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24 October 2023

Dear Ms King

Re: Update of Coastal Method Statement for October 2023.

As per the meeting earlier this month (9th October and 16th October) where the recommendations for the next six months of sampling for the estuary and marine environment were tabled here is the written method update. This was as per the request by yourself and Omar in the meeting to provide a formal indication of changes, removals and additions.

Please note that authorisation for this new method is extremely urgent given that MER will need to schedule and plan sampling over the summer period including the festive season holidays to time sampling with labs. Note that the methods to be used remain consistent with the descriptions in the approved MER Method#2 document and are therefore not repeated here.

1.1 Marine Indicators and Methods

The UPL Chemical spill which impacted habitats and faunal components along the nearby coastal marine habitats triggered extensive monitoring efforts to assess impact on the coastal ecosystem. However, the consistent and significant declines in contaminant concentrations in beach water and sediments, along with the recovery of indicator species

such as ghost crabs and mussels, strongly indicates that the ecosystem has largely returned to its pre-spill condition.

Given these positive trends, it is reasonable to conclude that the need for further detailed monitoring in the marine habitats has diminished. Instead, it is recommended that future efforts remain focussed on maintaining and tracking baseline measures of chemical concentrations in beach water and sediments at a limited range of sites, ensuring that the input to the coastal system remains stable with regards to contaminant concentrations and ensure that the downstream marine environments are safeguarded against potential disturbances during the ongoing clean up and restoration actions in the upstream creek, river and wetlands.

As per the recommendations within the Status Report the bulk of the marine monitoring is no longer necessary and these indicators need no longer be monitored or surveyed. However, the following are recommended to continue (please see the table below for the six-month programme integrated with the estuary sampling):

- Water and sediment sampling at six beach sites – three either side of the estuary mouth (B4N and B4S dropped). There is still a need to keep a watch on the outflow from the estuary to the marine environment. Water sampling **monthly** but sediment sampling reduced to **quarterly**.
- Bivalve sampling **quarterly** at three (reduced from four) sites.
- Ecotoxicity monthly at two sites (B1N and B1S) on either side of the estuary mouth.

1.2 Estuary

In contrast to the marine environment, the uMhlanga estuarine ecosystem continues to exhibit persistent contamination, albeit this at low levels. Presently, only three to five pesticide types are being recorded within the estuary water and sediments.

Furthermore, the estuary has sustained significant ecological loss of species and function as a result of the spill. The functional loss of the macrophytes (vegetation) is currently quantified at 35%, as measured by the functional component of the Botanical Importance Rating. In terms of the faunal composition the process of ecological recovery remains gradual. The removal or prevention of additional damaging activities, sewage, sandmining and discharges of other pollutants including solid waste will all assist estuary recovery.

Currently the invertebrate community has been assessed to be a diminished remnant of its former composition, currently comprising only polychaetes, leeches, and fly larvae. Notably, the more sensitive crustacean taxa remain absent, which aligns with their vulnerability to biocides which are often created to target this group. This lack of recolonization is particularly evident with the continued absence of the once dominant macrocrustacean, *Krausillichirus kraussi*, in the lower estuary.

Fish utilization of the estuary appears intermittent from observational records, warranting intensified monitoring efforts in this regard. While the waterbird population has shown positive growth in diversity and abundance, some critical invertebrate feeders and notable piscivores remain absent. Nonetheless, the increase in the waterbirds stands as a significant and encouraging factor for the prospective restoration of the estuarine food chain particularly through their potential role in the continued recruitment of invertebrates (Verdoorn *pers. comm.*, Okamura *et al.* 2019; Green *et al.* 2023).

Given that the estuary is still nowhere near its pre-spill state, it is imperative to maintain ongoing and increased monitoring of the estuary to continually assess the health and at the same time potential actions that could be implemented to facilitate restoration.

Initially classified as a D category system before the spill, the estuary's health rating had deteriorated to an F during August 2021as a result of the significant impact post-spill. As of July 2023, improvements in contamination levels have resulted in an improved reclassification to an E health rating.

The MER Status report ver 3.6 recommended the following essential estuary monitoring for the next six months (November 2023 – April 2024) but please note that the external reviewer may request additional monitoring and this method would then need to be further updated:

- Daily mouth state monitoring to be continued
- Rainfall records to be maintained.
- Estuary Water quality monitoring continued monthly with the same metals and pesticides currently being monitored. Additionally, pathogen and nutrient samples should be taken to inform estuary state.

Directors: Anthony Forbes, Nicolette Forbes. Reg No.: CK 99/14501/23

- Estuary sediment monitoring reduced to quarterly for in-channel pesticides and metals.
- Reassessment of the macrophytes (vegetation) at the start and end of the upcoming summer (November 2023 and then March/April 2024)
- Benthic macroinvertebrate sampling continued at five sites through summer with the same methods as previously. This includes *in situ* physico-chemical water profiling and laboratory testing for nutrient and pathogens.
- Continued observational scans and the implementation of more intensive abundance sampling if the presence of *Kraussillichirus kraussi* is found during the observational scans.
- Fish sampling quarterly (non-destructive) with seine nets only in the lower estuary. The mid to upper estuary will be included if suitable sites and water levels permit.
- Waterbird monitoring monthly following same methods as described in MER Method#2.
- Surveillance of any discharge water from any areas of the site upstream of the estuary using estuary and marine methods and coastal specialist interpretation as per Appendix A of Directive 2.

Appointment and Timeframes

The proposal covers a six-months timeframe from November 2023 to end April 2024. For ease of visualisation of the above bullets and text below a table has been added (see overleaf) to provide a Gantt chart style timeline of all sampling. This obviously includes any additional sampling which may be required while being responsive to events or other instructions through the directives.

Please note that UPL will need to appoint this work for the full six-month programme to ensure continuity as the month-to-month appointments are not allowing the programme to roll out in response to environmental conditions.

Yours sincerely

N.T. Forbes

Nicolette Forbes.
Director and Senior Scientist

Summary table: indicating overall number of samples currently taken, newly proposed (red) with changes shown in red as well as a monthly timestep indicating what will be sampled when. A reference number (RN) column is included for ease of reference when seeking clarity or querying

	Coastal Method #3	**Current**	**Proposed**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**Change from Method#2**
RN	**Sample description**			actual number of samples listed						
1	Daily mouth observations	daily	daily	Y	Y	Y	Y	Y	Y	None
2	Daily rainfall figures	daily	daily	Y	Y	Y	Y	Y	Y	None
	Water and sediments - V&M pesticides and metals, Talbot water quality									
3	Beach Water (monthly) from three sites north and south	8	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**monthly timestep remains, the same but two sites dropped (B4N and B4S)**
4	Beach Sediment (monthly to quarterly) from three sites north and south	8	**6**		**6**			**6**		**change to quarterly-will only be collected every third month**
5	Estuary Water (monthly)	2	2	2	2	2	2	2	2	monthly with no change in sites or timing
6	Estuary Sediment (monthly to quarterly)	2	**2**		**2**			**2**		**change to quarterly**
7	Background and tributary sites (water only)	2	2							monthly UT4 and SW23
8	Background and tributary sites (water only)	4	4	4	4	4	4	4	4	repeatabillity sampling to confirm discharge suitability for coastal habitats-as per the methods and sites included in MER Short Specialist Reports #8, #9,#10 and #12. Actual numbers of samples still to be decided dependent on discharge requirements.
	Background and tributary sites (water only)									
9	Bivalves (mussels only for pesticides and metals)	4	**2**		**2**			**2**		**quarterly - next sample end October-sites SFH4N already dropped and now SFH3N dropped**
10	Ecotoxicity Background and tributary sites water and sediment	4	4	4	4	4	4	4	4	monthly UT4 and SW23
11	Ecotoxicity Beaches water and sediment	8	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**monthly remains, changed to two sites - one either side of mouth**
12	Ecotoxicity Estuary water and sediment	4	4	4	4	4	4	4	4	monthly at only upper and lower estuary sites
13	Water quality (Talbot analysis)		**5**		**5**			**5**		**quarterly at five estuary sites**
14	Vegetation assessment update for the estuary functional zone using satellite imagery, groundtruthing and GIS	2	2	1					1	Previous survey done end of summer 2022 - needs to be repeated beginning and end of summer period 2023/2024
15	Benthic macroinvertebrate grab sampling	5	5		25			25		quarterly five replicates at five sites
16	Sediment particle size and organic analysis	5	5		25			25		quarterly five replicates at five sites
17	*Krausillichirus kraussi*	1	1	1	1	1	1	1	1	monthly observational
18	*Krausillichirus kraussi* sampling abundance		**6**	**1**	**1**	**1**	**1**	**1**	**1**	**6 units in the lower estuary monthly only if monthly observations indicate presence**
19	Fish seine netting		**4**		**4**			**4**		**quarterly at sites that are suitable for this method**
20	Waterbird surveys	2	2	2	2	2	2	2	2	monthly -no change in sites or timing