BayMonitor Program	PoMC Monitoring program
1. Dredge plume water quality The extent, intensity and duration of the dredge's plume will be regularly monitored and used to predict areas of impacts on water quality and rates of sedimentation (habitat smothering). Water quality measurements from fixed sites and a moving boat will cover turbidity, chlorophyll, dissolved oxygen, salinity, temperature, suspended sediments, nutrients and light attenuation.	Satellite imagery of plume and underway vessel mapping of turbidity along transects. This measurement has little sensitivity at near background levels and is not a good surrogate measure for the things that matter (such as light attenuation for plants and total suspended solids for sedimentation and smothering of seabed). There are currently no reliable conversion factors for converting turbidity measurements to light attenuation for phytoplankton or seabed algae. Eleven fixed sites are monitored for water quality but these are not associated with describing the dredge plume water quality impacts and the dispersion of these impacts. This program will not assist any understanding of the other impacts of the plume, particularly the interactions between suspended sediments, nutrients and phytoplankton.
2. Impact zone of toxic sediment during dredging and disposal Amounts of material mobilized into the water column during dredging and disposal of the contaminated silts in the Yarra River will eventually settle on the bottom of the bay. How much, at what rate and over what area? The focus here is to measure the impact zone of the dredge and disposal and the spread of suspended sediments and toxic material.	Not included.
3. Relationship between turbidity and light attenuation This provides conversion factors for comparing light attenuation between different measurement units, including turbidity in NTUs, total suspended solids (TSS, mg/L) and light attenuation (Kd, /m). These conversion factors are critical for determining how much light is available for plants, for example associated with the Environmental Limit (which is proscribed in NTUs) or from the dredge plume modelling (which is in TSS).	The management plan provides a baywide conversion factor between NTU and TSS. However, separate conversion factors are required for different places and sediment types in the Bay. Loggers at the seagrass sites will provide data that could be used to determine conversion factors for NTU and Kd. But there appears to be no intention to do that. Without the two types of loggers in the same locations, the validity of such an approach would be questionable anyway. Nor is there a clear study articulated to determine Kd to TSS conversion factors.
4. Yarra and Maribyrnong Rivers – base flow The Yarra and Maribyrnong Rivers have flow upstream in their bottom waters. Water data collection here will show any changes in the amount of nutrients and suspended sediments traveling up the rivers and again the extent of the dredge's impact zone.	Not included
5. Yarra and Maribyrnong Rivers – flood events The dredging program may destabilise the side walls of the channel and areas under the docks. The new river channel will also lead to changes in river currents during flood events, and these could wash away the sediments from the side walls. Flood events and then the backflow will move toxic materials down and then back up the rivers. These measurements will estimate the load of potentially toxic sediments during the flood events.	Not included
6. Seagrass modeling and health This measures the existing impact of dredging on seagrass beds in terms of primary production (light energy converted into biological energy), abundance (habitat provision for the community) and condition (visual health parameters). The data collected includes continuous logging of benthic light, temperature and light attenuation, as well as seagrass abundance and	This takes continuous measurements of turbidity, however there are currently no adequate conversions to relate turbidity to light attenuation, nor concurrent determination of subsurface irradiance, to relate turbidity to the amount of light reaching the seagrass beds. Includes continuous monitoring of benthic light, light attenuation, quarterly monitoring of seagrass

condition (20 quadrats). Both *Heterozostera* (3 sites) and the long-lived *Amphibolis* (2 sites) seagrass beds are monitored. The data drive primary production and biomass models which forecast the impacts and sustainability of the seagrass beds according to the dredging schedule. Sustainability is assessed fortnightly and health and abundance measured monthly. This system provides an early warning system of impacts. An important outcome of this work is validating how much light is required for sustainability of a seagrass patch and what the appropriate environmental limits should be.	abundance (12 quadrats) and condition and annual aerial photography of seagrass cover in 1 km^2 patches (6 sites, but 2 are in Geelong Arm which has very different ecology). *Amphibolis* seagrass beds are not monitored. This program does not provide a means of relating light to primary production. There is no early warning system to detect impacts (although light is measured continuously, there is no means provided for evaluating in the context of seagrass patch sustainability). There is no means of testing whether the environmental limits were appropriate unless all the seagrass dies, by which time it will be too late to respond.
7. Impacts on specific habitats of concern The effect of turbidity, toxicity and sedimentation can lead to short or long-term impacts on many marine habitats. Towed video and echo-sounding can measure bottom conditions in areas affected by the dredging. Places to monitor include beds of seagrass, kelp, scallops, *Pyura* seasquirts and seapens. Other features investigated include biological congregations of animals (spider crabs) and areas of conservation interest such as Pope's Eye and Portsea Hole in the Port Phillip Heads Marine National Park, and in the north Ricketts Point, Brighton Sands/Sandringham *Pyura* beds and Point Cooke Marine Sanctuary. Effective methods of monitoring sponge gardens at The Heads is being investigated	There is no mechanism for detecting and investigating untoward or unforeseen impacts in habitats other than seagrass.
8. Penguins at St Kilda Pier This would include diet sampling, penguin distribution in the bay during dredging (including satellite tracking), penguin breeding success and chick growth over the coming breeding seasons.	Penguins at Phillip Island are to be weighed. It is recognised in the PoMC procedure that most of the Phillip Island penguins sampled would not have entered Port Phillip Bay.