

18. CONCLUSIONS & RECOMMENDATIONS

18.1 CONCLUSIONS

The Panel has considered all the submissions, evidence and documentation referred to it and has reached the following conclusions.

The project is clearly supported by Government policy, subject to the proviso that it can be delivered in a manner that leads to acceptable environmental effects.

However, data provided in the exhibited EES, as augmented by evidence and background documentation considered by the Panel is insufficient to enable an assessment of environmental effects at this time. If the project were to proceed directly to implementation without further consideration and review, the Panel considers that the potential for significant adverse environmental effects would not have been sufficiently excluded.

It therefore follows that the project should not proceed to approval or the commencement of works until the issues addressed in the Panel's detailed recommendations have been thoroughly considered.

The primary drivers for this position are as follows:

- the environmental risk analysis in the EES is not methodologically sound, lacks integration and requires further development;
- channel designs are not necessarily optimised, so opportunities to reduce environmental impacts and costs are not necessarily maximised;
- chosen dredge technology is not necessarily best practice technology and hence environmental impacts are not necessarily minimised;
- background modelling of effects such as turbidity require further development before the environmental effects of dredging can be assessed;
- characterisation of contaminated sediment from the Yarra is not sufficient to enable conclusions to be drawn about methods and effects of sediment disposal in the Bay;
- there are not always clear and proven means by which the proponent can deliver satisfactory performance to a range of relevant requirements arising from its own Environmental Management Plan; and
- hence the proponent is not always clear as to how the project will be delivered to time and budget, by means that do not entail unduly adverse environmental effects.

That being said, the Panel does not consider that this indicates against the principle of the project. It ought to be possible, having regard to relevant policy and best practice, to configure the project in a way that meets best practice and meets thresholds of compliance. However, these are matters that the Panel strongly believes require further consideration by the Minister, Government and the proponent before an assessment of environmental effects is made.

The Panel's recommendations are divided into two sets.

- The primary recommendations aim to address the process steps necessary to be taken to further develop the project and guide it towards sustainability. They are a response to the synthesis of issues considered by the Panel.
- The secondary recommendations draw together the detailed technical recommendations made in the preceding chapters of this report. They are intended to provide guidance in the process articulated by the primary recommendations.

Readers should note that many of the secondary recommendations are contingent on the information presented to the Panel by the proponent. The Panel is conscious that the proponent was undertaking additional analysis throughout its process and that work has been ongoing in the time taken to prepare this report. Public expectations and rules as to procedural fairness dictate that Panels must 'bring down the boom gate' and assess projects in terms of the information to hand. This Panel did so on the basis of information to hand at close of business on 17 December 2004. However, in making that statement, the Panel must acknowledge the willingness of the proponent to engage in further studies over several subject matters to resolve the manifest issues.

The recommendations in this report are designed to focus future studies to address the impacts of the project in an integrated and best practice manner. Any future studies should be subject to the control and oversight of an excellent project management group, experienced in major project delivery. They should promote a culture of rational and rigorous attention to detail, in ensuring that the project can be realised to the benefit of all.

18.2 RECOMMENDATIONS

Based on the reasons set out in this report, the Panel makes the following primary recommendations to the Minister for Planning.

Primary Recommendations

- Recommendation A The project should not proceed to approval or the commencement of works until the issues addressed in the Panel's detailed recommendations have been thoroughly considered.
- Recommendation B Sufficient time should be provided before an assessment is made to enable the project to be managed towards sound environmental delivery.
- Recommendation C A high-level **project management group** could be assembled, representing interested government departments and agencies and the Port of Melbourne Corporation. This team or an equivalent body should draw up a project plan to target subject matters raised in this report for action and to program that action and to ensure that sufficient information to support environmental assessment is obtained. Particular attention should be paid to the development of sound strategic project management and quality assurance processes within the Port of Melbourne Corporation.
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- Recommendation D Early consultations should be held between the project management group and the Commonwealth Department of Environment and Heritage to ensure that ongoing environmental assessment processes will satisfy *Environment Protection & Biodiversity Conservation Act* requirements.
- Recommendation E The further **independent expert panel** proposed in the governance framework should be established at an early point. It should have an independent Chair of sound public standing and expert Members representative of the range of technical issues raised by the project. Its terms of reference should provide it with ongoing roles to advise the Minister and the project management group. It should also direct the proponent in responding to the recommendations within this report and provide for appropriate means of environmental impact assessment. It should be established with sufficient resources to enable it to pay close attention to the many issues that it should consider.¹⁹⁹
- Recommendation F Subject to discussion with the Commonwealth, it could be beneficial for the further assessment of the project to be conducted in more than one stage.
- Recommendation G Once the project (or a stage of it) is ready for implementation, the independent expert panel should also be made available to support and advise the proposed **project auditor**. However, care should be exercised to ensure that this relationship does not compromise the audit function. The auditor must retain a distinct status.
- Recommendation H A **community liaison committee** should be established to facilitate direct communication between the proponent and key stakeholder communities. It should have should have an independent Chair of sound public standing and Members representative of the range of Bay stakeholders. It should be constituted to enable it to refer matters to the independent expert panel and the project auditor.
- Recommendation I This Panel has recommended that a significant number of aspects of the project as documented in the EES and in evidence before it would benefit from the carrying out of independent peer review processes. The ‘Seagrass Workshop’ undertaken by the proponent in the last quarter of 2004 provides a suitable model. Peer reviews should be carried out pursuant to the secondary recommendations below. The scope of such reviews should be agreed by the independent expert panel before they commence. The results should be reported to the project management group and the independent expert panel.

These recommendations are supported by the following recommendations in relation to matters of detail.

¹⁹⁹ There is no technical reason why this body should not be appointed under more than one legislative head of power. For example, amongst other powers it could be appointed under the Environment Effects Act, the Planning and Environment Act and/or the Environment Protection Act.

Secondary Recommendations

- Recommendation 1 The failure to exhibit the document “Stage 2: Additional Environmental Survey Work”, was a significant procedural defect. The most expeditious remedy for potential parties procedurally disadvantaged by the non-exhibition of documentation will be to participate in the exhibition and public review of a successor document. The Panel recommends the replacement of the sediment sampling strategy and characterisation in the EES, and re-exhibition to enable public comment on this change and its consequences.
- Recommendation 2 Before the assessment of environmental effects, the proponent should be required to complete its evaluation of design and operational criteria for the Great Ship Channel in the Heads. An independent channel design expert should validate these. It will be necessary to:
- outline the percentage of metocean conditions and tide conditions for which the design criteria intend the Great Ship Channel to be capable of transit by 14 metre draught vessels;
 - determine that these provisions are either broadly in accordance with the project definition providing for '*...the removal of rock at the entrance to the Bay (so that the channel accommodates ships of 14 metre draught in all tidal conditions*', or if this cannot be met, to explain the new specification that can be met and the precise reasons for the change; and
 - state clearly whether this new specification requires a deepening or widening of the channel, significantly in addition to that assessed in the EES.
- Recommendation 3 Should the proposed works significantly depart from the original design definition or require a deepening or widening of the channel, in addition to that assessed in the EES, all directly and indirectly impacted aspects of social, economic and environmental effects should be rigorously re-assessed.
- Recommendation 4 Interface works (works to approaches and berths, anchorages, navigation aids, pipeline protection etc) associated with the project must be clearly specified. Options for work delivery must be properly evaluated and the environmental impacts associated with the works must be properly assessed.
- Recommendation 5 The proponent must prepare a consolidated list for all primary dredge locations of the following data:
- current actual and declared depths;
 - proposed actual and declared depths; and
 - the actual proposed depth of dredging.
- Recommendation 6 All operational and design constraints should be consolidated into a single document. These include the requirement for tidal assistance in the Yarra, over the Melbourne Water sewer, in the vicinity of Hovell Pile and for passage through the Heads. The full economic, safety and other environmental impacts associated with these constraints should then be returned to relevant consultants for environmental assessment.
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- Recommendation 7 All references specifying locations or using coordinates should be in a consistent format in all future documentation produced by the proponent.
- Recommendation 8 That a review of available dredging technology and practice be carried out to enable the development of a best practice dredging program followed by environmental impact assessment and management measures.
- Recommendation 9 In reconfiguring the Channel Deepening Project to accord with best practise environmental management, consideration must be given to the following issues.
- Impact minimisation by selection of dredge technology and spoil disposal methods.
 - Additional baseline studies of the Port Phillip environment to enable further proving of ecological threshold limits.
 - Development of active environmental management responses to protect key assets.
 - Proving of all concepts to ensure they will meet project and environmental protection objectives in a practical manner.
 - However, before commencing to address this recommendation, attention should be focussed on the primary need to respond more fully to the waste hierarchy; a matter addressed further below.
- Recommendation 10 The existing EES risk assessment embodies flaws that have propagated throughout the EES, which makes reliance upon its outcomes for environmental assessment and decision-making purposes most unsound. The risk assessment should be repeated in a whole of project-team process, which meets the following criteria.
- It should remain under the supervision of relevant expert risk advisers throughout.
 - It should preferably be based upon a common methodology for and shared understanding of risk assessment as between all participants. If it does not take this step, a clear explanation should be provided, with consideration given to methodological consequences.
 - If a standard methodology is to be applied, the assessment should use a normalised set of likelihood and consequence criteria across all studies to weight each risk area, before impact acceptability thresholds are set.
 - It should include a comprehensive group workshop process that allows risks arising from the interactions between disciplines to be identified and assessed.
 - Dredging experts should participate in the process.
 - The proponent should also undertake a comprehensive review of the risk rankings, to ensure that no risks have had their ranking reduced, without the identification of at least one, and preferably more workable controls.
 - The outcomes of the process must be rigorously tracked and fully documented, to support decision making in reliance upon them.
- Recommendation 11 In its current form, the outcomes of the quantitative risk assessment work expressed in POMSIM cannot be relied upon. This body of work needs to be peer reviewed by a person or organisation with appropriate expertise and with access to the appropriate risk tools and a full range
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of data inputs. Such a review should determine the degree to which model adjustments or a complete remodelling are required to produce valid and sound outputs. The outcomes of this assessment should be presented separately for the construction and operational phases of the project. Following the outcome of this re-evaluation and review, other studies that rely upon the findings of the quantitative risk assessment also need to be reassessed accordingly.

- Recommendation 12 Before the commencement of works, a basic safety assessment should be undertaken to inform the findings of the other EES studies.
- Recommendation 13 Before the commencement of works, the proponent should undertake consultations and studies to ensure that current oil spill risks and contingencies are adequate, and conform to industry practices. Oil spill contingency modelling should be undertaken for a suite of scenarios that consider the outcomes of the quantitative shipping risk assessment. This modelling should then inform the project emergency response plan. Where necessary, additional oil spill response equipment should be provided by the proponent and located in areas where it may be necessary to protect sensitive environmental resources. If this is to be managed by others, the response plan must provide for communication mechanisms between the proponent and the plan manager, during the dredging. The panel recommends that chemical spill contingency modelling commensurate with the level of risk also be undertaken.
- Recommendation 14 Before the recommencement of detailed evaluations pursuant to later recommendations, a process requires to be set in train whereby the proponent devotes a reasonable period of time to setting the project and its environmental assessment onto a sound methodological and policy footing.
- Recommendation 15 The simulation study should be peer-reviewed by an independent simulation expert. Attention should be paid to:
- the prior training and assessment of pilots on simulator use with both existing and design vessels and conditions; and
 - model validation against existing channel and vessel conditions.
- Recommendation 16 The proponent should prepare a document that defines and provides reasons for the proposed underkeel clearances and overdredging along the channels.
- Recommendation 17 Computerised UKC systems (including DUKC®) should be transparently investigated as potential management responses to:
- optimise the use of the current port facilities and services, including channel depth; and
 - minimise future maintenance and capital dredging works
- Recommendation 18 For the purpose of validating channel design safety at The Heads, the proponent should define the nature of a 'near miss' and an 'incident', in respect to vessels leaving the channels, grounding etc. Vessel tracking data should be collected. The data should inform a review of shipping incident risk as an input into channel design.
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- Recommendation 19 The proponent should provide the 'before' and 'after' risk information in relation to the deepening and use of the construction channels and evidence that the design of these channels is optimised. The proponent should also provide information about the operation of these channels during the construction period, so that the associated environmental impacts can be assessed.
- Recommendation 20 A design review should be undertaken by the proponent in relation to areas in the Yarra, where there is a possibility that infrastructure owned by other stakeholders may be affected. Any areas of disagreement should be subject to a defined mechanism of external dispute resolution.
- Recommendation 21 Channel batter stability in sensitive locations should be reviewed in the light of the dynamic effects of the proposed design vessels.
- Recommendation 22 The anchorage requirements for deeper draught vessels should be determined in a study that seeks to document and control the environmental impacts and risks of transiting to the anchorage and anchoring.
- Recommendation 23 The concept of a bund as proposed before the Panel is insufficiently resolved to enable any assessment of its fitness to task or engineering feasibility in situ. Later in its recommendations, the Panel calls for a re-appraisal of sediment characterisation and disposal, which may suggest different spoil disposal options. If the bund concept is pursued, then a detailed structural design should be prepared before implementation.
- Recommendation 24 The current impacts of ship generated waves on coastal infrastructure and moored leisure craft should be studied. This study should then form the basis of an assessment of the impacts of ship generated waves from larger vessels. Should speed limits that exacerbate the current ship generated wave climate be adopted, protection measures for third party structures and vessels should be designed and implemented.
- Recommendation 25 The effects of vessel suction should be studied. This study should focus particularly upon impacts on recreational and non-commercial vessels, seabed scour and re-suspension. Such studies could have implications for optimisation of dredge depths and control over operational turbidity in the Yarra, which could have significant environmental and economic consequences, currently unassessed.
- Recommendation 26 An assessment should be undertaken of design limiting operational factors (such as one way channels) that may determine the growth limits for the port, and how these interact with the need for channel deepening. It should be clearly demonstrated that set channel speed limits represent an optimised balance between vessel squat, channel depth, dredge requirements and the maintenance of safe vessel operations in the channel. Pursuant to such an evaluation, additional options to reduce the volume of dredged materials and consequential environmental impacts may exist. Discussions between the proponent and Port Phillip Sea Pilots should develop a clear protocol
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- for the monitoring and enforcement of any declared channel speed limits.
- Recommendation 27 Having refined the project design issues referred to above, and as a response to the waste hierarchy, the proponent should undertake a study to ensure that the works minimise the dredging required to achieve the project objective.
- Recommendation 28 The proponent should sample and characterise the fine 'rock flour' known to exist in the south of the bay. Parameters for study should include all the necessary data for input into revised turbidity modelling. Estimates of the distribution/extent of this material should be made.
- Recommendation 29 It is essential to carry out historical research to disclose locations of potential contamination in the Yarra sediments, to guide the selection of contaminants to be investigated, sampling design and the location of potential 'hotspots'.
- Recommendation 30 The volume and location of recent (post settlement) silts should be mapped as an essential early part of additional sediment studies.
- Recommendation 31 The proponent should design a new sampling strategy for the Yarra zones. The historical use analysis and the silt distribution map recommended above should be used, together with the results of a critical review of previous studies. This is required to ensure that the results obtained are representative of the material to be dredged, in both area and depth. NODG provides clear guidance on this process, which should be followed. The number of samples should be sufficient to yield statistically valid results that as a minimum meet NODG requirements. The sampling strategy should be documented and externally approved before additional survey works commence.
- Recommendation 32 A new analytical chemistry strategy must be devised, based on sound statistical and quality control principles. This should incorporate rigorous management oversight extending to matters of detail. It should ensure performance that meets NODG requirements as a minimum. An external peer review process should be devised to provide necessary additional assurance.
- Recommendation 33 A new program of sampling and analysis incorporating the strategies from the two previous recommendations above should be implemented, to respond to the serious deficiencies in the sampling, handling and analysis of samples reported in the Stage 1 and Stage 2 reports. The Panel considers that this program can only incorporate data from the Stage 1 and Stage 2 reports with the utmost care and attention to methodological and quality control considerations.
- Recommendation 34 The new program recommended above should ensure that the sampling and analysis is conducted in a manner that permits implementation of the NODG requirement to compare 95% upper confidence limits (UCL) of mean concentrations of contaminants in the sediment with the appropriate screening levels.
- Recommendation 35 The results of whole of sediment toxicity testing to date show the Yarra sediment to be acutely toxic, leading to an NODG classification of 'highly contaminated'. This eliminates the option of open marine
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- disposal for most of this sediment and necessitates development of more expensive and complex management solutions. For this reason, it is important that the Yarra sediments should be examined in more detail, to determine the distribution of toxic material and contamination hotspots. A more comprehensive, flexible and targeted sampling strategy should inform the development of a wider choice of disposal methods.
- Recommendation 36 Using better information, the disposal strategy should be re-examined with a view to considering separate disposal methods for highly contaminated, moderately contaminated and uncontaminated materials. Different approaches to work scheduling and disposal scheduling should also be considered.
- Recommendation 37 The proponent has not demonstrated that the dredging proposed is the minimum required to achieve the project objective. They should do so before the environmental impact of the project is assessed.
- Recommendation 38 Following action to minimise the production of dredged materials, those required to be produced must be properly evaluated for use as a resource. Such evaluation should determine whether there is a practicable alternative to the proposed aquatic discharge, which would have less adverse impact on the aquatic ecosystem and might offer a greater balance of public benefit as against the cost of works. The aim of this evaluation should also be to develop implementation strategies and programs for using the spoil materials for particular projects.
- Recommendation 39 The failure of the EES to significantly evaluate land disposal options is a breach of policy. Options for disposal to land, particularly for contaminated spoil from the north, should be fully evaluated and assessed, with reference to the international literature, including the practice of land based treatment and re-use of materials including contaminated sediments at De Slufter, Port of Rotterdam, Netherlands.
- Recommendation 40 The proponent should undertake a full environmental, economic and risk assessment of the disposal of the spoil from the south of the bay to Bass Strait. The assessment must be able to be compared on the same basis to the work already done for disposal within the Bay. The disposal option with the best balance of benefit against environmental impact should be selected.
- Recommendation 41 A detailed rationale for the choice of the location for the southern DMG should be undertaken. This should include a full assessment of the environmental impacts of the proposed SEDMG against other alternatives. The assessment should include an analysis of the long-term effects on declared marine aquaculture zones and recreational fishing.
- Recommendation 42 Placement of additional spoil at the PMDMG should not be considered until it is demonstrated that any material to be placed will remain within the proposed boundaries.
- Recommendation 43 An international literature review should be undertaken prior to the selection of a method for any marine disposal of contaminated materials. Any selected method should be demonstrated as providing
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full confinement pursuant to the requirements of the NODG, to the satisfaction of the approving authority.

- Recommendation 44 The proponent should seek expert and independent assistance to review available dredge equipment, work methods and project scheduling approaches, in particular:
- Dredges capable of producing spoil with high solids content, that lower turbidity at source and that would enable capping.
 - Cutting heads that dissect clay to produce clay blocks.
 - The construction of a sediment 'pits' to contain and confine contaminated sediments.
 - Equipment that 'bags' spoil that can be used to construct retaining walls.
 - Mechanical sand-silt separation equipment such as the 'mechanical treatment of harbour sediments' plant in Hamburg.
 - Sand separation plants and engineered water basins such as De Slufter, Rotterdam, Netherlands.
 - Alternate capping methodologies such as sediment screens.
- Recommendation 45 An early trial dredge campaign should be undertaken in, or near, the Heads, to validate and assess the proposed new technology for use there. The wider project should not proceed until this work has been done. This should be subject to independent review as to method and outcome. It should include:
- A determination of the environmental characteristics of the proposed technology in the field, so that they can be assessed by EES consultants.
 - Further work being undertaken to determine the specific tidal and current conditions that will best protect the canyon walls from rock fall.
 - The works can be undertaken in the proposed tidal and potential sea condition windows and that this can be safely achieved in the vicinity of commercial and recreational vessels transiting the rip.
 - A quantitative risk assessment by a suitably qualified organisation be undertaken of the works with the view to ensuring acceptable risk criteria are met.
 - That all of the above work inform the economic analysis of the project
- Recommendation 46 The Panel recommends that a complete description of interface works on berths and infrastructure be developed so that the environmental impacts associated with the works can be adequately assessed.
- Recommendation 47 An estimate be made of the likely changes to greenhouse gas exchange across the air-sea boundary as a result of increased water exchange between Bass Strait and Port Phillip Bay.
- Recommendation 48 The Panel supports the conclusions of hydrodynamic modelling as to changes in tide level. However, it notes that the confidence limits of the results were not presented and considers that they should be before the project is assessed. Lack of confidence limits means that the Panel cannot assess the order of magnitude of short or long term changes.
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- Recommendation 49 The proponent should quantitatively assess the potential for re-suspension of materials/scour along the channels and determine the environmental impacts that this will cause.
- Recommendation 50 No reliance can be placed on turbidity modelling in the exhibited EES to support environmental assessment or decision-making.
- Recommendation 51 The Annexure D turbidity modelling prepared for the proponent provides a valuable step towards viable turbidity modelling for use in environmental impact assessment of dredging. However, before it can be fully used in assessment, the following must be undertaken:
- the model must be calibrated with further reference to real Bay data. Specifically, the selection of the eddy diffusivity factor must be justified or amended. Runs with appropriate representative meteorological data must be undertaken, with some attempt made to control against foreseeable extreme events.
 - a methodologically sound means of assembling a 'proof of concept' model of a whole of dredge campaign under a range of meteorological conditions should be pursued.
 - If the model is still intended for use as a real time adaptive management tool, trial runs of expedited responses to real time environmental effects and change processes must be undertaken.
- Recommendation 52 Whilst there is virtue in interactive real time modelling of turbidity plumes from data gathered in the field, this must be done using mechanisms that provides real access to monitoring and compliance tools to the relevant regulatory authorities and does not delegate them exclusively to the dredge undertaker.
- Recommendation 53 The Panel finds that the applications of modelling demonstrated by Dr Edmunds has the potential to be a valuable aid in managing future dredge programs. This work should be continued and extended, but most importantly should be based on sound underlying predictions of sedimentation and turbidity.
- Recommendation 54 Real-time monitoring and medium term predictions of plume behaviour are only suitable for confirming progress and making small modifications to the dredging programme to ensure threshold limits are complied with. Computer modelling and plume predictions are not sufficiently reliable to permit them to be used to control major changes in a dredge program. This is a powerful driver for the adoption of a 'best practice' approach.
- Recommendation 55 As was stated by peer reviewer Dr Black, it appears that the sediment modelling has not excluded the potential for large changes to banks and channels throughout most of the Sands region, increases in sedimentation to the north of the shipping channel, major changes off Queenscliff and against the coast at headlands on the south side of the bay. As a precaution to limit such effects, changes at The Heads should be minimised.
- Recommendation 56 The proponent should demonstrate a tested and reliable procedure for monitoring turbidity plumes and predicting their development over times corresponding to their persistence.
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- Recommendation 57 Time should be allowed for the establishment of an audit team trained and equipped to carry out the proposed audit process as set out under the EP Act.
- Recommendation 58 The Panel recommends that an independent investigation of low turbidity dredge equipment be undertaken and methods producing intrinsically lower levels of turbidity be used.
- Recommendation 59 The Panel recommends that approval for the dredging should not be given until the turbidity model to be used has been validated in field tests based on some simulated or real small scale dredging.
- Recommendation 60 The project should not be approved until the requirements for sustainability of the denitrification process are adequately understood and the plume modelling is satisfactorily calibrated and verified.
- Recommendation 61 A specific study should estimate the current bay biomass of the northern pacific seastar and consider the impact that this may have occasioned to the denitrification efficiency of the benthic systems observed in the PPBES.
- Recommendation 62 The Panel recommends that all nitrogen related threshold limits and performance criteria in the EMP should be subject to statistical analysis and confidence limits applied. Careful consideration should be given to the degree to which these adequately respond to factors beyond the control of the proponent, such as inputs due to major flood events, or proposed Parks Victoria dredging higher in the Yarra. A failure to maintain denitrification efficiency has the potential to trigger irreversible change in the state of the bay.
- Recommendation 63 A bay nitrogen input figure should be calculated for the project life to 2030. Staged nitrogen offset payments should be made by the proponent to land managers, to secure targeted action to reduce bay nitrogen inputs by this amount over the period to 2030.
- Recommendation 64 The consequences of denitrification failure are potentially catastrophic and long lasting. To protect against this eventuality dredging should not commence until appropriate threshold limits for light and turbidity can be set with confidence.
- Recommendation 65 Nitrogen inputs from sediments reinforce the effects of possible denitrification failure. The dredging program must be designed to take all practicable steps to minimise nitrogen release from the sediments.
- Recommendation 66 As the project is currently proposed, the potential for significant adverse effects on marine mammals and penguins has not been sufficiently excluded. Impacts on these species need to be re-evaluated following further refinement of the project approach pursuant to recommendations above, particularly including those relating to turbidity modelling, light driven primary production models and sediment chemistry.
- Recommendation 67 As the project is currently proposed, the potential for significant adverse effects on species and areas of conservation concern with State and Commonwealth legislative protection has not been sufficiently excluded. Impacts need to be re-evaluated following further
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- refinement of the project approach pursuant to recommendations above, particularly including those relating to turbidity modelling, light driven primary production models and sediment chemistry.
- Recommendation 68 Where lack of information on species of conservation concern is a serious impediment to decision making (for example the Yarra native fish species), a research program should be initiated immediately to provide enough information to assess and then mitigate impacts.
- Recommendation 69 Existing policy responses suggest that performance criteria for all Marine Protected Areas should be set to achieve 'no net change' to communities or species during and after dredging. The proponent will need to demonstrate how they will achieve this using dredge technology, dredge timing, silt curtains or by other means. It will be necessary to technically prove proposed controls prior to dredging commencing.
- Recommendation 70 Prior to project implementation, case study research on the scale and timing of *Leptomithrax gaimardii* aggregations should be undertaken with the objective of establishing more accurate impacts on dredge scheduling and project costs. This research could provide a window whereby broader questions as to the relative weighting and proportionality of response to a range of habitats and species of conservation concern can be considered.
- Recommendation 71 Prior to implementation of hydro-hammering, dredging and stonefishing close to Entrance Deep, technical and management measures for rock fall prevention should be refined and tested in less sensitive locations. This work should confirm that rock falls will not pose a threat to intermediate depth kelp communities and deep reef sessile invertebrate communities in the canyon.
- Recommendation 72 The light driven primary production model approach should be refined and developed further with broad peer input, more research at appropriate temporal and spatial scales and extensive field testing utilising trial dredge plumes, prior to deployment in the capital works campaigns.
- Recommendation 73 The proponent should adopt a consistent approach to managing ecosystems in the north and the south of the bay.
- Recommendation 74 Following further research into sediment chemistry in the Yarra River, Port Melbourne Channel, Hobsons Bay and the Northern DMG, the potential for mobilisation of contaminants into the Bay ecosystem be should reviewed with particular reference to pathways from the sediment into the food chain.
- Recommendation 75 Further research into the causes, likely duration and effects of a dredging related toxic algal bloom should be undertaken prior to dredging commencing, to develop a detailed, practical, effective prevention and response plan that protects beneficial uses and project integrity.
- Recommendation 76 As the project is currently proposed, the potential for significant adverse effects on bay-wide and regional ecosystems has not been sufficiently excluded. The Panel considers they may have been
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significantly under-estimated. Impacts need to be re-evaluated following further refinement of the project approach pursuant to recommendations above, particularly including those relating to turbidity modelling, light driven primary production models and sediment chemistry.

- Recommendation 77 Specialist marine acoustic expertise should be engaged to assist the proponent during the project. A comprehensive set of ambient marine noise data should be collected for key areas particularly in the Rip, but also including other locations where it is determined that there may be sensitive marine biological receptors. Appropriate underwater noise criteria should be established for species potentially affected at these locations by DSE (with the advice of DPI, who have experience in the management of marine acoustic noise). The cetacean and penguin protection measures should provide protection to an equivalent standard to that implied in the Commonwealth seismic cetacean guidelines.
- Recommendation 78 The acoustic signature of all proposed construction equipment should be obtained and a complete underwater noise assessment be undertaken by a specialist marine acoustic consultant.
- Recommendation 79 The measures should require the use of an appropriately experienced/trained cetacean observer and include the specification of:
- the length of observation time required before start up;
 - the length of observation time required following the sighting of a marine mammal or penguin within the exclusion zone; and
 - the use of night observation devices when dark
- Recommendation 80 Development of environmental protection and mitigation strategies including controls such as bubble curtains to meet the specified performance criteria should be considered.
- Recommendation 81 The specification for the ambient noise monitoring programme should:
- be undertaken prior to the commencement of works to allow time for analysis and remedial action to be taken;
 - specify the required technical equipment (e.g. hydrophones with calibrated amplifiers and high speed logging) and where and how it should be used;
 - ensure that the monitoring undertaken includes cumulative noise from sources such as the hydro-hammer, dynamic positioning thrusters of the vessels and passing vessels;
 - be designed to give reassurance over time that it continues to meet the specified levels under a range of conditions.
- Recommendation 82 The proponent should provide a cash contribution towards the cost of coastal zone management in Ramsar sites and other significant areas of native habitat around the bay. The precise basis for, quantum and distribution of this contribution should be set out in a document prepared to the satisfaction of the approving authority.
- Recommendation 83 Monitoring and management measures should be undertaken to maintain the resident and breeding capacity of birds using Popes Eye against changes in tidal range.
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- Recommendation 84 More detailed investigations should be pursued to ensure that either:
- turbidity plumes generated by whole of dredge campaigns using the technology analysed in the EES will not continuously or significantly occlude the foraging grounds of EPBC Act listed birds resident and/or breeding on islands and structures in the south of the bay; and/or
 - changes to the dredge technology offer are made, to limit turbidity generation or limit turbidity dispersal in areas of EPBC Act listed bird habitat, or both.
- Recommendation 85 The noise impacts of the chosen dredge technology on bird species remain to be fully assessed.
- Recommendation 86 Assuming that a revision of channel design and/or the technology proposed to be used to carry out dredging works leads to a revised analysis of construction and operational risk pursuant to recommendations above, the results of this work should be used to revisit and further validate conclusions as to terrestrial ecological effects due to oil and chemical spills. Unless such a revalidation takes place, it will not be possible to reach sound assessments of species and community effects for the purposes of the Flora & Fauna Guarantee and Environment Protection and Biodiversity Conservation (Cwth) Acts.
- Recommendation 87 Assuming that a revision of sediment chemistry and/or turbidity plume analysis takes place pursuant to recommendations above, the results of this work should be used to revisit and further validate conclusions as to terrestrial ecological effects. Unless such a revalidation takes place, it will not be possible to reach sound assessments of species and community effects for the purposes of the Flora & Fauna Guarantee and Environment Protection and Biodiversity Conservation (Cwth) Acts.
- Recommendation 88 The economic case for the project should be reviewed following further project development work and refinement of Project definition, project technology and environmental management proposals. This review should include specialists in maritime economics, resource economics, economic risk management and major projects specialists.
- Recommendation 89 The proponent should undertake a social impact assessment as part of the project environmental impact assessment. This body of work should be fully integrated with other aspects of the project work.
- Recommendation 90 An early board level meeting should be held between the proponent and Ecogen Energy Pty Ltd, with a view to establishing a basis for mutually negotiated and practical problem solving.
- Recommendation 91 Before the commencement of dredging works in the Yarra, the proponent in collaboration with Ecogen Energy Pty Ltd should undertake a detailed operational study of Newport Power Station. This study should determine:
- The necessary operational water quality parameters for the power station.
 - The capacity of dredge works to exceed these.
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- An optimum combination of dredge scheduling and dredge technology to minimise foreseeable loss or damage to the power station.
 - This study should then form the basis of a memorandum of understanding between the parties.
- Recommendation 92 Should sensible and timely agreement not be reached on the content of a memorandum of understanding, or on its execution thereafter, an independent arbitration mechanism should be available to the parties.
- Recommendation 93 Before the commencement of the project, the proponent and State government should turn their minds to an agreement or other scheme whereby compensation for direct loss and damage to businesses and associated plant is unavoidably caused by or due to the effects of project works. Means of determining liability and the quantum of compensation should be agreed and formalised. The presence of such an agreement or scheme could provide a basis for statute limiting common law actions against the proponent.
- Recommendation 94 Further to the appropriateness of continued recreational fishing for human consumption in the 'Warmies', Lower Yarra and Port of Melbourne DMG an independent study of the presence and concentration of key toxic materials in pelagic fish taken from these areas is required. Desirably, work should continue as an ongoing component of Bay environmental monitoring.
- Recommendation 95 Before the project proceeds, the proponent should undertake a thorough and systematic study of industrial uptakes from and discharges to all waters potentially affected by dredging or disposal works or by turbid plumes from these. The study should identify:
- The location of all lawful uptakes and discharges;
 - The nature of each industrial process requiring the uptake;
 - Its dependence (if any) on the particular quality or constituents of the water abstracted and the influence (if any) that dredging works might have on this (including its capacity to influence the performance or maintenance requirements of plant);
 - The condition of water discharged and the influence (if any) that dredging works might have on this (including its capacity to influence performance against a discharge license); and
 - The views of the process operator on the measures necessary to safeguard operations and comply with discharge obligations.
- Recommendation 96 The industrial uptake study should identify the measures to be implemented by the proponent in terms of:
- Information sought from the industrial process operator;
 - The choice of dredge technologies and or industrial process changes available to minimise potential dredge impacts on the industrial process;
 - The design of monitoring and early warning frameworks to safeguard against unlooked for outcomes; and
 - Consideration of the needs of the industrial process in the dredge schedule.
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- Recommendation 97 Where necessary, the principles of the agreement or scheme of compensation proposed for Newport Power Station above could be extended to other industries.
- Recommendation 98 A further study of cultured mussels should be undertaken, to determine the likely economic effects of moderate levels of turbidity exposure, over the likely duration of a dredge campaign (as opposed to 20 days). Further exploration of the following should occur if the study shows significant adverse impacts:
- additional means of turbidity control; or
 - mechanisms for industry compensation.
- Recommendation 99 Subject to the recommended re-appraisal of dredged material disposal options recommended above, should the SE DMG be retained as a disposal option, a further study should be undertaken to provide assurance that its location and management will not prejudice the future function of the Mt Martha, Dromana and Pinnacle Aquaculture Zones. Particular reference should be made to the use of the DMG during proposed maintenance dredging. The study should seek to minimise turbid plume events on the Aquaculture Zones. Re-location of this zone should not be ruled out until the study is complete.
- Recommendation 100 A best practice approach to dredging should be pursued, as it will provide significant opportunities to reduce or better control the likely impacts on the commercial fishing and abalone industries. The detailed impact of the project on these industries cannot be assessed until relevant changes to the means of implementation are known and assessed.
- Recommendation 101 Should impacts entailing significant economic loss to the industry be unavoidable, before the commencement of the project, the proponent and State government should turn their minds to an agreement or other scheme whereby compensation for direct loss and damage to commercial fishing and wild abalone businesses is unavoidably caused by or due to the effects of project works. Means of determining liability and the quantum of compensation should be agreed and formalised. The presence of such an agreement or scheme could provide a basis for limiting common law actions against the proponent.
- Recommendation 102 Efforts are required to inspire confidence in the dive industry that their issues are being effectively considered by the proponent. A best practice approach to dredging should be pursued, as it will provide significant opportunities to reduce or better control the likely impacts on the dive industry. The detailed impact of the project on the dive industry cannot be assessed until the relevant changes to the means of implementation are known and assessed. Should impacts entailing significant economic loss to the industry be unavoidable, the proponent and State government should turn their minds to a mechanism whereby compensation is provided for direct loss and damage to dive businesses unavoidably caused by, or due to, the effects of project works.
- Recommendation 103 Means of determining liability and the quantum of compensation should be agreed and formalised before the commencement of the project.
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The presence of such an agreement or scheme could provide a basis for limiting common law actions against the proponent.

- Recommendation 104 A clear tourism, recreational diving and fishing mitigation strategy for the Bay should be prepared. Key elements of this strategy will include:
- Dredge scheduling to minimise economic impacts on tourism, insofar as this is compatible with the minimisation of ecological impacts;
 - Attitudinal research and complaints monitoring to discover people's motivations for and expectations of Bay visits and to provide a means of immediate response if unplanned adverse tourism effects are noted;
 - Provision of widely disseminated data on project effects to support decision making by those planning visits. Web and traditional media outlets should be used;
 - Active promotion of the tourism offers of affected regions, focussing on the promotion of alternative beach locations, the promotion of diversified hinterland activities and promotion of the 'all clear', with 're-launches' held as dredging effects diminish;
 - In relation to recreational fishing, open water and beaches not impacted by plumes should be publicised; and
 - In relation to diving, a horizontal visibility figure for key locations should be published and regularly updated.
- Recommendation 105 Prior to project approval the proponent should reach agreement with Heritage Victoria on the range of further investigations to be carried out and resulting protective measures that are to be implemented during and following dredging. This agreement should include (but not be limited to) the following areas:
- Remnant Yarra River banks and bed historic items/places
 - The degaussing range and Hobsons Bay anchorage
- Recommendation 106 Site visits by the project heritage consultants to relevant Commonwealth Places must take place and the results must be documented, before the assessment of this project under the EPBC Act.
- Recommendation 107 Prior to project approval, further consultation with Indigenous communities should be undertaken to determine key inputs and opportunities for involvement.
- Recommendation 108 Site investigations and documentation of potential Aboriginal heritage interest on Commonwealth Lands should occur before EPBC Act assessment takes place.
- Recommendation 109 Prior to project approval the proponent should undertake further consultation with the National Native Title Tribunal and Native Title interest groups with a view to reaching a resolved position on Native Title issues.
- Recommendation 110 The proponent should identify all services, structures and infrastructure that may be affected by the project. It should fully describe works related to, or that could impact on, these services, structures and infrastructure and ensure that further impact assessment is undertaken as part of the EES. This include impacts on/works to structures including:
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- non commercial structures in the Port;
 - operational wharves in the Port;
 - the ethane pipeline; or
 - the West Gate Bridge.
- Recommendation 111 The proponent should commission a full 'before' survey of all third party infrastructure that has some reasonable potential of impact. This includes the inlet and outlet structures associated with Newport Power Station. The survey should include photographic records and survey at an appropriate level of accuracy. Monitoring for movement shall be undertaken at least annually for at least five years following the completion of dredging, including maintenance dredging. A mechanism for agreeing repair costs should be available.
- Recommendation 112 The proponent should be responsible for any costs, including management costs, incurred by Vic Roads as a result of any structural assessment of the Westgate Bridge required as a result of the Channel Deepening project.
- Recommendation 113 Whilst Coastal Management Act consent is required, it should not be viewed as the primary vehicle of project approval and regulation. The Panel notes that the review of the Geelong dredging campaign recommended a regulatory amendment to provide that dredging require a Works Approval under the Environment Protection Act. If this can be achieved, the Panel would consider it to be a sound response. Alternatively, consideration could be given to the preparation and approval of a Planning and Environment Act planning scheme for Port Phillip. If these options do not prove to be possible, the main means of project regulation should be the advance preparation and service of a Pollution Abatement Notice under section 31A of the Environment Protection Act 1970, before the commencement of works.
- Recommendation 114 The PoMC needs to develop or improve rigorous 'management of change' procedures to control changes to the project to ensure that:
- project changes occur smoothly and that risks are assessed in a manner appropriate to their level;
 - all documentation and decisions are traceable and authorised;
 - design decisions, plans, schedules, models, drawings etc are updated and kept current and implemented in a timely manner once authorised; and
 - that all parties are aware of changes, changed responsibilities and changed requirements - as they occur.
- Recommendation 115 Government agencies need to establish change control procedures within and between themselves to ensure that proposed Channel Deepening project changes undergo an appropriate level of risk assessment, public review and authorisation. This framework should be facilitative of changes that are demonstrably reductive of risk or impact. It should require rigorous review of changes that are not.
- Recommendation 116 The proposed environmental auditor (appointed by the EPA) and the proposed expert panel should be appointed across the same fields of expertise. Opportunities for joint working between the environmental auditor and the expert panel should be maximised to provide each with the broadest access to relevant expertise in the discharge of their
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obligations. However, care must be taken to ensure that the audit function is not compromised by such links.

- Recommendation 117 A project stakeholder committee should be constituted broadly as provided for in EMP Version A, but with the addition of a regional tourism peak body or bodies. Its constitution should provide for direct engagement, liaison and problem-solving between the project proponent and stakeholders. To facilitate this role, it should be provided with a strong independent Chair. Issues should only require to be reported to Ministers when they are of an intractable or unresolved nature that cannot be settled within the committee. The committee Terms of Reference should entitle it to request that issues be investigated or considered by the auditor and/or the expert panel.
- Recommendation 118 The Alliance contract arrangements should be benchmarked against those of other similar large-scale projects to ensure beneficial environmental outcomes within acceptable economic parameters.
- Recommendation 119 The environmental management arrangements for the works outside the Alliance contract need to be specified in more detail and their potential to impact upon critical environmental assets examined. At present the Panel can not assess these.
- Recommendation 120 The EES Main Report (Volume 1) should be searched for 'commitments' that did not translate to the EMP. These should be added to a table based on Annexure F2 - Fate of Management Recommendations, together with explanations as to why they were not carried forward.
- Recommendation 121 The EMP Version A will require a systematic update to respond to issues raised in this Panel Report.
- Recommendation 122 The Alliance management systems for the full scope of works should be audited against the requirements of ISO14001. Compliance with the standard should be achieved prior to the commencement of works.
- Recommendation 123 The PoMC should clarify the arrangements with respect to the EMP and SMP required under Section 91C of the Port Services Act and outline how these documents interface with the project.
- Recommendation 124 As required by the Best Practice Environmental Management Guidelines for Dredging, the proponent should prepare an Environment Improvement Plan for the project incorporating all the requirements of an EIP into other plans and systems, with a bridging document to show how the requirements of the EIP have been satisfied.
- Recommendation 125 At a project level there needs to be a hierarchy of project and vessel specific emergency response plans that are well integrated. Work needs to be done to identify any additional response equipment required as a result of the project and all persons require training at an appropriate level in the implementation of the plans. All plans need to be bridged (linked) to other relevant documents.
- Recommendation 126 The approval authority should review the final environmental approval documentation to develop a series of 'work windows' that will allow the proponent to schedule works whilst protecting the beneficial uses of the
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Bay. These beneficial uses include ecosystem (marine habitat, fish migration & spawning, bird reproduction etc), water contact recreation; commercial and recreational fishing, aquaculture etc. These windows should separate out:

- dredging (extraction) activities by site and beneficial use to be protected, and
- dredging dumping activities by site and beneficial use to be protected.

Recommendation 127 For a balance of reasons flowing from its considerations throughout this Report, the Panel considers that serious attention must be given to the potential benefits of dividing the project into a sequenced program of works. For example:

- The viability of dredging The Heads provides the key to the viability of the project overall. Plans should be made to prove the concepts and technologies necessary to achieve this objective as a first step.
- Assuming the viability of dredging the Heads, the second step could be to develop a strategy (if necessary including a range of physical works and disposal options) for resolving the Yarra sediments.
- The third step could be to develop a staged dredge program for the bay, in units of a scale whose impacts are sufficiently reduced to be absorbed within existing environmental capacities without significant order risks.

Recommendation 128 Should the project be approved, the approval should not include an 'in principle' approval of necessary maintenance dredging works to the year 2030. This should be separately approved, having regard to the state of knowledge of the bay, the availability of best practice dredge technology and the need to minimise environmental harm, at the relevant time.
