

Abbot Point, Terminal 0, Terminal 2 and Terminal 3 Capital Dredging
(EPBC 2011/6213 GBRMPA G34897.1)

North Queensland Bulk Ports

Recommendations of the Great Barrier Reef Marine Park Authority

Great Barrier Reef Marine Park Authority

Townsville, Queensland

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Executive Summary

North Queensland Bulk Ports requires a decision on their application to dredge and dispose of 3 million meters cubed of capital dredge material, at the Port of Abbot Point.

The Great Barrier Reef Marine Park Authority (GBRMPA) has considered the application in detail and decided that the proposal in its current form is clearly unacceptable.

There are clear and prudent alternatives to the dredging and disposal action such as the extension of port trestles by a little over 1km further than the proponents proposal. The ed option, which GBRMPA is able to demonstrate that believes such alternatives will result in superior environmental and social outcomes and such alternatives are critical to the maintenance of the Great Barrier Reef World Heritage Area (GBRWHA):

GBRMPA acknowledges that the alternatives are more costly than the original proposal, however the GBRWHA Great Barrier Reef World Heritage Area is currently at risk due to multiple natural and anthropogenic stressors that are impacting on the resilience of the GBR and Outstanding Universal Value for which the area was inscribed.

Considering the high conservation value of the GBR region, GBRMPA does not consider the additional costs of alternatives disproportionate and believes that this is the cost of doing business in the GBRWHA.

Furthermore the proponent has failed to adequately assess the cumulative risk of their proposal concerning the current level of regional risk to GBR biodiversity.

GBRMPA's recommendation is to refuse the proponents application for capital dredging at the Port of Abbot Point.

Background

The Port of Abbot Point is an operational coal port located within port limits approximately 25 kilometres North West of Bowen on the central Queensland Coast. The port commenced operations in 1984 and underwent a major expansion of the existing terminal (Terminal 1(T1)) to increase the capacity to 50 million tonnes per annum from the original capacity of approximately 17 million tonnes per annum in 2011. Currently the terminal is operating at approximately 34% of the 50 Mtpa capacity, similar to their 2008/2009 throughput.

North Queensland Bulk Ports (NQB) is the port authority for the Port of Abbot Point and the project proponent. NQB proposed to undertake capital dredging works of berth pockets and aprons to facilitate the operation of Terminal 0 (T0), Terminal 2 (T2) and Terminal 3 (T3) at the Port of Abbot Point (the proposal). The proposal work includes:

- Capital dredging of up to 3 million cubic metres (m³) of marine sediment, using a Trailer Suction Hopper Dredge (TSHD) over an area of approximately 185 hectares (ha) within the Great Barrier Reef World Heritage Area; and

- Relocation of dredged material to an offshore site within the Great Barrier Reef Marine Park

The Great Barrier Reef Marine Park

The Great Barrier Reef Region encompasses the Great Barrier Reef Marine Park (GBRMP), the Great Barrier Reef World Heritage Area (GBRWHA) and an internationally recognised International Maritime Organization Particularly Sensitive Sea Area (PSSA) status. All these declarations are intended to protect and conserve the Outstanding Universal Value area from undue anthropogenic harm.

The Great Barrier Reef Marine Park Authority (GBRMPA) notes the very high environmental and conservation value of the Great Barrier Reef (GBR) in all of its decisions. It also notes that the Great Barrier Reef Marine Park is a multi-use marine park and that most of the development of ports occurs outside of the boundaries of the GBRMP but within the GBWRHA.

GBRMPA has considered both the information contained in the original Public Environment Report (PER), the supplementary PER, the public comments and any other environmental, economic, social and strategic issues informing the recommendation. This report provides the GBRMPA's advice and recommendations to assist in decision making of the proposal. The information can be used to guide the assessments of the proposal under the Environment Protection and Biodiversity Conservation (EPBC), GBRMP and Environment Protection (Sea Dumping) (SD) Acts.

The GBRMPA makes independent environmental recommendations and it is the role of the appropriate delegate of the Federal Minister for Sustainability, Environment, Water, Population and Communities (Minister) to make a decision under the EPBC Act. On the second of October 2009 the Minister delegated certain powers under the SD Act to representatives of the GBRMPA. Delegation of powers to GBRMPA for activities that occur in the Marine Park under the Sea Dumping Act does not remove the right of the minister to make a decision under that Act for either dredging and or disposal that is to occur in the Marine Park. A permit under the GBRMPA Act will also be required because the proposed disposal area is in the Great Barrier Reef Marine Park. This decision is independent from the EPBC and SD Act and relies on the mandatory and discretionary considerations under the GBRMP Act.

The GBRMPA decided that the following key environmental factors were relevant to the proposal and required detailed evaluation:

- a) The current state and resilience of the GBR
- b) Seagrasses
- c) Corals
- d) Water quality (turbidity, sedimentation and nutrients)
- e) Fisheries and other users^[OC1]
- f) Alternatives to the project

The following principles/strategies were considered by GBRMPA in relation to the proposal:

- a) Halt and reverse the decline in water quality
- b) The precautionary principle (this was included in the GBRMPA Act in 2007)
- c) Reversing the burden of proof
- d) The biodiversity conservation strategy
- e) Precedent

The following assumption has been made throughout this recommendation report:

- (a) That the predicted and measured impacts from suspended sediments and nutrients from river catchments will be similar to the impacts of suspended sediments and nutrients released during the dredging and disposal operation. This assumption was made [DC2] as more information on the impacts of suspended sediments and nutrients from river catchments on the water quality of the GBR is available.

Key Assessment Findings

The GBRMPA has considered the proponents PER and supplementary PER and supporting documentation, public and government agency submissions, advice from specialist technical experts and the proponents response to submissions in undertaking its assessment. GBRMPA has included a full reference list of the most up to date information used in this recommendation report at Attachment A. The GBRMPA recognises the extensive work and substantial reviews that were conducted as part of the proponent's submission.

There are a number of key issues related to this proposal that require careful consideration by the GBRMPA. The proposal is the first large scale capital dredging and disposal proposal requiring a decision since the World Heritage Committee noted with extreme concern regarding the level of coastal development taking place in the Great Barrier Reef World Heritage Area. This proposal for dredging and disposal at Abbot Point is also unique in that it is the first proposal where there are clear and feasible alternatives.

Outlined below are the key environmental factors considered by GBRMPA regarding the environmental manageability and acceptability of the proposal.

The current state and resilience of the Great Barrier Reef and Abbot Bay

Recent scientific evidence indicates that the inshore Great Barrier Reef (GBR) is in a state of serious decline. Key risks and contributing factors are ocean acidification, declination [DC3] of water quality, extreme weather events, coral bleaching and Crown of Thorns starfish outbreaks.

Coral cover in the GBR has declined by 50% over the last 27 years and evidence suggests that fish stocks are currently at half of their natural stock size [DC4]. Inshore mega fauna such as dolphin and dugong populations are substantially smaller than roughly 50 years ago and recent extreme weather events have exacerbated this and other risks.

Inshore biodiversity resilience is considered low and determining if a precipice exists and what factors may will push potential thresholds over the point of no return, is critical pertinent

to exercising halt and reverse management^[DC5] of the GBR decline.

Abbot Bay is influenced by run off from the Don River Catchment which covers an area of 3695 km² and the Burdekin River catchment which covers an area of 130,126 km². Approximately 92% of the Don River catchment has been cleared, predominantly for agricultural use and around 73% of the Burdekin catchment has been cleared for grazing^[DC6]. Nutrient export from both catchments is classified as medium to high risk and collectively, the catchments contribute 4293 k tonnes/yr of total suspended solids (TSS).

Total suspended solids (TSS), is generally seasonally variant and related to wind, wave and terrigenous river sediment input. TSS in Abbot Bay is elevated year round and found to be above the relevant GBRMP/QWQ guidelines.

Marine ecosystem and dredging

Key aspects of this proposal involve approximately 3 million m³ of dredging for berths and aprons and dredge spoil disposal in a yet to be determined site offshore from the Port of Abbot Point.

The direct impact of dredging and the disposal actions are predicted to impact on 585 ha of the seabed. This is mainly attributed to the digging up of sediments at the dredge site and 400 ha which will be buried at the disposal site.

Modelling

While the proponent has undertaken extensive simulation modelling to predict the potential impacts of dredging and disposal and peer reviewed the model as stated in the Abbot Point Terms of Reference, there is considerable uncertainty about what the actual degree of impact to the marine environment and the timescales and extent of recovery from that impact.

During this assessment it has become evident to the GBRMPA that there is considerable uncertainty surrounding the prediction of marine environmental impacts associated with this proposal, mostly confounded by the ~~fact that debate~~^[DC7] about the plume modelling predictions. GBRMPA acknowledges that modelling is continually improving and that all models will have limitations and assumptions.

It is known that the main drivers of ocean movement in the GBR are wind, waves, tides and longshore oceanic currents. GBRMPA has stated clearly in its guidelines for hydrodynamic modelling for dredging projects in the GBR that all of these factors must be included in a hydrodynamic/sediment plume model to predict the impacts of dredge spoil in the GBRMP. GBRMPA has independent expert advice that the inclusion of the longshore currents in predictive plume modelling is key to obtaining realistic results of sediment plume modelling, and the use of longshore currents has been successfully used in the modelling of oil spills and search and rescue operations in the past. GBRMPA notes that the modelling associated

with this proposal did not include longshore oceanic currents. The supplementary PER provided by the proponent explains that these were not included because GBRMPA's guidelines for hydrodynamic modelling were released after the Terms of Reference for the PER were released^(DC8).

There are a number of shortcomings associated with the modelling associated with this project. They are:

- a) The exclusion of long-shore oceanic currents into the model
- b) The relatively short timeframes modelled (the model was run for 6 weeks while the actual dredging campaign is expected to be 10 weeks)
- c) The short-time frames modelled do not consider the re-suspension of fine sediments over time
- d) The small geographical footprint depicted (although^(DC9) this may be all the footprint that was required from this model)
- e) The model was simulated using 2007 conditions which they acknowledged were conservatively mild conditions

Due to all the factors listed above GBRMPA is concerned that the modelling provided for the capital dredging and disposal operations are not good practice and are likely may-to underestimate the plume and the extent of the impacts.

Potential Impacts^(DC10)

Uncertainty also exists concerning the marine habitats that would be affected by the dredge plume or the general decline in water quality caused by the dredging and disposal activity. Furthermore, there is little to no clarity from the proponent on the cumulative ecological consequences associated with this decline in water quality.

Dredging changes the physical habitat and biological structure of ecosystems. This fact also applies to the disposal of large amounts of dredged material at the dredge disposal site as ~~this will change the benthic community into an alternate state.~~ This will result in a change to the species composition and functioning of an existing benthic ecosystem. This shift in habitat and community composition has the potential of a domino effect, thereby altering the other organism's use of an area and potentially resulting in the displacement of those animals and a change in species diversity and / or biomass.

Human modification to the marine environment (either directly or indirectly) will compromise the ability of that ecosystem to recover from other stressors such as cyclones, floods, eutrophication and climate change.

Seagrasses

GBRMPA has conducted a number of vulnerability assessments on 'at-risk' species. With regards to seagrasses the vulnerability assessment states that "the key elements for the survival of seagrass are suitable light, sediment, salinity and temperature ranges, an appropriate level of nutrients, and minimal natural and human disturbance. Each of these characteristics determines the ability of seagrass to survive. Parts of the coastal environment are particularly exposed to pressures that make it unfavourable for growth. Particular risk locations are those around key population centres, port facilities, and downstream of catchments that discharge high loads of sediment, nutrient and pesticides.

While seagrasses are vulnerable to changes in water quality from non-point sources their location in coastal areas of direct anthropogenic activity and development means they are also under significant cumulative pressure from local activities such as modification of coastal processes, dredging, reclamation and point source discharge impacts. Habitat assessments, taking into account values and pressures, found seagrass meadows in the Cairns/Trinity Inlet, Townsville/Cleveland Bay, Abbot Point, Gladstone, and Mourilyan Harbour regions to be the most at-risk regions.

In the keystone document of the impacts of dredging on seagrasses, Erftemeijer *et al* (2006) acknowledge that in recent times there has been an increase in awareness of the value of seagrass beds and the importance to make a concerted effort to minimise impacts on these sensitive systems. The keystone document then goes on to describe a number of thresholds and impacts from dredging around the world. The research from around the world acknowledged that not all large-scale dredging operations have a significant impact on seagrass beds^[DC11]. GBRMPA acknowledges this.

What is of most concern however is the timing of the proposed dredging and the fact that large areas of the GBR are already under extreme stress, including seagrass beds and that these areas are currently in a recovery phase^[DC12].

The 'Assessment of the relative risks of water quality to ecosystems of the GBR' stresses that suspended sediments discharged from rivers in excess of natural erosion rates, especially the fine fractions are the greatest risk to seagrasses in the GBR. It continues to acknowledge that on a regional basis the Burdekin and Fitzroy regions present the greatest risk to the GBR in terms of sediment loads. This is the region in which the proposed dredging and disposal operation is proposed. Releasing the same suspended sediments that the abovementioned report claims is the greatest risk to seagrasses. The cumulative impact on seagrasses of the suspended sediments associated with the Burdekin and the Don River added to the predicted suspended sediments associated with the proposed dredging and disposal operation is not quantified and adds another level of risk.

The proposed dredging is to occur in the dry season which overlaps with the known seagrass growing season. As current seagrass communities are in a recovery phase following extreme weather events in 2011 the dredging and disposal action could adversely impact on the recovery of the seagrasses and potentially result in further losses. The PER or supplementary PER is dismissive about this potential by stating that since these species are in recovery phase they are not expected to be widespread at the time of dredging. Such a view stated in the PER clearly understates the ecological risk of additional stressors to sea grass.

The PER adopts, a relatively unproven threshold for sediment deposition in relation to seagrass of 10mm. Based on this threshold (which GBRMPA does not necessarily agree with) the PER predicts changes in bed thickness of 10mm or more to over 765 ha of seagrass habitat. Of this predicted area, 197 ha of seagrass habitat is expected to experience changes to bed thickness of up to 40mm. The exact impact of these levels of sedimentation on seagrass is not discussed.

Research has shown that the burial of seagrasses by 40mm caused mortality in the order of 50%. GBRMPA considers that on this basis, and due to smothering alone a reduction of 100ha of seagrass habitat can be expected notwithstanding any other stressors. On a sublethal level it is estimated that 765 ha of seagrass habitat will be affected possibly^[DC13] resulting in decreased biomass, loss of species diversity and/or reduced ability to recover from previous stressors.

Recent studies associated with the National Environmental Research Project (NERP) have shown the turbidity associated with river plumes is persisting for longer periods than originally believed. The studies show that river flood associated turbidity is extending for some 5 months after the flood. This has implications for how much time is actually available with ideal water clarity conditions for growing of seagrasses.

All the above mentioned issues raise a series of potential concerns:

- As seagrasses only experience "ideal" growing conditions for an average of up to five months per year, the reduction in the growing/recovery period could severely impact on the viability for the remaining seagrass meadows in the area.
- Sedimentation of seagrass communities are well known to result in the deterioration of the state of the seagrasses either lethally or sub-lethally. Some species can respond with vertical growth but there are limits to how quickly and what depth of burial the seagrasses can cope with.
- Undeniably the nearby seagrass communities will experience a reduction in light due to turbidity and a probability of smothering due to sedimentation. At the very least this will exert extra stress on the remaining seagrasses.
- The exact impact or long-term consequence of the dredging and disposal on the remaining seagrasses of Abbot Bay are unknown as no long-term sediment migration modelling was undertaken by the proponent.

The other concern is that of recovery times. The proponent estimates the impacts to be of a temporary nature of up to 4 years. GBRMPA notes that dredging is planned to continue well into 2020 and as such the predicted recovery time estimated by the proponent may be ambitious if it were to eventuate at all. Generally recovery can range between 2 to 5 years depending on the species involved and the type of disturbance. This recovery time should be considered in synergy to the fact that the seagrasses are still undergoing a recovery phase from the 2011 floods. Considering this, full recovery to natural levels may never eventuate if turbidity and continual re-suspension of unconsolidated sediments and decreased water quality persists in the area.

Erfteemeijer *et al* (2006) summarise the impacts of dredging on seagrasses. GBRMPA has included these in the table below to indicate a comparison of how this project and possible alternatives could impact on seagrasses. It is important to note that the table below is a

comparison between alternatives only (i.e. it does not imply that the impact of turbidity on seagrasses of the proposal will be high- this is unknown due to the uncertainty surrounding the modelling, selected thresholds and potential impacts). What it does demonstrate is that the possible impact of turbidity of the current proposal compared to the alternatives will be higher on seagrasses than the identified alternatives[DC14].

Risk/Option	NQBP Proposal with full sea dumping scenario	Full extension of trestles	Part extension of trestles with partial sea dumping
Physical removal or burial of vegetation at dredging and disposal site	High (400 ha of DMRA)	None	High (400 ha of DMRA)
Increased turbidity (light reduction)	High (under average conditions the proponents modelling shows that about 2000 ha (20km ²) of seagrass habitat is expected to be impacted by decreased light attenuation) (worst case scenario is over 600km ²)	Low- from pile driving	Medium (high from dredging but lower from disposal as less material)
Increased sedimentation	High	Low	Medium

Coral

The proponent has not identified any corals at the dredge disposal site. However GBRMPA found considerable uncertainty associated with the extents provided of the dredge plume (through the modelling) and possible re-suspension of dredged material. As such, impacts to benthic coral assemblages such as those located at Cape Upstart or Camp Island Reef may still occur. The reef around Camp Island is the most isolated and most northern reef of the RE4 Coastal Southern Reef category in the Great Barrier Reef Marine Park.

Impacts include direct smothering and irritation due to plumes created by dredging and disposal actions. Indirect impacts included the long-lasting changes to water quality and effects from re-suspension of sediments. Recruitment of juvenile corals may be affected as coral larvae require a solid substrate to attach to. If sediment is covering the substrate recruitment may be impacted.

GBRMPA is concerned with both direct impacts and indirect long lasting impacts. The 2010 PIANC report on "Dredging and Port Construction around coral reefs" notes impacts associated with dredging on corals are those associated with increased turbidity and TSS such as:

- reduced light availability;
- abrasion of coral tissue;
- reduced larval survival;
- reduced coral polyp activity;
- reduced reproductive rates;
- smothering of coral polyps;
- hindered attachment of coral larvae, and

- increased susceptibility to coral pathogens.

Changes to water quality are also noted in the PIANC report as stressors associated with dredging to coral and the most notable being the reduction of dissolved oxygen and the release of nutrients and contaminants. GBRMPA notes that uncertainties exist as to the extent and severity of the dredge plume and the level of nutrients that will be released through the dredging and disposal operation. If all these uncertainties were additive then GBRMPA would be compelled to apply the precautionary principle in this case due to the real and undeniable fact that significant environmental harm could be caused by this proposal.

The proponent's PER demonstrates vast gaps in knowledge as although the proponent's modelling shows potential plumes at Cape Upstart nowhere does it address the potential impacts on the corals reefs of Cape Upstart.

Water Quality

The unpublished 'Assessment of the relative risk of water quality to ecosystems of the GBR', co-authored by organisations such as James Cook University TropWATER and the Australian Institute of Marine Science (AIMS) amongst others has concluded that "the increased loads of suspended sediment, nutrients (nitrogen and phosphorus) and pesticides all pose a high risk to some parts of the GBR". The study acknowledges that the risk differs depending on individual factors.

The abovementioned report acknowledges that suspended (fine) sediments and nutrients (nitrogen, phosphorus) are classified as 'pollutants'. However, fine sediments and nutrient occur naturally in the environment. Pollution occurs when "human activities raise ambient levels of these materials to concentrations that cause environmental harm and changes to the physical structure, biological communities and biological functions of the ecosystem". This approach has for over a decade been used to appropriately address the outputs of pollutants from river catchments. GBRMPA considers the same is applicable to other anthropogenic actions that involve the release of unconsolidated sediments and nutrients into the water column (i.e. the action of dredging and dredge spoil disposal).

Using this principle the GBRMPA has calculated that this dredging and disposal proposal would constitute 7-23% (depending on how many years the dredging is conducted over) of the annual input of suspended sediments from the Don and the Burdekin catchments. GBRMPA considers that this is a substantial amount especially considering the amount of Federal and Queensland Government funding allocated to reducing the amount of suspended sediments from the catchments. In comparison to Reef Plan, GBRMPA has calculated that this proposal could negate the advancements made through Reef Plan by introducing 4 times more suspended sediments into the system in one year than was removed through Reef Plan in the last four years. In conclusion, it could negate the positive steps that have been made to reduce the amount of suspended sediments flowing into the GBR through Reef Plan. This goes against the principle of halting and reversing the decline in water quality of the GBR.

GBRMPA notes that the current sediment input to Abbot Bay is already above acceptable

limits as demonstrated in the Cumulative Impact Assessment conducted for the Port of Abbot Point which states that "total suspended solids means during wet and dry seasons are above the GBRMP/QWQ guideline value of 2 mg/L". For this reason GBRMPA finds that any further sediment input will further increase the risks from sediments to water quality and the values of Abbot Bay.

Another uncertainty with potentially high environmental impacts is the possibility of nutrients being released from dredged sediments. The PER notes that there were low levels of nutrients in the sediments to be dredged but does not provide estimates or further information regarding the subsequent release of nutrients from dredged sediments, nor does the PER substantiate the classification of low levels.

As there are no specified screening levels for nutrients in sediments under the NAGD, there is no requirement for further testing such as Elutriate or Pore water analysis. This is an unfortunate oversight to the NAGD as elutriate tests could show a release of soluble nitrogen and phosphorus. The potential impact from elevated levels of nutrients from the dredged sediment is unknown.

Another potential unknown impact is the levels of chlorophyll a. Chlorophyll a is used to determine the likely amount or density of algal biomass in water. High levels are usually associated with eutrophication of a system and can be harmful for aquatic ecosystems.

Chlorophyll a concentrations often have an inverse relationship with nutrient concentrations from river plumes or other nutrient sources and GBRMPA believes the same would be true for dredge plumes. Chlorophyll a levels are known to increase with distance or time away from the plume, as heavier sediments settle out allowing increased light for photosynthesis and as nutrients are used up during growth.

At Abbot Point, Chlorophyll a levels show some seasonal variability and are above both the ANZECC upper limit of 1.4 µg/L and the GBRMP/QWQ guideline value of 0.45 µg/L during the wet season. During the dry season, Chlorophyll a levels drop slightly yet remains above the GBRMP/QWQ guideline value.

It is therefore anticipated that dredging would result in an increase in Chlorophyll a levels, which would remain above the relevant guidelines. It is also anticipated that the effects of increased algal blooms and eutrophication will be experienced beyond the modelled plume, meaning that impacts such as reduced light and/or increased epiphytic growth may be widespread.

Fisheries and other users of the Marine Park

GBRMPA acknowledges that the disposal of 3 million m³ of capital dredge spoil in the General Use Zone of the Marine Park provides opportunity for reasonable use for the proponent. The likelihood is high, however, that the disposal of capital dredge spoil at this location would impact significantly on opportunities for reasonable use by other Marine Park stakeholders (Marine Park users). It is more than reasonable to conclude that a number of Marine Park stakeholders will be ~~that could potentially be impacted~~ by this proposal. These include:

- (a) Commercial fishing operators (direct negative impacts on opportunity)
- (b) Recreational fishers (direct negative impacts on opportunity)^[DC15]

- (c) Visitors to the Marine Park- for example scuba divers diving the nearby Catalina dive wreck (WWII aircraft) (direct negative impacts on opportunity)
- (d) Local seafood suppliers (indirect impacts on opportunity)

Many of these groups of stakeholders have been very outspoken during the public consultation phase of this proposal. The details of how the groups will be impacted are included in the permit assessment documentation.

Consideration of alternatives to ocean disposal

The GBRMPA acknowledges the volume of material that the proponent has assembled addressing alternatives to dredging and disposal. The proponent has provided multiple options to avoid or minimise dredging and disposal in the GBRWHA and thus avoid impacts on the Marine Park and its values.

Due to the feedback received during the public comment phase of this project the GBRMPA consulted with the proponent through a series of meetings requesting the evaluation of more alternatives to unconfined ocean disposal. The proponent produced a number of feasibility studies of alternatives which GBRMPA believes, considering the high conservation value of the Great Barrier Reef World Heritage Area, produce a far better and more manageable environmental outcome than the proposed sea dumping option. GBRMPA communicated this position at meetings and in documents provided to the proponent.

The final PER that was submitted has dismissed the alternatives in favour of the original proposal of dredging and disposal in the Marine Park at a yet to be identified location. The proponent has placed a strong emphasis on monitoring measures to determine if reactive management is required. GBRMPA is of the opinion that avoidance is preferred over mitigation and management.

The main justification supporting the original proposal from the proponent's perspective is the disproportionate costs associated with extension of the trestles and the possible schedule delays that would occur by implementing one of the alternatives. As the exact costing's associated with the proposal were not included GBRMPA has done some calculations to estimate the degree of disproportionate cost associated with the extension of the trestles using the unverified estimates provided by the proponent.

	Estimated cost of option 5	Cost of Stage 3 expansion of T1	T0 T2 T3 coal capacity 155 million metric tonnes /annum		
	\$430 million	\$430 million (2004 dollars) involving capital dredging of 100,000 m ³	\$15-28 billion		
	\$430 million		lower estimate April 2013 price (indexmundi.com/coal)		

			thermal), upper estimate 2017 \$ (Australian Coal Association Exports		
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Based on the table above it appears that the extra investment of \$430 million to extend the trestles at Abbot Point for T0, T2 and T3 would be equivalent to the amount of money invested in expanding T1 in 2004. Based on the lower and upper estimates of the price of coal, the additional cost of approximately \$400 million represents a one off maximum cost of 2.6% of the annual turnover for one year (\$15 billion). Over the life of the project (excluding depreciation and other write downs) this would equate to approximately 0.05% of the projected total value of exports (50 years).

There is limited information in the PER pertaining to the estimation of costs and the tools or techniques used to derive these figures. GBRMPA adds that there are a number of shortcomings associated with the proponents economic calculations of disproportionate costs. They are:

- (a) There is no value placed on the degradation of the Marine Park (GBRMPA acknowledges that this is difficult but degrading the water quality of the marine park may have economic repercussions)
- (b) The proponent has not included the fact that if dredge spoil were to be re-used that the \$144 million worth of general clean fill may be reduced or eliminated

Based on the figures presented above and the high conservation value of the GBRWHA, GBRMPA does not believe that the extension of the trestles at \$430 million represents disproportionate costs. GBRMPA acknowledges that alternative options will be more costly, and would result in superior environmental benefits, this is the cost of doing business in the GBRWHA.

Risk Assessment

The risk assessment provided by the proponent is severely at odds with a risk assessment conducted by the GBRMPA internal group of experts. The proponents' risk assessment identifies predominantly low risks (due to the predicted temporary nature of the dredge plume and the associated impacts) with one medium risk (being the interaction of marine megafauna with the dredge and vessels). The GBRMPA preliminary risk assessment resulted in 12 high risk and 3 extreme risks for the same activity. Clearly there is a disconnect with how the proponent has applied risk and it seems to be clearly inconsistent with GBRMPA's application of risk. Due to this high degree of disconnect between the proponent's application of risk and GBRMPA's application of risk it is not possible for GBRMPA to evaluate the proponents' risk assessment associated with the proposal.

Conclusion

Over the past three decades, significant pressure has been placed on the fishing industry and land use industries, such as agriculture, to promote and encourage improvements to practices which historically and currently place pressure on the GBR's biodiversity. Initiatives such as the Great Barrier Reef Water Quality Protection Plan (Reef Plan), the Great Barrier Reef Marine Park Zoning Plan 2003 and Traditional Use of Marine Resource Agreements have been key steps in making progress towards protecting the GBR's biodiversity.

Dredging and disposal in the WHA in recent history has been mainly maintenance dredge campaigns or small capital dredging campaigns. The future of dredging and disposal proposed for the WHA is an order of magnitude difference to previous campaigns and poses a significant risk to the water quality and overall biodiversity of the GBR region.

The proponent provided a dredge disposal location in their PER. This subsequently generated public concern associated mostly with fishing grounds and a WWII aircraft wreck. The supplementary PER was supposed to address public concern associated with the dredge spoil location but instead offered an "investigation area" to be refined at a later date. The investigation area is approximately 140 times larger than the originally proposed dredge disposal site. Whilst GBRMPA appreciated the time constraints that the proponent is faced with, the approach is completely unacceptable. By not specifying a dredge spoil disposal location it is impossible to fully address the direct and indirect impacts associated with the proposal. This approach is not best practice and raises the level of uncertainty already associated with this proposal.

Notwithstanding, the facts remain that the dredging and disposal (no matter where the disposal site is) will have impacts on water quality such as increased amounts of suspended sediments, possible increase in levels of nutrients and chlorophyll *a*. Irrespective of where these impacts occur they still cause a decline in water quality which is in direct opposition to the principle of halting and reversing the decline in water quality of the GBR and in direct opposition to the efforts and budget allocated to Reef Plan.

Notwithstanding where the proposed dredge material is ultimately dumped the other fact remains that there are clear and feasible alternatives to dredging and dumping. As such, it is the opinion of GBRMPA that rather than ask the proponent to conduct expensive modelling and benthic investigations to determine a sea dumping location at this stage that the proponent be spared this expense in favour of more relevant studies on the impacts of extended trestles and/or land disposal.

The PER submitted by the proponent has not addressed the cumulative impacts of this activity in conjunction with other proposed activities at Abbot Point and the GBR in general. There is currently one existing terminal at Abbot Point (T1). Another terminal has been approved (T3) but not built and there are another two proposal under assessment (T2 and Warratah) and a commitment by the Queensland Government to build the Abbot Point Expansion (which involves a long rock groyne and undisclosed amount of dredging and dredge spoil disposal). The cumulative impacts of this development in the Port of Abbot Point is unclear and as such more uncertainties about whether Abbot Bay and the GBR in general can deal with this proposal become evident.

The GBRMPA considers that even with best endeavours, the likely impact of the dredging and disposal in the Great Barrier Reef World Heritage Area currently proposed would be environmentally and socially unacceptable.

This is based on:

- a) The current state of the GBR and lack of resilience
- b) The high level of public concern, regional interest and international scrutiny currently placed on all dredging and disposal activities in the region
- c) The uncertainties that surround the potential impacts of the proposal including long-term and cumulative impacts
- d) The availability of feasible and practical alternatives that either completely eliminates the need for dredging or substantially reduces it.

The GBRMPA thus considers that the proposal for capital dredging of 3 million m³ of sediment and disposal to a yet to be specified location within the Great Barrier Reef Marine park should not be approved.

The proponent has not been able to demonstrate to the GBRMPA that the environmental values of the GBR could be maintained with a high degree of certainty nor that the risks to those values would be acceptably low in the long term. What the proponent has failed to recognise is the reduced level of resilience and at risk GBR biodiversity due to the influence of anthropogenic coastal activity and natural climate change related impacts. GBRMPA has taken into account the water quality exceedances of the ANZECC and the GBRMP and QWQ guidelines already existing in the proposed area. The GBRMPA acknowledges that the water quality in Abbot Bay is already compromised and the background levels found in the proponents surveys and monitoring are not consistent or representative of healthy and natural GBR inshore water quality.

Based on the assessment, the GBRMPA believes that the only way to make the proposal environmentally and socially acceptable is to extend the trestles into deeper water or to find an acceptable location for the dredge spoil on land without affecting the Calley Valley wetlands (i.e. by, for example, using land that is earmarked for coal laydown areas).

The proponent has proposed a management regime to deal with the adverse impacts from dredging that involves limiting the duration of dredging, scheduling works outside the turtle nesting season and adhering to management plans that are yet to be developed. The GBRMPA appreciates that controlling dredge plumes in a dynamic environment is not a precise exercise. GBRMPA however, has not been convinced that the approach to monitoring or the level of management proposed adequately addresses the residual environmental risks that arise due to the level of uncertainty described in this document.

Having considered the proponents PER and supplementary information, public and government agency submissions, separate expert advice and the proponents response to submissions, the GBRMPA has concluded that the overall impacts of the proposal would be environmentally and socially unacceptable and are likely to erode the values of the Great Barrier Reef World Heritage Area (GBRWHA).

