

Appendix 14.1

Regulatory and Baseline Water Quality

Regulatory Water Quality Standards

Table 14.1.1: Surface Water Quality – Physio-Chemical Conditions supporting Biological Elements from Relevant Legislation (Part A – General Conditions)

Parameters	Units	Surface Water (Amendments) Regulations 2019	Salmonid Water Regulations, 1988 (Mandatory Levels)
<i>Thermal Conditions</i>			
Temperatures	°C	Not greater than a 1.5°C rise in ambient temperature outside the mixing zone	
<i>Oxygenation Conditions (Biochemical Oxygen Demand)</i>			
Biochemical Oxygen Demand (BOD)	mg O ₂ /l	<u>River Water Body</u> High Status ≤ 1.3 (mean) or ≤ 2.2 (95%ile) Good Status ≤ 1.5 (mean) or ≤ 2.6 (95%ile) <u>Transitional Water Body</u> High Status ≤ 3.0 (mean) (95%ile) Good Status ≤ 4.0 (mean) (95%ile)	≤ 5
Dissolved Oxygen Lower Limit	mg O ₂ /l	<u>River Water Body</u> 95%ile ≥ 80% Saturation <u>Transitional Water Body (summer)</u> High Status (0-17 psu 95%ile ≥ 80% Saturation Good Status (0-17 psu 95%ile ≥ 70% Saturation)	50% ≥ 9
Dissolved Oxygen Upper Limit	mg O ₂ /l	<u>River Water Body</u> 95%ile ≤ 120% Saturation <u>Transitional Water Body (summer)</u> High Status (0-17 psu 95%ile ≤ 120% Saturation Good Status (0-17 psu 95%ile ≤ 130% saturation)	
<i>Acidification Status</i>			
Acidification Status	pH	<u>River Water Body</u> Soft ⁽³⁾ Water 4.5<pH<9.0 Hard ⁽⁴⁾ Water 6.0<pH<9.0 <u>Transitional Water Body</u> N/A	≤ 6.5 & ≤ 9.5
⁽³⁾ Water Hardness 100 mg/l CaCO ₃ ⁽⁴⁾ Water Hardness > 100 mg/l CaCO ₃			

Parameters	Units	Surface Water (Amendments) Regulations 2019	Salmonid Water Regulations, 1988 (Mandatory Levels)
<i>Nutrient Conditions</i>			
Total Ammonia	mg N/l	<u>River Water Body</u> High Status ≤ 0.040 (mean) and ≤ 0.090 (95%ile) Good Status ≤ 0.065 (mean) and ≤ 0.140 (95%ile) <u>Transitional Water Body (winter and summer)</u> N/A	N/A
Dissolved Inorganic Nitrogen	mg N/l	<u>River Water</u> N/A <u>Transitional Water Body (winter and summer)</u> N/A	N/A
Molybdate Reactive Phosphorus (MRP)	mg P/l	<u>River Water Body</u> High Status ≤ 0.025 (mean) and ≤ 0.045 (95%ile) Good Status ≤ 0.035 (mean) and ≤ 0.045 (95%ile) <u>Transitional Water Body (winter and summer)</u> High Status (0-17 psu) ≤ 0.030 (median) (>17-35psu) $\leq 0.030-0.025$ (median) Good Status (0-17 psu) ≤ 0.060 (median) (>17-35psu) $\leq 0.060-0.040$ (median)	N/A
Total Phosphorus	mg P/l	<u>River Water</u> N/A <u>Transitional Water Body (winter and summer)</u> N/A	N/A
Suspended Solids	mg/ litre	<u>River Water</u> N/A <u>Transitional Water Body (winter and summer)</u> N/A	≤ 25
Nitrites	mg/ litre NO ₂	N/A	≤ 0.05
Non-ionized Ammonia	mg/ litre NH ₃	N/A	≤ 0.02
Total Ammonium	mg/ litre NH ₄	N/A	≤ 1.0

Parameters	Units	Surface Water (Amendments) Regulations 2019	Salmonid Water Regulations, 1988 (Mandatory Levels)
Total Residual Chlorine	mg/ litres HOC ₁	N/A	≤ 0.005

⁽²⁾ Growing Season March to September

Source: Table 8 of European Union Environmental Objectives (Surface Water) (Amendment) Regulations (S.I No. 77 of 2019). If a particular parameter is not found in S.I. No. 77 of 2019 then the regulation 2009 value applies

Table 14.1.2: Surface Water Quality – Physio-chemical Conditions supporting Biological Elements from Relevant Legislation (Part B – Specific Pollutants)

Parameters	Units	Surface Water (Amendments) Regulations 2019	Salmonid Water Regulations, 1988 (Mandatory Levels)
Copper	mg/ litre Cu	<u>Inland Surface Waters</u> 5 – water hardness ≤100mg/l CaCO ₃ 30 – water hardness >100mg/l CaCO ₃ <u>Other Surface Waters</u> 5 – water hardness ≤100mg/l CaCO ₃	10 ≤ 0.005 50 ≤ 0.022 100 ≤ 0.04 500 ≤ 0.112
Zinc	mg/ litre Zn	<u>Inland Surface Waters</u> 0.008 – water hardness ≤100mg/l CaCO ₃ 0.05 – water hardness >10 ≤100mg/l CaCO ₃ – water hardness >100mg/l CaCO ₃ <u>Other Surface Waters</u> 0.04 – water hardness	10 ≤ 0.03 50 ≤ 0.2 100 ≤ 0.3 300 ≤ 0.5

Source: Table 8 of European Union Environmental Objectives (Surface Water) (Amendment) Regulations (S.I No. 77 of 2019). If a particular parameter is not found in S.I. No. 77 of 2019 then the regulation 2009 value applies

Table 14.1.3 Q value classification

Q Value	WFD Status	Pollution Status	Condition (re beneficial uses)
Q5, Q4-5	High	Unpolluted	Satisfactory
Q4	Good	Unpolluted	Satisfactory
Q3-4	Moderate	Slightly polluted	Unsatisfactory
Q3, Q2-3	Poor	Moderately polluted	Unsatisfactory
Q2, Q1-2, Q1	Bad	Seriously polluted	Unsatisfactory

Source: EPA website (<http://www.epa.ie/QValue/webusers/>)

Table 14.1.4 Transitional Water - Biological Quality Elements

Biological Quality Elements	Classification System	Ecological Quality Ratio	
		High-Good boundary	Good moderate boundary
Macroalgae	OGA Tool – Opportunistic Green Macroalgal Abundance	0.80	0.60
Angiosperms	Intertidal Seagrass tool	0.80	0.61
Phytoplankton	Phytoplankton biomass (2) (Chlorophyll)	0.80	0.60
	Phytoplankton composition	0.80	0.60
Fish	TFCI – Transitional Fish Classification Index	0.81	0.58
	EMFI – Estuarine Multi -metric Fish Index	0.92	0.65
Benthic invertebrate fauna	IQI – Infaunal Quality Index	0.75	0.64

(2) Growing Season March to September

Source: Table 8 of European Union Environmental Objectives (Surface Water) (Amendment) Regulations (S.I No. 77 of 2019)

Table 14.1.5 Coastal - Biological Quality Elements

Biological Quality Elements	Classification System	Ecological Quality Ratio	
		High-Good boundary	Good moderate boundary
Macroalgae	RSL – Rocky shore reduced species list	0.80	0.60
	OGA Tool – Opportunistic Green Macroalgal Abundance	0.80	0.60
Angiosperms	Intertidal Seagrass tool	0.80	0.61
	SMAATIE – Saltmarsh Angiosperm Assessment Tool for Ireland	0.80	0.60
Phytoplankton	Phytoplankton biomass ⁽¹⁾ (Chlorophyll)	0.82	0.60
	Phytoplankton composition	0.80	0.60
Benthic invertebrate fauna	IQI – Infaunal Quality Index	0.75	0.64

(1) Growing Season March to September

Source: Table 8 of European Union Environmental Objectives (Surface Water) (Amendment) Regulations (S.I No. 77 of 2019)

Baseline Water Quality Data

Table 14.1.6 River Avoca Biological Quality Rating (Q value)

Station	Station No.	1981	1986	1990	1994	1997	2000	2003	2006	2009	2012	2015	2018	2019
Avoca Br	RS10A030700	1	1	1	1	-	1	-	4	2	3	3	2	2-3
Arklow Br	RS10A031200	-	1	1	-	-	-	-	-	-	-	-	-	-

Source: EPA River Quality Surveys: Biological Report (24/02/2021)

Table 14.1.7 EPA Physico-Chemical data from EPA sampling point – AV010

EPA Physico- Chemical Data – River Avoca (2014 – 2020)				
Station No: AV010 Station name: Arklow Bridge (main Arch)				
Parameter	Unit	Min	Mean	Max
Ammonia-Total (as N)	mg/l	0.052	0.222	1.1
BOD 5 days (Total as BOD)	mg/l	1.2	3.2	6.1
Chlorophyll	Âµg/l	1.1	2.288	4.7
Chlorophyll	mg/m3	1.4	3.267	4.8
Dissolved Oxygen	% Saturation	84	96.08	103
Dissolved Oxygen	mg/l	-	-	-
ortho-Phosphate (as P) - unspecified	mg/l	0.005	0.0268	0.091
ortho-Phosphate (as P) - unspecified	Âµg/l	5	7.6	11
pH	pH units	6.7	7.07	7.5
Salinity	psu	0.03	1.491	5.1
Silica (as SiO2)	mg/l	3.7	4.95	6.2
Temperature	°C	5.5	13.007	18.8
Total Oxidized Nitrogen (as N)	mg/l	0.45	1.317	2

Source: Catchments Website: https://www.catchments.ie/data/#/waterbody/IE_EA_150_0100 (22/02/2021)

Table 14.1.8 EPA Physico-Chemical data from EPA sampling point – AV020

EPA Physico- chemical Data – River Avoca (2014 – 2020)				
Station No: AV020 Station name: Harbour Office				
Parameter	Unit	Min	Mean	Max
Ammonia-Total (as N)	mg/l	0.02	0.151	0.584
BOD 5 days (Total as BOD)	mg/l	1.0	2.57	7.5
Chlorophyll	Âµg/l	1.3	3.5	5.9
Chlorophyll	mg/m3	1.5	6.875	26.2
Dissolved Oxygen	% Saturation	30.6	88.993	111
Dissolved Oxygen	mg/l	-	-	-
ortho-Phosphate (as P) - unspecified	mg/l	0.006	0.0164	0.052
pH	pH units	6.8	6.99	7.3
Salinity	psu	0.6	1.76	5.1
Silica (as SiO2)	mg/l	0.29	4.408	8.2
Suspended Solids	mg/l	4	131	258
Total Oxidized Nitrogen (as N)	mg/l	0.04	1.011	2.0

Source: Catchments Website: https://www.catchments.ie/data/#/waterbody/IE_EA_150_0100 (22/02/2021)

Table 14.1.9 EPA Physio-Chemical data from EPA sampling point – AV030

EPA Physico- chemical Data – River Avoca (2017 – 2020)				
Station No: AV030 Station name: Harbour Basin				
Parameter	Unit	Min	Mean	Max
Ammonia-Total (as N)	mg/l	0.096	0.219	0.46
BOD 5 days (Total as BOD)	mg/l	2.4	2.4	2.4
Chlorophyll	Âµg/l	1.1	2.544	7.4
Dissolved Oxygen	% Saturation	86.0	95.4	102.0
ortho-Phosphate (as P) - unspecified	mg/l	0.009	0.0227	0.05
pH	pH units	6.9	7.107	7.4
Salinity	psu	0.3	3.067	8
Silica (as SiO ₂)	mg/l	3.2	4.707	6.1
Temperature	°C	5.7	13.62	20.2
Total Oxidized Nitrogen (as N)	mg/l	0.44	1.319	3.1

Source: Catchments Website: https://www.catchments.ie/data/#/waterbody/IE_EA_150_0100 (22/02/2021)

Table 14.1.10 EPA Physio-Chemical data from EPA sampling point – AV040

EPA Physico- chemical Data – River Avoca (2014 – 2020)				
Station No: AV040 Station name: Inner Harbour Mouth				
Parameter	Unit	Min	Mean	Max
Ammonia-Total (as N)	mg/l	0.029	0.128	0.372
BOD 5 days (Total as BOD)	mg/l	1.1	1.952	3.7
Chlorophyll	Âµg/l	1.0	3.488	15
Chlorophyll	mg/m ³	1.4	7.993	15.4
Dissolved Oxygen	% Saturation	84.0	93.667	103.0
Dissolved Oxygen	mg/l	-	-	-
ortho-Phosphate (as P) - unspecified	mg/l	0.006	0.0163	0.032
ortho-Phosphate (as P) - unspecified	Âµg/l	6	26.384	58
pH	pH units	6.8	7.277	8.1
Salinity	psu	0.3	9.991	34.24
Silica (as SiO ₂)	mg/l	0.2	4.235	6.1
Suspended Solids	mg/l	5	7.571	17
Temperature	°C	5.4	11.7	19
TOC (as NPOC)	mg/l	2.2	2.8	3.4
Total Oxidized Nitrogen (as N)	mg/l	0.06	1.185	6.6

Source: Catchments Website: https://www.catchments.ie/data/#/waterbody/IE_EA_150_0100 (22/02/2021)

Table 14.1.11 EPA Physio-Chemical data from EPA sampling point – RS10A031140

EPA Physio- chemical Data – River Avoca 2011-2015				
Station No: 10A03-1140 Station name: 0.5km d/s Honeywell (Pearse Park)				
Parameter	Unit	Min	Mean	Max
Alkalinity-total (as CaCO ₃)	mg/l	12	16.654	25
Ammonia-Total (as N)	mg/l	0.025	0.0953	0.223
BOD 5 days (Total as BOD)	mg/l	0.3	1.127	5.5
Conductivity @20°C	µS/cm	52	89.722	151
Chloride*	mg/l	8	10.737	13
Dissolved Oxygen	% Saturation	87.4	96.333	103.4
Dissolved Oxygen	mg/l	8.4	10.797	12.2
Nitrite (as N)	mg/l	0.001	0.0066	0.021
ortho-Phosphate (as P) - unspecified	mg/l	0.004	0.0093	0.027
pH*	pH units	5.53	6.239	7.21
Temperature*	°C	5.4	10.322	17.9
Total Hardness (as CaCO ₃)	mg/l	13	27.28	43
Total Oxidized Nitrogen (as N)	mg/l	0.33	1.247	1.85
True Colour*	Hazen	20	62.556	180

Source: Catchments Website: <https://www.catchments.ie/data/#/waterbody/> (25/02/2021)

Note: Limits for parameters are given in Table 14.1.1, Parameters that are outside the limits are highlighted in bold