

## Appendix E-1 Waterhole Water Quality Summary Statistics pre-2015 and post 2015

# APPENDIX E-1

## Santos Fairview Water Release Scheme Preliminary Documentation

### Summary Water Quality Statistics - June 2013 - May 2015 for the Waterhole and 2015 to 2022 for the HCS04 DWB Pond and Waterhole

	Units	LoR	State EA CL S4	sub-regional WQO / DGV 95% Spp. Prot.	State EA CL HCS04 DWB Pond	HCS04 Desalinated Water Balance Pond (HCS04DWB1) - 2015-2021									WLMP5-2013 - 2015								
						Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>																							
Dissolved Oxygen - Field	mg/L	-	NL	7.0-9.0	6.4-16.1	156	156	100	5.6	7.7	8.4	9.4	10.6	13.4	35	35	100	0.1	7.8	9.2	10.5	11.0	11.5
Electrical Conductivity - Field	µS/cm	-	NL	370 (base flow) 210 (high flow)	370 (75%ile)	157	157	100	33	63	91	129	217	376	35	35	100	161	352	464	560	738	818
pH - Field	pH units	-	NL	6.5 - 8.5	6.5-8.5	156	156	100	6.3	7.7	8.2	8.6	9.0	9.8	35	35	100	6.7	7.5	7.8	8.1	8.5	8.6
Suspended Solids	mg/L	5	NL	< 30	NL	157	157	100	2	5	5	5	6	28	39	38	97	8	29	46	73	160	345
Turbidity - Field	NTU	-	NL	50	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	24	24	100	0.0	12.3	49.1	93.6	264.6	24.0
<b>Cations</b>																							
Calcium (dissolved)	mg/L	1	Minimum 1	No WQO	Minimum 1	157	149	95	1.0	1.0	3.0	4.8	6.2	10.0	39	39	100	11.0	28.2	34.0	38.0	40.1	41.0
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	157	0	0	NC	NC	NC	NC	NC	NC	39	39	100	4.0	12.0	16.0	18.4	22.1	26.0
Sodium (dissolved)	mg/L	1	NL	No WQO	115	157	156	99	1.0	8.0	12.0	18.0	34.4	40.0	39	39	100	10.0	22.0	33.0	44.4	54.2	60.0
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	157	1	1	NC	NC	NC	NC	NC	4.0	39	39	100	10.0	18.2	24.0	32.0	38.2	40.0
<b>Anions</b>																							
Chloride	mg/L	1	NL	No WQO	175	154	154	100	5.00	10.00	13.00	20.40	29.35	36.00	39	38	97	10	24.4	33.5	47.8	72.15	75
Fluoride	mg/L	0.1	1.5	No WQO	1.0	159	3	2	NC	NC	NC	NC	NC	0.3	39	39	100	0.1	0.2	0.2	0.3	0.4	0.4
Sulfate as SO <sub>4</sub> <sup>2-</sup>	mg/L	1	NL	< 5	5	157	14	9	NC	NC	NC	NC	NC	4.0	39	3	8	NC	NC	NC	NC	NC	3.0
<b>Metals and Metalloids</b>																							
Aluminium (dissolved)	mg/L	0.01	0.20	0.055	0.055	157	83	53	0.01	0.01	0.01	0.02	0.03	0.05	39	29	74	0.01	0.01	0.02	0.04	0.15	0.56
Arsenic (dissolved)	mg/L	0.001	0.010	0.013	NL	160	0	0	NC	NC	NC	NC	NC	NC	39	39	100	0.001	0.001	0.002	0.003	0.004	0.005
Boron (dissolved)	mg/L	0.05	4.0	2.9	2.9 @ 18 ML/day <sup>a</sup> 2.5 @ 13.5 ML/day	158	158	100	0.22	0.58	0.83	1.17	1.81	2.05	39	31	79	0.05	0.05	0.07	0.10	0.13	0.15
Cadmium (dissolved)	mg/L	0.0001	0.002	0.0002	0.0002	158	1	1	NC	NC	NC	NC	NC	0.0002	39	1	3	NC	NC	NC	NC	NC	0.0005
Chromium (dissolved)	mg/L	0.001	0.050	0.001	0.001	158	8	5	NC	NC	NC	NC	NC	0.003	39	0	0	NC	NC	NC	NC	NC	<0.001
Cobalt (dissolved)	mg/L	0.001	NL	0.001	NL	3	0	0	NC	NC	NC	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (dissolved)	mg/L	0.001	2.0	0.0014	0.0014	158	6	4	NC	NC	NC	NC	NC	0.003	39	30	77	0.001	0.001	0.001	0.002	0.003	0.004
Lead (dissolved)	mg/L	0.001	0.01	0.0034	0.0034	158	4	3	NC	NC	NC	NC	NC	0.004	39	2	5	NC	NC	NC	NC	NC	0.002
Manganese (dissolved)	mg/L	0.001	0.5	1.9	1.9	158	14	9	NC	NC	NC	NC	NC	0.059	39	37	95	0.001	0.012	0.042	0.117	0.321	0.844
Mercury (dissolved)	mg/L	0.0001	0.001	0.0006	0.0006	157	0	0	NC	NC	NC	NC	NC	NC	39	0	0	NC	NC	NC	NC	NC	<0.0001
Nickel (dissolved)	mg/L	0.001	0.02	0.011	0.011	158	3	2	NC	NC	NC	NC	NC	0.007	39	33	85	0.001	0.001	0.001	0.002	0.002	0.002
Selenium (dissolved)	mg/L	0.01	0.01	0.011	0.011	158	1	1	NC	NC	NC	NC	NC	0.007	39	0	0	NC	NC	NC	NC	NC	<0.01
Zinc (dissolved)	mg/L	0.005	3.0	0.008	0.008	158	12	8	NC	NC	NC	NC	NC	0.142	39	15	38	0.005	0.005	0.005	0.006	0.012	0.063
<b>Nutrients</b>																							
Ammonia as N	mg/L	0.01	0.50	0.02	0.9	159	145	91	0.01	0.03	0.07	0.14	0.26	0.34	39	30	77	0.01	0.01	0.03	0.10	0.26	0.46
Nitrate as N	mg/L	0.01	NL	No WQO	NL	5	1	20	NC	NC	NC	NC	NC	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate as N	mg/L	0.01	NL	0.06	NL	157	61	39	NC	NC	NC	NC	NC	0.05	39	15	38	0.01	0.01	0.01	0.02	0.11	0.48
Total Nitrogen as N	mg/L	0.1	NL	0.62	0.62	157	117	75	0.1	0.1	0.2	0.3	0.4	0.6	39	38	97	0.1	2.2	2.5	3.1	4.0	30.3
Total Phosphorus as P	mg/L	0.01	NL	0.07	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table Notes**

Green highlighting is to provide visual guidance for the applicable statistic to be referenced against the State EA CL or WQO

LoR = Limit of Reporting of analytical method

NA = Not Analysed

NC = Insufficient detections to calculate summary statistics - maximum value provided only

sub-regional WQO = sub-regional Water Quality Objective

DGV = Default Guideline Value (ANZG, 2018) for 95% species protection level (Spp. Prot.)

NL = No State EA Contaminant Limit

Percent (%) detection values that are underlined indicate the number of detections are too low to calculate a reliable summary statistic

Bold values denote a dissolved phase value in outside or above the sub-regional WQO as follows:

- for physico-chemical parameters the median value are compared against the sub-regional WQO

- for nutrients, toxicants, metals and metalloids the 95<sup>th</sup> percentile is compared against the sub-regional WQO

Values shaded orange = the median (physico-chemical parameters) or 95<sup>th</sup> percentile are above the respective State EA CL triggering a review/investigation of trend or cause

- State EA Contaminant Limits (CL) are derived from EPPG00928713

- Physico-Chemical and Nutrient sub-regional WQO derived from the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 - Schedule 1 document for the Upper Dawson River;

Environmental Protection (Water) Policy 2009 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Dawson River Sub-basin except the Callide Creek Catchment September 2011

- Toxicant/parameters WQO derived from Australia and New Zealand Guidelines for Fresh and Marine Water Quality (2019) Default Guideline Value (DGV) for 95% species protection level (moderately disturbed) for filtered/dissolved chemicals.

<sup>a</sup> - Site specific water quality guideline (SSWQG<sup>1</sup>) used for Boron as developed in AECOM, 2019

# APPENDIX E-1

**Santos Fairview Water Release Scheme  
Preliminary Documentation**

**Summary Water Quality Statistics - June 2013 - May 2015 for the Waterhole and 2015 to 2022 for the HCS04 DWB Pond and Waterhole**

	Units	LoR	State EA CL S4	sub-regional WQO / DGV 95% Spp. Prot.	State EA CL HCS04 DWB Pond	WLMP5-2015-2022								
						Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>														
Dissolved Oxygen - Field	mg/L	-	NL	7.0-9.0	6.4-16.1	44	44	100	2.4	6.6	7.5	9.1	11.7	12.6
Electrical Conductivity - Field	µS/cm	-	NL	370 (base flow) 210 (high flow)	370 (75%ile)	44	44	100	108	136	160	214	254	310
pH - Field	pH units	-	NL	6.5 - 8.5	6.5-8.5	43	43	100	7.1	7.5	8	7.9	8.2	9.8
Suspended Solids	mg/L	5	NL	< 30	NL	30	23	77	5.0	5.0	8	16.0	53.1	155.0
Turbidity - Field	NTU	-	NL	50	50	10	10	100	3.8	10.5	14	31.6	222.5	353.0
<b>Cations</b>														
Calcium (dissolved)	mg/L	1	Minimum 1	No WQO	Minimum 1	29	29	100	7.0	9.6	13.0	18.4	22.0	28.0
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	29	27	93	1.0	2.0	2.0	4.0	6.7	7.0
Sodium (dissolved)	mg/L	1	NL	No WQO	115	28	28	100	8.0	10.0	12.0	16.0	20.6	22.0
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	28	27	96	1.0	2.0	4.5	7.6	15.3	16.0
<b>Anions</b>														
Chloride	mg/L	1	NL	No WQO	175	8	8	100	10	10.4	11.5	20	29.15	33
Fluoride	mg/L	0.1	1.5	No WQO	1.0	8	6	75	0	0	0	0	0	0
Sulfate as SO <sub>4</sub> <sup>2-</sup>	mg/L	1	NL	< 5	5	8	0	0	NC	NC	NC	NC	NC	<1
<b>Metals and Metalloids</b>														
Aluminium (dissolved)	mg/L	0.01	0.20	0.055	0.055	8	8	100	0.01	0.02	0.03	0.04	0.19	0.27
Arsenic (dissolved)	mg/L	0.001	0.010	0.013	NL	8	6	75	0.001	0.001	0.001	0.002	0.003	0.003
Boron (dissolved)	mg/L	0.05	4.0	2.9	2.9 @ 18 ML/day <sup>a</sup> 2.5 @ 13.5 ML/day	46	42	91	0.05	0.26	0.60	0.90	1.23	9.00
Cadmium (dissolved)	mg/L	0.0001	0.002	0.0002	0.0002	8	0	0	NC	NC	NC	NC	NC	<0.0001
Chromium (dissolved)	mg/L	0.001	0.050	0.001	0.001	8	0	0	NC	NC	NC	NC	NC	<0.001
Cobalt (dissolved)	mg/L	0.001	NL	0.001	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (dissolved)	mg/L	0.001	2.0	0.0014	0.0014	8	1	13	NC	NC	NC	NC	NC	<0.001
Lead (dissolved)	mg/L	0.001	0.01	0.0034	0.0034	8	1	13	NC	NC	NC	NC	NC	<0.001
Manganese (dissolved)	mg/L	0.001	0.5	1.9	1.9	8	7	88	0.001	0.012	0.027	0.065	0.226	0.291
Mercury (dissolved)	mg/L	0.0001	0.001	0.0006	0.0006	8	0	0	NC	NC	NC	NC	NC	0.0
Nickel (dissolved)	mg/L	0.001	0.02	0.011	0.011	8	1	13	NC	NC	NC	NC	NC	<0.001
Selenium (dissolved)	mg/L	0.01	0.01	0.011	0.011	8	0	0	0.0	NC	NC	NC	NC	<0.01
Zinc (dissolved)	mg/L	0.005	3.0	0.008	0.008	29	3	10	0.005	0.005	0.005	0.005	0.006	0.011
<b>Nutrients</b>														
Ammonia as N	mg/L	0.01	0.50	0.02	0.9	30	22	73	0.01	0.01	0.02	0.07	0.16	0.42
Nitrate as N	mg/L	0.01	NL	No WQO	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate as N	mg/L	0.01	NL	0.06	NL	30	9	30	0.01	0.01	0.01	0.03	0.08	0.14
Total Nitrogen as N	mg/L	0.1	NL	0.62	0.62	30	30	100	0.3	0.5	0.7	1.0	1.5	3.5
Total Phosphorus as P	mg/L	0.01	NL	0.07	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table Notes**

Green highlighting is to provide visual guidance for the applicable statistic to be referenced against the State EA CL or WQO

LoR = Limit of Reporting of analytical method

NA = Not Analysed

NC = Insufficient detections to calculate summary statistics - maximum value provided only

sub-regional WQO = sub-regional Water Quality Objective

DGV = Default Guideline Value (ANZG, 2018) for 95% species protection level (Spp. Prot.)

NL = No State EA Contaminant Limit

Percent (%) detection values that are underlined indicate the number of detections are too low to calculate a reliable summary statistic

Bold values denote a dissolved phase value in outside or above the sub-regional WQO as follows:

- for physico-chemical parameters the median value are compared against the sub-regional WQO

- for nutrients, toxicants, metals and metalloids the 95<sup>th</sup> percentile is compared against the sub-regional WQO

Values shaded orange = the median (physico-chemical parameters) or 95<sup>th</sup> percentile are above the respective State EA CL triggering a review/investigation of trend or cause

- State EA Contaminant Limits (CL) are derived from EPPG0928713

- Physico-Chemical and Nutrient sub-regional WQO derived from the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 - Schedule 1 document for the Upper Dawson River;

Environmental Protection (Water) Policy 2009 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Dawson River Sub-basin except the Callide Creek Catchment September 2011

- Toxicant/parameters WQO derived from Australia and New Zealand Guidelines for Fresh and Marine Water Quality (2019) Default Guideline Value (DGV) for 95% species protection level (moderately disturbed) for filtered/dissolved chemicals.

<sup>a</sup> - Site specific water quality guideline (SSWQG) used for Boron as developed in AECOM, 2019

## Appendix E-2 Waterhole and Dawson River Water and Sediment Quality Summary Statistics 2015 to 2022

# APPENDIX E-2

Santos Fairview Water Release Scheme  
Preliminary Documentation

Summary Water Quality Statistics - July 2015 to 2021 - HCS04 DWB Pond, Waterhole and Dawson River

	HCS04 Desalinated Water Balance Pond (HCS04DWB1) - 2015-2021														WLMP1-2015-2022								
	Units	LOR	State EA CL S4	sub-regional WQO / DGV 95% Sp. Prot.	State EA CL HCS04 DWB Pond	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>																							
Dissolved Oxygen - Field	mg/L	-	NL	7.0-9.0	6.4-16.4	156	156	100	5.6	7.7	8.4	9.4	10.6	13.4	68	68	100	0.5	6.9	8.3	9.7	11.0	11.6
Electrical Conductivity - Field	µS/cm	-	NL	370 (base flow) 210 (high flow)	370 (75%ile)	157	157	100	33	63	91	129	217	376	68	68	100	83	133	165	206	275	350
pH - Field	pH units	-	NL	6.5 - 8.5	6.5-8.5	156	156	100	6.3	7.7	8.2	8.6	9.0	9.8	67	67	100	5.0	7.4	7.8	8.3	8.7	9.3
Suspended Solids	mg/L	5	NL	< 30	NL	157	13	9	NC	NC	NC	NC	NC	28	46	36	78	5	5	11	16	33	152
Turbidity - Field	NTU	-	NL	50	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	11	11	100	3	10	18	23	30	36
<b>Cations</b>																							
Calcium (dissolved)	mg/L	1	Minimum 1	No WQO	Minimum 1	157	149	95	1	1	3	5	6	10	27	27	100	9	13	16	21	28	13
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	157	0	0	NC	NC	NC	NC	NC	NC	27	25	93	1	2	4	6	7	3
Sodium (dissolved)	mg/L	1	NL	No WQO	115	157	156	99	1	8	12	18	34	40	26	26	100	10	13	16	21	23	13
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	157	1	1	NC	NC	NC	NC	NC	4	26	26	100	2	4	7	13	16	5
<b>Anions</b>																							
Chloride	mg/L	1	NL	No WQO	175	155	155	100	5.00	10.00	13.00	20.20	29.30	36.00	7	7	100	10	11	12	21.6	30	34
Fluoride	mg/L	0.1	1.5	No WQO	1.0	159	3	2	NC	NC	NC	NC	NC	NC	7	5	71	0.1	0.1	0.2	0.6	0.8	0.2
Sulfate as SO4 2-	mg/L	1	NL	< 5	5	157	14	9	NC	NC	NC	NC	NC	4	7	0	0	NC	NC	NC	NC	NC	NC
<b>Metals and Metalloids</b>																							
Aluminium (dissolved)	mg/L	0.01	0.20	0.055	0.055	157	83	53	0.01	0.01	0.01	0.02	0.03	0.05	7	7	100	0.01	0.01	0.02	0.04	0.15	0.20
Arsenic (dissolved)	mg/L	0.001	0.010	0.013	NL	160	0	0	NC	NC	NC	NC	NC	< 0.001	7	6	86	0.001	0.001	0.001	0.003	0.004	0.004
Boron (dissolved)	mg/L	0.05	4.0	0.94	2.9 @ 18 ML/day <sup>a</sup> 2.5 @ 13.5 ML/day	158	158	100	0.22	0.58	0.83	1.17	1.81	2.05	71	68	96	0.05	0.42	0.59	0.87	1.14	1.47
Cadmium (dissolved)	mg/L	0.0001	0.002	0.0002	0.0002	158	1	1	NC	NC	NC	NC	NC	NC	7	0	0	NC	NC	NC	NC	NC	< 0.0001
Chromium (dissolved)	mg/L	0.001	0.050	0.001	0.001	158	8	5	NC	NC	NC	NC	NC	0.003	7	0	0	NC	NC	NC	NC	NC	< 0.001
Cobalt (dissolved)	mg/L	0.001	NL	0.001	NL	3	0	0	NC	NC	NC	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (dissolved)	mg/L	0.001	2.0	0.0014	0.0014	158	6	4	NC	NC	NC	NC	NC	0.003	7	1	14	NC	NC	NC	NC	NC	0.004
Lead (dissolved)	mg/L	0.001	0.01	0.0034	0.0034	158	4	3	NC	NC	NC	NC	NC	0.004	7	1	14	NC	NC	NC	NC	NC	0.002
Manganese (dissolved)	mg/L	0.001	0.5	1.900	1.9	136	14	10	NC	NC	NC	NC	NC	0.059	7	7	100	0.002	0.010	0.042	0.155	0.250	0.283
Mercury (dissolved)	mg/L	0.0001	0.001	0.0006	0.0006	157	0	0	NC	NC	NC	NC	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel (dissolved)	mg/L	0.001	0.02	0.011	0.011	158	3	2	NC	NC	NC	NC	NC	0.007	7	1	14	NC	NC	NC	NC	NC	0.001
Selenium (dissolved)	mg/L	0.01	0.01	0.011	0.011	158	0	0	NC	NC	NC	NC	NC	NC	7	0	0	NC	NC	NC	NC	NC	NC
Zinc (dissolved)	mg/L	0.005	3.0	0.008	0.008	158	21	13	NC	NC	NC	NC	NC	0.142	37	2	5	NC	NC	NC	NC	NC	0.013
<b>Nutrients</b>																							
Ammonia as N	mg/L	0.01	0.50	0.02	0.9	159	145	91	0.01	0.03	0.07	0.14	0.26	0.34	46	34	74	0.01	0.01	0.03	0.08	0.12	0.35
Nitrate as N	mg/L	0.01	NL	No WQO	NL	5	1	20	NC	NC	NC	NC	NC	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate as N	mg/L	0.01	NL	0.06	NL	157	48	31	0.01	0.01	0.01	0.01	0.02	0.05	46	13	28	0.01	0.01	0.01	0.01	0.04	0.13
Total Nitrogen as N	mg/L	0.1	NL	0.62	0.62	157	117	75	0.1	0.1	0.2	0.3	0.4	0.6	46	46	100	0.2	0.4	0.6	1.0	1.3	4.8
Total Phosphorus as P	mg/L	0.01	NL	0.07	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table Notes**  
Green highlighting is to provide visual guidance for the applicable statistic to be referenced against the State EA CL or WQO.  
LoR = Limit of Reporting of Analytical Method  
NA = Not Analyzed  
NC = sufficient detections to calculate summary statistics - maximum value provided only  
sub-regional WQO = sub-regional Water Quality Objectives  
DGV = Desalination Guideline Value (ANZG, 2018) for 95% species protection level (Sp. Prot.)  
NL = No State EA Contaminant Limit  
Percent (95) detection values that are underlined indicate the number of detections are too low to calculate a reliable summary statistic.  
Bold values denote a dissolved phase value in excess of or above the sub-regional WQO as follows:  
- for physico-chemical parameters the median value are compared against the sub-regional WQO  
- for nutrients, toxicants, metals and metalloids the 95th percentile is compared against the sub-regional WQO  
Values shaded orange = the median (physico-chemical parameters) or 95th percentile are above the respective State EA CL triggering a review/evaluation of threat or cause  
- State EA Contaminant Limit (CL) are provided from DP-C0529723  
- Physico-chemical and Nutrient sub-regional WQO derived from the Environmental Protection (Water and Wetland Biodiversity) Policy 2018 - Schedule 1 document for the Upper Dawson River  
- Invertebrate Protection (Water) Policy 2009 Dawson River Sub Basin Invertebrate and Water Quality Objectives Basin No. 132 (part), including all waters of the Dawson River Sub Basin except the Callide Creek Catchment September 2011  
- Toxicant parameters WQO derived from Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2011) Data at Guideline Value (DGV) for 95% species protection level (generally distributed) for filtered/dissolved chemicals  
- Site specific water quality guideline (SSWQO) used for Boron as developed in ACOM, 2019

# APPENDIX E-2

Santos Fairview Water Release Scheme  
Preliminary Documentation

Summary Water Quality Statistics - July 2015 to 2021 - HCS04 DWB Pond, Waterhole and Dawson River

	Units	LOR	State EA CL S4	sub-regional WQO / DGV 95% Sp. Prot.	State EA CL HCS04 DWB Pond	WLMP4-2015-2022									WLMP5-2015-2022								
						Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
Physicochemical Parameters																							
Dissolved Oxygen - Field	mg/L	-	NL	7.0-9.0	6.4-16.4	30	30	100	3.6	6.5	8.1	9.3	10.3	11.0	44	44	100	2.4	6.6	7.5	9.1	11.7	12.6
Electrical Conductivity - Field	µS/cm	-	NL	370 (base flow) 210 (high flow)	370 (75%ile)	30	30	100	121	266	298	378	499	524	44	44	100	108	136	160	214	254	310
pH - Field	pH units	-	NL	6.5 - 8.5	6.5-8.5	29	29	100	6.1	7.4	7.8	8.0	8.6	8.8	43	43	100	7.1	7.5	7.7	7.9	8.2	9.8
Suspended Solids	mg/L	5	NL	<30	NL	16	14	88	5	5	10	24	137	174	30	23	77	5	5	8	16	53	155
Turbidity - Field	NTU	-	NL	50	50	11	11	100	5	6	12	17	30	31	10	10	100	4	11	14	32	223	353
Cations																							
Calcium (dissolved)	mg/L	1	Minimum 1	No WQO	Minimum 1	13	13	100	13	23	27	38	43	44	29	29	100	7	10	13	18	22	28
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	13	13	100	4	4	6	12	12	13	29	27	93	1	1	2	4	7	7
Sodium (dissolved)	mg/L	1	NL	No WQO	115	12	12	100	14	22	24	26	28	30	28	28	100	8	10	12	16	21	22
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	12	12	100	5	6	9	24	27	29	28	28	100	1	2	5	8	15	16
Anions																							
Chloride	mg/L	1	NL	No WQO	175	7	7	100	22	24	28	34.4	37	38	8	8	100	10	10	12	20	29	33
Fluoride	mg/L	0.1	1.5	No WQO	1.0	7.0	7.0	100.0	0.1	0.1	0.1	0.2	0.2	0.2	8	8	100	0.1	0.1	0.1	0.2	0.2	0.2
Sulfate as SO4 2-	mg/L	1	NL	<5	5	7	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Metals and Metalloids																							
Aluminium (dissolved)	mg/L	0.01	0.20	0.055	0.055	7	4	57	0.01	0.01	0.02	0.02	0.03	0.04	8	8	100	0.01	0.02	0.03	0.04	0.19	0.27
Arsenic (dissolved)	mg/L	0.001	0.010	0.013	NL	7	6	86	0.001	0.001	0.002	0.002	0.003	0.004	8	6	75	0.001	0.001	0.001	0.002	0.003	0.003
Boron (dissolved)	mg/L	0.05	4.0	0.94	2.9 @ 18 ML/day <sup>a</sup> 2.5 @ 13.5 ML/day <sup>b</sup>	30	27	90	0.05	0.14	0.75	1.09	1.35	1.77	46	42	91	0.05	0.26	0.60	0.90	1.23	1.49
Cadmium (dissolved)	mg/L	0.0001	0.002	0.0002	0.0002	7	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Chromium (dissolved)	mg/L	0.001	0.050	0.001	0.001	7	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Cobalt (dissolved)	mg/L	0.001	NL	0.001	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (dissolved)	mg/L	0.001	2.0	0.0014	0.0014	7	0	0	NC	NC	NC	NC	NC	NC	8	1	13	NC	NC	NC	NC	NC	0.004
Lead (dissolved)	mg/L	0.001	0.01	0.0034	0.0034	7	0	0	NC	NC	NC	NC	NC	NC	8	1	13	NC	NC	NC	NC	NC	0.002
Manganese (dissolved)	mg/L	0.001	0.5	1.900	1.9	7	7	100	0.014	0.022	0.037	0.139	0.192	0.211	8	7	88	0.001	0.005	0.023	0.057	0.215	0.291
Mercury (dissolved)	mg/L	0.0001	0.001	0.0006	0.0006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel (dissolved)	mg/L	0.001	0.02	0.011	0.011	7	4	57	0.001	0.001	0.002	0.002	0.002	0.002	8	1	13	NC	NC	NC	NC	NC	0.001
Selenium (dissolved)	mg/L	0.01	0.01	0.011	0.011	7	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Zinc (dissolved)	mg/L	0.005	3.0	0.008	0.008	26	1	4	NC	NC	NC	NC	NC	0.005	29	3	10	NC	NC	NC	NC	NC	0.011
Nutrients																							
Ammonia as N	mg/L	0.01	0.50	0.02	0.9	16	11	69	0.01	0.01	0.03	0.06	0.15	0.25	30	22	73	0.01	0.01	0.02	0.07	0.16	0.42
Nitrate as N	mg/L	0.01	NL	No WQO	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate as N	mg/L	0.01	NL	0.06	NL	16	3	19	NC	NC	NC	NC	NC	0.35	30	9	30	NC	NC	NC	NC	NC	0.14
Total Nitrogen as N	mg/L	0.1	NL	0.62	0.62	16	16	100	0.4	0.6	1.0	1.5	1.9	2.1	30	30	100	0.3	0.5	0.7	1.0	1.5	3.5
Total Phosphorus as P	mg/L	0.01	NL	0.07	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table Notes**  
 Green highlighting is to provide visual reference for the applicable statistic to be referenced against the State EA CL or WQO  
 LOR - Limit of Reporting of analytical method  
 NA - Not Analyzed  
 NC - Insufficient detections to calculate summary statistics - maximum value provided only  
 sub-regional WQO - sub-regional Water Quality Objective  
 DGV - Default Guideline Value (AS/NZS 22818 for 95% species protection level (Sp. Prot.))  
 NL - No State EA Contaminant Limit  
 Percentile detection values that are underlined indicate the number of detections are too low to calculate a reliable summary statistic  
 italic values denote dissolved phase value in contrast to the sub-regional WQO as follows:  
 - for physico-chemical parameters the italic value is compared against the sub-regional WQO  
 - for nutrients, toxic metals and metalloids the italic value is compared against the sub-regional WQO  
 Values shaded orange = the maximum physico-chemical parameters or 95th percentile is compared against the sub-regional WQO  
 - State EA Contaminant Limit (CL) are derived from (R1990)00718  
 - Physico-chemical and nutrient sub-regional WQO derived from the Environmental Protection (Water and Wetland Rehabilitation) Policy 2019 - Schedule 7 - Guidelines for the Upper Dawson River  
 - Environmental Protection (Water) Policy 2000 Dawson River Sub-acute Environmental Values and Water Quality Objectives Basin No. 130 (part), including all basins of the Dawson River Sub-basin except the Collier Creek Catchment September 2015  
 - Toxic substances WQO derived from Australia and New Zealand Guidelines for Fresh and Marine Water Quality (2015) Default Guideline Value (DGV) for 95% species protection level (proceedably described) for filtered/dissolved metals  
 - Data specific water quality guideline (DGV) used for boron as developed in ALCUM, 2019

# APPENDIX E-2

Santos Fairview Water Release Scheme  
Preliminary Documentation

Summary Water Quality Statistics - July 2015 to 2021 - HCS04 DWB Pond, Waterhole and Dawson River

	Units	LOR	State EA CL S4	sub-regional WQO / DGV 95% Sp. Prot.	State EA CL HCS04 DWB Pond	DRR1-2015-2022									DRMP1 2015-2022								
						Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>																							
Dissolved Oxygen - Field	mg/L	-	NL	7.0-9.0	6.4-16.4	25	25	100	3.6	5.2	6.3	7.1	7.6	7.8	58	58	100	3.4	6.2	7.1	8.9	9.6	11.6
Electrical Conductivity - Field	µS/cm	-	NL	370 (base flow) 210 (high flow)	370 (75%ile)	25	25	100	82	241	273	290	307	312	58	58	100	102	222	275	303	335	602
pH - Field	pH units	-	NL	6.5 - 8.5	6.5-8.5	25	25	100	6.7	7.1	7.4	7.5	7.6	7.9	56	56	100	5.9	7.2	7.4	7.7	7.9	8.1
Suspended Solids	mg/L	5	NL	< 30	NL	26	20	77	5	5	12	42	277	711	25	21	84	5	6	12	36	153	174
Turbidity - Field	NTU	-	NL	50	50	11	11	100	11	13	20	21	520	1000	10	10	100	12	13	17	27	34	39
<b>Cations</b>																							
Calcium (dissolved)	mg/L	1	Minimum 1	No WQO	Minimum 1	24	24	100	5	14	16	18	20	21	26	26	100	6	14	16	19	22	23
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	24	24	100	1	6	7	7	8	9	26	26	100	2	6	6	7	8	10
Sodium (dissolved)	mg/L	1	NL	No WQO	115	9	9	100	8	23	28	31	32	19	25	25	100	8	26	29	31	34	37
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	23	23	100	3	3	4	4	5	6	25	25	100	3	4	4	5	6	4
<b>Anions</b>																							
Chloride	mg/L	1	NL	No WQO	175	9	9	100	4	18	21	24	26	26	8	8	100	16	21	22	24	25	25
Fluoride	mg/L	0.1	1.5	No WQO	1.0	9	8	89	0.1	0.1	0.1	0.1	0.2	0.2	8	8	100	0.1	0.1	0.1	0.2	0.3	0.4
Sulfate as SO4 2-	mg/L	1	NL	< 5	5	9	4	44	NC	NC	NC	NC	NC	2.0	8	5	63	1.0	1.0	1.0	2.2	3.7	4.0
<b>Metals and Metalloids</b>																							
Aluminium (dissolved)	mg/L	0.01	0.20	0.055	0.055	9	9	100	0.01	0.01	0.02	0.12	0.26	0.30	8	8	100	0.01	0.02	0.03	0.06	0.13	0.15
Arsenic (dissolved)	mg/L	0.001	0.010	0.013	NL	9	1	11	NC	NC	NC	NC	NC	0.001	8	1	13	NC	NC	NC	NC	NC	0.001
Boron (dissolved)	mg/L	0.05	4.0	0.94	2.9 @ 18 ML/day <sup>a</sup> 2.5 @ 13.5 ML/day <sup>a</sup>	26	0	0	NC	NC	NC	NC	NC	NC	60	26	43	NC	NC	NC	NC	NC	0.28
Cadmium (dissolved)	mg/L	0.0001	0.002	0.0002	0.0002	9	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Chromium (dissolved)	mg/L	0.001	0.050	0.001	0.001	9	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Cobalt (dissolved)	mg/L	0.001	NL	0.001	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper (dissolved)	mg/L	0.001	2.0	0.0014	0.0014	9	2	22	NC	NC	NC	NC	NC	0.005	8	1	13	NC	NC	NC	NC	NC	0.0020
Lead (dissolved)	mg/L	0.001	0.01	0.0034	0.0034	9	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Manganese (dissolved)	mg/L	0.001	0.5	1.900	1.9	9	9	100	0.003	0.076	0.148	0.206	0.221	0.227	8	8	100	0.061	0.095	0.156	0.201	0.208	0.211
Mercury (dissolved)	mg/L	0.0001	0.001	0.0006	0.0006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel (dissolved)	mg/L	0.001	0.02	0.011	0.011	9	0	0	NC	NC	NC	NC	NC	NC	8	1	13	NC	NC	NC	NC	NC	0.001
Selenium (dissolved)	mg/L	0.01	0.01	0.011	0.011	9	0	0	NC	NC	NC	NC	NC	NC	8	0	0	NC	NC	NC	NC	NC	NC
Zinc (dissolved)	mg/L	0.005	3.0	0.008	0.008	26	2	8	NC	NC	NC	NC	NC	0.011	60	6	10	NC	NC	NC	NC	NC	0.008
<b>Nutrients</b>																							
Ammonia as N	mg/L	0.01	0.50	0.02	0.9	26	21	81	0.01	0.01	0.04	0.06	0.10	0.15	25	25	100	0.01	0.02	0.05	0.07	0.08	0.13
Nitrate as N	mg/L	0.01	NL	No WQO	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite + Nitrate as N	mg/L	0.01	NL	0.06	NL	26	19	73	0.01	0.01	0.04	0.10	0.45	0.83	25	22	88	0.01	0.01	0.04	0.08	0.74	0.87
Total Nitrogen as N	mg/L	0.1	NL	0.62	0.62	26	19	73	0.1	0.1	0.2	0.5	2.0	2.1	25	21	84	0.1	0.1	0.2	0.5	1.7	1.8
Total Phosphorus as P	mg/L	0.01	NL	0.07	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

**Table Notes:**  
 Down highlighting is to indicate exceedance for the applicable statistic to be assessed against the State EA CL or WQO.  
 LoR - Limit of Reporting of analytical method.  
 NA - Not Analyzed.  
 NC - Insufficient detections to calculate summary statistics - minimum value provided only.  
 sub-regional WQO - sub-regional Water Quality Objective.  
 DGV - Domestic Guideline Value (AS/NZS 2018) for 95% species protection level (S4a, Prati).  
 NL - No State EA Contaminant Limit.  
 Percentile detection values that are exceeded indicate the number of detections are too low to calculate a reliable summary statistic and values denote a detected phase that is outside or above the sub-regional WQO as follows:  
 - For physico-chemical parameters the detection occur as unpaired values. For sub-regional WQO.  
 - For nutrients, trace metals and metalloids the 95th percentile is compared against the sub-regional WQO.  
 - For dissolved metals - the median (physico-chemical parameters) or 95th percentile are above the respective State EA CL triggering a (verbal) investigation of trend or cause.  
 State EA Contaminant Limits (CALs) are derived from: LHMPS201212.  
 - Physico-chemical and nutrient sub-regional WQOs derived from the Environmental Protection (Water and Wetland Biocriteria) Policy 2015 - Schedule 1 document for the Upper Dawson River.  
 - Nutrient limits for the Upper Dawson River (Dawson River Sub-basin) for sub-regional WQOs and Water Quality Objectives (WQOs) for the Dawson River Sub-basin (see the Catchment Creek Catchment September 2017).  
 - Domestic Guideline Value (DGV) for Boron as defined in the Environmental Protection (Water Quality) Policy 2015 - Schedule 1 document for the Dawson River Sub-basin.  
 - State specific water quality guidelines (SSWQGs) used for Boron as developed in AEMO, 2019.

# APPENDIX E-2

Santos Fairview Water Release Scheme  
Preliminary Documentation

Summary Water Quality Statistics - July 2015 to 2021 - HCS04 DWB Pond, Waterhole and Dawson River

	S4 2015-2022													
	Units	LOR	State EA CL S4	sub-regional WQO / DGV 95% Sp. Prot.	State EA CL HCS04 DWB Pond	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>														
Dissolved Oxygen - Field	mg/L	-	NL	7.0-9.0	6.4-16.4	58	58	100	5.6	6.4	7.3	8.9	10.2	13.0
Electrical Conductivity - Field	µS/cm	-	NL	370 (base flow) 210 (high flow)	370 (75%ile)	58	58	100	111	214	273	306	338	393
pH - Field	pH units	-	NL	6.5 - 8.5	6.5-8.5	57	57	100	6.6	7.4	7.6	7.9	8.5	9.5
Suspended Solids	mg/L	5	NL	<30	NL	17	10	59	5	5	16	144	555	650
Turbidity - Field	NTU	-	NL	50	50	9	9	100	6	16	20	30	37	40
<b>Cations</b>														
Calcium (dissolved)	mg/L	1	Minimum 1	No WQO	Minimum 1	10	10	100	13	15	17	18	22	25
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	10	10	100	6	6	7	7	8	8
Sodium (dissolved)	mg/L	1	NL	No WQO	115	10	10	100	25	29	31	34	35	36
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	10	10	100	3	3	4	4	4	4
<b>Anions</b>														
Chloride	mg/L	1	NL	No WQO	175	7	7	100	21	22	23	25	27	28
Fluoride	mg/L	0.1	1.5	No WQO	1.0	35	33	94	0.1	0.1	0.1	0.1	0.2	0.2
Sulfate as SO4 2-	mg/L	1	NL	<5	5	7	4	57	NC	NC	NC	NC	NC	2.0
<b>Metals and Metalloids</b>														
Aluminium (dissolved)	mg/L	0.01	0.20	0.055	0.055	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (dissolved)	mg/L	0.001	0.010	0.013	NL	NA	NA	NA	NA	NA	NA	NA	NA	NA
Boron (dissolved)	mg/L	0.05	4.0	0.94	2.9 @ 18 ML/day <sup>a</sup> 2.5 @ 13.5 ML/day	17	2	12	NC	NC	NC	NC	NC	0.24
Cadmium (dissolved)	mg/L	0.0001	0.002	0.0002	0.0002	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium (dissolved)	mg/L	0.001	0.050	0.001	0.001	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt (dissolved)	mg/L	0.001	NL	0.001	NL	1	0	0	NC	NC	NC	NC	NC	<0.001
Copper (dissolved)	mg/L	0.001	2.0	0.0014	0.0014	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead (dissolved)	mg/L	0.001	0.01	0.0034	0.0034	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (dissolved)	mg/L	0.001	0.5	1.900	1.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury (dissolved)	mg/L	0.0001	0.001	0.0006	0.0006	24	0	0	NC	NC	NC	NC	NC	NC
Nickel (dissolved)	mg/L	0.001	0.02	0.011	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium (dissolved)	mg/L	0.01	0.01	0.011	0.011	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc (dissolved)	mg/L	0.005	3.0	0.008	0.008	NA	NA	NA	NA	NA	NA	NA	NA	NA
<b>Nutrients</b>														
Ammonia as N	mg/L	0.01	0.50	0.02	0.9	46	38	83	0.01	0.01	0.04	0.06	0.10	0.18
Nitrate as N	mg/L	0.01	NL	No WQO	NL	1	1	100	NC	NC	NC	NC	NC	0.02
Nitrite + Nitrate as N	mg/L	0.01	NL	0.06	NL	24	18	75	0.01	0.01	0.02	0.18	0.38	0.57
Total Nitrogen as N	mg/L	0.1	NL	0.62	0.62	24	23	96	0.1	0.1	0.2	1.4	1.9	3.2
Total Phosphorus as P	mg/L	0.01	NL	0.07	NL	7	7	100	0.01	0.02	0.02	0.05	0.07	0.08

**Table Notes:**  
 - Values in yellow cells to provide additional guidance for the applicable statistical analysis and against the State EA CL or WQO.  
 - LOR = Limit of Reporting of analytical method.  
 - NA = Not Analyzed.  
 - NC = Not Detected - detection limit for an analyte normally equals to the detection value provided only.  
 - sub-regional WQO = sub-regional Water Quality Objective.  
 - DGV = Default Guideline Value (ANZL, 2018) for 95% species protection level (95%ile).  
 - NL = Not a State EA Guideline Value.  
 - For nutrients, metals, metalloids, trace organics and PCBs the 95th percentile is compared against the sub-regional WQO.  
 - For physicochemical parameters, the median value is compared against the sub-regional WQO.  
 - For values above the reported detection limit in table or above the sub-regional WQO see below.  
 - For trace organics, metals, metalloids, PCBs and trace organics, the median value is compared against the sub-regional WQO.  
 - For nutrients, metals, metalloids, trace organics and PCBs the 95th percentile is compared against the sub-regional WQO.  
 - For values above the reported detection limit in table or above the sub-regional WQO see below.  
 - State EA Contaminant Limit (CL) are derived from the EPA (2018) CL.  
 - Physicochemical and nutrient sub-regional WQO are derived from the Environmental Protection (Water and Wetland Biodiversity) Act 2019 - Schedule 1 (contaminant limit) for the Upper Dawson Basin.  
 - Environmental Protection (Water) Policy 2020 Dawson River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (2020), including 21 vectors of the Dawson River Sub-basin except the Callide Creek Catchment Sub-basin 2011.  
 - Contaminant parameters WQO derived from Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZL) Default Guideline Value (DGV) for 95% species protection level (95%ile) for dissolved trace organics.  
 - Site specific water quality guideline (SWWGL) used for 2019 as detailed in ALLUM, 2019.



## Appendix E-3 Sediment Quality Summary Statistics

Summary Sediment Quality Statistics - 2009 - 2021 - Waterhole and Dawson River

	LoR	Units	REMP LT WH / DR	ANZG (2018) DGV	WLMP1-2015-2022									WLMP4-2015-2022								
					Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>																						
Electrical Conductivity @ 25C	1	µS/cm	No LT	No DGV	13	13	100	37	70	121	387	2,018	3,530	13	13	100	27	30	47	45	57	69
Electrical Conductivity (Saturated Paste)	0.01	µS/cm	No LT	No DGV	3	3	100	180	184	190	196	199	200	3	3	100	80	92	110	110	128	140
<b>Metals and Metalloids</b>																						
Aluminium	50	mg/kg	13,933 / 5,191	No DGV	13	13	100	5,030	5,964	8,180	14,140	15,120	15,300	13	13	100	5,230	6,104	6,700	8,149	11,560	12,600
Arsenic	5	mg/kg	20 / 20	20	13	4	<b>31</b>	5	5	5	6	8	9	13	2	<b>15</b>	5	NC	NC	NC	NC	7
Boron (Total via USEPA_6010)	50	mg/kg	18.8 / 17.9	No DGV	13	0	<b>0</b>	NC	NC	NC	NC	NC	<50	13	0	<b>0</b>	NC	NC	NC	NC	NC	0
Boron (N via Rayment et al., 2011)	0.2	mg/kg	18.8 / 17.9	No DGV	8	8	100	0.5	1.2	2.6	3.7	4.1	4.2	8	8	100	0.3	0.9	1.8	1.8	2.5	3.3
Cadmium	1	mg/kg	1.5 / 1.5	1.5	13	0	<b>0</b>	NC	NC	NC	NC	NC	<1	13	0	<b>0</b>	NC	NC	NC	NC	NC	0
Chromium	2	mg/kg	80 / 80	80	13	13	100	4	5	6	11	11	12	13	13	100	5	6	6	7	9	11
Copper	5	mg/kg	65 / 65	65	13	13	100	9	10	13	16	16	17	13	13	100	9	10	11	11	13	15
Iron	50	mg/kg	17,867 / 9,353	No DGV	13	13	100	8,320	11,140	14,100	18,820	20,620	21,100	13	13	100	8,210	9,610	13,000	13,119	16,440	17,900
Lead	5	mg/kg	50 / 50	50	13	13	100	8	11	13	17	18	20	13	13	100	10	12	13	14	16	17
Manganese	5	mg/kg	648 / 230.5	No DGV	13	13	100	270	420	475	585	767	919	13	13	100	234	296	442	509	671	1,050
Mercury (via APHA_3112_CV_FMS)	0.1	mg/kg	0.15 / 0.15	0.15	13	0	<b>0</b>	0	NC	NC	NC	NC	<0.1	13	0	<b>0</b>	NC	NC	NC	NC	NC	0
Nickel	2	mg/kg	21 / 21	21	13	13	100	6	7	9	12	13	14	13	13	100	7	7	9	9	11	12
Selenium	5	mg/kg	1 / 1.73	No DGV	13	0	<b>0</b>	NC	NC	NC	NC	NC	<5	13	0	<b>0</b>	NC	NC	NC	NC	NC	0
Zinc	5	mg/kg	200 / 200	200	13	13	100	29	38	50	66	68	69	13	13	100	31	34	38	42	54	61
<b>Nutrients</b>																						
Ammonia as N	20	mg/kg	No LT	No DGV	12	8	<b>67</b>	20	20	30	50	55	60	3	3	100	29	35	44	43	51	55
Nitrate as N (Sol.)	0.1	mg/kg	No LT	No DGV	13	4	<b>31</b>	NC	NC	NC	NC	NC	1	13	1	<b>3</b>	NC	NC	NC	NC	NC	0.2
Total Kjeldahl Nitrogen as N	20	mg/kg	No LT	No DGV	13	13	100	620	2,038	2,880	4,532	4,736	4,760	13	13	100	450	1,262	1,440	1,679	1,944	4,570

**Notes**

REMP Local Trigger (LT)

WH = Waterhole

DR = Dawson River

ANZG (2018) = Australia and New Zealand guidelines for fresh and marine water quality - default guideline values (DGV) for sediment quality

Results in Bold exceed the REMPT or ANZG (2018) Sediment DGV

Summary Sediment Quality Statistics - 2009 - 2021 - Waterhole and Dawson River

	LoR	Units	REMP LT WH / DR	ANZG (2018) DGV	WLMF5-2015-2022									DRR1-2015-2022								
					Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>																						
Electrical Conductivity @ 25C	1	µS/cm	No LT	No DGV	13	13	100	14	21	28	42	88	152	13	13	100	19	25.8	30	60.4	109.8	174
Electrical Conductivity (Saturated Paste)	0.01	µS/cm	No LT	No DGV	3	3	100	100	104	110	140	155	160	2	2	100	100	102	105	108	109.5	110
<b>Metals and Metalloids</b>																						
Aluminium	50	mg/kg	13,933 / 5,191	No DGV	13	13	100	6,200	8,104	11,700	13,540	16,280	17,600	13	13	100	550	1,174	4,150	7,742	10,600	11,500
Arsenic	5	mg/kg	20 / 20	20	13	0	0	NC	NC	NC	NC	NC	<5	13	2	15	5	5	5	5	5	5
Boron (Total via USEPA_6010)	50	mg/kg	18.8 / 17.9	No DGV	13	0	0	NC	NC	NC	NC	NC	<50	13	0	0	NC	NC	NC	NC	NC	<50
Boron (N via Rayment et al., 2011)	0.2	mg/kg	18.8 / 17.9	No DGV	8	8	100	1.0	1.6	3.0	7.0	9.0	9.0	8	3	38	0.2	0.2	0.2	0.3	0.4	0.5
Cadmium	1	mg/kg	1.5 / 1.5	1.5	13	0	0	NC	NC	NC	NC	NC	<1	13	0	0	NC	NC	NC	NC	NC	<1
Chromium	2	mg/kg	80 / 80	80	13	13	100	6	8	10	12	13	13	13	10	77	2	3	5	6	9	9
Copper	5	mg/kg	65 / 65	65	13	13	100	12	13	15	16	18	19	13	8	62	6	6	9	11	12	12
Iron	50	mg/kg	17,867 / 9,353	No DGV	13	13	100	9,900	12,580	14,500	16,720	18,960	21,000	13	13	100	1,680	3,144	10,300	13,620	16,600	18,400
Lead	5	mg/kg	50 / 50	50	13	13	100	11	14	16	17	17	18	13	8	62	5	5	8	13	14	15
Manganese	5	mg/kg	648 / 230.5	No DGV	13	13	100	199	302	373	488	549	553	13	13	100	49	88	277	380	544	721
Mercury (via APHA_3112_CV_FMS)	0.1	mg/kg	0.15 / 0.15	0.15	13	0	0	NC	NC	NC	NC	NC	<0.1	13	0	0	NC	NC	NC	NC	NC	<0.1
Nickel	2	mg/kg	21 / 21	21	13	13	100	7	8	10	12	13	13	13	10	77	2	2	6	9	10	11
Selenium	5	mg/kg	1 / 1.73	No DGV	13	0	0	NC	NC	NC	NC	NC	<5	13	0	0	NC	NC	NC	NC	NC	<5
Zinc	5	mg/kg	200 / 200	200	13	13	100	33	40	56	60	68	76	13	10	77	5	8	23	35	44	48
<b>Nutrients</b>																						
Ammonia as N	20	mg/kg	No LT	No DGV	13	10	77	20	24	50	102	144	180	13	4	31	20	20	20	36	58	70
Nitrate as N (Sol.)	0.1	mg/kg	No LT	No DGV	13	9	69	0.1	0.1	0.1	0.3	0.4	0.6	13	1	8	0	0	0	0	1	1.2
Total Kjeldahl Nitrogen as N	20	mg/kg	No LT	No DGV	13	13	100	710	2,912	3,790	4,892	5,810	6,470	13	13	100	80	150	530	1,128	1,380	1,620

**Notes**

REMP Local Trigger (LT)

WH = Waterhole

DR = Dawson River

ANZG (2018) = Australia and New Zealand guidelines for fresh and marine water quality - default guideline values (DGV) for sediment quality

Results in Bold exceed the REMF LT or ANZG (2018) Sediment DGV

APPENDIX E-3

Santos Fairview Water Release Scheme  
Preliminary Documentation

Summary Sediment Quality Statistics - 2009 - 2021 - Waterhole and Dawson River

	LoR	Units	REMP LT WH / DR	ANZG (2018) DGV	DRMP1 2015-2022									S4 2015-2022								
					Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum	Number of data	No. > LoR	% detection	Minimum	20th Percentile	Median	80th Percentile	95th Percentile	Maximum
<b>Physicochemical Parameters</b>																						
Electrical Conductivity @ 25C	1	µS/cm	No LT	No DGV	13	13	100	12	15	19	36	70	111	12	12	100	10	12.4	17	24.8	30.15	34
Electrical Conductivity (Saturated Paste)	0.01	µS/cm	No LT	No DGV	2	2	100	86	107	138	169	185	190	2	2	100	29	40	56.5	73	81.25	84
<b>Metals and Metalloids</b>																						
Aluminium	50	mg/kg	13,933 / 5,191	No DGV	15	15	100	370	610	1,450	3,016	4,122	4,220	12	12	100	360	706	980	2,926	4,800	5,300
Arsenic	5	mg/kg	20 / 20	20	13	0	0	NC	NC	NC	NC	NC	<5	12	0	0	NC	NC	NC	NC	NC	<5
Boron (Total via USEPA_6010)	50	mg/kg	18.8 / 17.9	No DGV	13	0	0	NC	NC	NC	NC	NC	<50	12	0	0	NC	NC	NC	NC	NC	<50
Boron (N via Rayment et al., 2011)	0.2	mg/kg	18.8 / 17.9	No DGV	8	1	13	NC	NC	NC	NC	NC	0.2	8	2	25	0	NC	NC	NC	NC	2.6
Cadmium	1	mg/kg	1.5 / 1.5	1.5	13	0	0	NC	NC	NC	NC	NC	<1	12	0	0	NC	NC	NC	NC	NC	<1
Chromium	2	mg/kg	80 / 80	80	13	4	31	3	3	4	4	4	4	12	4	33	2	2	2	3	4	4
Copper	5	mg/kg	65 / 65	65	13	1	8	NC	NC	NC	NC	NC	7	12	1	8	5	5	5	5	6	7
Iron	50	mg/kg	17,867 / 9,353	No DGV	13	13	100	1,030	2,176	3,700	5,428	7,382	8,300	12	12	100	950	1,646	2,450	6,352	9,547	10,900
Lead	5	mg/kg	50 / 50	50	13	2	15	NC	NC	NC	NC	NC	8	12	2	25	5	5	5	6	8	10
Manganese	5	mg/kg	648 / 230.5	No DGV	13	13	100	22	66	98	216	328	430	12	12	100	18	42	51	102	308	459
Mercury (via APHA_3112_CV_FMS)	0.1	mg/kg	0.15 / 0.15	0.15	13	0	0	NC	NC	NC	NC	NC	<0.1	12	0	0	NC	NC	NC	NC	NC	<0.1
Nickel	2	mg/kg	21 / 21	21	13	13	100	2	2	2	4	4	5	12	4	33	2	2	2	3	4	5
Selenium	5	mg/kg	1 / 1.73	No DGV	13	0	0	NC	NC	NC	NC	NC	<5	12	0	0	NC	NC	NC	NC	NC	<5
Zinc	5	mg/kg	200 / 200	200	13	9	69	5	5	8	15	22	23	12	6	50	5	5	6	15	23	26
<b>Nutrients</b>																						
Ammonia as N	20	mg/kg	No LT	No DGV	13	0	0	NC	NC	NC	NC	NC	<20	12	0	0	NC	NC	NC	NC	NC	<20
Nitrate as N (Sol.)	0.1	mg/kg	No LT	No DGV	13	1	8	NC	NC	NC	NC	NC	0.1	12	0	0	NC	NC	NC	NC	NC	<0.1
Total Kjeldahl Nitrogen as N	20	mg/kg	No LT	No DGV	13	12	92	20	60	150	274	392	470	12	12	100	50	60	115	356	1,600	2,980

Notes

REMP Local Trigger (LT)

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ANZG (2018) = Australia and New Zealand guidelines for fresh and marine water quality - default guideline values (DGV) for sediment quality

Results in Bold exceed the REMPT LT or ANZG (2018) Sediment DGV