

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
Physicochemical Parameters																							
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
Cations																							
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	3	8	1.0	1.0	1.0	1.0	1.1	3.00
Magnesium (dissolved)	mg/L	1	0.5	No WQO	NL	157	0	0	NC	NC	NC	NC	NC	NC	39	39	100	4.000	12.00	16.00	18.40	22.10	26.00
Sodium (dissolved)	mg/L	1	NL	No WQO	115	157	156	99	1	8	12	18	34	40	39	39	100	11	28	34	38	40	41
Potassium (dissolved)	mg/L	1	NL	No WQO	NL	157	1	1	NC	NC	NC	NC	NC	4	39	39	100	10	18	24	32	38	40
Anions																							
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 SO4 2-	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
Metals and Metalloids																							
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 ^a 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
Nutrients																							
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 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/investigation of trend or cause

- State EA Contaminant Limits (CL) are derive 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.

^a - Site specific water quality guideline (SSWQG) used for Boron as developed in AECOM, 2019

