

PROBLEM STATEMENT:

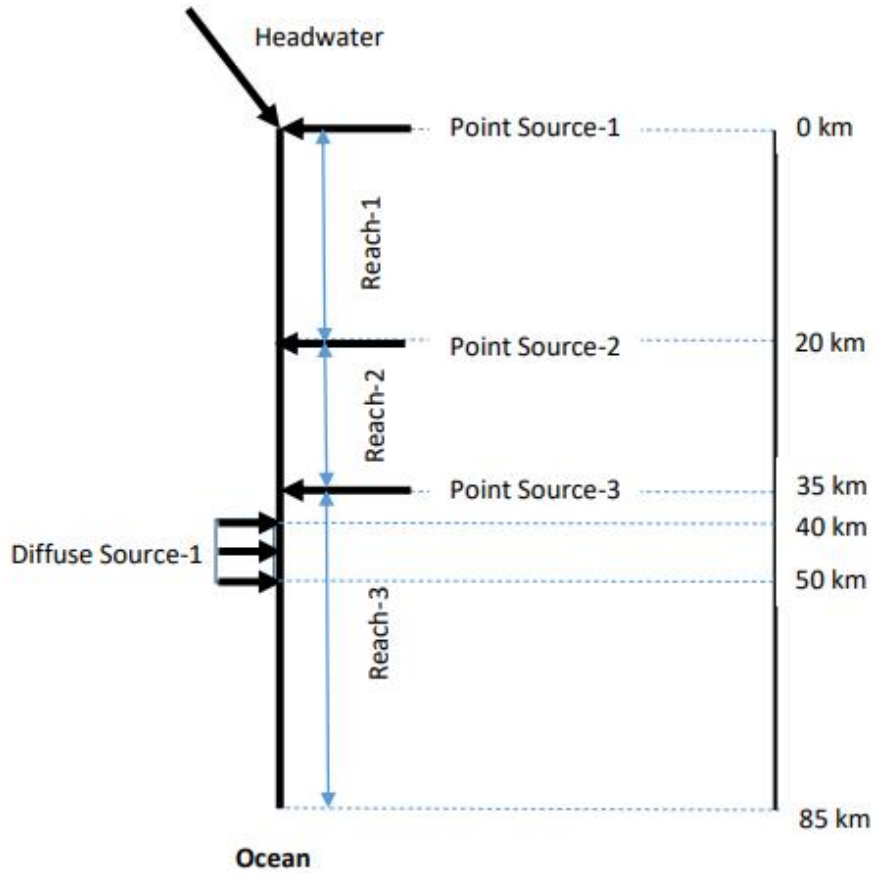


Table 1: Water Quality Parameters

Parameter	Headwater	Point Source-1	Point Source-2	Point Source-3	Diffuse Source-1
Flow rate, Q (m^3/s)	10	2	3	2	0.2
Fast CBOD, mg/L	5	60	50	250	35
$\text{NH}_4\text{-N}$, mg/L	15	25	100	75	20
Inorganic-P, mg/L	2	10	20	40	10
Temperature, $^{\circ}\text{C}$	15	35	30	40	10
Pathogens, cfu/100 mL	0	0	170	500	50
Phytoplankton, mg/L	20	5	200	50	10
DO, mg/L	7	2	2	3	1.5

Table 2: Reach Characteristics

Parameter	Reach-1	Reach-2	Reach-3
Channel slope	0.002	0.001	0.005
Side slope	2	1	1.5
Bottom width, m	20	15	30
Roughness	0.033	0.035	0.03
Solar intensity, W/m ²	700 (8AM-8PM) 20 (8PM-8AM)	1000 (9AM-6PM) 20 (6PM-9AM)	500 (8AM-5PM) 30 (5PM-8AM)
Wind speed, m/s	5	10	10

SOLUTION:

1. Entering upstream values in Qual2kw

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QUAL2Kw

Stream Water Quality Model

LA-8 Solution (4/12/2021)

Headwater and Downstream Boundary Data:

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Headwater Flow	10.000 m ³ /s												
Prescribed downstream boundary?	No												
Headwater Water Quality	Units	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM
Temperature	C	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Conductivity	umhos												
Inorganic Solids	mgD/L												
Dissolved Oxygen	mg/L	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	
CBODslow	mgO ₂ /L												
CBODfast	mgO ₂ /L	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	
Organic Nitrogen	ugN/L												
NH ₄ Nitrogen	ugN/L	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	
NO ₃ Nitrogen	ugN/L												
Organic Phosphorus	ugP/L												
Inorganic Phosphorus (SRP)	ugP/L	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	2000.00	
Phytoplankton	ugA/L	20000.00	20000.00	20000.00	20000.00	20000.00	20000.00	20000.00	20000.00	20000.00	20000.00	20000.00	
Detritus (POM)	mgD/L												
Pathogen	cfu/100 mL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generic constituent	user defined												
Alkalinity	mgCaCO ₃ /L	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
pH	s.u.	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	
Downstream Boundary Water Quality (optional)	Units	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM
Temperature	C												
Conductivity	umhos												

QUAL2K Headwater Reach Reach Rates Initial Conditions Air Temperature Dew Point Temperature Wind Speed Cloud Cover Shade Solar Light and Wind

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2. Specifying reach characteristics

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

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change diel plots to this reach

Reach length (km)	Downstream		Elevation location (km)	Upstream (m)	Downstream						Weir		Hydraulic Model (Weir Overrides Rating Curves; Rating Curves Override Manning Formula)				Manning Formula				
	Latitude	Longitude			Latitude	Longitude	Latitude	Longitude	Height (m)	Width (m)	Velocity Coefficient	Exponent	Depth Coefficient	Exponent	Channel Slope	Manning n	Bot Width (m)	Side Slope	Side Slope		
0.00	0.00	0.00	0.000											0.002	0.0330	20.00	2.00				
0.10	0.00	0.00	0.100											0.002	0.0330	20.00	2.00				
0.40	0.00	0.00	0.500											0.002	0.0330	20.00	2.00				
0.50	0.00	0.00	1.000											0.002	0.0330	20.00	2.00				
18.00	0.00	0.00	19.000											0.002	0.0330	20.00	2.00				
0.50	0.00	0.00	19.500											0.002	0.0330	20.00	2.00				
0.40	0.00	0.00	19.900											0.002	0.0330	20.00	2.00				
0.10	0.00	0.00	20.000											0.002	0.0330	20.00	2.00				
0.10	0.00	0.00	20.100											0.001	0.0350	15.00	1.00				
0.40	0.00	0.00	20.500											0.001	0.0350	15.00	1.00				
0.50	0.00	0.00	21.000											0.001	0.0350	15.00	1.00				
13.00	0.00	0.00	34.000											0.001	0.0350	15.00	1.00				
0.50	0.00	0.00	34.500											0.001	0.0350	15.00	1.00				
0.40	0.00	0.00	34.900											0.001	0.0350	15.00	1.00				
0.10	0.00	0.00	35.000											0.001	0.0350	15.00	1.00				
0.10	0.00	0.00	35.100											0.005	0.0300	30.00	1.50				
0.40	0.00	0.00	35.500											0.005	0.0300	30.00	1.50				
0.50	0.00	0.00	36.000											0.005	0.0300	30.00	1.50				
3.00	0.00	0.00	39.000											0.005	0.0300	30.00	1.50				
0.50	0.00	0.00	39.500											0.005	0.0300	30.00	1.50				
0.40	0.00	0.00	39.900											0.005	0.0300	30.00	1.50				
0.10	0.00	0.00	40.000											0.005	0.0300	30.00	1.50				
0.10	0.00	0.00	40.100											0.005	0.0300	30.00	1.50				
0.40	0.00	0.00	40.500											0.005	0.0300	30.00	1.50				
0.50	0.00	0.00	41.000											0.005	0.0300	30.00	1.50				
8.00	0.00	0.00	49.000											0.005	0.0300	30.00	1.50				
0.50	0.00	0.00	49.500											0.005	0.0300	30.00	1.50				

QUAL2K Headwater Reach Reach Rates Initial Conditions Air Temperature Dew Point Temperature Wind Speed Cloud Cover Shade Solar Light and Heat

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3. Specifying point sources

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QUAL2Kw Stream Water Quality Model LA-8 Solution (4/12/2021) Point Source Data:

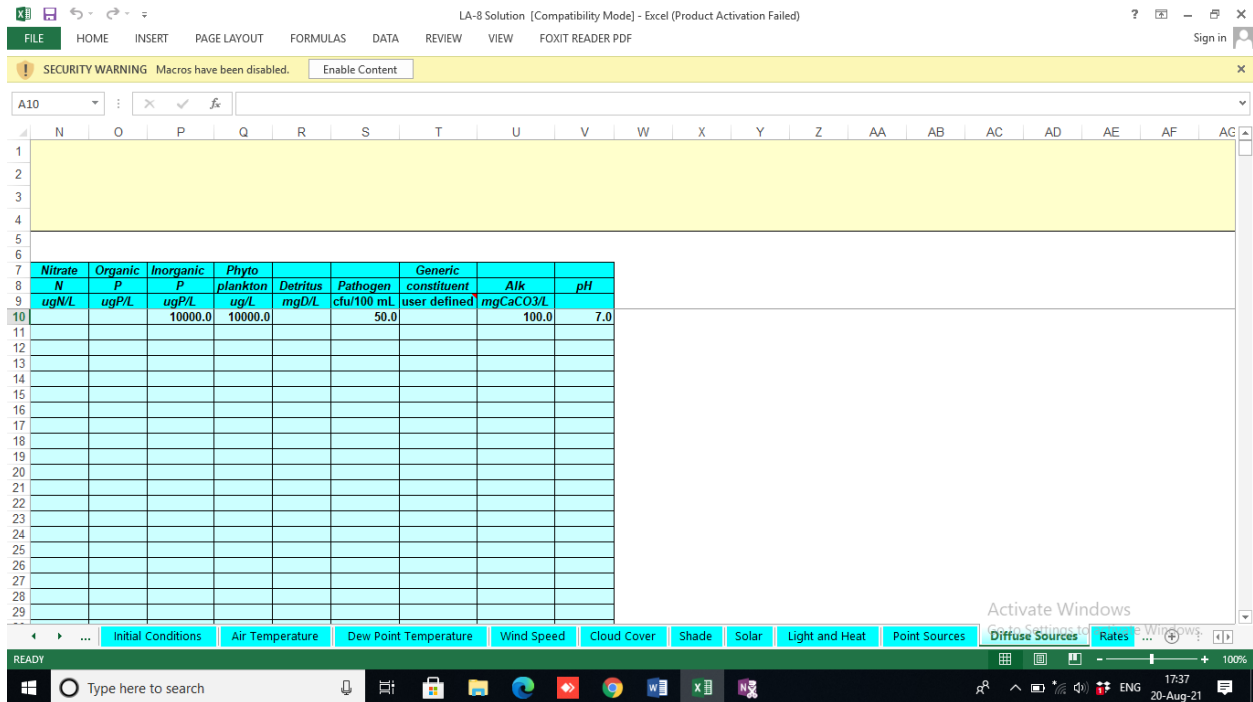
Open File Run VBA Run Fortran

Name	Location (km)	Point		Temperature			Specific Conductance			Inorganic Suspended Solids			Dissolved
		Abstraction m ³ /s	Inflow m ³ /s	mean °C	range/2 °C	time of max	mean umhos	range/2 umhos	time of max	mean mg/L	range/2 mg/L	time of max	
	0.00	0.0000	2.0000	35.00									2.00
	20.00	0.0000	3.0000	30.00									2.00
	35.00	0.0000	2.0000	40.00									3.00

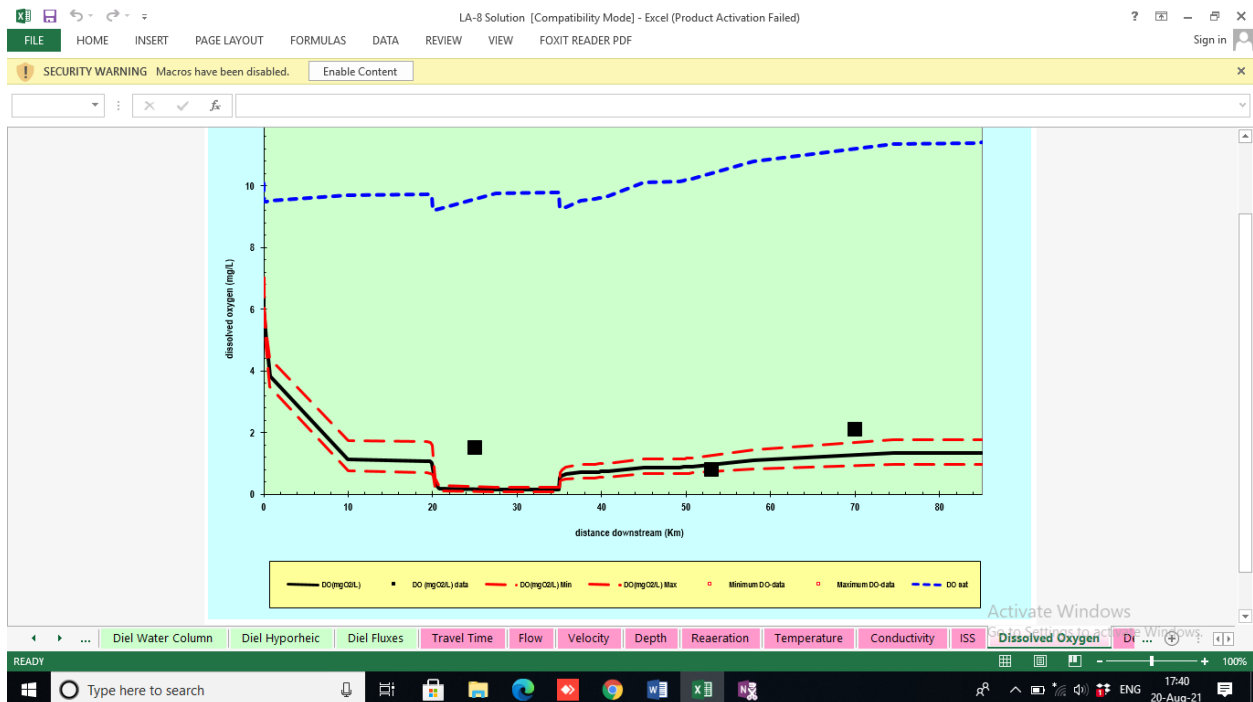
Reach Reach Rates Initial Conditions Air Temperature Dew Point Temperature Wind Speed Cloud Cover Shade Solar Light and Heat Point Sources

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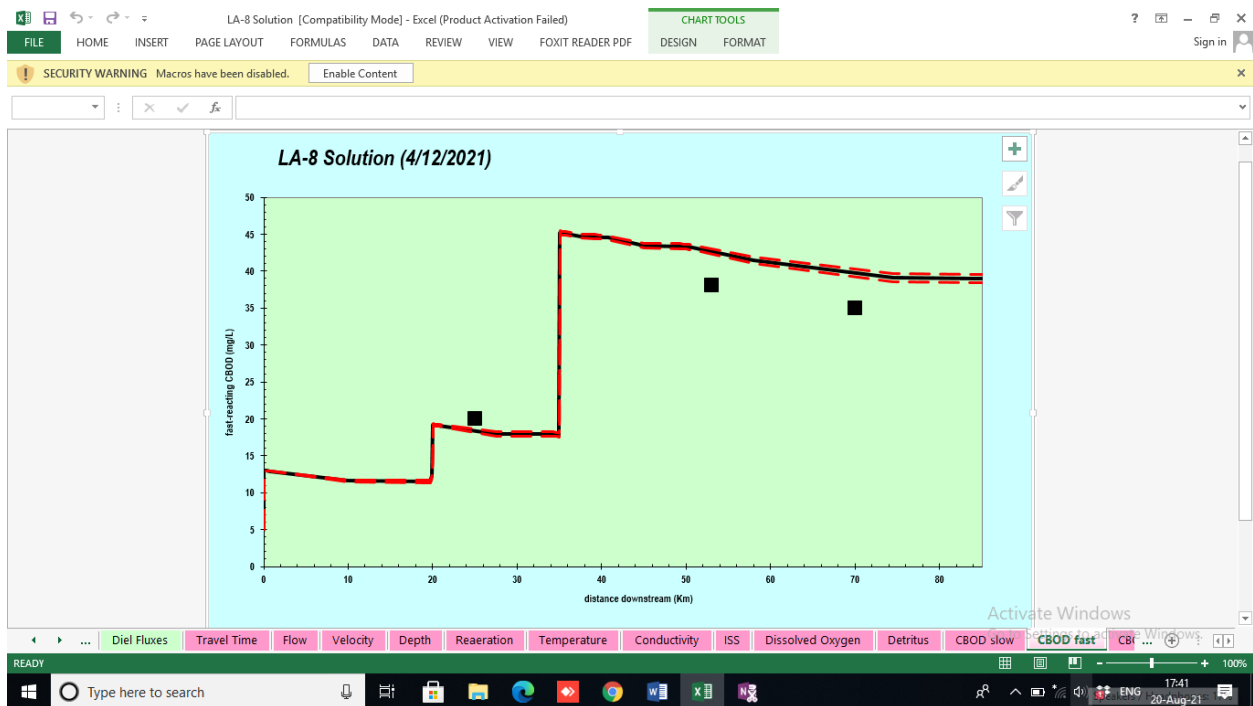
4. Specifying Diffuse source



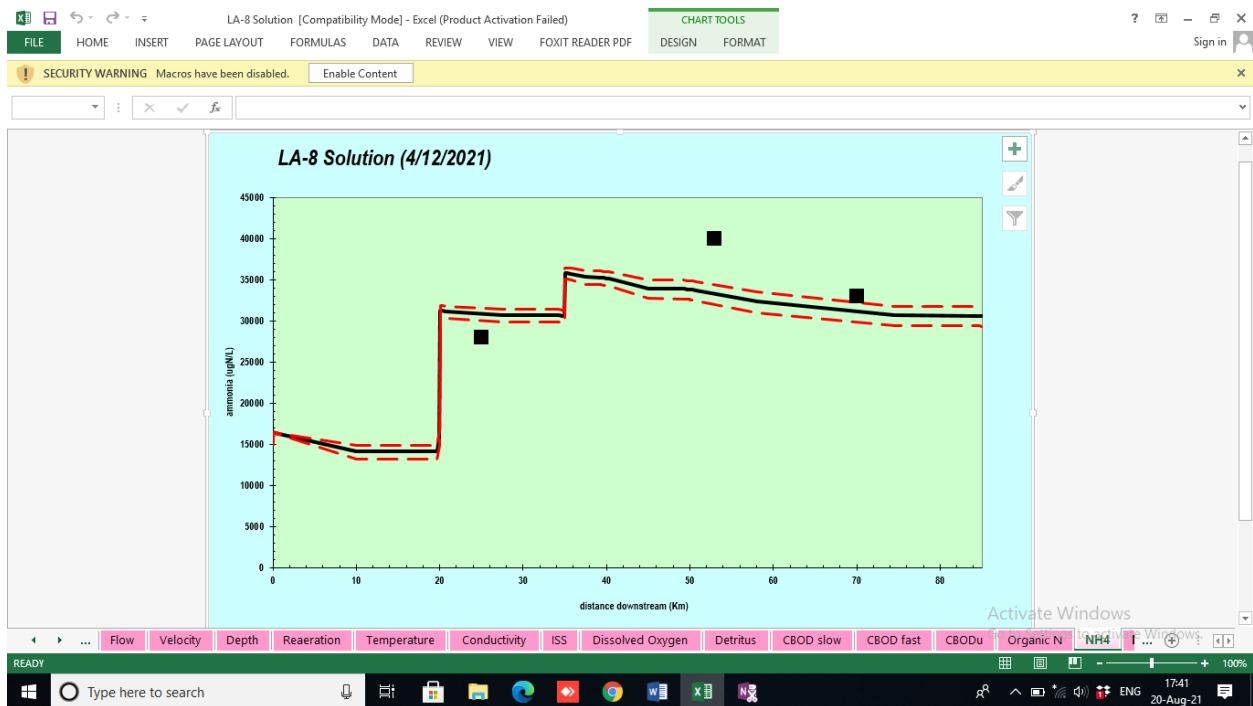
5. Results: Dissolved oxygen



CBoD Fast



Ammonia



Nitrate

