MARINE POLLUTION RESEARCH PTY LTD

Marine, Estuarine and Freshwater Ecology, Sediment and Water Quality Dynamics

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EAGLETON QUARRY PROJECT SSD7332 REQUEST FOR RESPONSE TO SUBMISSIONS (RRTS)– AQUATIC ECOLOGY ASPECTS

Figure 1 Water Quality Sampling Site A2 in Seven Mile Creek above Road Crossing.

1 INTRODUCTION

Clause 18 of the NSW Department of Planning & Environment Response to Submissions request requires the proponent to provide specific comments on the *Environment and Ecology* section of Port Stephens Council's (PSC) submission. In relation to aquatic ecology the PSC *Environment and Ecology* Section Clause 3 requires *inter alia* an aquatic ecology survey to establish baseline information (fish and macroinvertebrates) within the development site and study area.

Following discussions between Kleinfelder and Marine Pollution Research Pty (MPR) regarding appropriate monitoring requirements, the following base-line aquatic ecology survey proposal was adopted:

- Field surveys to be done to capture a dry weather event (no rain in the previous week) with three stream-health sites to be established either on the three first plus second order creeks within the development property boundaries or if not possible, on Seven Mile Creek above, within and downstream of the development property footprint.
- The stream-health sites are to be sampled for fish and macroinvertebrates.
- Dry weather water quality at the sites to be established by both metering and collection of samples for laboratory analysis.
- Additional water quality sampling (metering and/or sample collection) in Seven Mile Creek sites upstream and downstream of the three site drainages and within the three site drainages where possible.

1.1 Field Survey

The aquatic ecology field survey was undertaken on 8 May 2017. The probable rainfall patterns at the site were established by inspecting the daily rainfall records for Williamstown RAAF base. There was a large rain event between 12 and 16 April (53.2mm total with 33mm on the 12th), and a smaller event between 26 and 30 April (14.6mm total with 7.8mm on the 26th). There was no rain recorded for the 1st through to the 8th May.

Figure 2 shows the location of sites that were surveyed and Table 1 provides GPS coordinates for sites sampled:

- Three in-stream sites on Seven Mile Creek (A1, A2 and A6) were sampled for aquatic macroinvertebrates and fish. Metered water quality sampling was undertaken at all three sites and water samples for laboratory analysis were obtained from sites A1 and A2.
- There were two additional Seven Mile creek sites sampled for metered water quality (sites SDL3 and SDL6.

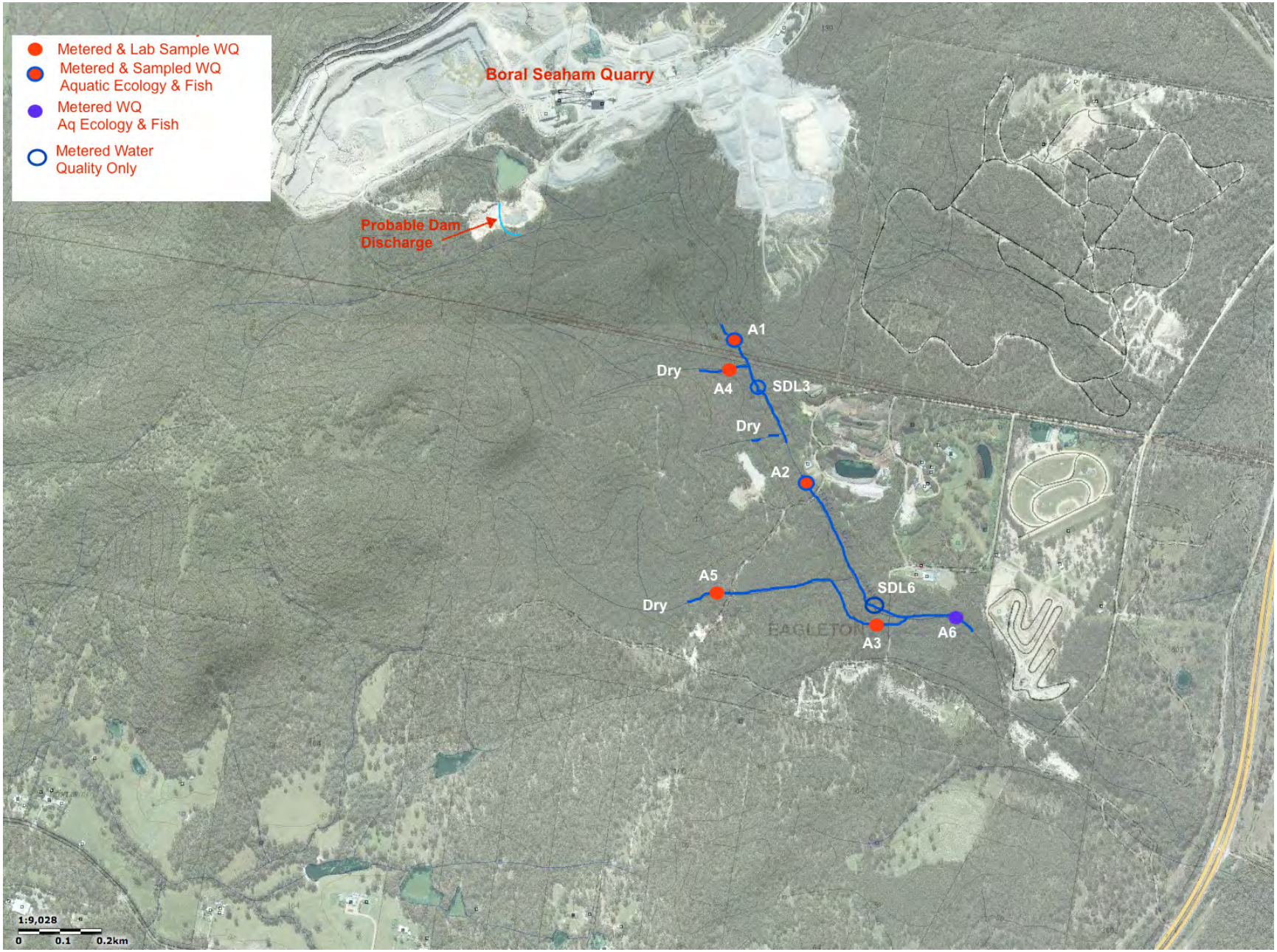


Figure 2
Six Map aerial view of the Seven Mile Creek Catchment below Boral Seaham Quarry showing extent of walk over survey (blue lines) and sampling sites.

Table 1 Site Locations

Site	Lat	Long
A1	-32.68387	151.7955067
A2	-32.68414667	151.7952133
SDL3	-32.68457	151.795865
A5	-32.689175	151.7948233
A2	-32.686945	151.797265
A3	-32.68945167	151.799445
A6	-32.68980167	151.8000967
SDL6	-32.68907833	151.7997067

- There are four west to east flow lines to Seven Mile Creek below Seaham Quarry:
    - The northern-most second-order creek line located below the Boral Seaham Quarry works and above the project site northern boundary would appear to receive dam overflow discharge from the quarry dam as indicated in Figure 2 (based on SixMap aerial photo interpretation).
    - The west to east drainage line joining the main creek immediately south of (below) the property boundary fence was dry to around 60m upstream from the confluence and then comprised stepped small-shallow rock constrained pools. Waters from one of these pools was sampled for water quality laboratory analysis and for metered water quality (site A4).
    - The short west to east first order drainage located south of the drainage above and draining the proposal site was dry and could not be sampled.
    - The second order west to east drainage south of the drainage above which is located to the south of the proposed project southern boundary was sampled at two places, at a location above the upper road crossing (site A5) and at a location above the lower road crossing, upstream of the confluence with Seven Mile Creek (site A3). Both sites were sampled for metered and laboratory analysis water quality

Aquatic macroinvertebrate sampling at sites A1, A2 and A6 was undertaken using standard methods (AusRivAS) with sorting undertaken to proscribed identification levels as described in Turak et al (2004). The results were used to generate Diversity, SIGNAL and EPT indices where Diversity is the number of taxa per site, SIGNAL and EPT are pollution sensitivity indices with SIGNAL considering taxa at the Family level (see Chessman 2003a) and EPT considering taxa from three pollution sensitive orders (Ephemoptera, Pleacoptera and Trichoptera).

2 SURVEY RESULTS

2.1 Drainage Line Descriptions

The main creek line down to the A6 sampling site comprises a more of less continuous series of mostly linked pools interrupted for the most part by rock bars and riffles in the upper section (above Site A1) and by sediment bars plus riffles in the lower section between sites A1 and A6:

- There was a reasonable flow in the creek leading to site A1. This may be a long-tail base flow for the upper creek, although, given the time since previous rainfall, this is considered unlikely. The flow is more likely a combination of residual creek base flow and dam discharge or seepage from the Seaham Quarry.
- The second order creek line (site A4) comprised a wide U shaped valley above site A4 with no definite drainage line until the last 100m or so where there was a shallow sediment and litter filled channel that then cut down through rock to the Seven Mile Creek confluence. This creek is likely to provide some base-flow after storm events but there would be little or no surface storage until the small shallow rock pools towards the confluence.
- The short first order creek below that comprised a simple narrow U shaped gully incised into the Seven Mile Creek riparian sediment bank. The drainage line was filled with sediment and leaf litter and this line would only flow during storms with little or no base-flow following rain events.
- The southern second order creek was dry from about 20m upstream of the upper road crossing, and the creek line above that comprised a broad shallow U shaped forested valley with a generally narrow and sediment filled dry low flow drainage that was more deeply incised where the creek line was constrained by tree roots:
    - It would appear that whilst this drainage carries a substantial flood flow there is only a short post-flood period of small pools interconnected by sub-surface flow through the creek sediments and that longer-tail base flow is carried sub-surface for most of the time.
    - There is a long but shallow sediment-filled pool that is built up behind the upper road crossing (site A5) and there are a few more sediment-connected pools in the creek line leading down toward the lower road crossing.
    - There is a small shallow pool behind the lower road crossing (site A3) and a few sediment constrained pools between the lower road crossing and the confluence with Seven Mile Creek.

2.2 Water Quality Results

Table 2 provides the results of the metered water quality sampling and Table 3 provides the results of laboratory analysis of water samples collected on the day. Results are summarised as follows:

- Surface water temperatures were generally similar (14 to 15.7°C) with changes generally related to time of day.
- Feeder creek conductivity readings ranged from 244 μS/cm at site A5 to 318μS/cm at site A4, and creek conductivity was elevated at site A1 (783 μS/cm), decreased to 613 μS/cm at site A2 (probably due to dilution effects from west to east runoff), then increased to 803 μS/cm at site SDL6. Conductivity increased marginally with depth.
- The conductivity patterns described above were reflected in the TDS results.
- Water pH varied from 5.88 pH units (site A5) to 8.12 pH units (site A2), and pH exhibited a similar pattern to conductivity, with overall lower pH values in feeder creek drainages and a general decrease in main creek pH downstream. Water pH was generally uniform with depth.
- Surface water dissolved oxygen (DO) concentrations (expressed as % saturation) ranged from fair to marginal (from 68 to 59% sat) for sites A4, A1, SDL 6 and SDL3, marginal to poor (46 to 39% sat) at sites SDL4 and A6 respectively, and poor to very poor (25 to 1.8%sat) from sites A2 and A5 to A3. DO concentrations decreased with depth.
- Water turbidity was low and varied from 4 NTU at site A5 to 21 NTU at site A2. These results are reflected in the laboratory suspended solids concentration results, which were all below detection (<5mg/L).
- Sub-catchment creek alkalinity was very low (4 to 9 mg/L), whilst alkalinity in Seven Mile Creek was comparatively high (148 to 199 mg/L).
- Most (8 of 10) total metal concentrations were near or below detection for both creek and sub-catchment site waters with the following exceptions:
    - Total manganese concentrations in the creek were less than 30μg/L and the sub-catchment waters had concentrations ranging from 66 to 632μgL.
    - Total iron ranged between 90 to 690μg/L for most sites with 6060μg/L at the lower southern creek site A3.
- Total phosphorus concentrations were generally less than detection (<10μg/L) with 20μg/L recorded Creek site A2.
- Nitrogen concentrations were more variable:
    - Ammonia concentrations ranged from 600μg/L at site A3 to below detection (10μg/L) at three other sites or slightly elevated (20μg/L at site A2).
    - NOx concentration at site A2 was 450μg/L whilst most other sites were below detection (<10μg/L) or low (50μg/L at site A1).

Table 2 Metered Water Quality Seven Mile Creek Eagleton 8 May 2017

Location			Time	Depth	Temp	EC	pH	ORP	Turb	DO	DO	TDS
Main Creek	Sub-Catch Ck			m	°C	µS/cm	pH units	mV	NTU	% sat	mg/L	mg/L
At North property fence		A1	12:01	0	14.46	783	8.12	323	6.3	63.6	5.79	480
At North property fence		A1	12:02	0.06	14.16	782	8.12	326	6.6	62.9	5.76	480
	WtoE Upper Mid Drainage	A4	13:34	0	14.55	318	6.51	377	13.2	68	6.19	180
Below A4 Confluence		SDL3	13:41	0	15.28	731	7.79	395	5.2	58.6	5.24	450
Below A4 Confluence		SDL3	13:42	0.22	14.63	729	7.8	396	6	50.2	4.55	450
Above upper road crossing		A2	15:32	0	15.06	613	7.78	460	21.4	25.4	2.28	370
Above upper road crossing		A2	15:33	0.29	14.73	615	7.79	460	21.5	24.8	2.25	370
Above upper road crossing		A2	15:33	0.64	14.64	616	7.8	460	21.2	24.6	2.23	370
Above upper road crossing		A2	15:34	1.1	14.63	620	7.79	459	20.8	23.3	2.12	370
Above lower road crossing		SDL6	17:31	0	15.54	803	7.61	385	8	61.5	5.46	490
Above lower road crossing		SDL6	17:31	0.41	14.53	807	7.62	386	10.5	49.9	4.53	490
Above lower road crossing		SDL6	17:32	0.61	14.48	806	7.61	386	10.5	46.3	4.21	500
	Above Upper Crossing Sth Ck	A5	15:11	0	14.24	244	5.88	455	3.8	20.6	1.88	140
	Above Lower Crossing Sth Ck	A3	16:00	0.07	13.71	620	6.18	382	10.7	1.8	0.17	380
Below Sth Ck Confluence		A6	16:18	0	14.57	745	7.5	401	11.4	39.3	3.56	460
		A6	16:18	0.18	14.46	742	7.52	399	10.6	36.3	3.31	450

Table 3 Water Chemistry		Location	Ck up	WENo2	Ck mid	WENo4Up	WENo4Dn
		Site	A1	A4	A2	A5	A3
Analyte	Units	LOR					
Suspended Solids (SS)	mg/L	5	<5	<5	<5	<5	<5
Hydroxide Alkalinity as CaCO3	mg/L	1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	199	6	148	4	9
Total Alkalinity as CaCO3	mg/L	1	199	6	148	4	9
Total Arsenic	mg/L	0.001	0.001	<0.001	0.001	<0.001	<0.001
Total Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Copper	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.016	0.066	0.028	0.173	0.632
Total Nickel	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Zinc	mg/L	0.005	<0.005	0.007	<0.005	0.006	<0.005
Total Iron	mg/L	0.05	0.09	0.43	0.68	0.69	6.06
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Ammonia as N	mg/L	0.01	<0.01	<0.01	0.02	<0.01	0.6
Nitrite + Nitrate as N	mg/L	0.01	0.05	<0.01	0.45	<0.01	<0.01
Total Kjeldahl Nitrogen as N	mg/L	0.1	0.2	0.7	0.3	0.6	1.5
Total Nitrogen as N	mg/L	0.1	0.2	0.7	0.8	0.6	1.5
Total Phosphorus as P	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	0.02
Total Organic Carbon	mg/L	1	46	35	33	19	26
Escherichia coli	CFU/100mL	1	~10	~4	~2	96	<2
Enterococci	CFU/100mL	1	~6	~50	~2	~12	~16

  - TKN was comparatively low in the two creek sites (200 to 300μg/L) compared to sub-catchment drainage concentrations (600 to 1500μg/L).
  - As a result of the varying concentrations of Ammonia, NOx and TKN at the various sites the resultant Total Nitrogen concentrations varied between 200 and 1500 μg/L ranking from lowest to highest sites as follows A1-A5-A4-A2-A3.
- Total organic carbon (TOC) ranged from 19mg/L at site A5 to 46 mg/L at site A1 with no pattern to the variations.
- Bacterial concentrations were low at all sites with all concentrations less than 100 cfu/100mL, and nine of the ten less than 10cfu/100mL.

2.3 Aquatic Ecology of the Study Sites

One of the aims of the study was to sample the sub-catchment creeks for macroinvertebrate fauna and fish if there was sufficient aquatic habitat to sample. As noted in Sections 2.1 and 2.2 there was insufficient or no aquatic habitat to sample in the three sub-catchment creeks so sampling was undertaken at three Seven Mile creek sites, one at the property boundary (Site A1), one within the property (site A2) and one below the property boundary (Site A6). As described in Section 1.1 sampling and field sorting was undertaken using AusRivAS methods with taxa identified to the AusRivAS taxonomic levels. Duplicate fish bait traps were set at each sampling site and left out for at least one hour, and additional meshing plus observations were made for fish at each site.

Table 4 provides the field notes for each of the sites surveyed, and Table 5 provides the results of the macroinvertebrate survey:

- There were a total of 29 taxa comprising 21 insect taxa, 4 crustaceans, 2 gastropod molluscs and one mite and one worm taxa; 18 occurred at site A1, 17 at A2 and 15 at A6.
- Six taxa occurred at every site including several pollution sensitive taxa found for this survey, one from the mayfly family Leptophlebiidae (SIGNAL value 8) and a Leptoceridae caddis fly taxa (SIGNAL 6). A Megapodagrionidae damselfly (SIGNAL 5) also occurred at all three sites.
- Ten taxa occurred at two sites; five taxa at sites A1 and A2, three at sites A2 and A6 and two from sites A1 plus A6. Two moderately sensitive taxa were found at two sites; freshwater mites (Hydracarina – SIGNAL 6) from sites A1 and A2 plus a Gomphidae dragonfly (SIGNAL 5) from sites A2 and A6.
- Thirteen taxa occurred at one site only; five at site A1, three at site A2 and five at site A6.
- The overall SIGNAL scores for the three Seven Mile Creek sites for this survey was 4.11, which indicates a fair rating in terms of pollution sensitivity. Individual site SIGNAL indices were similar; 4.18 at Site A1. 4.24 at site A2 and 4.13 at site A6.

Table 4 Field Comments – Eagleton Autumn 2017 Survey		
Site	Date	Comments
A1	8/05/17	Water was clear and flowing throughout site. Maximum pool depth was approximately 0.7m and the average depth was 0.2m. Maximum width was 3.5m with an average width of 1.2m. Habitats sampled included mostly detritus, undercut banks and some trailing bank vegetation. Sediments consisted mainly of sands and gravels with lesser amounts of boulders and cobbles. There were no aquatic macrophytes and filamentous green algae were not observed.
A2	8/05/17	Water was turbid with a low surface flow. Maximum depth was 1.6m with an average depth of 1m. Maximum width was to 9m with an average width of 5m. Sulphur smell was given when sediments were disturbed. Habitats sampled included mostly detritus with some trailing bank vegetation and undercut banks. Substrates consisted mainly of silty sands with small amounts of cobbles and gravels. No macrophytes but small amounts of green filamentous green algae were observed.
A6	8/05/17	Water was slightly turbid with a low flow throughout site. Maximum Pool width was 7m with an average width of 2m. Maximum depth was1.5m with an average depth of 0.4m. Habitats sampled included undercut banks, some trailing bank vegetation and undercut banks. Sediments consisted of mostly silts and sands with lesser amounts of gravels and cobbles. No macrophytes or filamentous green algae were observed.

- There were three EPT taxa and all three sites supported two; (Leptophlebiidae mayflies and Leptoceridae caddis flies). Baetidae mayflies only occurred at site A6. Accordingly Site A6 had an EPT score of 3 with an EPT score of 2 for the other two sites (A1 and A2).
- There were no fish caught in any of the duplicate traps set at each of the three sites, no fish were caught in the macroinvertebrate meshing and none were caught during mesh net sweeping. Water clarity and depth were sufficient for observations at sites A1 and A6 at least, and whilst no fish were observed at any site, Atayid freshwater shrimp were common at all sites.
- Crayfish burrows were noted along the creek bank between sites A2 and A6 and crayfish were caught in a fish trap at site A6.

Table 5 Eagleton Quarry Seven Mile Creek Macroinvertebrate Survey Results Autumn 2017																
								Life Stage			8/05/17	8/05/17	8/05/17		
Phylum	Class	Sub-Class	Order	Sub-Order	Family	Sub-Family	Common name	L	N	A	A1	A2	A6	Occur	SIG-2
Arthropoda	Insecta		Coleoptera		Dytiscidae		Diving Beetles	x		x	1		1	2	2
Arthropoda	Insecta		Coleoptera		Scirtidae		Marsh Beetles					1		1	6
Arthropoda	Insecta		Diptera		Chironomida	Chironominae	Bloodworms	x				1	1	2	3
Arthropoda	Insecta		Diptera		Chironomida	Orthocladiinae	Bloodworms	x			1		1	2	4
Arthropoda	Insecta		Diptera		Chironomida	Tanypodinae	Bloodworms	x			1	1		2	4
Arthropoda	Insecta		Diptera		Stratiomyidae		Soldier Flies	x			1			1	2
Arthropoda	Insecta		Diptera		Tipulidae		Crane Flies	x			1			1	5
Arthropoda	Insecta		Ephemoptera		Baetidae		Mayflies		x				1	1	5
Arthropoda	Insecta		Ephemoptera		Leptophlebiidae		Mayflies		x		1	1	1	3	8
Arthropoda	Insecta		Hemiptera		Gerridae		Water Striders				1			1	4
Arthropoda	Insecta		Hemiptera		Gelastocoridae		Toad Bugs					1		1	5
Arthropoda	Insecta		Hemiptera		Hydrometridae		Water Measurers				1	1		2	3
Arthropoda	Insecta		Hemiptera		Veliidae		Small Water Striders				1	1	1	3	3
Arthropoda	Insecta		Hemiptera		Nepidae		Water Scorpions						1	1	3
Arthropoda	Insecta		Hemiptera		Notonectidae		Backswimmers				1	1		2	1
Arthropoda	Insecta		Odonata	Epiproctophora	Aeshnidae		Dragonflies	x			1	1		2	4
Arthropoda	Insecta		Odonata	Epiproctophora	Gomphidae		Dragonflies	x				1	1	2	5
Arthropoda	Insecta		Odonata	Zygoptera	Isostictidae		Damselflies	x					1	1	3
Arthropoda	Insecta		Odonata	Zygoptera	Megapodagrionidae		Damselflies	x			1	1	1	3	5
Arthropoda	Insecta		Odonata	Zygoptera	Synlestidae		Damselflies	x			1			1	7
Arthropoda	Insecta		Trichoptera		Leptoceridae		Caddis Flies	x			1	1	1	3	6
Arthropoda	Arachnida		Acarina	Hydracarina			Freshwater Mites				1	1		2	6
Arthropoda	Crustacea	Branchiopoda	Diplostraca	Cladocera			Water Fleas				1			1	*
Arthropoda	Crustacea	Copepoda	Cyclopoida		Cyclopidae		Copepods						1	1	*
Arthropoda	Crustacea		Decapoda		Atyidae		Freshwater Shrimp				1	1	1	3	3
Arthropoda	Crustacea		Decapoda		Parastacidae		Crayfish/ Yabbie						1	1	4
Annelida	Oligochaeta						Freshwater Worms					1		1	2
Mollusca	Gastropoda				Ancylidae		Freshwater Limpets				1	1	1	3	4
Mollusca	Gastropoda				Planorbidae		Freshwater Snails					1	1	2	4
							Total number of invertebrate taxa per site:				18	17	16	29	
Notes:	* Represents those taxa for which SIGNAL-2 scores are not available, or do not apply.						Site SIGNAL2 Scores:				4.18	4.24	4.13		4.11

3 SUMMARY AND CONCLUSIONS

An autumn survey of dry weather water quality and aquatic ecology of an upper section of Seven Mile Creek plus three west to east draining feeder drainages to Seven Mile Creek located upstream (north) through to downstream (south) of the Eagleton Quarry Proposal site was undertaken on 8 May 2017.

Of the two west to east feeder drainages draining the proposal site, one was dry and is not considered to provide any aquatic ecological habitat whilst the other (site A4) provides some limited aquatic ecology habitat comprising very shallow rock-confined pools stepped down the bank to the main creek.

As the Seaham Quarry footprint has excised the original north to northeast arms of Seven Mile Creek, the upper feeder creek immediately south of the Boral Seaham Quarry site (and north of the proposal site) appears to be the main source of flow to the Seven Mile Creek study area.

The west to east drainage located south of the proposal site is considered ephemeral with surface flow most likely only occurring during rainfall events followed by a very short post-rainfall surface flow and a longer sub-surface base-line flow. There are a series of small isolated ponds found from just upstream of the upper roads crossing down to and past the lower road crossing to the Seven Mile Creek confluence.

The base-flow from the west to east flowing drainages is inferred to have low EC (around (240 to 320 μS/cm), is slightly acidic pH (5.9 to 6.5 pH units) and low alkalinity ((4 to 10 mg/L). The main creek waters at site A1 (at the property fence) had elevated EC (780μS/cm) and whilst main creek conductivity generally decreased downstream - probably under the influence of lower saline feeder creek base-flows - there was a spike of elevated EC at site SDL6.

Whilst total metal concentrations in both the creek and feeder drainages were low, total manganese concentrations in the creek were less than 30μg/L whilst the sub-catchment waters had concentrations ranging from 66 to 632μgL. Total iron ranged between 90 to 690μg/L for most sites with 6060μg/L at the lower southern feeder creek site A3. This site, including the lower section of the creek to the confluence was also noted to have a very high iron bacteria/precipitate presence (Figure 3).

Total phosphorus concentrations were uniform and low (generally <10μg/L) and there were varying concentrations of Ammonia, NOx and TKN between the sites with resultant Total Nitrogen concentrations ranging between 200 and 1500 μg/L ranked from lowest to highest concentrations as follows A1-A5-A4-A2-A3.

Figure 3 Confluence of Southern west to east sub-catchment drainage and Seven Mile Creek showing iron bacteria/precipitate in the sub-catchment drainage mixing with Seven Mile Creek drainage.

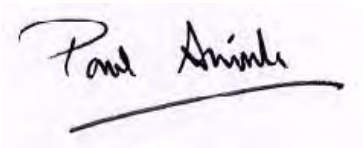
The study revealed that the only suitable aquatic ecology habitat for long-term support of aquatic biota in the study area was in the main Seven Mile Creek channel where there are sizable drought-resistant pools linked by sub-surface shallow alluvial flows during dry weather and sustained by base-flows from the natural catchment and possibly by infiltration from the Seaham Quarry (that probably benefits the aquatic habitats by providing more feeder water during extended drought periods than the natural catchment would).

There would appear to be several other discharges to the creek that provide the higher alkalinity/higher EC waters observed, but in total the sub-surface and surface discharges combine to provide a reasonable water quality for the support of aquatic organisms, as evidenced by the good diversity and SIGNAL indices provided from the three macroinvertebrate survey sites for this survey.

Whilst there were no fish observed or caught for this study the result is not unexpected as Seven Mile Creek is an ephemeral creek that originally flowed to an extensive shallow water swamp habitat, which eventually became the Grahamstown Reservoir. The reservoir is recharged with pumped water from the Williams River, further limiting colonisation of the reservoir by native fish. The reservoir is stocked with Australian bass and the only other native fish noted from the reservoir would appear to be eels. Two introduced fish species have been found in the reservoir or drainage channels leading into the reservoir, the plague minnow, *Gambusia holbrooki* and an escaped aquarium fish, and the platyfish (or platy), *Xiphophorus variatus* - the subject of an

extensive eradication program in Campvale Drain undertaken by NSW Fisheries in 2008 to 2009 (Ayres & Clunie 2010). Plague minnow are more or less ubiquitous throughout east-flowing drainages in NSW and are listed as a key threatening process for Australian frogs, thus the absence of this species from Seven Mile Creek is considered a distinct ecological benefit and may be instrumental in the relatively good macroinvertebrate results obtained for this survey.

It is concluded that the loss of portions of west-east feeder drainages to Seven Mile Creek to the Eagleton Quarry Project would deprive the creek of some low salinity base-line flow but, given the comparatively small sizes of the sub-catchments involved, this loss is unlikely to provide a material risk for the aquatic habitats plus biota of the main creek. Notwithstanding, the project should include a surface water and groundwater management plan that identifies the habitat values of the receiving waters and ensures that the quality of waters of Seven Mile Creek remains the same or is improved.



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