

**Draft Water Quality Objectives for Queensland Murray-Darling Basin – Border Rivers Basin**

Water area/type (Sources: s1–s5)	Management intent /Level of protection	<b>BORDER RIVERS BASIN: aquatic ecosystem water quality objectives<sup>1-3</sup></b>											
		<b>Note:</b> WQOs for indicators are primarily shown as a range of 20 <sup>th</sup> , 50 <sup>th</sup> and 80 <sup>th</sup> percentiles to be achieved (e.g. 3–4–5). WQOs may also be shown as single values to be achieved as the 50 <sup>th</sup> percentile (median) of test data or as lower and upper limits (e.g. pH: 7.2–8.2).											
		HEV: high ecological value; SD: slightly disturbed; MD: moderately disturbed – refer accompanying maps for details Sources: S1: HWMP; S2: MDB Plan targets; S3: Local datasets/reporting (e.g. DSITI); S4: ANZECC and ARMCANZ (2000) AWQG; S5: other sources											
		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate (mg/L) Alkalinity (mg/L CaCO <sub>3</sub> )
HEV and SD waters	HEV	Maintain/achieve effectively unmodified water quality (20th, 50th and 80th percentiles of HEV waters), habitat, biota, flow and riparian areas. There is insufficient information available to establish effectively unmodified water quality for these waters. Refer to QWQG for details on how to establish a minimum water quality data set for deriving local 20th, 50th and 80th percentiles.											
GRANITE BELT catchment waters  (s3)	MD	<b>LOW FLOW &lt;0.8 m<sup>3</sup>/s (cumeecs) at gauge 416319A – Quart Pot Creek at Stanthorpe</b>											
		9 (s3)	4 (s3)	650 (s3)	4 (s3)	35 (s3)	ID	90-110% (s2)	5 (s3)	5 (s3)	6.6-7.5 (s3)	185 (s3)	SO <sub>4</sub> : 5 A: 45 (s3)
		<b>HIGH FLOW &gt;0.8 m<sup>3</sup>/s (cumeecs) at gauge 416319A – Quart Pot Creek at Stanthorpe</b>											
		30 (s3)	45 (s3)	1000 (s3)	10 (s3)	50 (s3)	ID	90-110% (s2)	12 (s3)	12 (s3)	6.6-7.3 (s3)	150 (s3)	SO <sub>4</sub> : 6 A: 40 (s3)
	HEV	<b>LOW FLOW &lt;0.8 m<sup>3</sup>/s (cumeecs) at gauge 416319A – Quart Pot Creek at Stanthorpe</b>											
		6-9-17 (s3)	2-4-20 (s3)	550-650-860 (s3)	3-4-8 (s3)	25-35-50 (s3)	ID	90-110% (s2)	3-5-9 (s3)	5-5-11 (s3)	6.6-7.1-7.5 (s3)	150-185-250 (s3)	SO <sub>4</sub> : 3-5-9 A: 35-45-65 (s3)
<b>HIGH FLOW &gt;0.8 m<sup>3</sup>/s (cumeecs) at gauge 416319A – Quart Pot Creek at Stanthorpe</b>													
20-30-40 (s3)	16-45-90 (s3)	850-1000-1300 (s3)	9-10-20 (s3)	50-50-70 (s3)	ID	90-110% (s2)	9-12-19 (s3)	5-12-20 (s3)	6.6-7.0-7.3 (s3)	115-150-200 (s3)	SO <sub>4</sub> : 4-6-8 A: 30-40-60 (s3)		
DUMARESQ FLOODPLAIN catchment waters  (s3)	MD	<b>LOW FLOW &lt;5.2 m<sup>3</sup>/s (cumeecs) at gauge 416310A – Dumaresq River at Farnbro</b>											
		ID	ID	490 (s3)	ID	40 (s3)	ID	60-110% (s2)	8 (s3)	7 (s3)	7.4-8.1 (s3)	220 (s3)	SO <sub>4</sub> : 10 A: 55 (s3)
		<b>HIGH FLOW &gt;5.2 m<sup>3</sup>/s (cumeecs) at gauge 416310A – Dumaresq River at Farnbro</b>											

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		<b>Note:</b> WQOs for indicators are primarily shown as a range of 20 <sup>th</sup> , 50 <sup>th</sup> and 80 <sup>th</sup> percentiles to be achieved (e.g. 3–4–5). WQOs may also be shown as single values to be achieved as the 50 <sup>th</sup> percentile (median) of test data or as lower and upper limits (e.g. pH: 7.2–8.2). HEV: high ecological value; SD: slightly disturbed; MD: moderately disturbed – refer accompanying maps for details Sources: S1: HWMP; S2: MDB Plan targets; S3: Local datasets/reporting (e.g. DSITI); S4: ANZECC and ARMCANZ (2000) AWQG; S5: other sources											
		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate Alkalinity (mg/L CaCO <sub>3</sub> )
	HEV	ID	ID	800 (s3)	ID	60 (s3)	ID	60-110% (s2)	35 (s3)	25 (s3)	7.1-7.8 (s3)	140 (s3)	SO <sub>4</sub> : 11 A: 60 (s3)
		<b>LOW FLOW &lt;5.2 m<sup>3</sup>/s (cumecs) at gauge 416310A – Dumaresq River at Farnbro</b>											
		ID	ID	410-490-600 (s3)	ID	30-40-50 (s3)	ID	60-110% (s2)	5-8-15 (s3)	5-7-12 (s3)	7.4-7.8-8.1 (s3)	190-220-260 (s3)	SO <sub>4</sub> : 6-10-15 A: 40-55-80 (s3)
		<b>HIGH FLOW &gt;5.2 m<sup>3</sup>/s (cumecs) at gauge 416310A – Dumaresq River at Farnbro</b>											
		ID	ID	625-800-970 (s3)	ID	45-60-80 (s3)	ID	60-110% (s2)	20-35-55 (s3)	10-25-40 (s3)	7.1-7.4-7.8 (s3)	115-140-165 (s3)	SO <sub>4</sub> : 5-11-12 A: 50-60-115 (s3)
TRAPROCK catchment waters (s3)	MD	<b>LOW FLOW &lt;0.8 m<sup>3</sup>/s (cumecs) at gauge 416404C – Bracker Creek at Terraine (CLOSED) &lt;0.3 m<sup>3</sup>/s (cumecs) at gauge 416312A – Oaky Creek at Texas</b>											
		10 (s3)	6 (s3)	520 (s3)	8 (s3)	30 (s3)	ID	60-110% (s2)	4 (s3)	5 (s3)	7.1-8.0 (s3)	290 (s3)	SO <sub>4</sub> : 25 A: 40 (s3)
		<b>HIGH FLOW &gt;0.8m<sup>3</sup>/s (cumecs) at gauge 416404C – Bracker Creek at Terraine (CLOSED) &gt;0.3 m<sup>3</sup>/s (cumecs) at gauge 416312A – Oaky Creek at Texas</b>											
		ID	ID	600 (s3)	ID	40 (s3)	ID	60-110% (s2)	9 (s3)	10 (s3)	6.9-7.7 (s3)	215 (s3)	SO <sub>4</sub> : 18 A: 55 (s3)
	HEV	<b>LOW FLOW &lt;0.8 m<sup>3</sup>/s (cumecs) at gauge 416404C – Bracker Creek at Terraine (CLOSED) &lt;0.3 m<sup>3</sup>/s (cumecs) at gauge 416312A – Oaky Creek at Texas</b>											
8-10-10 (s3)		1-6-15 (s3)	350-520-730 (s3)	6-8-10 (s3)	20-30-50 (s3)	ID	60-110% (s2)	2-4-11 (s3)	5-5-10 (s3)	7.1-7.6-8.0 (s3)	215-290-465 (s3)	SO <sub>4</sub> : 13-25-45 A: 25-40-90 (s3)	

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		<b>Note:</b> WQOs for indicators are primarily shown as a range of 20 <sup>th</sup> , 50 <sup>th</sup> and 80 <sup>th</sup> percentiles to be achieved (e.g. 3–4–5). WQOs may also be shown as single values to be achieved as the 50 <sup>th</sup> percentile (median) of test data or as lower and upper limits (e.g. pH: 7.2–8.2).											
		HEV: high ecological value; SD: slightly disturbed; MD: moderately disturbed – refer accompanying maps for details Sources: S1: HWMP; S2: MDB Plan targets; S3: Local datasets/reporting (e.g. DSITI); S4: ANZECC and ARMCANZ (2000) AWQG; S5: other sources											
Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate Alkalinity (mg/L CaCO <sub>3</sub> )		
		<b>HIGH FLOW &gt;0.8m<sup>3</sup>/s (cumecs) at gauge 416404C – Bracker Creek at Terraine (CLOSED)</b> <b>&gt;0.3 m<sup>3</sup>/s (cumecs) at gauge 416312A – Oaky Creek at Texas</b>											
		ID	ID	420-600-745 (s3)	ID	30-40-60 (s3)	ID	60-110% (s2)	4-9-26 (s3)	5-10-20 (s3)	6.9-7.4-7.7 (s3)	185-215-315 (s3)	SO <sub>4</sub> : 10-18-30 A: 30-55-100 (s3)
CANNING CREEK catchment waters  (s3)	MD	<b>LOW FLOW &lt;0.6 m<sup>3</sup>/s (cumecs) at gauge 416410A – Macintyre Brook at Barongarook (CLOSED)</b> <b>&lt;3.5 m<sup>3</sup>/s (cumecs) at gauge 416402C – Macintyre Brook at Inglewood</b>											
		10 (s3)	6 (s3)	520 (s3)	8 (s3)	30 (s3)	ID	60-110% (s2)	35 (s3)	25 (s3)	7.2-7.8 (s3)	200 (s3)	SO <sub>4</sub> : 2 A: 80 (s3)
		<b>HIGH FLOW &gt;0.6m<sup>3</sup>/s (cumecs) at gauge 416410A – Macintyre Brook at Barongarook (CLOSED)</b> <b>&gt;3.5 m<sup>3</sup>/s (cumecs) at gauge 416402C – Macintyre Brook at Inglewood</b>											
		ID	ID	600 (s3)	ID	40 (s3)	ID	60-110% (s2)	50 (s3)	60 (s3)	6.9-7.9 (s3)	165 (s3)	SO <sub>4</sub> : 3 A: ID (s3)
	HEV	<b>LOW FLOW &lt;0.6 m<sup>3</sup>/s (cumecs) at gauge 416410A – Macintyre Brook at Barongarook (CLOSED)</b> <b>&lt;3.5 m<sup>3</sup>/s (cumecs) at gauge 416402C – Macintyre Brook at Inglewood</b>											
		8-10-10 (s3)	1-6-15 (s3)	350-520-730 (s3)	6-8-10 (s3)	20-30-50 (s3)	ID	60-110% (s2)	20-35-100 (s3)	14-25-35 (s3)	7.2-7.5-7.8 (s3)	145-200-390 (s3)	SO <sub>4</sub> : 1-2-5 A: 70-80-95 (s3)
		<b>HIGH FLOW &gt;0.6m<sup>3</sup>/s (cumecs) at gauge 416410A – Macintyre Brook at Barongarook (CLOSED)</b> <b>&gt;3.5 m<sup>3</sup>/s (cumecs) at gauge 416402C – Macintyre Brook at Inglewood</b>											
		ID	ID	420-600-745 (s3)	ID	30-40-60 (s3)	ID	60-110% (s2)	20-50-80 (s3)	25-60-150 (s3)	6.9-7.6-7.9 (s3)	115-165-330 (s3)	SO <sub>4</sub> : 2-3-7 A: ID (s3)
KUMBARILLA RIDGE catchment waters  (s3)	MD	Refer to Kumbarilla Ridge catchment waters – Condamine River Basin in Table 11.											

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		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate (mg/L) Alkalinity (mg/L CaCO <sub>3</sub> )
UPPER WEIR RIVER catchment waters  (s3)	MD	<b>LOW FLOW &lt;1.4 m<sup>3</sup>/s (cumeCs) at gauge 416204A – Weir River at Gunn Bridge</b>											
		19 (s3)	65 (s3)	1745 (s3)	30 (s3)	290 (s3)	ID	60-110% (s2)	200 (s3)	100 (s3)	7.0-7.7 (s3)	195 (s3)	SO <sub>4</sub> : 3 A: 50 (s3)
		<b>HIGH FLOW &gt;1.4 m<sup>3</sup>/s (cumeCs) at gauge 416204A – Weir River at Gunn Bridge</b>											
		ID	ID	ID	ID	ID	ID	60-110% (s2)	350 (s3)	ID	6.8-7.4 (s3)	100 (s3)	ID
	HEV	<b>LOW FLOW &lt;1.4 m<sup>3</sup>/s (cumeCs) at gauge 416204A – Weir River at Gunn Bridge</b>											
		13-19-25 (s3)	50-65-80 (s3)	1270-1745- 1900 (s3)	15-30-30 (s3)	270-290-385 (s3)	ID	60-110% (s2)	100-200-320 (s3)	75-100-310 (s3)	7.0-7.3-7.7 (s3)	150-195-250 (s3)	SO <sub>4</sub> : 1-3-5 A: 35-50-90 (s3)
<b>HIGH FLOW &gt;1.4 m<sup>3</sup>/s (cumeCs) at gauge 416204A – Weir River at Gunn Bridge</b>													
ID		ID	ID	ID	ID	ID	60-110% (s2)	245-350-565 (s3)	ID	6.8-7.1-7.4 (s3)	85-100-130 (s3)	ID	
LOWER WEIR RIVER catchment waters  (s3)	MD	<b>LOW FLOW &lt;5.0m<sup>3</sup>/s (cumeCs) at gauge 416202A – Weir River at Talwood</b>											
		10 (s3)	70 (s3)	1300 (s3)	25 (s3)	190 (s3)	ID	65-110% >5mg/L (s2)	400 (s3)	75 (s3)	6.9-7.6 (s3)	165 (s3)	SO <sub>4</sub> : 3 A: 80 (s3)
		<b>HIGH FLOW &gt;5.0m<sup>3</sup>/s (cumeCs) at gauge 416202A – Weir River at Talwood</b>											
		ID	ID	1200 (s3)	ID	210 (s3)	ID	65-110% >5mg/L (s2)	285 (s3)	145 (s3)	6.8-7.3 (s3)	115 (s3)	SO <sub>4</sub> : 2 A: 80 (s3)

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		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate Alkalinity (mg/L CaCO <sub>3</sub> )
	HEV	LOW FLOW <5.0m <sup>3</sup> /s (cumeecs) at gauge 416202A – Weir River at Talwood											
		5-10-25 (s3)	10-70-195 (s3)	1100-1300-1600 (s3)	20-25-45 (s3)	160-190-260 (s3)	ID	65-110% >5mg/L (s2)	300-400-600 (s3)	40-75-200 (s3)	6.9-7.2-7.6 (s3)	130-165-205 (s3)	SO <sub>4</sub> : 2-3-5 A: 60-80-95 (s3)
		HIGH FLOW >5.0m <sup>3</sup> /s (cumeecs) at gauge 416202A – Weir River at Talwood											
		ID	ID	990-1200-1510 (s3)	ID	155-210-275 (s3)	ID	65-110% >5mg/L (s2)	235-285-915 (s3)	80-145-435 (s3)	6.8-7.0-7.3 (s3)	95-115-140 (s3)	SO <sub>4</sub> : 2-2-3 A: 35-80-110 (s3)
MACINTYRE BARWON FLOODPLAIN catchment waters  (s3)	MD	LOW FLOW <57.7m <sup>3</sup> /s (cumeecs) at gauge 416201A – Macintyre River at Goondiwindi											
		20 (s1)	10 (s1)	575 (s1)	20 (s1)	70 (s1)	3 (s1)	65-110% >5.0mg/L (s2)	30 (s1)	25 (s1)	7.4-8.0 (s1)	245 (s1)	SO <sub>4</sub> : 7 A: 55 (s1)
		HIGH FLOW >57.7m <sup>3</sup> /s (cumeecs) at gauge 416201A – Macintyre River at Goondiwindi											
		ID	195 (s1)	900 (s1)	ID	150 (s1)	ID	65-110% >5.0mg/L (s2)	110 (s1)	70 (s1)	7.0-7.5 (s1)	180 (s1)	SO <sub>4</sub> : 6 A: 55 (s1)
	HEV	LOW FLOW <57.7m <sup>3</sup> /s (cumeecs) at gauge 416201A – Macintyre River at Goondiwindi											
		11-20-35 (s1)	10-10-75 (s1)	470-575-750 (s1)	10-20-45 (s1)	50-70-110 (s1)	1-3-5 (s1)	65-110% >5.0mg/L (s2)	20-30-70 (s1)	15-25-50 (s1)	7.4-7.7-8.0 (s1)	210-245-295 (s1)	SO <sub>4</sub> : 5-7-10 A: 40-55-75 (s1)
HIGH FLOW >57.7m <sup>3</sup> /s (cumeecs) at gauge 416201A – Macintyre River at Goondiwindi													
ID	170-195-380 (s1)	740-900-1120 (s1)	ID	80-150-210 (s1)	ID	65-110% >5.0mg/L	55-110-235 (s1)	40-70-130 (s1)	7.0-7.2-7.5 (s1)	155-180-210 (s1)	SO <sub>4</sub> : 4-6-9 A: 45-55-65		

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		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate (mg/L) Alkalinity (mg/L CaCO <sub>3</sub> )
								(s2)					(s1)
LOWER MACINTYRE BROOK catchment waters  (s3)	MD	<b>LOW FLOW &lt;2.6m<sup>3</sup>/s (cumeecs) at gauge 416406A - Macintyre Brook at Ben Dor Weir (CLOSED)</b> <b>&lt;3.2 m<sup>3</sup>/s (cumeecs) at gauge 416415A – Macintyre Brook at Booba Sands</b>											
		8 (s3)	18 (s3)	705 (s3)	11 (s3)	55 (s3)	ID	60-110% (s2)	11 (s3)	10 (s3)	7.4-8.0 (s3)	370 (s3)	SO <sub>4</sub> : 10 A: 90 (s3)
	HEV	<b>HIGH FLOW &gt;2.6m<sup>3</sup>/s (cumeecs) at gauge 416406A - Macintyre Brook at Ben Dor Weir (CLOSED)</b> <b>&gt;3.2 m<sup>3</sup>/s (cumeecs) at gauge 416415A – Macintyre Brook at Booba Sands</b>											
		ID	ID	910 (s3)	ID	70 (s3)	ID	60-110% (s2)	25 (s3)	25 (s3)	7.2-8.0 (s3)	250 (s3)	SO <sub>4</sub> : 10 A: 95 (s3)
		<b>LOW FLOW &lt;2.6m<sup>3</sup>/s (cumeecs) at gauge 416406A - Macintyre Brook at Ben Dor Weir (CLOSED)</b> <b>&lt;3.2 m<sup>3</sup>/s (cumeecs) at gauge 416415A – Macintyre Brook at Booba Sands</b>											
		4-8-35 (s3)	3-18-95 (s3)	600-705-870 (s3)	6-11-21 (s3)	40-55-80 (s3)	ID	60-110% (s2)	6-11-20 (s3)	9-10-20 (s3)	7.4-7.7-8.0 (s3)	310-370-480 (s3)	SO <sub>4</sub> : 7-10-13 A: 75-90-115 (s3)
<b>HIGH FLOW &gt;2.6m<sup>3</sup>/s (cumeecs) at gauge 416406A - Macintyre Brook at Ben Dor Weir (CLOSED)</b> <b>&gt;3.2 m<sup>3</sup>/s (cumeecs) at gauge 416415A – Macintyre Brook at Booba Sands</b>													
ID	ID	720-910-1300 (s3)	ID	50-70-125 (s3)	ID	60-110% (s2)	15-25-65 (s3)	15-25-45 (s3)	7.2-7.6-8.0 (s3)	200-250-310 (s3)	SO <sub>4</sub> : 6-10-15 A: 75-95-120 (s3)		

Draft Water Quality Objectives for Queensland Murray-Darling Basin – Border Rivers Basin

Water area/type (Sources: s1–s5)	Management intent /Level of protection	BORDER RIVERS BASIN: aquatic ecosystem water quality objectives <sup>1-3</sup>											
		<p><b>Note:</b> WQOs for indicators are primarily shown as a range of 20<sup>th</sup>, 50<sup>th</sup> and 80<sup>th</sup> percentiles to be achieved (e.g. 3–4–5). WQOs may also be shown as single values to be achieved as the 50<sup>th</sup> percentile (median) of test data or as lower and upper limits (e.g. pH: 7.2–8.2).</p> <p>HEV: high ecological value; SD: slightly disturbed; MD: moderately disturbed – refer accompanying maps for details Sources: S1: HWMP; S2: MDB Plan targets; S3: Local datasets/reporting (e.g. DSITI); S4: ANZECC and ARMCANZ (2000) AWQG; S5: other sources</p>											
		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate Alkalinity (mg/L CaCO <sub>3</sub> )
		<b>TOXICANTS, PESTICIDES</b>											
HEV and SD waters: Toxicants (s4)	HEV and SD	<p>WQGs for all toxicants and pesticides in these waters as per ANZECC and ARMCANZ (2000) AWQG, to protect species at the HEV level of protection.</p> <ul style="list-style-type: none"> <li>Toxicants in water: refer to AWQG volume 1 section 3.4—‘water quality guidelines for toxicants’ (including tables 3.4.1, 3.4.2, and Figure 3.4.1), and AWQG volume 2 (section 8). AWQG values for the HEV level of protection typically correspond to protection of 99% of species.                             <ul style="list-style-type: none"> <li>Toxicants in sediments: refer to AWQG volume 1 section 3.5—‘sediment quality guidelines’ (including Table 3.5.1, Figure 3.5.1), and AWQG volume 2 (section 8)</li> </ul> </li> </ul>											
Other waters: Toxicants (s4)	MD	<p>WQGs for all toxicants and pesticides in these waters as per ANZECC and ARMCANZ (2000) AWQG, to protect species at the MD level of protection.</p> <ul style="list-style-type: none"> <li>Toxicants in water: refer to AWQG volume 1 section 3.4—‘water quality guidelines for toxicants’ (including tables 3.4.1, 3.4.2, and Figure 3.4.1), and AWQG volume 2 (section 8). AWQG values for the MD level of protection typically correspond to protection of 95% species (in a small number of cases where bioaccumulation may occur, the AWQG recommends 99% species protection level).</li> <li>Toxicants in sediments: refer to AWQG volume 1 section 3.5—‘sediment quality guidelines’ (including Table 3.5.1, Figure 3.5.1), and AWQG volume 2 (section 8)</li> </ul>											
		<b>TEMPERATURE<sup>3</sup> (s2)</b>											
Fresh waters		<p>Between the 20<sup>th</sup>ile and the 80<sup>th</sup>ile of natural monthly water temperature. (Based on Basin Plan schedule 11 target value for zones B2 – Border Rivers, Gwydir and Namoi valley upland; A2 - Border Rivers, Gwydir and Namoi valley lowland; C2– Border Rivers, Gwydir and Namoi valley montane)</p>											

Draft Water Quality Objectives for Queensland Murray-Darling Basin – Border Rivers Basin

Water area/type (Sources: s1–s5)	Management intent /Level of protection	BORDER RIVERS BASIN: aquatic ecosystem water quality objectives <sup>1-3</sup>											
		<p><b>Note:</b> WQOs for indicators are primarily shown as a range of 20<sup>th</sup>, 50<sup>th</sup> and 80<sup>th</sup> percentiles to be achieved (e.g. 3–4–5). WQOs may also be shown as single values to be achieved as the 50<sup>th</sup> percentile (median) of test data or as lower and upper limits (e.g. pH: 7.2–8.2).</p> <p>HEV: high ecological value; SD: slightly disturbed; MD: moderately disturbed – refer accompanying maps for details Sources: S1: HWMP; S2: MDB Plan targets; S3: Local datasets/reporting (e.g. DSITI); S4: ANZECC and ARMCANZ (2000) AWQG; S5: other sources</p>											
		Ammonium N (µg/L)	Oxidised N (µg/L)	Total N (µg/L)	Filterable Reactive P (µg/L)	Total P (µg/L)	Chlorophyll-a (µg/L)	Dissolved Oxygen (% saturation) (mg/L)	Turbidity (NTU)	Suspended Solids (mg/L)	pH	Conductivity (µS/cm)	Sulfate (mg/L) Alkalinity (mg/L CaCO <sub>3</sub> )
		<b>MACROINVERTEBRATES (s1, s3)</b>											
Fresh waters	HEV, MD	Insufficient data to derive water quality guidelines. Will be updated if information becomes available.											
		<b>FISH (s3)</b>											
Fresh waters	MD	Insufficient data to derive water quality guidelines. Will be updated if information becomes available.											
		<b>RIPARIAN, WETLANDS, SPP</b>											
Riparian	All	Refer to section 14.1 of this report.											
Wetlands	All	Refer to section 14 of this report (Also note Section 17.2).											
State Planning Policy	All	Refer to section 17.3.											

**Abbreviations:** ID: insufficient information

**Notes:**

1. Nutrients:

Oxidised N = NO<sub>2</sub> + NO<sub>3</sub>. Dissolved inorganic N (DIN) = Ammonium N + Oxidised N.

Except where specified for event conditions, nutrient guidelines do not apply during high flow events in fresh and estuarine waters. During periods of low flow and particularly in smaller creeks, build-up of organic matter derived from natural sources (e.g. leaf litter) can result in increased organic N levels (generally in the range of 400 to 800µg/L). This may lead to total N values exceeding the WQGs. Provided that levels of dissolved inorganic N remain low, then the elevated levels of organic N should not be seen as a breach of the WQGs, provided this is due to natural causes. See QWQG (section 5 and Appendix D) for more information on applying guidelines under high flow conditions.

2. Dissolved oxygen (DO): DO guidelines apply to daytime conditions. Lower values will occur at night in most waters. In estuaries, reductions should only be in the region of 10–15 per cent saturation below daytime values. In freshwaters, night-time reductions are more variable. Following significant rainfall events, reduced DO values may occur due to the influx of organic material. In estuaries post-event values as low as 40 per cent saturation may occur naturally for short periods but values well below this would indicate some anthropogenic effect. In freshwaters, post-event DO reductions are again more variable. In general, DO values consistently less than 50 per cent are likely to impact on the ongoing ability of fish to persist in a water body while short term DO values less than 30 per cent saturation are toxic to some fish species. Very high DO (supersaturation) values can be toxic to some fish as they cause gas bubble disease. DO values for fresh waters should only be applied to flowing waters. Stagnant pools in intermittent streams naturally experience values of DO below 50 per cent saturation.



3. Temperature: Temperature varies both daily and seasonally, it is depth dependent and is also highly site specific. It is therefore not possible to provide simple generic WQGs for this indicator for fresh or estuarine waters. (In open coastal/marine waters a WQG based on GBRMPA WQGs is provided.) The recommended approach is that local WQGs be developed. Thus, WQGs for potentially impacted streams should be based on measurements from nearby streams that have similar morphology and which are thought not to be impacted by anthropogenic thermal influences. From an ecological effects perspective, the most important aspects of temperature are the daily maximum temperature and the daily variation in temperature. Therefore measurements of temperature should be designed to collect information on these indicators of temperature and, similarly, local WQGs should be expressed in terms of these indicators. There will be an annual cycle in the values of these indicators and therefore a full seasonal cycle of measurements is required to develop guideline values.

4. Fish: Fish metrics are a tool used to score or describe the health of an ecosystem based on the composition of the fish fauna. Scores may be compared against an expected or average condition derived from existing data sets or expert opinion. Tables 15-18 display fish metrics developed to score native fish species richness against an expected mean condition; non-native fish richness against an expected mean condition; native fish abundance against non-native fish abundance; an index of rarity (scoring for presence of rare species at a site); a recruitment index for both native and non-native fish species, and for upper catchment sites, a cold water species index. Some of the metrics rely on data from derived tables for electrofishing combined with fyke netting. These methods are important to implement in order to compare catch data to fish metrics. For a good score, native fish metrics should score high and non-native fish metrics score low (For further information refer to Hutchison, 2014).

**References:**

ANZECC & ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality (AWQG)*.

Hutchison, M (2014), *Fish assemblages as indicators of ecosystem health in the Condamine-Balonne River system – A guide prepared for the Department of Science, Information Technology, Innovation and the Arts, Department of Agriculture, Fisheries and Forestry, Queensland.*

Queensland Government (EHP; 2009, as amended) *Queensland Water Quality Guidelines*. (Refer to section 5 and Appendix D of the QWQG for more detail on compliance assessment protocols.)