

Updated Root River Return Flow Hydraulic Conditions for Maximum 10.1 mgd Return Flow Rate

PREPARED FOR: City of Waukesha
 PREPARED BY: CH2M HILL
 DATE: March 23, 2015

As part of the Wisconsin Department of Natural Resources (WDNR) review of The City of Waukesha Application for Lake Michigan Diversion with Return Flow (Application), the WDNR requested that Tables 3 and 4 in Appendix K of Volume 4 of the Application be updated for a maximum return flow rate of 10.1 mgd.

TABLE 3
Summary of HEC-RAS Model Simulation Results for Return Flow at the Discharge Location

Root River Flow Scenario	River Flow Rate (cfs)	Return Flow Rate (cfs)	River Flow Rate with Return Flow (cfs)	Percent Increase in River Flow Rate (%)	Increase in water depth (ft)	Percent Increase water depth (%)	River Average Velocity (fps)	River Average Velocity with Return Flow (fps)
Low Flow	3	15.6	18.6	520%	0.59	52%	0.11	0.38
2-year	1030	15.6	1045.6	1.51%	0.04	0.46%	1.54	1.53
5-year	1720	15.6	1735.6	0.91%	0.03	0.30%	1.47	1.47
10-year	2300	15.6	2315.6	0.68%	0.03	0.27%	1.48	1.48
25-year	3180	15.6	3195.6	0.49%	0.02	0.16%	1.56	1.57
50-year	3940	15.6	3955.6	0.40%	0.01	0.08%	1.66	1.66
100-year	4820	15.6	4835.6	0.32%	0.02	0.14%	1.75	1.76

TABLE 4
Summary of HEC-RAS Model Simulation Results for Return Flow at the Steelhead Egg Harvesting Facility

Root River Flow Scenario	River Flow Rate (cfs)	Return Flow Rate (cfs)	River Flow Rate with Return Flow (cfs)	Percent Increase in River Flow Rate (%)	Increase in water depth (ft)	Percent Increase water depth (%)	River Average Velocity (fps)	River Average Velocity with Return Flow (fps)
Low Flow	5.6	15.6	21.2	279%	0.47	69%	0.63	0.84
2-year	1927	15.6	1942.6	0.81%	0.03	0.41%	3.44	3.45
5-year	2843	15.6	2858.6	0.55%	0.02	0.23%	3.90	3.91
10-year	3510	15.6	3525.6	0.44%	0.02	0.21%	4.14	4.15
25-year	4421	15.6	4436.6	0.35%	0.01	0.09%	4.50	4.51
50-year	5148	15.6	5163.6	0.30%	0.01	0.09%	4.82	4.83
100-year	5916	15.6	5931.6	0.26%	0.01	0.08%	5.04	5.05