5 SUBMISSION RESPONSES – VOLUME C

5.1 C1 – Alternative Locations to Middle Banks for Sand Dredging and Proposed Dredge Methodology *(4 of 196 submissions)*

Draft EIS/MDP reference: Chapter C1, Sections 1.2, 1.3, 1.4, Chapter C9, Section 9.2

Two community submitters and one NGO submitter raised concerns about the selection of Middle Banks as the intended source of sand fill for the New Runway Project.

Submitter Issues:

Specific comments raised in relation to this issue are as follows –

- Why the Draft EIS/MDP did not look at the option of recovering sand from a navigation channel cut through the south end of Moreton Island as this would supply the sand required, reduce pilotage distance to the Port of Brisbane and provide mineral sand that could be sold (1/4).
- If sand must be taken, that it should not be taken in sensitive areas of the Bay where animal species will be impacted. Instead the dredging should take place on the edges of shipping channels which are being closed in by sand drift from the Tweed Bypass operation (1/4).
- The proposed extraction of 15Mm^3 of sand over a relatively short period of time is not consistent with the purpose of the General Use Zone in the Marine Park (1/4).
- The Draft EIS/MDP should examine other, more direct ways of extracting sand from Middle Banks such as through the use of a cutter suction dredge with a series of booster pumps to facilitate the pumping of the sand material directly to the Airport site. This was suggested on the basis that this type of dredger gives better control on the position and depth of the sea bed excavation (1/4).

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	103, 130	Nil	143, 193	Nil
Total	2	0	2	0

BAC response:

5.1.1 Selection of Middle Banks

The selection of Middle Banks as the intended source of sand for the New Parallel Runway resulted from the findings of Queensland Government's Moreton Bay Sand Extraction Study (2004), which examined the cumulative impacts of large scale dredging proposals in northern Moreton Bay including the Port of Brisbane expansion, the Airport's NPR project and construction industry needs.

The Government's decision on future sand extraction from the Bay in relation to Middle Banks was that sand would be allowed from that area subject to environmental impact assessment with priority to be given to Brisbane Airport Corporation.

As outlined in Chapter C1 of the Draft EIS/MDP, the proposed dredge footprint was selected following identification and consideration of a range of environmental, social and logistic issues with the aim of selecting a dredge footprint that avoided or minimised impacts to the marine environment and other Bay users. This included selecting a dredge footprint that would contribute to increasing the width of the adjacent navigation channel.

Under the *Marine Parks (Moreton Bay) Zoning Plan 1997*, uses such as sand extraction are allowed to occur in the General Use Zone with the permission of the chief executive administering the Plan (in this case, the chief executive of the Queensland Environmental Protection Agency and Queensland Parks and Wildlife Service). BAC is required to apply for this permission (as well as other permits and licences under State legislation) before the proposed sand extraction occurs. As part of this assessment, the chief executive will determine the consistency of the project with the management intent for the zone and may impose conditions about the carrying out of the activity consistent with this zone intent.

5.1.2 Dredge Methodology

In the context of the proposed methodology for dredging, BAC engaged specialist dredging consultants and consulted several of the major international dredging companies about the most suitable method for obtaining the sand from Middle Banks. This advice formed the basis of the proposal to use a large-class Trailer Suction Hopper Dredge (TSHD) for the purpose of collecting sand at Middle Banks and hydraulically pumping the material onto the Airport site from a designated mooring point.

Given the proximity of the proposed dredge footprint to the East Shipping Channel and to environmental values such as seagrass on the shallow areas of Middle Banks to the west, the dredge management plan in the Draft EIS/MDP stipulates that dredger operate only within the nominated footprint and in accordance with minimum (-10m LAT) and maximum depth limitations. Modern TSHD dredges use state-of-the-art navigation and dredging technology to ensure dredging occurs within nominated areas and to established depths. Based on field observations of this technology and technical information supplied by consultants and the industry, there is no evidence that the proposed dredge cannot operate within the spatial and depth limits outlined in the dredge management plan.

No dredger would have the required pumping capacity to pump the material the 15 nautical miles from Middle Banks to the Airport. Pumping distances of this length are not known to occur for other sand dredging projects anywhere in the world. In this context, the 6 km distance required to pump from Luggage Point to the runway location will be amongst the longest pumping distances attempted in the world.

In order to pump sand direct from Middle Banks, a series of floating booster station vessels would be required to be established in Moreton Bay. These booster station vessels would need to be permanently moored between Middle Banks and the Airport for the duration of the dredging, would need to be regularly re-fueled and would involve localised amenity, air and noise impacts.

A preliminary assessment of likely impacts in addition to the cost implications of this methodology are such that this alternative option is not seen as feasible.

Addition/Omission to Draft EIS/MDP:

In light of the discussion above, no changes are proposed to the relevant sections within Chapter C1 or C9 of the Draft EIS/MDP with respect to these issues.

5.2 C1 – Dredge Footprint Plan

(2 of 196 submissions)

Draft EIS/MDP reference: Chapter C1, Figure 1.6a, Chapter C9, Figure 9.2a

Several submitters made comments about the dredge footprint plan as shown in the Draft EIS/MDP in Figures 1.6a and Figure 9.2a as referenced above.

Submitter Issues:

Specific comments raised are as follows:

- Confirmation that Chart Datum was equivalent to Lowest Astronomical Tide (1/2).
- That sampling data of seagrass along the Moreton Island foreshore undertaken in 2004 as part of the Ecosystem Health Monitoring Programme be shown on the plan (1/2).
- Observation that not all of the points shown in the seagrass sampling at Middle Banks by WBM (2005) as shown in Chapter C5, Figure 5.5b are reflected in the dredge footprint plan on Figures 1.6 and Figure 9.2a (1/2).

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	242	183	Nil
Total	0	1	1	0

BAC response:

5.2.1 Chart Datum

The dredge footprint plan has been amended to clarify that Chart Datum is Lowest Astronomical Tide (LAT).

5.2.2 Additional Seagrass Mapping

The 2004 seagrass mapping mentioned in the submission has been obtained and added to the dredge footprint plan.

5.2.3 Seagrass Data Points

The additional seagrass points from Figure 5.5b have been added to the dredge footprint plan. This was a mapping error that occurred when the data was imported and does not change the assessment outcomes or key findings of any part of the Draft EIS/MDP.

Addition/Omission to Draft EIS/MDP:

A revised dredge footprint plan incorporating the submitter issues raised above is shown below.

For the Draft EIS/MDP, the Figure below replaces Chapter C1, Figure 1.6a, and Chapter C9, Figure 9.2a.

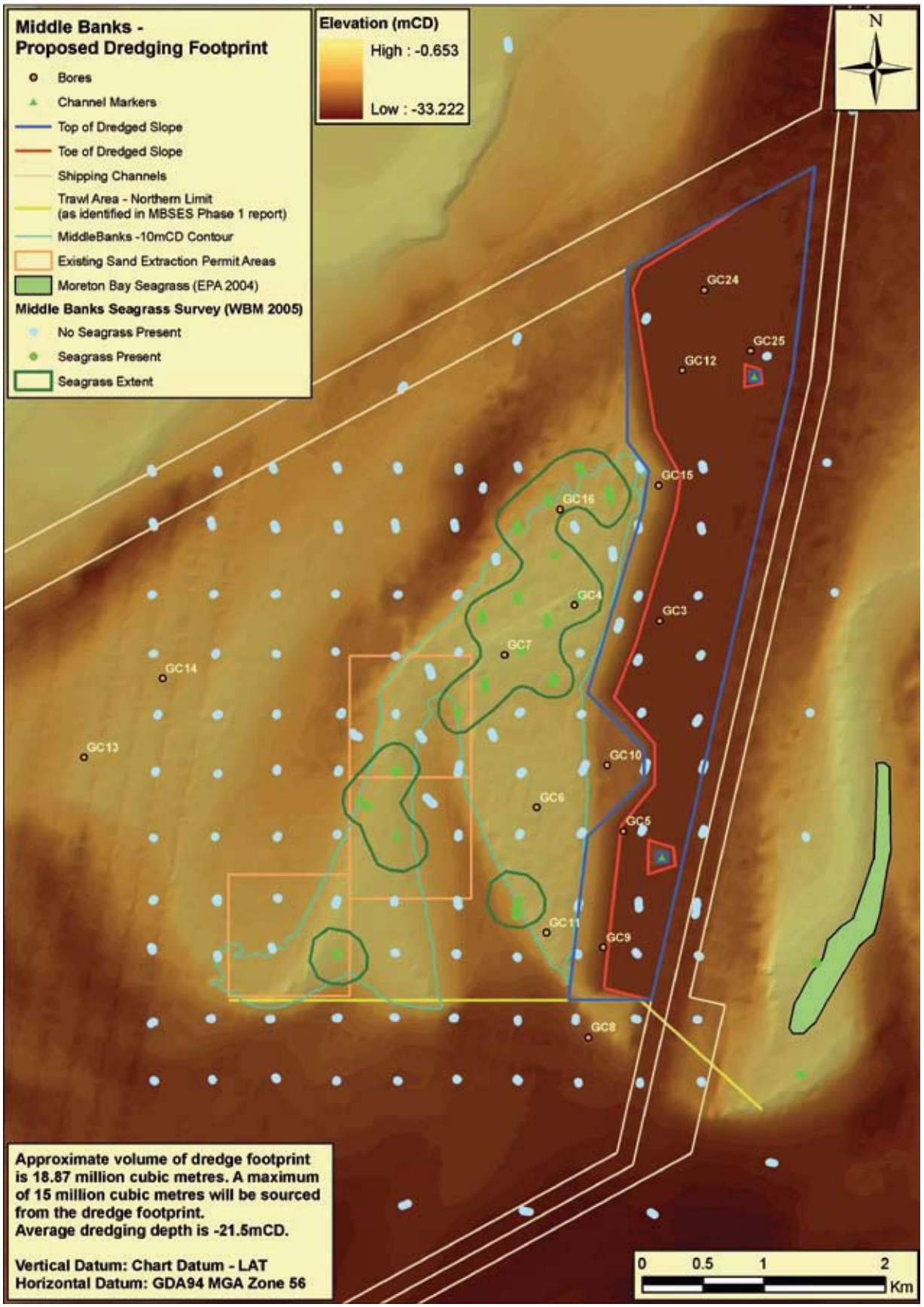

Figure 1.6a/Figure 9.2a: Revised Dredge Footprint Plan

5.3 C3 – Beach Erosion Along Moreton Island

(1 of 196 submissions)

Draft EIS/MDP reference: Chapter C3, Sections 3.11 and 3.14

One submitter raised concern regarding potential impacts the sand extraction at Middle Banks could have on the western beaches of northern Moreton Island between the township of Cowan and Tangalooma Resort.

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	33	Nil	Nil	Nil
Total	1	0	0	0

BAC response:

As indicated in Section 3.14.3.3 of Chapter C3 of the Draft EIS/MDP, for the proposed dredging to adversely affect the sand transport regime and stability of the adjacent shoreline of Moreton Island, it would have to:

- Significantly change the prevailing tidal currents immediately adjacent to the foreshores;
- Alter the prevailing wave conditions at the foreshores; and/or
- Alter the supply of sand, if any, to the foreshore.

The wave propagation modelling and other analysis undertaken as part of the Draft EIS/MDP in Chapter C3 has shown that none of these processes would be significantly altered by the proposed sand dredging and therefore the proposed dredging will not affect any shoreline areas of Moreton Bay.

Addition/Omission to Draft EIS/MDP:

No changes are proposed to Chapter C3 of the Draft EIS/MDP in relation to this issue.

5.4 C5 – Marine Ecology – Benthic Fauna

(2 of 196 submissions)

Draft EIS/MDP reference: Chapter C5, Section 5.5.6 (baseline) and Section 5.8.1 (impact)

Two submitters raised issues concerning the importance and prospective impacts to benthic fauna (eg. invertebrate animals living on or within the subsoil of the seabed) at Middle Banks from the proposed sand dredging.

Submitter Issues:

Specific issues raised can be grouped as follows –

Recognition of Benthic Habitats

- Recognition that important benthic bottom dwellers such as worms and sea cucumbers will be destroyed during dredging and the importance of these species as a source of animal protein for higher organisms and contribute as decomposers of organic detritus (1/2).
- Comment that the benthic habitat at Middle Banks is a habitat that should be noted and protected (1/2).

Meiofauna

- That the previous Moreton Bay Sand Extraction Study and BAC's Draft EIS/MDP do not identify or consider the importance of meiofauna (benthic animals ranging in size from 0.1 mm – 1 mm) as an important part of the marine food chain particularly for crabs and in nutrient cycling (1/2).

Coral reefs

- That there is a potential for coral reefs to exist in less mobile areas of Middle Banks (1/2).

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	Nil	72, 143	Nil
Total	0	0	2	0

BAC response:

5.4.1 Recognition of Benthic Habitats

Chapter C5, section 5.5.6 recognises and characterises spatial and temporal patterns of infauna and epibenthic macroinvertebrates including polychaetes (marine worms) and sea cucumbers. Section 5.5.6.4 recognises the ecological values provided by these animals in qualitative terms. These baseline findings are supported by field sampling at Middle Banks previous to and as part of the Moreton Bay Sand Extraction Study (WBM 2004) that resulted in capture of several polychaete species and sea cucumber individuals. The effect of the dredging on the habitat of these animals is documented in Sections 5.8.1, 5.8.3 and 5.8.4. As stated in the Chapter text, whilst there are no practicable means for reducing or eliminating the impacts on benthic fauna directly affected by the dredging, the dredge footprint has been selected to avoid areas to the south of Middle Banks known to have biologically rich and abundant benthic communities. Recolonisation of the dredge footprint area will occur during and after the dredging activity by these animals and based on findings in the Moreton Bay Sand Extraction Study, it is expected that the macrobenthic invertebrate communities that will colonise the deepened dredge footprint could on average, be slightly more abundant and richer than presently exist due to lower levels of wave disturbance.

5.4.2 Meiofauna

Under Chapter C5, Section 5.5.6, the Draft EIS/MDP has examined the baseline spatial and temporal extent and distribution of infauna invertebrate and epibenthic invertebrates able to be retained on a 0.5 mm sieve. The emphasis on this size grouping of benthic fauna was selected on the basis that these animals are of direct food value to commercial species and can be studied more effectively than smaller organisms within the meiofauna size classification (between 0.1 mm – 0.5 mm). In the context of impacts to benthic invertebrates from the proposed sand dredging, both groups have adaptations to allow rapid recovery following the dredging, characteristic of the nature of the habitat where they occur. As such, additional consideration of meiofauna as a separate class of benthic animals in the Draft EIS/MDP is not seen as warranted or likely to change the findings of the assessment.

5.4.3 Coral Reefs

BAC undertook extensive studies of the Middle Banks area as part of the preparation of the Draft EIS/MDP. In addition to the underwater video survey for seagrass and benthic fauna described in Chapter C5, seismic surveys of the seabed and underlying sediment layers and geotechincal investigations using marine vibro-cores were undertaken. There is no evidence from any of these surveys to the existence of hard coral communities in the vicinity of the dredge footprint or elsewhere in Middle Banks. Instead, the submitter may be referring to solitary (fungiid) corals. Examples of this kind of coral community have been found off Tangalooma Point in 8m of water by University of Queensland researchers in recent investigations. However, fungiids are considered rare and typically occur in very low numbers in the area. None of these corals were observed as part of the underwater video survey at Middle Banks and are not seen as being at risk from adverse impacts from the proposed sand dredging.

Addition/Omission to Draft EIS/MDP:

Based on the discussion above, no changes are proposed to the relevant sections of Chapter C5 of the Draft EIS/MDP in relation to these issues.

1 From Executive Summary (2007) – Source: http://www.aph.gov.au/senate/committee/rrat_ctte/oil_supply/report/a02.htm

5.5 C5 – Marine Ecology – Fisheries Issues

(5 of 196 submissions)

Draft EIS/MDP reference: Chapter C5, Section 5.5.7 (baseline), Section 5.6 (consultation), Section 5.8.9 (impact); Chapter C9, Dredge Management Plan

Under the topic of fisheries issues, submitters raised concerns in relation to the baseline assessment of fisheries values at Middle Banks, quantification of the potential impacts the dredging could have on fisheries as well as socio-economic impacts on commercial fishing operators. Related issues raised in submissions regarding the need for monitoring the effects of the proposed sand dredging on fisheries is also addressed in this section.

As in the Draft EIS/MDP, references to fisheries in the context of this section of the Supplementary Report includes reference to both nekto-benthic invertebrates such as crabs and prawns as well as fin fish.

Submitter Issues:

Specific comments about fisheries raised as part of the submissions were as follows –

Understanding of Fisheries Resources at Middle Banks

- Statement that there is not a reasonable understanding of the fishing resources found in the subject area and that the lack of science requires a precautionary approach (1/5).
- Statement that until the impact of dredging can be accurately, independently and fully assessed, no proposals for dredging should be confirmed (1/5).

Crab Fisheries

- That possible impacts of the sand dredging on crab fisheries such as Moreton Bay Bugs and Spanner Crabs, particular juveniles, is not known and that, "obtaining such knowledge is imperative" (1/5).
- That there are a number of crab species of commercial interest caught in the extraction area that should be noted and protected (2/5).

Prawn Trawl Fisheries

- Recommendation that the impact of sediment extraction on otter trawl operators should be monitored, with catch rates monitored for several years before, during and after the extraction to assess impact and take steps to offset potential impact on commercial operators (1/5).
- That the Draft EIS/MDP should outline how complaints from users of Middle Banks such as trawl fishery operators will be dealt with (1/5).

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	116	242	72, 143, 223	Nil
Total	1	1	3	0

BAC response:

5.5.1 Understanding of Fisheries Resources at Middle Banks

To establish an understanding of the existing fish and nekto-benthic invertebrate communities at Middle Banks and fishing use of the area, BAC engaged WBM Pty Ltd and Dr Daryl McPhee from the University of Queensland as recognised expert consultants in marine science and fisheries ecology. Their analysis used existing literature such as studies undertaken as part of the Moreton Bay Sand Extraction Study as well as undertaking additional field work such as trawl surveys of the project area to supplement existing knowledge of nekto-benthic and finfish assemblages in the area.

The consultants also used relevant data sets published by the Department of Primary Industries and Fisheries as well as conducting discussions with commercial fishing groups and representatives to understand fishing effort that is occurring in the area. Sections 5.5.7 and 5.8.9 of the Draft EIS/MDP outline this information.

Through the Draft EIS/MDP process, the dredge footprint has been selected through identification, avoidance and/or minimisation of impacts to marine resources and with a view to trying to minimise conflicts with other users of the Bay where possible. The dredge footprint avoids areas to the south of Middle Banks identified by the Moreton Bay Sand Extraction Study and subsequently confirmed in discussions on the NPR project with commercial fishing representatives to be important for prawn fisheries.

Monitoring has been proposed to validate the modelled extent and duration of dredge plumes and to ensure that plume behaviour as predicted in the Draft EIS/MDP can be verified.

It should also be noted that any occasional or itinerant commercial and recreational fishing activity that does occur in the Middle Banks area from time to time would not be prohibited or otherwise restricted within or adjacent to the dredge footprint during the sand dredging activity with consideration of safe passage of vessels.

5.5.2 Crab Fisheries

Consistent with previous sampling at Middle Banks and current trends in catch data for these species, fish and nekto-benthic invertebrate sampling as part of the current study for the Draft EIS/MDP resulted in the capture of a very small number of Spanner Crabs and Moreton Bay Bug species within the study area. This low catch rate is not unexpected as adults of both species tend to occur and are targeted by commercial operators in deeper offshore waters.

Previous studies of macro-invertebrate assemblages in Middle Banks using grab/core samplers discussed in section 5.5.7 of the Draft EIS/MDP also did not record significant numbers of juvenile or immature crabs of commercial fisheries value. However, as stated in the Draft EIS/MDP, it is possible that Middle Banks, like other sand banks in the Bay, represent areas where juvenile Bugs and Spanner Crabs settle and recruit.

These processes of settlement and recruitment will continue on Middle Banks during and following the proposed sand dredging activity taking into account the process and estimated timeframes for re-colonisation of the dredged area over time (as described in Section 5.8.8). Considering the wide range of water depths in which these species occurs, it is considered unlikely that the proposed lowering of the seabed will negatively alter its suitability as habitat for these animals in the long term.

5.5.3 Prawn Trawl Fishery

Consistent with the findings of the Moreton Bay Sand Extraction Study, the Draft EIS/MDP concluded that minor and short-term impacts on fisheries of commercial and recreational significance are expected to occur in the context of the area of the dredge footprint and surrounding local area, though re-colonisation of the dredged area will be occurring both during and following the activity over time. However, given the range of factors that can affect catch rates (climatic conditions such as drought, natural variation in the abundance of target species, level of fishing effort) it is not possible to predict, even in qualitative terms, a direct relationship between these impacts and commercial fishery production.

BAC will continue to engage with relevant commercial and recreational fishing groups to inform them of the status of the project and to discuss any issues or complaints lodged.

Addition/Omission to Draft EIS/MDP:

Based on the discussion above, no changes are proposed to the relevant sections of Chapter C5 of the Draft EIS/MDP in relation to these issues.

5.6 C5 – Marine Ecology – Impacts to Areas Designated as High Ecological Value *(1 of 196 submissions)*

Draft EIS/MDP reference: Chapter C5, Section 5.8.10

The Queensland Government in its submission recommended that the Supplementary EIS should present further assessment of the likely impacts of dredging and plume dispersal on the area of high ecological value (declared under schedule 1 of the *Environmental Protection (Water) Policy 1997*) that occurs to the east of the proposed dredge footprint.

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	242	Nil	Nil
Total	0	1	0	0

BAC response:

It is understood that the high ecological value area adjacent to the East Shipping Channel under the *Environmental Protection (Water) Policy 1997* has been declare in recognition of the excellent water quality present in the Eastern Bay. It also recognises the Ecological Values of nearshore areas along the western coast of Moreton Island that are declared to be part of the Moreton Bay Ramsar Site and are included as a Habitat Zone within the Moreton Bay Marine Park.

The main text of Chapters C4 and C5 provide a comprehensive analysis of potential impacts associated with the project, not only within the dredge footprint, but also at broader spatial scales, taking into account potential drift of the plume into High Ecological Value (HEV) areas and Ramsar declared areas. Section 5.8.10 is a summary of potential impacts to features of high ecological value. This section is not a standalone report, rather it re-states and summarises the findings of the detailed analyses undertaken in Chapters C4 and C5, in the context of the stated Ramsar values for the Moreton Bay Ramsar Site. **Table 5.8g** specifically looks at each Ramsar criteria relevant to Moreton Bay and provides an assessment of potential impacts.

As outlined in Chapter C4 of the Draft EIS/MDP, short term exposure to elevated turbidity has been recognised as a likely occurrence during dredging activities within the Environmental Protection (Water) Amendment Policy No. 1 2006 Explanatory Notes, where it is expected that some short term impacts may be present. The Notes recognise that these impacts are likely to be “transitory in nature” and “are not considered to be detrimental to the maintenance of the values of adjacent high ecological waters and their long term natural physico-chemical and biological variability”.

Given this statement in the Explanatory Notes and the thoroughness of the assessment presented in the water quality and ecology chapters of Volume C, no further assessment of potential impacts is seen as warranted.

Addition/Omission to Draft EIS/MDP:

In light of the above discussion, no changes are proposed to section 5.8.10 of Chapter C5 of the Draft EIS/MDP in relation to the issues raised in the submission.

5.7 C5 – Marine Ecology – Marine Species of Conservation Significance

(3 of 196 submissions)

Draft EIS/MDP reference: Chapter C5, Sections 5.5.8 – 5.5.11 (baseline), Chapter C5, Sections 5.8.6 – 5.8.7 (impact)

Submitters have raised issues about the use of Middle Banks by marine species of conservation significance such as whales, dolphins, turtles and dugongs and potential impacts from operation of the dredge on those species.

Submitter Issues:

Specific comments from submitters with regard to this issue can be grouped as follows –

General Interaction

- General concerns were raised about interaction between the dredge vessel and whales, dolphins, turtles and dugongs within or traversing Middle Banks (3/3).

Dugongs and Turtles

- Statement that the utilisation of Middle Banks by dugong and green turtles is unclear but it is noted that these species will utilise deep water (>12 m) seagrass meadows and that favourite feeding sites are not dependant on the extent of the meadow or density of the seagrass (2/3).
- That research on boat strikes fatalities of dugong show strikes are due to large vessels (1/3).

Whales and Dolphins

- That over 30 whales were sighted off the western shore of Moreton Island and within Moreton Bay (based on data from the community group and Tangalooma Resort) in 2005 and that the statements in the Draft EIS/MDP that the area is not used by whales is inaccurate (2/3).
- Given that humpback whale population numbers are growing on an annual basis, increasing numbers of whales are likely to be using Moreton Bay and there is growing risk of interaction with the dredge (1/3).
- That noise does have an impact on whales and recommending that this matter be given greater priority and attention in the document (1/3).
- That dredging Moreton Bay to within three kilometres of Moreton Island where tourists view dolphins, “is something that should be treated with caution” (1/3).

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	116	Nil	72, 193	Nil
Total	1	0	2	0

BAC response:

5.7.1 Interaction Issues

While unlikely to occur, interaction between the dredge vessel and marine fauna of conservation significance may be unavoidable. To address this, measures are proposed in Chapter C9, Dredge Management Plan to ensure spotters on board the dredge vessel inspect the proposed extraction area during daylight hours to identify any marine megafauna in the vicinity prior to commencement of dredging and during the operation. In the event that a large animal or group of animals is able to be spotted, the dredger will wherever possible be re-positioned to avoid potential interactions.

To reduce adverse interactions with marine turtles, the dredge management plan stipulates that the dredge contractor fit turtle exclusion devices onto the dredge head and implement other best practice measures to reduce risk of harm to turtles (refer Section 9.6.2.2 of Chapter C9). Observation and interaction data will be collected and logged.

5.7.2 Dugongs and Turtles

As stated in the Draft EIS/MDP and consistent with the findings of the Moreton Bay Sand Extraction Study, the area of Middle Banks is located in the zone of lowest dugong density in Moreton Bay. While it may be possible that dugongs are present at Middle Banks from time to time, such occurrences are unlikely due to more favourable food resource areas to the south of Middle Banks (Moreton and Amity Banks). Video survey of seagrass present at Middle Banks showed no evidence of any observable dugong foraging trails.

Seagrass sampling as part of the current study by WBM Pty Ltd found very little seagrass in areas deeper than –10m LAT in the study area and no seagrass was found through the survey to be present in either the selected dredge footprint area or shipping channels which would be used by the dredge vessel to enter and exit the footprint area (refer Chapter C1, ***Figure 1.6a*** for the location of the shipping channels and seagrass sampling points). In the unlikely event that there is a passing dugong or turtle foraging on seagrass near the dredge footprint, there is a buffer of between 100 m and 250 m to all sampled seagrass points to the west of the proposed dredge footprint. Seagrass found east of the dredge footprint and Shipping Channel (on Ridge Shoal) is over 1 kilometre away.

As outlined in the dredge management plan within the Draft EIS/MDP (Chapter C9), the dredge will be required to operate only within the nominated dredge footprint which has been chosen to avoid areas of the seabed less than 10 m depth. On completion of the dredging, the dredge vessel will quickly move to intercept either the Main or the East shipping channels and will return to the mouth of Brisbane River. Once within the shipping channels, the dredge is not seen as posing any additional risk to dugong, turtles, whale or dolphin to any other large vessel arriving or departing from the Port.

5.7.3 Whales and Dolphins

The Draft EIS/MDP confirms that there have been anecdotal sightings of whales from time to time in Moreton Bay. The figure of 30 whale sightings within the Bay in 2005 asserted by the submitters is not disputed although it is not known how this data has been collected. Irrespective of this, given the large volume of shipping traffic already using the Port of Brisbane it is not regarded that the proposed operation of the dredge increases the risk of adverse interactions with whales in any significant way. Mitigation measures should a whale be traversing the dredge footprint during the dredge operation are outlined above.

The sections in Chapter C5 of the Draft EIS/MDP related to the potential impacts of underwater noise from the dredge on whales, dolphins and other marine fauna of conservation significance were prepared by a recognised underwater acoustic specialist together with WBM. BAC would argue that there is no evidence or references provided in the submissions that would suggest the assessment and conclusions reached by the specialist on this issue are not reasonable or scientifically robust.

Addition/Omission to Draft EIS/MDP:

No changes are proposed to the relevant sections of Chapter C5 of the Draft EIS/MDP in relation to this issue.

5.8 C5 – Marine Ecology – Nutrient Release and Impacts on Phytoplankton *(1 of 196 submissions)*

Draft EIS/MDP reference: Chapter C5, Section 5.5.4; Chapter C4, Section 4.9.

One submitter raised issues regarding nutrient additions on phytoplankton in the study area.

The specific issues raised are as follows:

- An assertion that the area in the vicinity of Middle Banks does not experience a high degree of flushing with the ocean, with a residence time of approximately 45 days.
- That the statements in the Draft EIS/MDP about the bioassay technique used by Jones et.al. has been superceded by subsequent work and now should be retracted on the basis that Eastern Bay phytoplankton populations would be expected to respond to nutrient additions like most sub-tropical or temperate clean water populations studies elsewhere.
- That effects of nutrient additions from the dredging on phytoplankton in the study area be reconsidered particularly where the modelling indicates the dredge plumes will extend into the High Ecological Value (HEV) area.

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	242	Nil	Nil
Total	0	1	0	0

BAC response:

5.8.1 Residence Time

Preliminary indications of residence time at Middle Banks from desktop review of modelling results would suggest residence times are typically in the order of hours, to a maximum of several days. The figure quoted in the submission of a 45-day residence time is typically assumed as the residence time for the entire Bay in some current and wind scenarios, hence it is unlikely to apply to Middle Banks specifically. As a result, no changes are suggested to the existing statement in this section.

5.8.2 Reference to Jones et al (1998)

The submitter's comment about removing the reference to Jones et al (1998) (based on the work being superseded by subsequent work) is noted. It is proposed that the redundant reference be removed altogether from the section of the Draft EIS/MDP as it is essentially background information about baseline conditions for microalgae in the Eastern Bay and was not used as a basis for any findings in the assessment.

5.8.3 Effects of Nutrient Additions on Phytoplankton

Quantification of likely nutrient additions to the water column from the sand dredging is addressed in Chapter C4 of the Draft EIS/MDP. As shown in the plume modelling in this chapter, nutrient plumes are restricted to the immediate area of the dredging when compared to sediment plumes and do not extend into the HEV area as shown in Figure 4.9a and 4.9b of the Draft EIS/MDP. The primary reason for this is the dilution effect on the porewater (liberated through the suction of the sand and water into the vessel) while within the hopper of the dredge.

These findings are consistent with observations in the Phase 2 NIWA report contained within the Moreton Bay Sand Extraction Study which monitored dredging by the suction dredge "Darra" in 2003 in which it was found the concentrations of suspended solids, Total (Kjeldahl) Nitrogen and Total Phosphorus were not significantly different from background within a short distance of the dredge due to a lack of fines, rapid dilution in the fast moving water (0.5-0.6 m/s), dispersion and (possibly) settling.

In addition to the analysis and modelling undertaken by BAC's consultants as part of the Draft EIS/MDP, the water quality and ecology chapters of the Draft EIS/MDP were peer reviewed by the Scientific Expert Panel of the Moreton Bay, Catchment and Waterways Partnership. The scientists on the peer review team did not raise nutrient additions and associated effects on phytoplankton from the sand dredging activity as an issue of concern or one that required further investigation in their review.

Based on these considerations, BAC would argue that the assessment of potential impacts on nutrient releases on phytoplankton within the Draft EIS/MDP is satisfactory and it is maintained that there is a negligible risk that sand dredging will cause detectable blooms or other detrimental impacts on phytoplankton populations from the release of nutrients in the HEV area or elsewhere in the immediate area of dredging.

Addition/Omission to Draft EIS/MDP:

As outlined in the discussion above, the Draft EIS/MDP is to be amended as follows:

Section 5.5.4.1, 2nd Paragraph – Omit the following sentences:

However, field experiments by Jones et al (1998) found that phytoplankton assemblages in eastern Moreton Bay demonstrated almost no response to in vivo nutrient addition. This may indicate that these phytoplankton assemblages do not show the same responses as phytoplankton assemblages elsewhere, or that the short residence time of waters in this area prevents the rapid utilisation of nutrients (Gowen and Bradbury, 1987).

No other changes to Chapters C4 or C5 are proposed in relation to this issue.

5.9 C5 – Marine Ecology – Seagrass Issues

(3 of 196 submissions)

Draft EIS/MDP reference: Chapter C5, Section 5.5.3 (baseline) and Sections 5.8.4 – 5.8.5 (impact), Chapter C9, Section 9.6.2.2

Several submitters raised issues regarding impacts on seagrass as a result of the dredging. Comments about amendments to the **dredge footprint plan** in relation to showing additional seagrass mapping have been addressed in this Supplementary Report under **section 5.2**.

This section of the Supplementary Report also addresses comments from submitters about mitigation and monitoring related to seagrass (which are addressed in the Draft EIS/MDP in Chapter C9).

Submitter Issues:

Specific issues raised in submissions about seagrass can be grouped as follows –

Values of Seagrass Habitats and Relationship to Dredge Footprint

- Regardless of the seagrass meadows size or density it is a habitat worthy of protection as a valuable food source for dugongs and a variety of commercial and non-commercial marine species (2/3).
- Sufficient measures should be put in place to ensure that dredging does not occur anywhere in or immediately adjacent to seagrass meadows (1/3).

Other Seagrass Mapping and Additional Assessment of Impacts

- A submitter remarked that it was surprising that the Draft EIS/MDP found only limited areas of seagrass in the study area as this contradicts other recent studies (1/3).
- Provide additional assessment of likely impacts on seagrass incorporating the 2004 sampling data on seagrass meadows showing the dredge footprint, its areas of influence (due to slumping) and seagrass distribution (1/3).

Mitigation and Monitoring

- A comment was made asking what contingency plans will be in place to respond to any plume impacting on seagrass beds (1/3).

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	242	72, 193	Nil
Total	0	1	2	0

BAC response:

5.9.1 Values of Seagrass Habitats and Relationship to Dredge Footprint

The values of seagrass habitats are stated in Chapter C5, Section 5.5.3.2 of the Draft EIS/MDP. Despite the sparseness of the assemblages observed at Middle Banks, the ecosystem values of seagrass is acknowledged and have been a critical constraint issue in the selection of the dredge footprint. Direct impact to seagrass has been avoided to the greatest possible extent by selecting a dredge footprint that excludes areas where seagrass was observed as part of underwater video sampling as well as placing a depth limit on the proposed dredging to exclude all areas of the seabed above -10 m LAT where, because of light availability, seagrass is most likely to establish. The latter criterion was adopted following the advice of the Scientific Expert Panel of the Moreton Bay, Catchments and Waterways Partnership that were engaged as Peer Reviewers for the project.

Based on data obtained from geotechnical investigations, care was also taken to seek to avoid dredging in areas within the nominated footprint area with higher fractions of silt and fine material (thus reducing the extent and duration of sediment plumes when dredging is carried out). The exclusion of the seabed from the footprint around borehole GC 10 as shown in Chapter C1, ***Figure 1.6a*** is an example of this.

The Draft EIS/MDP also examined the indirect impacts of plumes on the seagrass and has predicted that the short duration and limited size of the plume make it unlikely that there would be long term impacts on the seagrass communities at Middle Banks from the dredging. Further analysis of this issue is provided below.

5.9.2 Other Seagrass Mapping and Additional Assessment of Impacts

Additional seagrass mapping (2004) referenced in the submitter's comment has been included in the amended dredge footprint plan (refer issues under Chapter C1 of this Supplementary Report). These seagrass communities are situated across the East shipping channel on Ridge Shoal over a kilometre east-southeast from the nominated dredge footprint. WBM, as part of the current study, also found seagrass at this location as part of its underwater survey.

The seagrass sampled by WBM immediately to the west of the proposed dredge footprint is buffered from the edge of the proposed dredge cut by between 100m and 250m (refer Chapter C1, ***Figure 1.6a***). Impacts to seagrass assemblages in these areas from slumping is not seen as a threatening process given the buffer distance of these assemblages from the edge of the cut, the relatively gentle slope of the bank as it moves east towards the shipping channel and based on the sediment properties.

Chapter C4 modelled the likely durations of elevated suspended solids in 3 locations within the Middle Banks seagrass area as well as three locations within the High Ecological Value (HEV) area declared under the Queensland *Environmental Protection (Water) Policy 1997*. Within the HEV area, point HEV 3 as shown on ***Figure 4.7v*** would be in relatively close proximity to the seagrass area sampled on Ridge Shoal.

From **Table 4.9c** in Chapter C4, the maximum concentration of TSS during the dredge cycle is predicted as 0.8mg/L above background concentrations once the plume is fully mixed vertically. The longest duration of the plume at any point in either the seagrass area at Middle Banks or the High Ecological Value area is predicted to be approximately 6 hours in one scenario. The maximum background concentration of TSS recorded at the Middle Banks location was 3 mg/L, so making the very conservative assumption of the maximum background turbidity of 3 mg/L, with the maximum predicted increase in suspended solids of 0.8 mg/L, over an area of seagrass of 2.31 km^2 with an approximate water depth of 10m (from bathymetry surveys), this would result in approximately 877.8 t (dry mass) of suspended solids over that area. Assuming that bulk density of the settled material = 1.5t/m^3, this would potentially have a volume of 1135 m^3.

Based on these assumptions and recognising that this is a highly conservative approach, if the entire amount of this sediment was to settle over the seagrass area the resultant depth of deposition would be approximately 0.49mm. Taking into account the tidal velocities in this area and the amount of wind mixing, it is considered very unlikely that the majority of the suspended solids would settle but would remain in suspension and disperse throughout the Bay.

Even in a hypothetical situation where all this material settled onto seagrass beds within the plume, it is considered highly unlikely that there would be a detectable change in seagrass distribution, density or cover. The shallow water environments in which these species occur would regularly experience re-mobilisation and deposition of bed sediments. As stated in the Draft EIS/MDP, the species that occur in this area have adaptations that allow rapid growth and recovery following disturbance and smothering, hence no long-term changes in seagrass extent and cover are expected.

5.9.3 Mitigation and Monitoring

Given the data available on dredge plume behaviour from previous dredging at Middle Banks and observations of turbidity plumes from other large dredge vessels operating in the Bay recently, it is considered unlikely that the plume will behave differently to that predicted by the modelling.

To verify predicted impacts from the dredge plume, the Draft EIS/MDP outlines monitoring of the dredge plume to validate the modelling predicted in Chapter C4. Key elements of this monitoring programme are outlined in Chapter C9 of the Draft EIS/MDP. Should field turbidity and TSS measurements in terms of plume extent and intensity over the seagrass or HEV area vary significantly to the modelled values, further analysis of potential impacts on these areas would be undertaken. Based on this analysis, if plume impacts over seagrass/HEV areas are deemed to be unacceptable, BAC could consider employing a strategy whereby the dredge operates exclusively against the prevailing tidal current when dredging near seagrass areas. As shown in the plume modelling, this strategy can reduce the extent of the plume and may help to reduce the short term turbidity impacts over seagrass area in particular tidal conditions. Adoption of this approach would also need to be considered in the context of any corresponding negative effect on dredge production rates that could result from limiting the operation of the dredge to certain tidal conditions.

Addition/Omission to EIS:

Noting the change to the dredge footprint plan to show additional seagrass mapping, no further changes are proposed to relevant sections of the Draft EIS/MDP in relation to the issues raised by submitters about seagrass.

5.10 C5 – Marine Ecology – Shorebird Issues

(1 of 196 submissions)

Draft EIS/MDP reference: Chapter C5, Section 5.8.10.2, Table 5.8g (item 3a)

One NGO submitter raised concerns that the proposed dredging at Middle Banks may have an impact on shorebird roosting and feeding habitat along Moreton Island.

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	Nil	237	Nil
Total	0	0	1	0

BAC response:

As outlined in this section of Chapter C5, the recession and accrual of sands from the shoreline along the western coast of Moreton Island is a natural coastal process. Coastal hydrodynamic modelling shows that no significant changes to tidal currents or wave heights near the shorelines would occur as a result of the proposed dredging at Middle Banks.

The Middle Banks area where the dredging is proposed to occur is entirely sub-tidal, with minimum depths of –4m LAT. The distance between the dredging area and the nearest inter-tidal areas along Moreton Island are significant (kilometers) and as such no direct impact to shorebirds or their habitats are predicted to occur.

Addition/Omission to Draft EIS/MDP:

No changes are proposed to this section of Chapter C5 in relation to this issue.

5.11 C9 – Shipping Channels and Port Issues

(1 of 196 submissions)

Draft EIS/MDP reference: Chapter C9, Section 9.6.1

The Port of Brisbane has raised issues related to the operation of the seaport. These relate to possible effects the dredging at Middle Banks may have on the adjacent shipping channel as well as concerns about possible increased sedimentation of the Swing Basin adjacent to Luggage Point. These matters are dealt with in the Draft EIS/MDP under Chapter C9, Dredge Management Plan.

Submitter issues:

Specific issues raised in the Port of Brisbane submission include –

Issues Related to the Shipping Channel

- The need for determination of the extent of impacts in the short and long term from sediment movement on the stability of the shipping channel or if increased sedimentation would lead to potential increased maintenance dredging requirements.
- The need to prepare cross-section plans of the dredge footprint in order to better define the target dredging depth.

Issues Related to the Pump-out Operation and Swing Basin

- The likely potential and extent of bank scour from the mooring of the dredge at Luggage Point and whether this will be monitored.
- Potential for sedimentation of the swing basin from scour and/or from the operation of the dredge pump and mitigation strategies if these processes adversely impact the existing dredged depths within the swing basin.
- Details of measures proposed to protect existing structures such as the Brisbane City Council sewer crossing.

Issues Related to Operation of the Port

- Seeking the proponent confirm that the operation of the dredge will not impact on shipping efficiencies within the Port.
- Recommendation for undertaking below water line inspection of the dredge vessel for marine pests in addition to meeting AQIS requirements.

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	Nil	Nil	183	Nil
Total	0	0	1	0

BAC response:

5.11.1 Shipping Channel

As shown in Chapter C3, ***Figure 3.5b***, the present bathymetry of the dredge footprint area adjacent to the shipping channel has very flat bed slopes. Based on analysis of the effect of previous dredging activity on current bathymetry of the area and based on the findings of the coastal processes modelling outlined in Chapter C3, no adverse impacts on the stability of the shipping channel or any significant increase in siltation in the shipping channel are expected to occur from the dredging. Similarly, the estimated rates of sedimentation are not expected to result in increased sedimentation in the channel and thus no specific mitigation measures are proposed.

Detailed cross-sectional plans along the dredge footprint will be prepared as part of applications for State approvals for the dredging activity which will include further consultation with the Port of Brisbane.

5.11.2 Pump-out Operation and Swing Basin

Dredge consultants for the project have advised that worldwide, unless it causes slope instability or exposure of submerged/trenched pipelines, scour from vessels is accepted in channels, swing basins and berth pockets.

Scour is already evident in the location of the proposed mooring based on the hydrographic survey of the nearby Tanker Berth - Pocket (MHS Drawing MH 1080-18, 2005) where propeller scour is noticeable to -16.5mLAT in the flat area of the swing basin (originally the area was dredged to -14m LAT+ overdredging). This has likely been caused by the propellers of oil tankers and the tugs during mooring and unmooring operations over many years.

BAC commissioned several boreholes in close proximity to the proposed mooring area (refer GC 18 and 23 in the Appendix to Chapter B3) to assess, in addition to the chemical analysis of the soil, the likely stability of the slope and adjacent swing basin at that location.

The soil analysis from the boreholes indicates that there is a likelihood of scour from propeller wash and bow thrust operations of a large to very large THSD mooring in this area on the sandy and silty materials in the slope above -8m LAT. To a lesser extent, scour will occur below -8mLAT, where soft to firm clay can be found. The rather steep slope angle of 1:1.5 (v:h) is another contributing factor for scour to occur to the slope in the berth pocket.

As a first step to addressing this issue, BAC and its dredge contractor will implement measures to restrict the speed of the THSD when approaching and departing from the pump-out facility to very low speed and low revolutions on the propellers in order to reduce the effects.

If warranted, BAC would consider the use of scour protection of these areas in the form of concrete matting (webbing cast in small concrete blocks), as used in the offshore oil industry to stabilise bedding and pipelines. The need for installation of the scour protection would be part of the development of the final mooring arrangement with the Port of Brisbane and Maritime Safety Queensland Harbour Master. These discussions will also include the need for and frequency of any monitoring.

In terms of contribution of sediment from the pump-out operation itself, a very small volume of water (between 0 and 5000 m^3) with suspended fine material may be lost during pump-out operations. This water loss is an unavoidable process that results from the opening and closing of intake valves during the pump-out operation and the water pressure created by the water level in the hopper interacting with a temporary blockage of a section of the discharge channel before the discharge gates are closed. Based on the estimated volume of water released and generally low proportion of fine sediments within the dredged sand at Middle Banks, it is not expected that this process would lead to any significant or observable deposition of material within the swing basin.

In the context of potential impacts on the Brisbane City Council sewer crossing line as shown in ***Figure 9.3a***, should the final mooring arrangement proposed by the dredge contractor involve placement of marine piles at the pump-out location or the need for the vessel to drop anchor, it may be prudent to place scour mats over the pipeline in the shallow inshore sections, where overburden of virgin clay is less than 5 metres. This concept will be developed further with the relevant agencies and dredge contractor as part of the detailed design process for the mooring arrangement.

5.11.3 Operation of the Port

Based on the location of the proposed mooring and proposed frequency of use of this area of the swing basin by the dredge vessel, the potential impacts from the temporary pump-out facility on the efficiency of the port is expected to be minimal, particularly when compared to alternative mooring locations at Juno Point and Koopa Channel canvassed in Chapter B1 of the Draft EIS/MDP. However, the Port of Brisbane itself is best placed to provide advice to BAC about any specific concerns about this matter that it holds.

The most direct influence of the proposed pump-out operation on port efficiencies would be when oil tankers are in the process of mooring and unmooring at the BP Oil Wharf. In this context, protocols will be developed further between BAC and its dredge contractor with the Harbour Master and Port of Brisbane prior to the commencement of the operation to the satisfaction of all parties.

BAC has no objection in-principle to the additional inspection recommended for marine pests below the water line if the dredge vessel is seen by the Port as a risk to marine pest translocation. This matter would be discussed further with the Port and the successful dredge contractor prior to commencement of the dredging operation.

Addition/Omission to Draft EIS/MDP:

To address the points raised in the submission as discussed above, the following text is proposed within Chapter C9 of the Draft EIS/MDP, in the context of how the proposed dredge operation may affect the Port as an area of State significance (social and economic) under the State and regional coastal management plan.

- That the following wording be added to Chapter C9, Table 9.6a under the heading Policy 2.1.1 –

  The extraction of sand from the nominated dredge footprint is not expected to impact on the stability or increase existing rates of sedimentation within the East shipping channel such that additional maintenance dredging would be required.

- That the following wording be added to Chapter C9, Table 9.6bc under the heading Policy 2.1.1 –

  As there is a potential for scour of the bank below the water line at Luggage Point, should scour become evident, BAC and its dredge contractor will implement measures to restrict the speed of the dredge vessel when approaching and departing from the pump-out facility to very low speed and low revolutions on the propellers in order to reduce the effects. Any net sedimentation of the swing basin from the mooring of the dredge vessel and pump-out operations is expected to be minimal. If sedimentation does occur to an unacceptable level, BAC in consultation with the Port of Brisbane will consider measures to address the issue.

  Procedures will also be developed with the Regional Harbour Master and Port of Brisbane to ensure safe and efficient vessel movements in and out of the Port during the operation of the dredge (12- 18 months) at the pump-out mooring.

5.12 Volume C – Miscellaneous Issues and Clarifications

(2 of 196 submissions)

Submitters have raised a number of miscellaneous issues in relation to various chapters of Volume C of the Draft EIS/MDP that are dealt with in this section of the Supplementary Report. The issue raised and proposed response is shown in tabular format below.

Draft EIS/MDP reference: As shown in table below.

Raised by:

	Community	Govt Agency	NGO	Elected Reps
Submitter ID	152	242	Nil	Nil
Total	1	1	0	0

BAC response:

Ref	Issue Raised	BAC response	Addition/Omission to the Draft EIS/MDP
C1	Given that implications of the impending peak and subsequent decline of world oil production (the 'peak oil' theory) make the NPR redundant, the environmental impacts at Middle Banks cannot be justified.	This issue is addressed with other comments on 'peak oil' theory in the context of Chapter A2.	See **section 3.5**, Justification and Need.
C4	The significance criteria for marine water quality in **Table 4.6b** are not appropriate and should be redefined to make them more relevant to the activity and not just dependant on the report card rating in the case of the high and major adverse impact.	As outlined in Chapter A1, Page A1-33, the Draft EIS/MDP uses an impact assessment methodology based on levels of adverse impacts with the categories of 'major' and 'high' impacts representing important considerations at the national and State level. A change to the Ecosystem Health Report Card Rating for Eastern Moreton Bay is introduced into the assessment criteria only in relation to the highest impact categories (major or high adverse). In this context, reference to a change in the Report Card is seen as appropriate as it would indicate a highly significant impact by the project over a large spatial scale. It should be noted that, neither of these impact assessment categories are relevant to the findings of the Chapter which assessed the impacts to water quality as being minor to negligible.	No change to the Draft EIS/MDP proposed.

Ref	Issue Raised	BAC response	Addition/Omission to the Draft EIS/MDP
C5	Under Section 5.5.7.2, the general comparison made between Stephenson's (1982) data and the current WBM [fin fish and nekton-benthic invertebrate] survey that more species occur on previously dredged areas is unlikely to pass detailed scrutiny when factors such as trawl gear, trawler operations, and trawl shot times are factored into the assessment.	Propose that an additional sentence be added to this section to address the submitters comment.	That the following sentence be added to this section after the first paragraph on page C5-205: *It should also be recognised that sampling equipment and effort differed between Stephenson's study and the present study, which prevents direct comparisons between data-sets".*
C5	Under Section 5.5.11, the grey nurse shark population estimate is 500 for the east coast Australia.	Support amendment of text.	Text in Section 5.5.11 in relation to grey nurse sharks be amended so that the sentence now reads: *"with an estimated population of 500 individuals on the east coast of Australia"*
C5	Under Section 5.7.2, Queensland fisheries are subject to the provisions of the EPBC Act.	Support amendment of the text.	Insert new paragraph into Section 5.7.2 that states: *"Queensland fisheries are subject to the provisions of the EPBC Act in terms of requiring accreditation of Management Plans for specific fisheries to enable export of product. Fisheries accredited within Moreton Bay include the spanner fishery, east coast otter trawl fishery, mud crab and blue swimmer crab fisheries, river and beam trawl fishery and several developmental fisheries."*
C5	Under Section 5.8.9.1, the relevance to saucer scallops is unclear in relation to habitat impacts from the sand extraction. No evidence is presented that this species is taken on or adjacent to the Middle Banks site.	While this issue is noted, no change is proposed to Draft EIS/MDP wording.	No change proposed

Addition/Omission to Draft EIS/MDP:

That the identified section/page of Volume C of the Draft EIS/MDP be amended in accordance with the far right column of the table above.

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