. Shaded cells indicate variables and values associated with the alternative wasteload allocations for Scenarios 11 and 12 for Odell WWTP (included in Table 14 of the TMDL document): cells in purple apply during the core cold water habitat portion of the critical period and cells in blue apply during the spawning season portion of the critical period.

Hood River as receiving stream														
	Variable	Jan	Feb	Mar	April	May	June 1- 15	June 16-30	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon and Steelhead Spawning						Core Cold Water Habitat				Spawning		
Critical period						May 1-September 30								
Applicable Temperature Criterion (^oC)	T_C	13.0				13.0		16.0				13.0		
Minimum Stream Flow (cfs)	Q_R*	235				235		185				235		
Odell WWTP discharge alone (Scenario 11)														
Maximum Effluent Temp (^oC)	T_E*	15.3	14.6	14.8	15.7	17.8	18.6	19.5	21.5	22.5	22.2	21.5	19.5	16.2
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.42				0.42						0.42		
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.65				0.65						0.65		
Dilution Ratio with 100% of stream flow	S**	362				362		286				362		
Human Use Allowance (^oC)	HUA_{PS}					0.18								
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01
Current Thermal Load (gcals/day)	CL**	3.7	2.5	2.9	4.3	7.6	8.9	5.6	8.7	10.3	9.9	13.5	10.3	5.1
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	104	104	82	82	82	82	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	N/A	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #						N/A	N/A	N/A
All permitted facilities in community of Odell discharge to Odell WWTP (Scenario 12)														
Maximum Effluent Temp (^oC)	T_E*	13.6	13.3	13.7	15.7	17.4	18.5		19.4	20.3	19.9	19.1	17.0	14.9
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.79				0.79						0.79		
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E													
Dilution Ratio with 100% of stream flow	S**	193				193		152				193		
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18						N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.00	0.00	0.00	0.01	0.02	0.03	0.02	0.02	0.03	0.03	0.03	0.02	0.01
Current Thermal Load (gcals/day)	CL**	1.8	0.9	2.1	8.1	13.2	16.5	7.5	10.2	12.9	11.7	18.3	12.0	5.7
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	104	104	82	82	82	82	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	N/A	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #						N/A	N/A	N/A

* *Measured data* ** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

\# *The calculated maximum allowable effluent temperature under allocated conditions is greater than is physically possible to generate at the facility (>43.7*C). The calculated value of T_{WLA} does not allow a facility to discharge effluent at these high temperatures; T_{WLA} needs to comply with thermal plume limitations in this OAR.*

Table D-5. Input parameters and results for alternative Reasonable Potential Analyses for the alternative Odell Creek cumulative effects analysis using Diamond Fruit Growers Odell facility cooling water discharge

Variables indicated in the second column of this table refer to variables used in Equations 3-5 in the 2018 WHS TMDL Revision. This analysis assumed only cooling water flows for the Diamond-Odell fruit plant. Because the thermal effect of the combined discharges (ΔT_R) was greater than the human use allowance, a subsequent analysis was done by splitting the HUA between the two facilities to evaluate the contribution of each facility. Further details for each facility are provided in Table D-2 (Diamond Fruit-Odell) and Table C-6 (Odell WWTP).

Odell Creek Cumulative Effects Analysis (using cooling water flows for Diamond-Odell)															
	Variable	Jan	Feb	Mar	Apr 1-14	Apr 15-30	May 1-15	May 16-31	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Steelhead Spawning				Core Cold Water Habitat									
Critical period						April 15-September 30									
Applicable Temperature Criterion (^oC)	T_C	13.0				13.0		16.0					16.0		
Maximum Effluent Temp (^oC)	T_E*	15.3	14.6	14.8	14.7	15.7	17.4	17.8	19.5	21.5	22.5	22.2	21.5	19.5	16.2
Minimum Stream Flow (cfs)	Q_R*	7.1	8.9	11.2	14.1	12.0	11.6	9.8	8.9	8.9	9.1	8.5	4.6	3.2	5.6
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.424				0.424							0.424		
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.66				0.66							0.66		
Dilution Ratio with 100% of stream flow	S**	12	15	18	22	19	19	16	15	15	15	14	8	6	10
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18							N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.19	0.11	0.10	0.08	0.14	0.24	0.11	0.24	0.38	0.44	0.44	0.69	0.60	0.02
Current Thermal Load (gcals/day)	CL**	3.7	2.6	2.9	2.7	4.3	7.1	2.9	5.6	8.8	10.4	10.0	8.8	5.6	0.3
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	5.6	5.4	4.6	4.2	4.2	4.3	4.0	N/A	N/A	N/A
Odell WWTP (included in Table C-6)															
Maximum Effluent Temp (^oC)	T_E*	15.3	14.6	14.8	14.7	15.7	17.4	17.8	19.5	21.5	22.5	22.2	21.5	19.5	16.2
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.42				0.42							0.42		
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09							N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.19	0.11	0.10	0.07	0.14	0.23	0.11	0.24	0.37	0.43	0.44	0.68	0.59	0.02
Current Thermal Load (gcals/day)	CL**	3.7	2.5	2.9	2.7	4.3	7.0	2.9	5.6	8.7	10.3	9.9	8.7	5.6	0.3
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	2.8	2.7	2.3	2.1	2.1	2.1	2.0	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	1.5	4.3	0.6	3.5	6.6	8.2	7.8	N/A	N/A	N/A
Diamond-Odell facility (included in Table D-2)^															
Maximum Effluent Temp (^oC)	T_E*	16.6	17.3	19.0	19.6	19.6	19.6	19.6	19.6	19.6	20.2	17.9	16.8	16.1	16.8
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.004				0.004							0.004		
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09							N/A	N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Current Thermal Load (gcals/day)	CL**	0.05	0.07	0.09	0.10	0.10	0.10	0.05	0.05	0.05	0.06	0.03	0.01	0.00	0.01
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	2.6	2.6	2.2	2.0	2.0	2.0	1.9	N/A	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	N/A	N/A	N/A

* *Measured data*

** *Calculated data*

^ *This plant does not discharge cooling water in April-July, but a wasteload allocation was calculated since they are allowed to discharge all months in their permit.*

Table D-6. Input parameters and results for alternative Reasonable Potential Analyses for the Terminal Ice and Cold Storage facility discharge alone into the ditch (without Duckwall-Pooley Van Horn discharge).

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 14 included in Table 14 of the TMDL document).

Terminal Ice facility: ditch as receiving stream, no Duckwall-Pooley Van Horn discharge (Scenario 14)													
	Variable	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon & Trout Rearing & Migration											
Critical period				March 1-October 31									
Applicable Temperature Criterion (^oC)	T_C	18.0		18.0								18.0	
Minimum Stream Flow (cfs)	Q_R*	0.0		0.0								0.0	
Maximum Effluent Temp (^oC)	T_E*	20.0	20.0	20.0	21.1	21.1	20.0	20.0	21.1	21.1	20.0	19.4	20.0
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.12		0.12								0.12	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.19		0.19								0.19	
Dilution Ratio with 100% of stream flow	S**	1		1								1	
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	0.18								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	2.0	2.0	2.0	3.1	3.1	2.0	2.0	3.1	3.1	2.0	1.4	2.0
Current Thermal Load (gcals/day)	CL**	0.9	0.9	0.9	1.4	1.4	0.9	0.9	1.4	1.4	0.9	0.6	0.9
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	0.8	1.3	1.3	0.8	0.8	1.3	1.3	0.8	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	91%	94%	94%	91%	91%	94%	94%	91%	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	18.0								N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}	N/A	N/A	##								N/A	N/A

* *Measured data*
** *Calculated data*
*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*
Because the ditch is effluent dominated, effluent temperatures need to be less than T_{WLA} regardless of effluent flow.

Table D-7. Input parameters and results for alternative Reasonable Potential Analyses for the Terminal Ice and Cold Storage facility discharge alone into the un-named Pine Grove Creek (without Duckwall-Pooley Van Horn discharge).

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 15 included in Table 14 of the TMDL document).

Terminal Ice facility: un-named Pine Grove creek as receiving stream, no Duckwall-Pooley Van Horn discharge (Scenario 15)													
	Variable	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon & Trout Rearing & Migration											
Critical period						May 1-October 31							
Applicable Temperature Criterion (^{o}C)	T_C	18.0				18.0						18.0	
Minimum Stream Flow (cfs)	Q_R*	1.0				1.0						1.0	
Maximum Effluent Temp (^{o}C)	T_E*	20.0	20.0	20.0	21.1	21.1	20.0	20.0	21.1	21.1	20.0	19.4	20.0
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.12				0.12						0.12	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.19				0.19						0.19	
Dilution Ratio with 100% of stream flow	S**	6				6						6	
Human Use Allowance (^{o}C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18						N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.31	0.31	0.31	0.49	0.49	0.31	0.31	0.49	0.49	0.31	0.22	0.31
Current Thermal Load (gcals/day)	CL**	0.9	0.9	0.9	1.4	1.4	0.9	0.9	1.4	1.4	0.9	0.6	0.9
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	0.5	0.5	0.5	0.5	0.5	0.5	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	0.9	0.4	0.4	0.9	0.9	0.4	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	63%	43%	43%	63%	63%	43%	N/A	N/A
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	N/A	N/A	N/A	N/A	19.1						N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	0.04	0.06	0.06	0.04	0.04	0.06	N/A	N/A

* *Measured data*
** *Calculated data*
*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*
**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*

Table D-8. Input parameters and results for alternative Reasonable Potential Analyses for the Terminal Ice and Cold Storage facility discharge into the un-named Pine Grove Creek (with the Duckwall-Pooley Van Horn discharge).

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 16, included in Table 14 of the TMDL document). Results from the Neal Creek cumulative effects analysis are included in this table and show the less stringent wasteload allocation for this facility associated with that analysis.

Terminal Ice facility: un-named creek as receiving stream, with Duckwall-Pooley Van Horn discharge (Scenario 16)													
	Variable	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon & Trout Rearing & Migration											
Critical period						May 1-October 31							
Applicable Temperature Criterion (^{o}C)	T_C	18.0				18.0						18.0	
Minimum Stream Flow (cfs)	Q_R*	1.0				1.0						1.0	
Maximum Effluent Temp (^{o}C)	T_E*	20.0	20.0	20.0	21.1	21.1	20.0	20.0	21.1	21.1	20.0	19.4	20.0
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.12				0.12						0.12	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.19				0.19						0.19	
Dilution Ratio with 100% of stream flow	S**	6				6						6	
Human Use Allowance (^{o}C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09						N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.3	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.5	0.3	0.2	0.3
Current Thermal Load (gcals/day)	CL**	0.9	0.9	0.9	1.4	1.4	0.9	0.9	1.4	1.4	0.9	0.6	0.9
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	0.3	0.3	0.3	0.3	0.3	0.3	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	1.1	0.6	0.6	1.1	1.1	0.6	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	81%	71%	71%	81%	81%	71%	N/A	N/A
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	N/A	N/A	N/A	N/A	18.6						N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	0.02	0.03	0.03	0.02	0.02	0.03	N/A	N/A

From Neal Creek cumulative effects analysis (from Table C-14)															
		Jan	Feb	Mar	April	May 1-15	May 16-31	June	July	Aug	Sept	Oct 1-14	Oct 15-31	Nov	Dec
Fish Use Designation		Salmon & Steelhead Spawning				Salmon & Trout Rearing & Migration							Spawning		
Critical period						May 1-October 31									
Applicable Temperature Criterion (^{o}C)	T_C	13.0				13.0	18.0						13.0	13.0	
Minimum Stream Flow (cfs)	Q_R*	12.3	15.8	34.1	37.6	29.6	28.0	20.4	15.7	13.7	17.6	13.4	9.5	6.6	9.1
Dilution Ratio with 100% of stream flow	S**	67	86	185	203	160	152	111	86	75	96	73	52	37	50
Human Use Allowance	HUA_{PS}	N/A	N/A	N/A	N/A	0.045								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.10	0.08	0.04	0.04	0.05	0.02	0.02	0.02	0.04	0.03	0.03	0.13	0.18	0.14
Current Thermal Load (gcals/day)	CL**	3.2	3.2	3.2	3.7	3.7	1.4	0.9	0.9	1.4	1.4	0.9	3.2	2.9	3.2
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	3.3	3.1	2.3	1.7	1.5	2.0	1.5	1.1	N/A	N/A

* *Measured data*

** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

****Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*

Table D-9. Input parameters and results for alternative Reasonable Potential Analysis for Terminal Ice and Cold Storage facility discharging directly into Neal Creek with all of the current facilities continuing to discharge

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 17, included in Table 14 of the TMDL document): cells in green and blue apply during the rearing and spawning seasons (respectively).

Terminal Ice facility: Neal Creek as receiving stream, all dischargers in the watershed (Scenario 17)															
	Variable	Jan	Feb	Mar	April	May 1-15	May 16-31	June	July	Aug	Sept	Oct 1-14	Oct 15-31	Nov	Dec
Fish Use Designation		Salmon & Steelhead Spawning				Salmon & Trout Rearing & Migration							Spawning		
Critical period						May 1-October 31									
Applicable Temperature Criterion (^{o}C)	T_C	13.0				13.0	18.0						13.0	13.0	
Minimum Stream Flow (cfs)	Q_R*	12.3	15.8	34.1	37.6	29.6	28.0	20.4	15.7	13.7	17.6	13.4	9.5	6.6	9.1
Maximum Effluent Temp (^{o}C)	T_E*	20.0	20.0	20.0	21.1	21.1	21.1	20.0	20.0	21.1	21.1	20.0	20.0	19.4	20.0
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.12				0.12								0.12	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.19				0.19								0.19	
Dilution Ratio with 100% of stream flow	S**	67	86	185	203	160	152	147	86	75	96	73	52	37	50
Human Use Allowance (^{o}C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.045								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.10	0.08	0.04	0.04	0.05	0.02	0.02	0.02	0.04	0.03	0.03	0.13	0.18	0.14
Current Thermal Load (gcals/day)	CL**	3.2	3.2	3.2	3.7	3.7	1.4	0.9	0.9	1.4	1.4	0.9	3.2	2.9	3.2
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	3.3	3.1	2.3	1.7	1.5	2.0	1.5	1.1	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	0.4	--	--	--	--	--	--	2.1	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	11%	--	--	--	--	--	---	66%	N/A	N/A
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	N/A	N/A	N/A	N/A	20.2	24.8#	23.0#	21.8#	21.4#	22.3#	21.3#	15.3	N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	0.11	--	--	--	--	--	--	0.04	N/A	N/A

* *Measured data*
** *Calculated data*
*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table*
**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*
\# *When effluent temperatures are greater than 21°C, a thermal plume analysis is required during permit renewal to prevent or minimize adverse effects to salmonids within the mixing zone (OAR 340-041-0053(2)(d)).*

Table D-10. Input parameters and results for alternative Reasonable Potential Analysis for alternative discharge scenarios for the Terminal Ice and Cold Storage facility discharging directly into Neal Creek with a reduced number of dischargers in the watershed.

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 18 and Scenario 19, included in Table 14 of the TMDL document): cells in green and blue apply during the rearing and spawning seasons (respectively). Note: the minimum Neal Creek flow varies between scenarios because the flow measurement point was downstream of all of the dischargers so discharge flows were subtracted from the measured Neal Creek flow.

Terminal Ice facility: Neal Creek as receiving stream															
	Variable	Jan	Feb	Mar	April	May 1-15	May 16-31	June	July	Aug	Sept	Oct 1-14	Oct 15-31	Nov	Dec
Fish Use Designation		Salmon & Steelhead Spawning				Salmon & Trout Rearing & Migration							Spawning		
Critical period		May 1-October 31													
Applicable Temperature Criterion (^oC)	T_C	13.0				13.0	18.0						13.0	13.0	
Maximum Effluent Temp (^oC)	T_E*	20.0	20.0	20.0	21.1	21.1	21.1	20.0	20.0	21.1	21.1	20.0	20.0	19.4	20.0
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.12				0.12								0.12	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.19				0.19								0.19	
No discharge from Diamond-Central or Duckwall-Pooley Odell facilities (Scenario 18)															
Minimum Stream Flow (cfs)	Q_R*	12.8	16.3	34.7	38.1	30.1	28.5	20.9	16.2	14.2	18.1	13.9	10.0	7.1	9.6
Dilution Ratio with 100% of stream flow	S**	70	89	188	206	163	154	114	88	77	98	76	55	39	53
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.10	0.08	0.04	0.04	0.05	0.02	0.02	0.02	0.04	0.03	0.03	0.13	0.00	0.00
Current Thermal Load (gcals/day)	CL**	3.2	3.2	3.2	3.7	3.7	1.4	0.9	0.9	1.4	1.4	0.9	3.2	2.9	3.2
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	6.7	6.3	4.6	3.6	3.2	4.0	3.1	2.2	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	--	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	27.7#	31.9#	28.2#	25.9#	25.0#	26.9#	24.8#	17.9	N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	0.08	N/A	N/A
Terminal Ice the only discharger in watershed (Scenario 19)															
Minimum Stream Flow (cfs)	Q_R*	12.9	16.4	34.7	38.2	30.2	28.6	21.0	16.3	14.3	18.2	14.0	10.1	7.2	9.7
Dilution Ratio with 100% of stream flow	S**	70	89	188	207	164	155	114	89	78	99	76	55	40	53
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.10	0.08	0.04	0.04	0.05	0.02	0.02	0.02	0.04	0.03	0.03	0.13	0.16	0.13
Current Thermal Load (gcals/day)	CL**	3.2	3.2	3.2	3.7	3.7	1.4	0.9	0.9	1.4	1.4	0.9	3.2	2.9	3.2
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	13	13	9.3	7.3	6.4	8.1	6.2	4.5	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	--	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #							23.0#	N/A	N/A

* *Measured data* ** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*

\# *When effluent temperatures are greater than 21°C, a thermal plume analysis is required during permit renewal to prevent or minimize adverse effects to salmonids within the mixing zone (OAR 340-041-0053(2)(d)). In Scenario 19, the calculated maximum allowable effluent temperature under allocated conditions is greater than is physically possible to generate at the facility (>31.7*C) during most months. The calculated value of T_{WLA} does not allow a facility to discharge effluent at these high temperatures. T_{WLA} needs to comply with thermal plume limitations in this OAR.*

Table D-11. Input parameters and results for alternative Reasonable Potential Analyses for the Duckwall-Pooley Fruit Company Van Horn facility discharge alone into the ditch (without Terminal Ice and Cold Storage discharge).

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 21, included in Table 14 of the TMDL document).

Duckwall-Pooley Van Horn facility: ditch as receiving stream, no Terminal Ice discharge (Scenario 21)													
	Variable	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon & Trout Rearing & Migration											
Critical period				March 1-October 31									
Applicable Temperature Criterion (^{o}C)	T_C	18.0		18.0								18.0	
Minimum Stream Flow (cfs)	Q_R*	0.0		0.0								0.0	
Maximum Effluent Temp (^{o}C)	T_E*	20.6	20.9	19.7	22.4	20.9	21.9	22.5	26.6	25.1	22.6	23.1	24.3
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.04		0.04								0.04	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.06		0.06								0.06	
Dilution Ratio with 100% of stream flow	S**	1		1								1	
Human Use Allowance (^{o}C)	HUA_{PS}	N/A	N/A	0.18								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	2.6	2.9	1.7	4.4	2.9	3.9	4.5	8.6	7.1	4.6	5.1	6.3
Current Thermal Load (gcals/day)	CL**	0.4	0.4	0.3	0.7	0.4	0.6	0.7	1.3	1.1	0.7	0.8	1.0
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	0.2	0.6	0.4	0.6	0.7	1.3	1.0	0.7	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	89%	96%	94%	95%	96%	98%	97%	96%	N/A	N/A
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	N/A	N/A	18.0								N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}	N/A	N/A	##								N/A	N/A

* *Measured data* ** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

Because the ditch is effluent dominated, effluent temperatures need to be less than T_{WLA} regardless of effluent flow.

Table D-12. Input parameters and results for alternative Reasonable Potential Analyses for the Duckwall-Pooley Fruit Company Van Horn facility discharge alone into the un-named Pine Grove creek (without Terminal Ice and Cold Storage discharge).

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 22, included in Table 14 of the TMDL document).

Duckwall-Pooley Van Horn facility: un-named creek as receiving stream, no Terminal Ice discharge (Scenario 22)													
	Variable	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon & Trout Rearing & Migration											
Critical period						May 1-October 31							
Applicable Temperature Criterion (^oC)	T_C	18.0				18.0						18.0	
Minimum Stream Flow (cfs)	Q_R*	1.0				1.0						1.0	
Maximum Effluent Temp (^oC)	T_E*	20.6	20.9	19.7	22.4	20.9	21.9	22.5	26.6	25.1	22.6	23.1	24.3
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.04				0.04						0.04	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.06				0.06						0.06	
Dilution Ratio with 100% of stream flow	S**	17				17						17	
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18						N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.15	0.17	0.10	0.26	0.17	0.23	0.26	0.50	0.41	0.27	0.30	0.37
Current Thermal Load (gcals/day)	CL**	0.4	0.4	0.3	0.7	0.4	0.6	0.7	1.3	1.1	0.7	0.8	1.0
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	0.5	0.5	0.5	0.5	0.5	0.5	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	--	0.1	0.2	0.8	0.6	0.2	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	--	21%	31%	64%	57%	33%	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	21.1#						N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	--	0.03	0.03	0.01	0.02	0.03	N/A	N/A

* *Measured data*
** *Calculated data*
*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*
**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*
\# *When effluent temperatures are greater than 21°C, a thermal plume analysis is required during permit renewal to prevent or minimize adverse effects to salmonids within the mixing zone (OAR 340-041-0053(2)(d)).*

Table D-13. Input parameters and results for alternative Reasonable Potential Analyses for the Duckwall-Pooley Fruit Company Van Horn discharge into the un-named Pine Grove Creek (with the Terminal Ice and Cold Storage discharge).

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells in grey indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 23, included in Table 14 of the TMDL document). Results from the Neal Creek cumulative effects analysis are included in this table and show the less stringent wasteload allocation for this facility associated with that analysis.

Duckwall-Pooley Van Horn facility: un-named creek as receiving stream, with Terminal Ice discharge (Scenario 23)													
	Variable	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Fish Use Designation		Salmon & Trout Rearing & Migration											
Critical period						May 1-October 31							
Applicable Temperature Criterion (^{o}C)	T_C	18.0				18.0						18.0	
Minimum Stream Flow (cfs)	Q_R*	1.0				1.0						1.0	
Maximum Effluent Temp (^{o}C)	T_E*	20.6	20.9	19.7	22.4	20.9	21.9	22.5	26.6	25.1	22.6	23.1	24.3
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.04				0.04						0.04	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.06				0.06						0.06	
Dilution Ratio with 100% of stream flow	S**	17				17						17	
Human Use Allowance (^{o}C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09						N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.2	0.2	0.1	0.3	0.2	0.2	0.3	0.5	0.4	0.3	0.3	0.4
Current Thermal Load (gcals/day)	CL**	0.4	0.4	0.3	0.7	0.4	0.6	0.7	1.3	1.1	0.7	0.8	1.0
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	0.2	0.2	0.2	0.2	0.2	0.2	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	0.2	0.4	0.4	1.1	0.8	0.5	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	47%	60%	66%	82%	78%	66%	N/A	N/A
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	N/A	N/A	N/A	N/A	19.5						N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	0.02	0.02	0.01	0.01	0.01	0.01	N/A	N/A

From Neal Creek cumulative effects analysis (Table C-14)															
		Jan	Feb	Mar	April	May 1-15	May 16-31	June	July	Aug	Sept	Oct 1-14	Oct 15-31	Nov	Dec
Fish Use Designation		Salmon & Steelhead Spawning				Salmon & Trout Rearing & Migration							Spawning		
Critical period						May 1-October 31									
Applicable Temperature Criterion (^{o}C)	T_C	13.0				13.0	18.0						13.0	13.0	
Minimum Stream Flow (cfs)	Q_R*	12.3	15.8	34.1	37.6	29.6	28.0	20.4	15.7	13.7	17.6	13.4	9.5	6.6	9.1
Dilution Ratio with 100% of stream flow	S**	200	256	552	608	479	453	330	255	222	285	217	154	108	148
Human Use Allowance	HUA_{PS}	N/A	N/A	N/A	N/A	0.045								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.04	0.03	0.01	0.02	0.02	0.00	0.01	0.02	0.04	0.02	0.02	0.06	0.09	0.08
Current Thermal Load (gcals/day)	CL**	1.2	1.2	1.0	1.4	1.2	-0.1	0.6	0.7	1.3	1.1	0.7	1.4	1.5	1.7
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	3.3	3.1	2.3	1.7	1.5	1.9	1.5	1.1	N/A	N/A

* *Measured data* ** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*

Table D-14. Input parameters and results for alternative Reasonable Potential Analysis for Duckwall-Pooley Fruit Company Van Horn facility discharging directly into Neal Creek with all of the current facilities continuing to discharge.

Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 24, included in Table 14 of the TMDL document): cells in green and blue apply during the rearing and spawning seasons (respectively).

Duckwall-Pooley Van Horn facility: Neal Creek as receiving stream, all dischargers in the watershed (Scenarion 24)															
	Variable	Jan	Feb	Mar	April	May 1-15	May 16-31	June	July	Aug	Sept	Oct 1-14	Oct 15-31	Nov	Dec
Fish Use Designation		Salmon & Steelhead Spawning					Salmon & Trout Rearing & Migration						Spawning		
Critical period						May 1-October 31									
Applicable Temperature Criterion (^{o}C)	T_C	13.0				13.0	18.0						13.0	13.0	
Minimum Stream Flow (cfs)	Q_R*	12.3	15.8	34.1	37.6	29.6	28.0	20.4	15.7	13.7	17.6	13.4	9.5	6.6	9.1
Maximum Effluent Temp (^{o}C)	T_E*	20.6	20.9	19.7	22.4	20.9	17.3	21.9	22.5	26.6	25.1	22.6	22.5	23.1	24.3
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.04				0.04								0.04	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.06				0.06								0.06	
Dilution Ratio with 100% of stream flow	S**	200	256	552	608	479	453	330	255	222	285	217	154	108	148
Human Use Allowance (^{o}C)	HUA_{PS}	N/A	N/A	N/A	N/A	0.045								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^{o}C)	ΔT_R**	0.04	0.03	0.01	0.02	0.02	0.00	0.01	0.02	0.04	0.02	0.02	0.06	0.09	0.08
Current Thermal Load (gcals/day)	CL**	1.2	1.2	1.0	1.4	1.2	-0.1	0.6	0.7	1.3	1.1	0.7	1.4	1.5	1.7
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	3.3	3.1	2.3	1.7	1.5	1.9	1.5	1.1	N/A	N/A
Load reduction needed to meet WLA (gcals/day)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	0.4	N/A	N/A
Load reduction needed to meet WLA (%)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	27%	N/A	N/A
Maximum Allowable Effluent Temperature (^{o}C)	T_{WLA}***	N/A	N/A	N/A	N/A	34.6#	38.4#	32.9#	29.5#	28.0#	30.8#	27.8#	19.9	N/A	N/A
Maximum Allowable Effluent Flow (MGD)	Q_{WLA}****	N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	0.03	N/A	N/A

* *Measured data*

** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table*

**** *Calculated maximum effluent discharge flow that would meet the WLA, assuming maximum effluent temperature and minimum stream flows as presented in this table.*

\# *The calculated value of T_{WLA} does not allow a facility to discharge effluent at these high temperatures. When effluent temperatures are greater than 21°C, a thermal plume analysis is required during permit renewal to prevent or minimize adverse effects to salmonids within the mixing zone (OAR 340-041-0053(2)(d)).*

Table D-15. Input parameters and results for alternative Reasonable Potential Analysis for alternative discharge scenarios for the Duckwall-Pooley Fruit Company Van Horn facility discharging directly into Neal Creek with a reduced number of dischargers in the watershed.
Variables indicated in the second column of this table refer to variables used in Equations 3-7 in the 2018 WHS TMDL Revision. Shaded cells indicate variables and values associated with the alternative wasteload allocations which apply during the critical period (Scenario 25 and Scenario 26, included in Table 14 of the TMDL document): cells in green and blue apply during the rearing and spawning seasons (respectively). Note: the minimum Neal Creek flow varies between scenarios because the flow measurement point was downstream of all of the dischargers so discharge flows were subtracted from the measure Neal Creek flow.

Duckwall-Pooley Van Horn facility: Neal Creek as receiving stream															
	Variable	Jan	Feb	Mar	April	May 1-15	May 16-31	June	July	Aug	Sept	Oct 1-14	Oct 15-31	Nov	Dec
Fish Use Designation		Salmon & Steelhead Spawning					Salmon & Trout Rearing & Migration						Spawning		
Critical period						May 1-October 31									
Applicable Temperature Criterion (^oC)	T_C	13.0				13.0	18.0						13.0	13.0	
Maximum Effluent Temp (^oC)	T_E*	20.6	20.9	19.7	22.4	20.9	17.3	21.9	22.5	26.6	25.1	22.6	22.5	23.1	24.3
Effluent Flow (avg. dry-weather design flow) (MGD)	Q_E	0.04				0.04								0.04	
Effluent Flow (avg. dry-weather design flow) (cfs)	Q_E	0.06				0.06								0.06	
No discharge from Diamond-Central or Duckwall-Pooley Odell plants (Scenario 25)															
Minimum Stream Flow (cfs)	Q_R*	12.8	16.3	34.7	38.1	30.1	28.5	20.9	16.2	14.2	18.1	13.9	10.0	7.1	9.6
Dilution Ratio with 100% of stream flow	S**	208	264	561	616	487	461	339	263	230	293	225	162	116	156
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.09								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.04	0.03	0.01	0.02	0.02	0.00	0.01	0.02	0.04	0.02	0.02	0.06	0.09	0.07
Current Thermal Load (gcals/day)	CL**	1.2	1.2	1.0	1.4	1.2	-0.1	0.6	0.7	1.3	1.1	0.7	1.4	1.5	1.7
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	6.6	6.3	4.6	3.6	3.1	4.0	3.1	2.2	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	--	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #								N/A	N/A
Duckwall-Pooley Van Horn is the only discharger in watershed (Scenario 26)															
Minimum Stream Flow (cfs)	Q_R*	13.0	16.5	34.9	38.3	30.3	28.7	21.1	16.4	14.4	18.3	14.1	10.2	7.3	9.8
Dilution Ratio with 100% of stream flow	S**	211	267	565	620	490	465	342	266	234	297	229	166	119	159
Human Use Allowance (^oC)	HUA_{PS}	N/A	N/A	N/A	N/A	0.18								N/A	N/A
Calculated Change in Creek Temperature under Current Operations (^oC)	ΔT_R**	0.04	0.03	0.01	0.02	0.02	0.01	0.01	0.02	0.04	0.02	0.02	0.06	0.08	0.07
Current Thermal Load (gcals/day)	CL**	1.2	1.2	1.0	1.4	1.2	0.4	0.6	0.7	1.3	1.1	0.7	1.5	1.5	1.7
Wasteload Allocation Thermal Load (gcals/day)	WLA**	N/A	N/A	N/A	N/A	13	13	9.3	7.2	6.4	8.1	6.2	4.5	N/A	N/A
Load reduction needed to meet WLA (gcals/day, %)		N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	--	N/A	N/A
Maximum Allowable Effluent Temperature (^oC)	T_{WLA}***	N/A	N/A	N/A	N/A	OAR 340-041-0053(2)(d) #								N/A	N/A

* *Measured data* ** *Calculated data*

*** *Calculated maximum effluent temperature that would meet the WLA, assuming design flows and minimum stream flows as presented in this table.*

\# *The calculated maximum allowable effluent temperature under allocated conditions is greater than is physically possible to generate at the facility (>27.6*C). The calculated value of T_{WLA} does not allow a facility to discharge effluent at these high temperatures. T_{WLA} needs to comply with thermal plume limitations in this OAR.*