

# **ASSESSMENT GUIDELINES**

Issued by the Minister for Planning for

## **PORT PHILLIP BAY CHANNEL DEEPENING SUPPLEMENTARY ENVIRONMENT EFFECTS STATEMENT**

PROPONENT:  
PORT OF MELBOURNE CORPORATION

**October 2005**



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Also refer to the PoMC Channel Deepening website:  
<http://www.channelproject.com/>

Further copies of the SEES Assessment Guidelines can be downloaded from the DSE website: <http://www.dse.vic.gov.au/planning/ees>

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# 1. INTRODUCTION

## 1.1 Background

The Port Phillip Bay Channel Deepening Proposal requires assessment under the *Environment Effects Act 1978* (the Proposal).

The Port of Melbourne Corporation (PoMC), as the proponent, prepared an Environment Effects Statement (EES) which was exhibited from 5 July to 16 August 2004. A Panel of Inquiry was appointed by the former Minister for Planning under the *Environment Effects Act 1978* to consider the EES and public submissions. The Inquiry submitted its report to the present Minister for Planning, Rob Hulls MP, on 11 February 2005.

While the EES prepared by PoMC had largely responded to the matters identified in the EES Assessment Guidelines, the Inquiry's Report recommended that substantial aspects of PoMC's Channel Deepening proposal and the EES should be further investigated.

In a Statement released on 31 March 2005, the Minister for Planning provided a provisional response to the Report and announced his intention to require PoMC to prepare a Supplementary EES (SEES). Public comments on the Minister's provisional response and the Inquiry's recommendations were invited.

After considering public comments, the Minister issued a further Statement on 11 July 2005. It can be downloaded from DSE's website: <http://www.dse.vic.gov.au/planning/ees>. This Statement confirmed the need for a SEES, as well as setting the aim, objectives and form of the SEES process. It also identified the key areas in which further studies were needed.

Draft SEES Assessment Guidelines were also released on 11 July for public comment. The 38 submissions subsequently received have been carefully considered in developing these final Guidelines.

Once the SEES has been prepared by PoMC, it will be exhibited for public comment. The Minister has announced that a second Inquiry will consider the SEES and submissions received, before reporting to the Minister for Planning.

The final step under the *Environment Effects Act 1978* will be the provision of an Assessment of the environmental effects of the Proposal by the Minister for Planning to relevant decision-makers, including the Minister for Transport, the Minister for Environment and the Australian Minister for the Environment and Heritage.

## 1.2 Purpose of the SEES Assessment Guidelines

The SEES Assessment Guidelines provide *guidance* in relation to matters that should be addressed. They are not requirements. The SEES, in combination with the EES, should provide an evidence-based and clearly reasoned assessment of matters identified in the Assessment Guidelines. In this context, the level of investigation should have regard to the level of risk and consequence, as determined through a staged analysis, i.e. whether more in-depth analysis is warranted to assess potential effects, their likelihood and appropriate management responses.

The SEES Assessment Guidelines provide detailed guidance on the focus and scope of environmental matters that should be investigated and documented in the SEES. The supplementary investigations will provide a comprehensive, sound and well-integrated body of analysis, to inform a final Assessment under the *Environment Effects Act 1978*.

The body of these Guidelines is largely based on responses to the Inquiry's recommendations as relevant to the assessment process under the Act, having regard to the submissions received in response to the Inquiry's recommendations and the Minister's March Statement, as well as subsequent submissions received on the advertised draft.

These Guidelines incorporate the content of - and therefore replace - the 2002 EES Assessment Guidelines. The Appendix includes the core content of these 'original EES Guidelines'. Therefore, only the SEES Guidelines will need to be used during the remainder of the *Environment Effects Act 1978* process.

## 2. INFORMATION ON PROPOSAL

### 2.1 The Proponent

PoMC is a self-funded Victorian State owned statutory corporation. It is responsible for the integrated management and development of land maritime functions of the Port of Melbourne. As part of this role, it is responsible for providing and managing channels for commercial shipping in the waters of Port Phillip Bay (including the common channels of Melbourne and Geelong, but excluding Geelong specific channels), as well as for ensuring the safe and efficient passage of vessels through its harbour control function.

### 2.2 Aim and Summary of the Proposal

PoMC proposes to deepen sections of the main commercial channels used to access Port Phillip Bay and the Port of Melbourne, in order to maintain the long-term international competitiveness of the port.

The Aim of the Proposal is **to modify channels within the existing shipping route that lead to the Port of Melbourne, to accommodate vessels with a draught of 14 metres.** Based on shipping trend estimates, this modification is to maintain the international competitiveness of the port to 2035.

The Proposal is for dredging works at locations on the existing channel alignment (including berth pockets in the port itself), as well as the management of dredged material. In summary, it involves the following works:

- Removal of rock in and adjacent to the Great Ship Channel, at the entrance to Port Phillip Bay at The Heads;
- Capital dredging of sections of the South Channel, in the south of Port Phillip Bay;
- Capital dredging of sections of the approach channels to the Port of Melbourne;
- Capital dredging of berth pockets in the Port of Melbourne, in Hobson's Bay, Port of Melbourne and Yarra River and stabilisation works required for berths as a consequence of dredging;
- Placing and managing the dredged material (mainly sand, silt, clay and rock); and
- Removal and/or protection of the pipeline services that traverse the shipping channels proposed for dredging.

The Proposal does not include future maintenance dredging works required to maintain the proposed depths of the channels, as that will be subject to separate approvals in the future. However, the frequency and volumes of material likely to be dredged in maintenance dredging campaigns to the year 2035 will need to be considered, particularly with regard to dredged material management options.

The Proposal, subject to assessment under the *Environment Effects Act 1978*, does not include land-side development of port infrastructure, which may be associated with improving access to the Port due to proposed channel deepening. Alternative port locations (e.g. Hastings) are also not required to be assessed in the SEES.

Required works at or near the land-water interface are only relevant to the SEES investigations if they have potential marine or estuarine related impacts.

### **3. REQUIRED APPROVALS AND ASSESSMENT PROCESS**

#### **3.1 Required Approvals**

The Victorian Government will consider whether to proceed with the Proposal after the Minister for Planning provides his Assessment under the *Environment Effects Act 1978*. In addition to the Government's decision whether to allocate funds to the project, the Minister for Environment will consider an application for consent under the *Coastal Management Act 1995* for the necessary 'development of coastal land and water'.

The project is a 'controlled action' under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and therefore requires approval under this Act, in addition to State approvals. The assessment process under the *Environment Effects Act 1978* has been accredited to meet assessment requirements under the EPBC Act.

#### **3.2 SEES Process for the Channel Deepening Proposal**

Section 4 of the Minister's July Statement on the SEES describes the elements of the extended assessment process being undertaken. This will lead to a final Assessment under the *Environment Effects Act 1978*, which will in turn inform both State and Australian Government decisions.

Figure 1 (next page) outlines the assessment and decision-making process for the Channel Deepening Proposal, including the SEES process now in train.

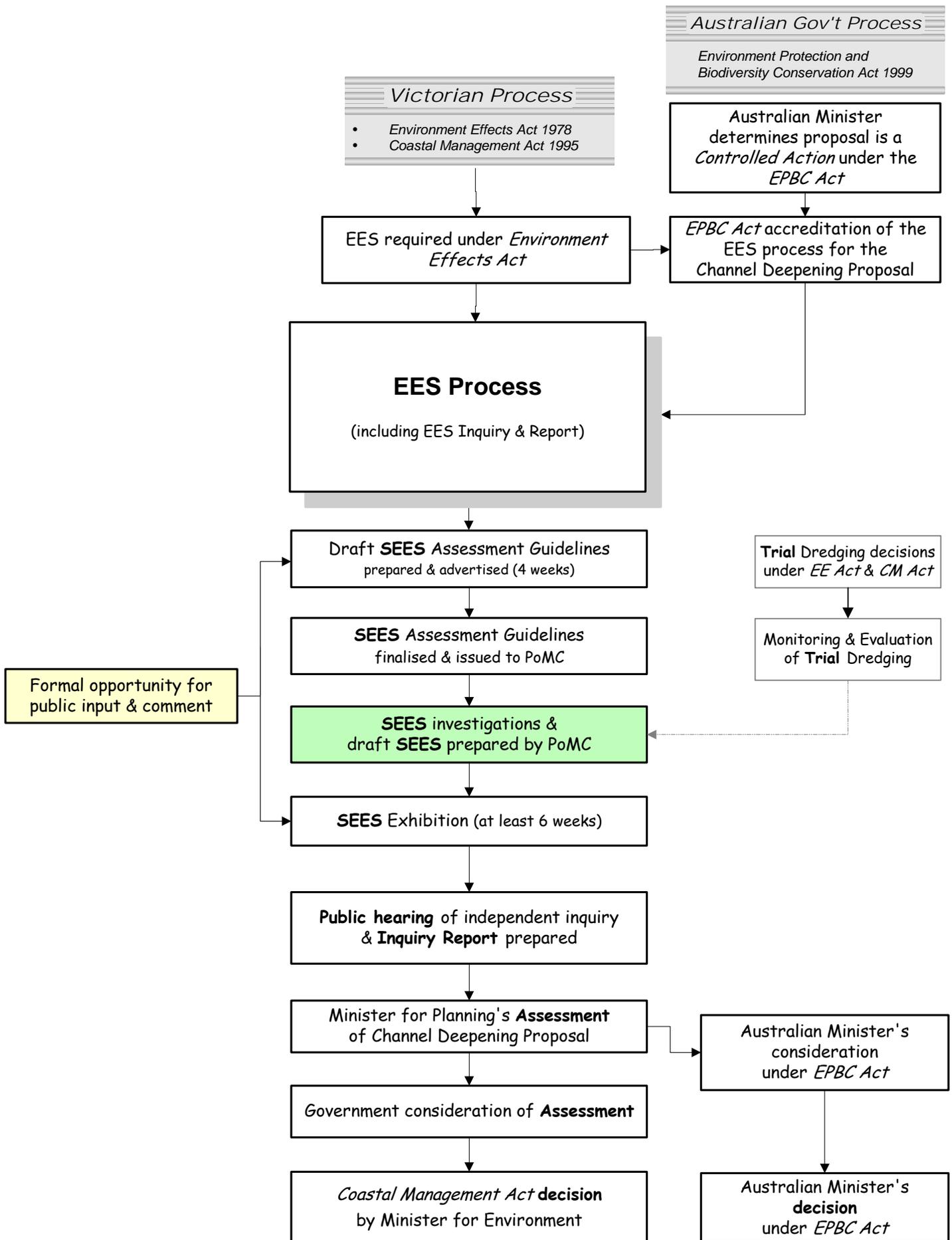


Figure 1 - Environmental Assessment and Decision-making Process

## 4. OVERALL APPROACH FOR THE SEES

### 4.1 Central Matters to be Investigated in SEES

The SEES, incorporating any relevant components of the EES, should provide a comprehensive, sound and well-integrated analysis of the potential environmental effects of the Channel Deepening Proposal. This should include proposed mitigation and management measures, as a result of: the construction of the deepened channels, construction of areas for disposal of dredged material, as well as likely changes in shipping and channel operations and patterns.

Arising out of the EES Inquiry's recommendations, there are three sets of inter-related matters that have been identified as the primary focus of the SEES:

#### 1. Foundational matters:

- i) Clarity of project definition;
- ii) Review of project design (including works design for channels and dredged material grounds, choice of technology and proposed work methods and scheduling) to explicitly address environmental, policy, safety risk and functionality issues;
- iii) Refinement of risk assessment methodology;
- iv) Identification and justification of performance criteria; and
- v) Conceptual model of system interactions and responses to guide study design.

#### 2. Modelling of driving environmental processes and core effects:

- i) Confirmation of confidence limits (i.e. degree of uncertainty) for hydrodynamic modelling outputs;
- ii) Verification, and, if necessary, further development of the turbidity model to provide predictive modelling of the proposed dredging campaign;
- iii) Verification and, if necessary, further development of the primary production model for key ecological communities, in particular to provide predictive modelling for the proposed dredging campaign, having regard to the potential for resuspension of unconsolidated sediments; and
- iv) Confirmation, or if necessary further assessment, of the effects of any medium to long-term changes to current patterns and/or sediment transport on: a) coastal areas and geomorphology (e.g. Lonsdale Bight shoreline, Great Sands), b) larval transport, and c) maintenance dredging volumes.

#### 3. Further assessment of key environmental effects and risks to demonstrate the ability of the proposed dredging campaign to avoid or effectively minimise adverse effects in order to comply with policy requirements:

- i) Significant risk to seagrass in the Great Sands area;
- ii) Significant risk to seagrass, macroalgae or reef communities within Marine Protected Areas;
- iii) Significant risks to any populations or habitat of listed fauna or other fauna of conservation significance (e.g. syngnathid fish);
- iv) Significant risks to marine fauna as well as uses of such fauna arising from altered transport of fish larvae;
- v) Significant risk to human or ecological health from mobilisation and bioavailability of toxic contaminants within the water column;

- vi) Significant risk to human health or ecological health from blooms of toxic algae species or resulting from short-term nutrient release;
- vii) Significant risk to ecological health from altered ecosystem nutrient budgets or a protracted reduction in the denitrification capacity of Bay sediments; and
- viii) Significant risks to marine-dependent economic uses of the Bay or lower Yarra waters.

Potentially significant risks need to be addressed in the SEES, by demonstrating that the risk would be acceptably low either without special measures being implemented (i.e. the project is unlikely to have a significant effect) or with special measures being implemented (i.e. through proposed risk avoidance or mitigation or other management measures).

Some other consequential effects will also need to be assessed as part of the SEES, although these may not be as critical as the above matters.

## 4.2 Approach to SEES Investigations

Section 3 of the Minister's July Statement sets out both the objectives and a structured sequence of actions to be adopted for this SEES. The above priorities are consistent with this. Figure 2 diagrammatically describes the relationships between the matters that need to be investigated and documented as part of the SEES.

An environmental assessment methodology based on an integrated approach to analysis of relevant environmental processes and effects should be adopted. This approach should incorporate the following elements:

- 1) Characterise the environmental assets, values and dependent uses that might be affected by the Proposal, based on a sound scientific understanding of the Port Phillip Bay system (i.e. its key environmental processes, communities and their sensitivities, seasonal and natural variations, and associated uncertainties);
- 2) Characterise potential hazards arising from the Proposal (i.e. where not sufficiently characterised in the EES). Hazards associated with both planned activities (capital dredging and channel operation, excluding maintenance dredging) and related accidental events should be differentiated;
- 3) Identify and justify proposed performance criteria associated with protecting the environmental assets and dependent uses of the Bay;
- 4) Describe and assess the proposed project design and technology measures to mitigate risks and adverse consequences, and assess their efficacy;
- 5) Describe the proposed environmental management measures to further minimise environmental risks, and assess their efficacy;
- 6) Describe and assess the specific environmental effects and potential consequences for particular environmental assets and dependent uses, the associated likelihood of these consequences, and the associated level of risk for the proposed project design, technology and environmental management options. Following an initial review of potential effects and associated risks, more detailed analysis of greater risks and potential responses will be needed (for the matters identified in the body of these SEES Assessment Guidelines);
- 7) Evaluate residual risks against the proposed performance criteria for acceptable risks (highlighting critical effects likely to affect the viability of the Proposal and Alternatives); and
- 8) Confirm strategies for monitoring and management (avoidance, mitigation or control) of environmental risks, with estimation of residual risks.

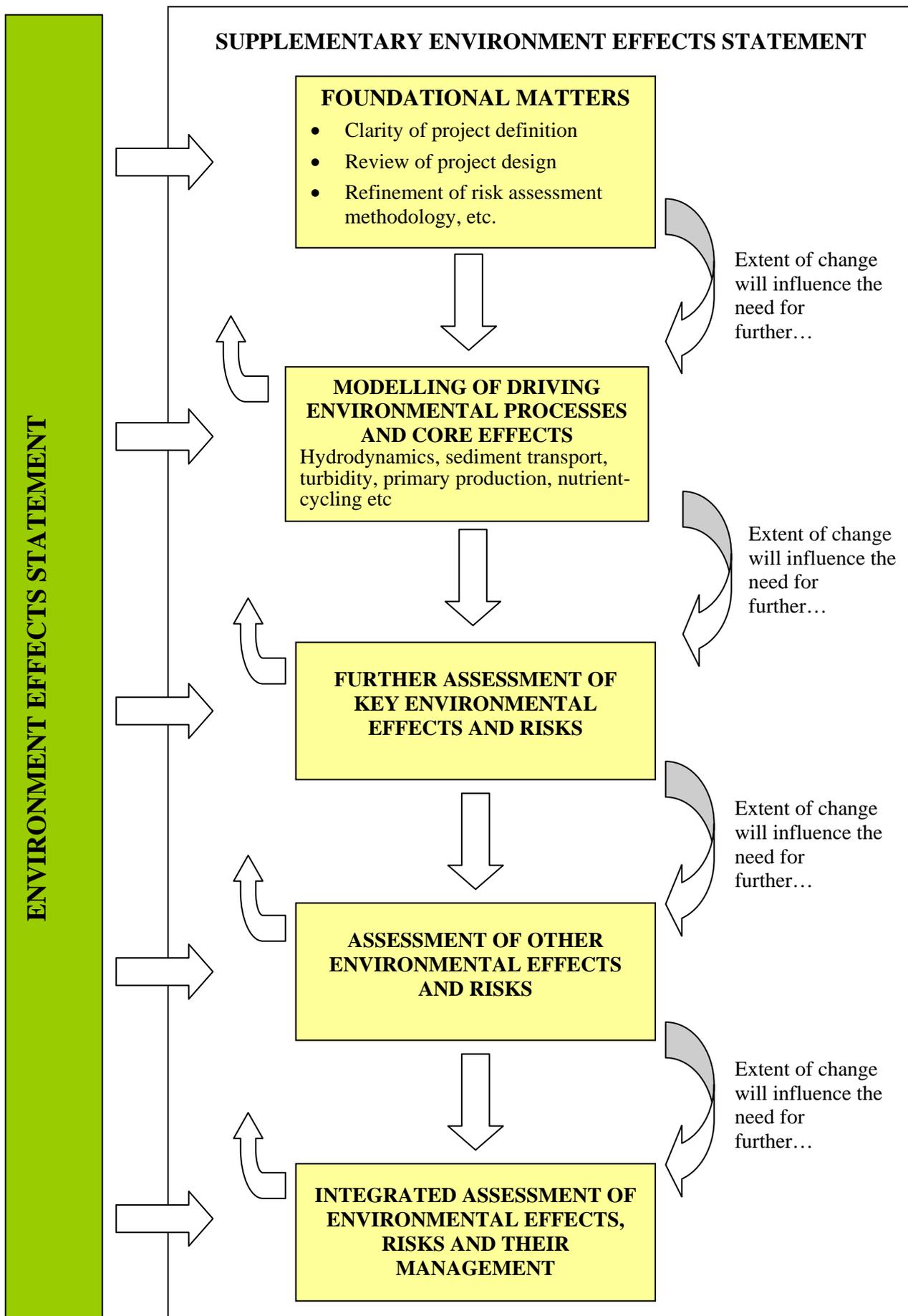


Figure 2 - Relationship between matters to be investigated in SEES

While the risk assessment approach undertaken in the EES incorporated elements of the above, the focus of the SEES is on ensuring a well-integrated approach is implemented to achieve a sound and robust consideration of environmental effects, including economic and social effects.

The potential environmental effects of design alternatives to the Proposal (i.e. in relation to channel and dredged material ground siting and design, dredging technology and environmental management regime), should be identified and assessed. The depth of investigation should be proportionate to potential of the design alternatives to meet the Aims of the Proposal (page 3) and/or to satisfy the evaluation objectives and performance criteria (pages 9-12).

Predictions of environmental effects and assessments of risks in the SEES should be based on **scientifically supported studies**. The SEES should:

- 1) Describe the methodologies used, as well as citing all technical data, sources of authority and other underpinning information; and outlining relevant assumptions and professional/scientific judgments;
- 2) Provide quantified predictions of environmental effects or assessments of risks where practicable, and if not, provide qualitative descriptions of potential effects or risks, in as much detail as practicable having regard to the level of risk;
- 3) Indicate the scientific reliability of investigations and predictions, including the estimated level of statistical confidence where practicable; and
- 4) Demonstrate that the proposed adaptive management approach is practicable and able to meet environmental protection objectives, while also taking account of scientific uncertainties.

## 4.3 Evaluation Objectives and Performance Criteria

### 4.3.1 Draft evaluation objectives

The SEES should assess the *potential effects* of the Proposal in the context of the *desired outcomes* of the Proposal.

The following draft evaluation objectives identify desired outcomes. They are intended, together with appropriate draft performance criteria to be developed by the proponent, to help focus the SEES investigations to provide the basis for a comprehensive and integrated assessment. They reflect relevant legislation and statutory policy, as well as the key environmental issues identified through the EES process to date:

- 1) To optimise the economic efficiency of improving shipping access to the Port of Melbourne, in terms of the economic benefits of improved opportunities for trade relative to the costs (economic and others) of the proposed design, technology and environmental management for the project;
- 2) To avoid unacceptable adverse long-term effects on water levels and current patterns, as well as sediment movement patterns, in Port Phillip Bay, taking account of existing long-term environmental influences;
- 3) To avoid unacceptable adverse long-term effects, and to minimise any short-term adverse effects, on the Bay's ecological processes and species or areas of conservation significance, as well as on the Bay's fringes, the area immediately outside Port Phillip Heads and the Yarra estuary, taking account of other long-term environmental influences;
- 4) To avoid adverse effects on human health and minimise any short-term adverse effects on public amenity, as a result of diminished water quality (e.g. turbidity, algae or toxicants) and dredging activities, in particular around sections of the foreshore and waters regularly used for recreation, tourism and other purposes;

- 5) To minimise any short-term adverse effects on the Bay's marine-based economic activities including fish harvesting, aquaculture, eco-tourism and recreation related activities, as well as industrial users of Bay and lower Yarra waters, as a result of diminished water quality and dredging activities;
- 6) To avoid unacceptable adverse effects on known sites of Aboriginal or post-settlement cultural heritage;
- 7) To minimise shipping related risks from the design or implementation of the capital dredging program (e.g. for commercial shipping and recreational boating); and
- 8) To provide a transparent framework, with clear accountability, for managing environmental risks associated with the project to achieve acceptable environmental outcomes.

The SEES should provide objective information pertaining to these draft objectives,<sup>1</sup> consolidating information from both new studies and the EES, which will enable a comprehensive and rigorous evaluation of the Proposal. Assessment of the Proposal relative to these objectives within the SEES should have due regard to both the principles of ecologically sustainable development – for example as articulated under the *Commissioner for Environmental Sustainability Act 2003* – and the principles of environment protection under the *Environment Protection Act 1970*.

The draft evaluation objectives are a revision of those contained in the original EES Guidelines. Some refinement of these objectives may be appropriate as the SEES process proceeds, including at the Inquiry stage. The new Inquiry will consider how the Proposal would perform relative to these (or equivalent) objectives. Ultimately, conclusions regarding the implications of the Proposal with respect to these (or equivalent) objectives will be drawn in the final Assessment by the Minister for Planning.

#### 4.3.2 Performance criteria

These draft evaluation objectives might usefully be translated into specific performance criteria by the proponent to guide the SEES studies and evaluation of the project design, technology and environmental management measures. The criteria should have regard to:

- Relevant provisions of State and Australian legislation, policies and strategies (e.g. SEPP Waters of Victoria, Schedule F6 Waters of Port Phillip Bay) especially with respect to the protection of beneficial uses;
- The application of best practice<sup>2</sup>, as determined through advice from EPA;
- Feasibility of measurement and appraisal of both anticipated and actual environmental outcomes; and
- Application of principles of environment protection under the *Environment Protection Act 1970*, including the waste hierarchy, the precautionary principle<sup>3</sup> and the principle that

<sup>1</sup> The SEES should translate these objectives into more specific performance criteria reflecting pertinent scientific conclusions, as well as relevant provisions of legislation and policy.

<sup>2</sup> Best practice is defined in the SEPP as “the combination of techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impact of that industry sector or activity”. In making decisions in relation to best practice, practicability is a relevant consideration.

<sup>3</sup> The precautionary principle is defined under section 1C of the *Environment Protection Act 1970*:

- (1) If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- (2) Decision making should be guided by-
  - (a) a careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and
  - (b) an assessment of the risk-weighted consequences of various options.

measures should be cost-effective and in proportion to the significance of the environmental problems being addressed.

The primary consideration is that the performance criteria should accurately reflect legislative requirements for the protection of environmental assets and uses, including the SEPP requirements that there be no long-term detriment to protected beneficial uses, and that adverse effects on water quality be minimised in both space and time. A further consideration is that the performance criteria should reflect the application of best practice approaches to demonstrably minimise environmental effects.

In this context, the identification of best practice methods may be achieved through benchmarking of approaches that might be practicable at the scale and in the environmental setting of the proposed Channel Deepening Proposal – i.e. best practicable combination of techniques, methods, processes and technology.

Demonstration of the expected performance of the Proposal relative to proposed performance criteria, and the higher level evaluation objectives, will need to be grounded in a rigorous assessment of:

- Potential effects of the Proposal (given the preferred design and technology, as well as design alternatives to the Proposal);
- The likelihood that these effects will be avoided or effectively minimised (given the proposed environmental management measures); and
- Associated uncertainties.

#### **4.4 General Content and Style of the SEES**

The SEES is to document the new studies that are supplementary to the original EES investigations. The SEES should also consolidate and integrate new investigations with the key findings of EES studies. The elements of the EES studies that remain relevant should be incorporated into the SEES to provide a coherent and well-integrated analysis. Detailed cross-referencing to elements of the EES may also be appropriate.

The SEES should include any necessary technical appendices and in the context of the Minister's 11 July Statement, include:

- An executive summary of the potential effects of the Proposal;
- A description of the Aim of the Proposal, its objectives, rationale and relationship to relevant policies and plans;
- A description of the entire Proposal, including allied activities;
- A description of feasible Alternatives to the Proposal, as well as the basis for the choice of the preferred Proposal – refer to Sections 5.1 and 5.2; and
- An outline of the various approvals required for the Proposal to proceed.

In relation to the specific matters identified in these SEES Assessment Guidelines, the main SEES report should also include:

- Descriptions of the existing environments, where this is relevant to the assessment of effects;
- Predictions of potential effects of the Proposal and design alternatives, relative to the existing channels (i.e. 'no change' scenario);
- Programs for avoiding, minimising, managing and monitoring effects, including an assessment of their likely effectiveness and a statement of commitment to implement the programs;

- Responses to issues raised during public and agency consultation (as far as practical);
- A separate section detailing the assessment and analysis of the effects relevant to each of the EPBC Act controlling provisions; and
- Matters that need to be addressed under the *Environment Protection and Biodiversity Conservation Regulations 2000*, Statutory Rule No.181, Schedule 4.

A concise summary document (A4-format) needs to be prepared by the proponent for free distribution to the community and interested parties. Both the SEES and SEES summary document should include details of the SEES exhibition and availability.

Close consultation with DSE during the investigations and preparation of the SEES will be necessary to minimise the need for revisions prior to DSE considering the adequacy of the SEES for public exhibition.

## 5. PROPOSED DESIGN AND ALTERNATIVES

This section guides the focus of the SEES investigations regarding the Proposal and Alternatives to the Proposal, which is derived in large measure from the relevant Inquiry recommendations, including 2, 6, 9, 15, 16, 17, 26, 27 and 37. The SEES investigations will also need to have regard to the general guidance set out in the Appendix (original EES Guidelines) and may draw upon relevant sections of the EES work.

### 5.1 Project Design

The SEES will need to establish the ***suitability of the project design*** for both the shipping channels and dredged material grounds (DMGs) in relation to:

- Achieving the Aim and objectives of the Proposal;
- Complying with relevant safety standards in order to minimise risks to shipping;
- Complying with relevant statutory policy, including the requirement to minimise dredging, related effects, and the generation of waste material;
- Avoiding significant long term environmental effects; and
- Minimising construction and operational costs whilst maximising benefits.

The assessment of alternatives to Port Phillip Bay Channel Deepening, including alternative ports (e.g. Hastings) and cargo transport options (e.g. rail and road), are not part of this EES process and are not required to be addressed in the SEES. If necessary, appropriate referencing to and clarification of the relevant content of the EES could be utilised to address the broad rationale for the Proposal's selection.

Alternatives that should be considered within the SEES are channel designs, dredged material locations and designs, technologies and environmental management options that generally fulfil the Aim of the Proposal and are feasible.

Specific aspects of the Proposal, as well as design alternatives to the Proposal, that should be addressed in the SEES include:

- The depth and width of the shipping channels;
- The design for marine containment of contaminated sediments in the extension of the Port of Melbourne DMG, if this can be demonstrated to be the optimal means for managing these sediments; and
- The choice and location of a DMG for dredged material, including the options of a site west of Mornington and disposal in Bass Strait.

Review of the proposed project design is a foundational component of the SEES, as it will influence the other SEES investigations. The review and revision of the project design to minimise both the required dredging and environmental effects should be a core element of the SEES investigations in particular.

The SEES should clarify, and to the extent necessary further assess aspects of the potential environmental effects arising from the proposed project design (e.g. sediment transport in the south of the Bay and turbidity plumes), even if the design does not change significantly. Should the proposed design vary significantly from the original, relevant consequential environmental effects should be assessed as part of the SEES. A transparent and structured evaluation (rather than a detailed assessment) of project design options, including their effects and costs, should be documented. These aspects of the SEES may draw in part upon previous work undertaken for the EES.

The SEES should document a review of **design and operational criteria** for the Great Ship Channel at The Heads, undertaken as part of the process for confirming the project design. In this context, it will be necessary to:

- Specify the range of metocean conditions and tide conditions for which the Great Ship Channel is intended to be capable of transit by 14 metre draught vessels; and
- State clearly, with external peer review, whether the design performance specification requires a deepening or widening of the channel, significantly in addition to (or less than) that described in the EES.

With respect to **operational aspects related to channel design**, the SEES will also need to:

- Describe the likely performance of the channel design and management in terms of the efficiency of vessel movements;
- Identify any channel 'bottlenecks' or 'excess capacity' and address any appropriate design variations in the context of operational factors, opportunities to reduce the necessary dredging volumes, as well as environmental effects associated with any proposed design variations;
- Provide a consolidated description of design and operational constraints, as well as of both current and proposed dredged depths, as part of the compilation of a clear project description;
- Specify and justify the proposed underkeel clearances and over-dredging along the channels, including in relation to requirements for tidal assistance in the Yarra, over the Melbourne Water sewer, in the vicinity of Hovell Pile and for passage through The Heads;
- Demonstrate that the final project design minimises the requirement for dredging whilst achieving the Aim of the Proposal and providing for safe navigational performance; and
- Assess and take account of the economic, safety and environmental implications of design and operational constraints, especially in relation to any changes in design constraints.

The SEES should address the following aspects of **design and operational safety**, drawing upon appropriate advice (e.g. from Marine Safety Victoria (MSV)):

- 1) The adequacy of the simulation study conducted as part of the EES, especially with respect to different larger vessel types (oil tankers, container vessels and bulk carriers);
- 2) The level of safety provided by the proposed design and operational criteria and works and their compliance with relevant standards;
- 3) The definition of safety incidents and the need for further analysis of shipping incident risks. A further assessment of shipping safety relevant to the Proposal should be provided in the SEES, based on the historical records (from MSV) of previous shipping incidents in the channels and near The Heads;
- 4) Any safety issues relevant to the Proposal that may require a detailed safety assessment; and
- 5) The potential role of computerised underkeel clearance (UKC) systems in assisting safe passage of deeper draught ships in the Bay and Port should be assessed in the SEES, including the extent to which such systems could assist in both:
  - Meeting the Aim of the Proposal; and
  - Refining the project design to minimise dredging, environmental effects and safety risks.

In relation to **adjoining structures**, the SEES will also need to:

- Specify the scope of proposed works that are ancillary such as berths, swing basins and adjoining structures, such as seawalls, largely at the interface of deepened areas, required as a consequence of dredging;
- Describe potential environmental effects and proposed management responses for these works; and
- Assess possible risks to Third Party Infrastructure along the Yarra segment, from channel deepening, dynamic effects of larger vessels or batter instability, and describe proposed design or operational responses to mitigate risks to Third-Party Infrastructure to an acceptable level and any residual issues.

## 5.2 Assessment of Alternatives to the Proposal

As indicated above, the SEES will need to justify the preferred **disposal and management of dredged material**. PoMC should undertake the following steps and document the outcomes in the SEES:

- (i) Consistent with the principle of waste hierarchy under the *Environment Protection Act 1970* and the specific provisions of SEPP (Waters of Victoria) Schedule F6, complete a rigorous evaluation of the opportunities and practicality of appropriate re-use of some portion of the dredged material. This evaluation may be undertaken at a general level unless specific opportunities are presented to PoMC by prospective purchasers or partners that *prima facie* would be both practically achievable and cost-effective. A transparent assessment of land disposal options should be included in the SEES, addressing practical opportunities and constraints in the context of:
  - Any statutory or policy preference for management of dredging material (cf. secure marine confinement of contaminated sediments);
  - The practicality of bringing dredged material onshore; and
  - Best practice for management of dredged material.
- (ii) Evaluate the merits of Alternatives to the Proposal for disposing dredged material from the south of the Bay. The evaluation should give consideration to:
  - The relative environmental sensitivity of options (i.e. design alternatives to the Proposal), including risks of translocating marine pests;
  - Shipping risks associated with these options;
  - Beneficial reuse opportunities; and
  - The economic implications, including with respect to both project costs and effects on other resource users of the Bay and ecosystem services.

If on the basis of this initial evaluation the other options (e.g. Bass Strait) are found to be feasible, it should then be designed and subjected to detailed assessment as part of the SEES, to enable a rigorous comparative evaluation with other practicable options.

- (iii) The selection of a southern DMG needs to be justified on the basis of the systematic assessment of practicable options, in relation to factors including:
  - The likely environmental effects of available options;
  - Shipping risks associated with these options; and
  - The economic implications of DMG options, including with respect to both Proposal costs and effects on other resource users and ecosystem services.

The siting of a southern DMG, at the South-Eastern DMG site or elsewhere, should take specific account of the associated environmental risks, during both construction stage (capital dredging) and subsequent maintenance dredging.

The SEES will also need to demonstrate that placement of additional dredged material at the Port of Melbourne DMG would be contained within the proposed boundaries; in the absence of this demonstration, alternatives would need to be examined.

The SEES will need to assess and justify the choices of **dredging technology, methods for dredged material management and scheduling**. It will be necessary to address their technical feasibility and environmental performance for the different components of the Proposal, having regard to the volume, character and depth of the material to be dredged, the tidal and current conditions involved, and logistical considerations. The proposed dredging technology and methods for dredged material management should be best practice.

In particular, the proposed dredging technology, methods and scheduling for implementing the Proposal, should be demonstrated to be able to:

- Protect the environment of Marine Protected Areas and species listed under *the Flora and Fauna Guarantee Act 1988*, the EPBC Act and the *Fisheries Act 1975*;
- Comply with State Environment Protection Policy, and relevant criteria to minimise local exceedances of environmental quality objectives to the smallest practicable area and time, as well as to avoid detriment to and ensure the long-term protection of beneficial uses (especially by reducing turbidity and nitrogen release, at source and disposal points);
- Minimise adverse effects on natural ecological communities and protect dependent fauna outside Marine Protected Areas;
- Protect ecological processes; and
- Minimise and mitigate long term adverse effects on other values and uses supported by the Bay environment (e.g. commercial fishing, aquaculture, diving and recreation).

Confirmation of the performance of the proposed **dredging technology and methods** with respect to key environmental parameters, as well as their technical feasibility in the expected tidal and current conditions, is needed. International experience should be drawn upon to establish appropriate strategies for both dredging and managing dredged material, including contaminated sediments from the Yarra estuary. In the Trial Dredging Program undertaken between August and October 2005, it was considered prudent to confirm the feasibility and practicability of the proposed technology for dredging in The Heads, as well as the behaviour of turbidity plumes from dredging of Bay sediments. Other field testing methods may also be useful in confirming aspects of environmental management. Optimal **scheduling** strategies with respect to both 'windows' for minimising adverse environmental effects should also be established in the SEES.

The SEES must provide an evaluation of approaches to both minimising dredging volumes and **managing contaminated sediments**, including design alternatives to the Proposal (i.e. methods) for marine confinement. It should incorporate a rigorous review of international best practice (including methods identified by the Inquiry in its report of 11 February 2005). The proposed method and design should be subject to external peer review. Any selected confinement method should be demonstrated as complying with the requirements of the National Ocean Disposal Guidelines for Dredged Material (NODG). If a bunding option is pursued, the SEES should document evidence of the physical stability of the proposed bund and capping design, based on the intended construction method.

## 6. KEY ENVIRONMENTAL MATTERS

### 6.1 Water Movement and Coastal Processes

This section guides the focus of the SEES investigations regarding ‘water movement and coastal processes’, which is derived in large measure from the relevant Inquiry recommendations, such as 28, 48, 55, 50 and 51. These SEES investigations will also need to have regard to the general guidance set out in the Appendix (original EES Guidelines) and may draw upon relevant sections of the EES investigations.

Confirmation of the hydrodynamic modelling is needed for the SEES. Further information on the degree of certainty (e.g. confidence limits) associated with the hydrodynamic modelling and predictions is needed, including in relation to predictions of potential changes in tides, water levels, as well as currents, waves and other hydrodynamic conditions in affected parts of the Bay. Any specified confidence limits should be relevant to the scale of the effect being examined.

A key priority for the SEES is to refine and extend the computer **modelling of turbidity**, as well as improve its reliability as a foundational element of the environmental effect assessment. It will be necessary to:

- (i) Refine and verify the turbidity model including by:
  - Collection of necessary data to confirm the parameters driving the turbidity model;
  - Characterisation of the relevant physical properties of sediment (including ‘rock flour’) to be dredged and their consequences; and
  - Further model calibration using empirical data, including that obtained through the Trial dredging. Reliable monitoring of the spatial extent, concentration and duration of turbidity plumes will be needed to verify the turbidity modelling. Consideration should be given to the potential for resuspension of unconsolidated sediments following both dredging and placement of material.
- (ii) Provide results of further simulation modelling of turbidity generated by dredging, to support both a robust assessment of turbidity related issues within the SEES and its proposed use as a tool for adaptive environmental management. In this respect, the following will be needed:
  - Confirmation that the values and time ranges used in simulations of turbidity plumes (i.e. dredge campaign modelling) are relevant to key ecological sensitivities;
  - Modelling of turbidity plumes that would be generated during the proposed dredging campaign (under different weather and seasonal conditions), to demonstrate the feasibility of the entire campaign being undertaken in a manner that is protective of the environment and its beneficial uses; and
  - Confirmation and refinement of the role of the modelling as a tool of adaptive environmental management.

These investigations will need to take account of the review of alternative dredging equipment and practices that might influence the generation of turbidity in different segments of the Bay.

The SEES will also need to assess the potential for medium to long-term changes to **sediment movement** and the stability in southern areas of the Bay, as a result of modifying channels in or near The Heads, specifically in relation to:

- Sediment transport in and out of the Bay;
- The movement and distribution of sediment in the south of the Bay, particularly around The Heads;

- Existing features and stability within the Great Sands region (e.g. channels, Mud Islands); and
- The shoreline and stability of coastal areas in the south of the Bay (e.g. Lonsdale Bight, Nepean Bay, Queenscliff and Swan Island).

Appropriate use of geomorphological expertise and computer modelling should be made. If significant medium to long-term changes, impacts or risks are identified, a revision of the channel design near the Heads should occur. In addition, any other available measures to reduce significant medium to long-term effects should be considered.

In addition, the SEES will need to clarify the following matters:

- Whether larger ships of different dimensions and/or the modified channels would lead to larger waves, as well as any associated risks of impact on third party structures, vessels or foreshores of the Bay;
- Vessel suction associated with larger ships and associated environmental effects; and
- The potential for resuspension during and following dredging operations, scour along the channels, as well as associated environmental effects.

Refined hydrodynamic modelling should also inform the investigations of other environmental effects and risks (e.g. on the migration of fish, larvae or sediment through The Heads).

The above SEES priorities will need to be addressed in the context of any changes to channel design, e.g. at or near The Heads. If design changes occur, additional modelling will be needed to assess all hydrodynamic and other physical implications of these changes.

## 6.2 Water and Sediment Quality

This section guides the focus of the SEES investigations for 'water and sediment quality', which is derived in large measure from the relevant Inquiry recommendations, including 35, 36, 50 and 51. These SEES investigations will also need to have regard to the general guidance set out in the Appendix (original EES Guidelines) and may draw upon relevant sections of the EES investigations.

The SEES will need to further assess the potential risks to and effects on physical, chemical and biological aspects of water and sediment quality. In particular, this will need to occur in the context of:

- Refinement of the project design; and
- Revised modelling of turbidity plumes associated with the dredging campaign, in terms of the spatial extent, concentrations and persistence of plumes (see Section 6.1).

This reassessment of potential effects on water quality and substrate sediment quality will need to be sufficient to inform other SEES investigations related to ecological effects, as well as other values and uses of the Bay's waters, including both recreation and industrial uses.

The SEES will need to address the following matters in relation to **water quality**:

- Relevant physical and chemical properties of the sediments to be dredged, including 'rock flour' and contaminated sediments;
- The possibility of increased mobilisation and bioavailability of contaminants within the water column, from disturbed and relocated sediments, following further characterisation of the sediment chemistry (i.e. in the Yarra River, Port Melbourne Channel, Hobsons Bay and Port Melbourne DMG);
- Refinement of the turbidity model to support a robust assessment of turbidity related issues;

- The risk to industrial operations from reduction of intake water quality as a result of the proposed dredging campaign;
- The risk of toxic algal blooms occurring during the proposed dredging and associated effects on beneficial uses;
- Assessment of oil and chemical spill risks, and if necessary further modelling of shipping risks; and
- Any other risks of non-compliance with water quality objectives under State Environment Protection Policy.

The SEES will need to establish the scientific basis of the water quality predictions, as well as providing information on confidence limits (relevant to the scale of effect), having regard to:

- Understanding of key processes affecting water quality;
- Availability of necessary baseline information;
- Verification of predictive modelling; and
- Relevant scientific uncertainties.

The SEES will need to document the relevant physical properties of materials to be dredged, including their physical and chemical properties. In particular, the SEES will need to incorporate the following matters in relation to **sediment quality**.

- Further investigations to characterise and map potentially contaminated and toxic sediments in the north (e.g. Yarra River and port berths), which will need to:
  - Respond to the deficiencies in the sampling, handling and analysis of samples reported in the Stage 1 and Stage 2 reports as part of the EES investigations. The further program should only incorporate data from the Stage 1 and Stage 2 reports with the utmost care and attention to methodological and quality control;
  - Demonstrate rigorous statistical design and quality control of the sampling and analysis;
  - Meet NODG requirements;
  - Be sufficiently reliable to enable confident evaluation of best practice options for the management of this material; and
  - Be subject to external peer review.
- Rigorous re-assessment of options for management, reuse and disposal for different categories of contaminated dredged material (including disposal to land). Given that the assessment of options for the disposal of any highly contaminated and/or toxic material will involve more expensive and complex management solutions, a more comprehensive, flexible and targeted analysis of such material is needed to inform the development and assessment of wider choices of disposal methods.

### 6.3 Ecological Processes and Nutrient-Cycling

This section guides the focus of the SEES investigations for 'ecological processes and nutrient-cycling', which is derived in large measure from the relevant Inquiry recommendations, such as 60 – 65, and 76. These SEES investigations will also need to have regard to the general guidance set out in the Appendix (original EES Guidelines) and may draw upon relevant portions of the EES investigations.

In further developing the environmental risk assessment for the project, the SEES will need to reassess the potential for effects on the health of the Bay's ecological processes and communities, either in the short- or long-term. This should occur in the context of any revision of the project design, as well as refined turbidity modelling, which will influence the assessment of ecological consequences. In particular, the SEES will need to:

- Use refined turbidity modelling of the dredging campaign to assess the effects of turbidity plumes and sediment smothering on primary production of key marine plants and communities (including seagrasses, kelp and microphytobenthos), denitrification and other relevant ecological processes;
- Characterise risks to the denitrification process arising from the proposed dredging campaign due to both smothering of sediments and release of pore water. Consideration should be given to the cumulative effect of other spatial and temporal influences on nitrogen-cycling in the Bay, including storm flows from the Bay's catchment and the effects of invasive introduced marine species;
- Characterise both the risk of algal blooms occurring as a result of dredging, the driving factors and the consequent risks to ecological processes and particular communities or species in the Bay. Primary reliance may be placed on synthesis of currently available knowledge. The development of a strategy to manage the risk of algal blooms should also be based on this synthesis;
- Identify the means by which the release of nutrients from sediments will be minimised through the design and management of the dredging program;
- Identify and fully justify relevant threshold limits and performance criteria (for different areas) for minimising the effects of dredging on both primary production and denitrification, both in terms of their scientific basis and their achievability using best practice approaches; and
- Provide reliable estimates nitrogen inputs from both the proposed capital dredging, and outline any proposed arrangements to offset these nitrogen inputs.

Calibration of the primary production modelling will need further baseline monitoring, to characterise variability between communities, depths and regions, as well as other physiological and ecological influences on primary production. The SEES should document the basis of primary production models in terms of both scientific knowledge and empirical calibration, including an explicit consideration of uncertainties (e.g. confidence limits). Identification of proposed performance criteria and adaptive management thresholds should also carefully address relevant legislation and policy, including the precautionary principle.

The monitoring program undertaken as part of the trial dredging program should, where possible, assist in the calibration of modelling. In view of the need to limit the duration of the trial, full calibration of the different primary production models through this means may not be possible. Other opportunities for calibration, including baseline monitoring to characterise other physiological and ecological influences on primary production, should be sought, if required.

The SEES will need to demonstrate that the reassessment of potential effects on ecological processes and communities is scientifically sound, in terms of:

- Understanding the key ecological processes and relationships;
- Availability of necessary baseline information (including summer and winter seasons);
- Verification of predictive modelling; and
- Relevant scientific uncertainties.

## **6.4 Biodiversity and Habitat**

This section guides the focus of the SEES investigations for 'biodiversity and habitat', which is derived in large measure from the relevant Inquiry recommendations, including 3, 53, 66, 67, 69, 70-72, 84, 85 and 87. These SEES investigations will also need to have regard to the general guidance set out in the Appendix (original EES Guidelines) and may draw upon relevant portions of the EES investigations.

The SEES will need to reassess the potential for effects on important ecological communities, species and habitats, including within Marine Protected Areas. In addition, the SEES will need to reassess the potential for adverse ecological effects at a bay-wide or regional scale.

Some core aspects of the SEES investigations that will need to underpin the further assessment of risks and effect predictions with respect to biodiversity and habitat are:

- Review and possible revision of the project design, technology work methods and scheduling;
- Characterisation of the relevant physical and chemical properties of sediments to be dredged, as well as the further turbidity modelling; and
- Further light-driven, ecological modelling of turbidity effects on primary production.

Validation of the modelling of the proposed dredging campaign is needed to inform ecological assessments within the SEES. The ecological modelling developed for the EES should therefore be further refined, validated and then applied to support the other aspects of the SEES, including assessment of risks to and effects on important ecological communities, habitats and species. The SEES should clearly outline the associated uncertainties and their consideration in the assessments.

The SEES will need to address the following matters in particular depth:

- Characterisation of risks to and potential impacts on protected or listed species and areas protected under State and Australian legislation. To a large extent, the information presented in the original EES will be a key source for this assessment. However, more work is needed to establish a reasonable level of confidence that the proposed dredging campaign would not give rise to significant impacts on protected or listed species and protected areas. Adequate modelling for the proposed dredging campaign is a primary need in this regard;
- Presentation of relevant information on protected and listed species (e.g. distribution, populations, habitat requirements, ecological interactions, seasonal/lifecycle patterns and faunal behaviour) is needed to inform the assessment of risks to different species. In some cases further baseline studies (e.g. covering summer and winter seasons) will be needed (e.g. for listed indigenous fish in the lower Yarra), although the SEES is not expected to comprehensively characterise the local ecology of these species. Where appropriate, attention may focus on particular vulnerable species within species assemblages;
- Further investigation of protected or listed species and communities may need to identify the local range of some species and limiting habitat factors, especially in the context of the direct physical and biological effects of the Proposal (i.e. generation of turbidity plumes, sedimentation and possible release of contaminants into the water column);
- Assessment of risks to protected or listed species, communities and areas of conservation significance will need to provide a reasonable response to scientific uncertainties, particularly with regards to the occurrence of these species and their sensitivity to the effects of dredging;
- The assessment of risks for different Marine Protected Areas needs to be consolidated, in relation to their biodiversity, ecological character and ecosystems, including for the different areas within the Port Phillip Heads Marine National Park (e.g. Mud Islands, Popes Eye and Swan Bay);
- Further investigation is needed to confirm the extent that dredging and hydro-hammering, including any associated potential for rock falls, may have significant impacts on deep sessile invertebrate communities and intermediate depth communities within the canyon and habitats at The Heads. Evaluation and monitoring of any rock fall and potential adverse environmental effects during the Trial dredging should inform this. As the full suite of proposed equipment was not utilised as part of the Trial, further information on

- the environmental performance of the non-mobilised equipment (e.g. hydro-hammering) should be obtained from its use in other locations. This should inform the evaluation of these measures for minimising adverse environmental effects on the communities and species inhabiting the canyon walls and intermediate to deep habitats at The Entrance;
- Further modelling of turbidity plumes and their ecological consequences should inform the refined assessment of risks to marine mammals and penguins. The SEES will need to refine the assessment of impacts and risks for:
    - anchovies and other important food sources and trophic pathways for penguins and mammals, both within and immediately outside the Bay;
    - the behaviour (e.g. avoidance) of Phillip Island penguins entering and leaving the Bay during dredging and increased turbidity, particularly for key periods such as their breeding-cycle; and
    - the Port Philip Bay dolphin population (sub-species).
  - Further assessment of marine and intertidal ecological risks - associated with turbidity plumes, sedimentation and mobilisation of contaminants - should build on the further analysis of these physical effects of the proposed dredging campaign. This assessment will be an important element of the SEES in view of the legislative status of some areas, habitats, communities and species protected under the EPBC Act or *Flora and Fauna Guarantee Act*;
  - Further assessment is also needed of the risks to shore and sea birds listed under the EPBC Act or *Flora and Fauna Guarantee Act*, which are resident, migratory and/or rely on islands, structures and inter-tidal areas in the south of the Bay. The SEES will need to assess impacts and risks resulting from factors such as the presence of turbid plumes, noise and vibrations from dredging activities, and changes to the behaviour/presence of fish etc;
  - Further consideration of noise impacts on relevant species of birds should be provided (this should be able to rely primarily on currently available knowledge). Evidence presented in the EES on the occurrence of listed bird species suggests that the main risk of noise impacts relates to Australasian Gannets at Popes Eye;
  - The underwater acoustic profiles of the proposed dredging equipment and methods should be established and compared with ambient conditions. While existing representative data on ambient noise levels may be used, if required, selection of sites for additional ambient underwater monitoring should take account of the typical occurrence of relevant sensitive species. While some assessment of the likely contribution of proposed dredging to underwater noise levels is needed, detailed field or modelling studies only need occur in key areas for sensitive receptor species. The investigation of underwater acoustic risks should also consider the feasible environmental protection and mitigation measures that might be used to avoid unacceptable impacts on sensitive receptor marine species;
  - As seasonal aggregation behaviour makes some species particularly vulnerable to dredging, existing research on the scale and timing of aggregations should be further examined. It should confirm the evaluation of risks and monitoring requirements that are necessary. The outcomes of this research should be summarised in the SEES and translated into management protocols. In particular, the SEES should describe the typical timing, scales and patterns of cetacean and penguin aggregation in the areas of the proposed dredging campaign and the associated risks;
  - The risk of toxic algal blooms occurring during dredging and the resultant risks to ecosystems, species and protected areas needs to be assessed. This risk characterisation should identify the factors driving the occurrence of algal blooms. Extensive research should not be needed. Rather, primary reliance should be placed on synthesis of currently available knowledge; and

- While oil and chemical spill risks may need further consideration, attention needs to focus on the prevention and control of any risks from larger vessels, rather than detailed assessment of ecological risks to marine and inter-tidal communities.

In view of the statutory objectives and protection of Marine Protected Areas, the SEES will need to demonstrate the means to be employed to avoid any long-term impact on the biodiversity, productivity or extent of ecological communities, as well as the local populations of protected or listed species. If impacts are predicted, it will be necessary to specify the predicted timeframe for full recovery, including whether it will be achieved within the short- to medium-term (i.e. less than 2 years). If other influences may adversely affect local Marine Protected Areas, these influences and their effects will also need to be well characterised. Further, the SEES will need to explain the scientific basis and justification for any proposed thresholds and performance criteria for protection of Marine Protected Areas.

Additional baseline monitoring or surveys may be needed to inform the setting of thresholds and criteria, as well as to enable a sound monitoring program to be developed for assessing compliance. Following further ecological assessments, the dredging work windows to minimise risks for different species, communities, beneficial uses (e.g. Marine Protected Areas) and parts of the Bay should be specified, as well as the proposed dredging schedule that takes account of these sensitivities.

The assessment of risks to and impacts on key ecological communities, habitats, species and Marine Protected Areas will need to provide a robust response to associated uncertainties. The SEES should include information on confidence limits or estimates of scientific reliability (relevant to the scale of impact) associated with the modelling and predictions, as well as scientific basis, particularly in relation to:

- Understanding the key community structures, trophic relationships and ecological processes;
- Acquisition of necessary baseline information;
- Verification of predictive modelling (as well as proposed ecological performance thresholds); and
- Relevant scientific uncertainties.

## 7. OTHER ENVIRONMENTAL MATTERS

### 7.1 Cultural Heritage

This section guides the focus of the SEES investigations for 'cultural heritage', which is derived in large measure from the relevant Inquiry recommendations, such as numbers 105 - 108.

The SEES will need to fully document heritage features and sites that may be affected by the Proposal, as well as potential impacts where relevant. PoMC should consult with Heritage Victoria and liaise closely with interested Indigenous communities during the SEES investigations.

In particular the SEES will need to address the following:

- Currently recorded heritage sites and features, including remnant or historic elements in the bed and banks of the lower Yarra River;
- Sites of Aboriginal cultural heritage significance on Commonwealth land. The proponent should seek to arrange access to Commonwealth land to enable assessment of possible impacts on Aboriginal heritage; and
- Non-Aboriginal heritage sites relevant to Commonwealth places or land. The proponent should seek to arrange access to Commonwealth places to enable assessment of relevant heritage impacts.

### 7.2 Tourism and Recreation

This section guides the focus of the SEES investigations for 'tourism and recreation', which is derived in large measure from the relevant Inquiry recommendations, such as 24, 25, 75, 102 and 104.

In further developing the assessment of potential impacts on tourism and recreation, the SEES will need to consider the implications for different parts of the Bay and along its coast, with respect to specific user and interest groups. During the SEES investigations, PoMC should consult closely with interest groups, users and local communities that may be affected.

Some core aspects of the SEES investigations that will need to underpin this revised assessment of impacts on tourism and recreational activities are:

- Review and possible revision of the project design, for both the channels and DMGs;
- Characterisation of the properties of sediments to be dredged and placed;
- Refined turbidity model and modelling of the proposed dredging campaign; and
- Further refined ecological assessment and modelling of primary production and associated changes/impacts.

Amongst other things, the SEES will need to<sup>4</sup>:

- Further develop the assessment of potential impacts on recreational divers, specific dive sites and the dive industry, as well as on recreational fishing and boating and other recreational activities. This should happen once relevant changes to the proposed dredging campaign and operational management of potential issues are better defined. Attention should focus primarily on the direct effects of both dredging (e.g. removal of benthic areas) and the presence of dredging vessels, such as associated noise and reduction in water quality, likely ecological/behavioural responses for key fauna species and ecological communities;

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<sup>4</sup> The issue of possible compensation for recreational and tourism business users of the Bay is a policy matter and not within the scope of the SEES. It is a matter for PoMC under relevant law.

- Assess the potential impacts on recreation and tourism activities, in different parts of the Bay, associated with the risk of toxic algal blooms and reduced water quality occurring during the proposed dredging campaign, including for the lower reaches of the Yarra and Maribyrnong as well as the Warmies;
- Investigate underwater acoustic risks for sensitive receptors - including humans (e.g. divers), dolphins and little penguins - in relation to implications for impacts on tourism and recreational activities, as well as documenting proposed ambient monitoring and mitigation measures;
- Document whether larger ships of different dimensions or the modified channels will lead to larger waves and an increase in risks of impacts on third party structures, recreational vessels or the Bay's shorelines;
- Characterise vessel suction associated with larger ships and associated environmental effects, such as impacts on recreational vessels; and
- Consider potential impacts on existing and future tourism and recreational uses and values, as part of the systematic assessment of feasible options for a southern DMG site.

The issue of possible compensation for recreational and tourism business users of the Bay is not within the scope of the SEES.

### 7.3 Economic Impacts

This section guides the focus of the SEES investigations for 'economic impacts', which is derived in large measure from the relevant Inquiry recommendations, such as 3, 88, 100, 102 and 111. Note that the issue of possible compensation for recreational and business users of the Bay is a policy and legislative matter and is not within the scope of the SEES.

The economic analysis of the Proposal and assessment of its specific economic impacts should be revised as part of the SEES, following both the review of the project design and other SEES environmental investigations. This will also need to have regard to the matters identified in the original EES Guidelines. Core aspects that should underpin this revised assessment of associated economic impacts are:

- Review and possible revision of the project design, for both the channels and DMGs;
- Management of sediments (contaminated and uncontaminated) to be dredged;
- Refined turbidity modelling;
- Further refined ecological assessment, including modelling of primary production and associated changes;
- Confirmation of core environmental management constraints for operations; and
- Project risks and uncertainties associated with the proposed dredging campaign (e.g. delays, time overruns, equipment problems, necessary restoration or clean-ups).

The SEES will also need to address the following:

- The core assumptions that underpin the economic impact assessment;
- Economic benefits and costs of relevant options, including dredging technologies, disposal of dredged material from the south of the Bay to Bass Strait (if relevant), as well as different dredged material ground options;
- Local, regional and state economic costs and benefits of the proposed dredging campaign (and channel operation), including short- and long-term effects on other Bay resource users and ecosystem services (particularly where meaningful quantitative estimates are possible), such as:

- Eco-tourism industry (e.g. dolphin and seal tours, Phillip Island penguin parade);
- Diving industry;
- Local businesses reliant upon coastal activities;
- Aquaculture and commercial fishing;
- Industrial businesses reliant upon the Bay's water; and
- Other ecosystem services (e.g. processing of nutrients, biodiversity).

Consideration should be given to the uncertainty or reliability associated with the economic forecasts and predictions.

The SEES need not detail project funding options. However, the SEES should provide an outline of project funding issues in so far as they could affect the distribution or the magnitude of project benefits and costs (e.g. increased fees/costs per container).

## 7.4 Social Impacts

This section guides the focus of the SEES investigations for 'social impacts', which is derived in large measure from the relevant Inquiry recommendations, such as 89, 75 and 3.

The assessment of social impacts of the proposed dredging campaign should be revised as part of the SEES, following both the review of the project design and revision of other environmental impact assessments. The social impact assessment should be consistent with the original EES Guidelines. It needs to ascertain the likely tangible effects of the project on the activities and interests of different sectoral groups and local communities, as well as their perceptions and attitudes. During the SEES investigations, PoMC should closely consult with local communities, sectoral groups, and Bay users that may be affected.

Amongst other things, the SEES needs to address the following:

- The potential social impacts of the proposed dredging campaign and its environmental effects, i.e. for:
  - Local tourism related businesses, commercial fishers and other Bay-dependent industries; and
  - Recreational divers/clubs, fishers, yacht clubs and other recreational groups, including their perceptions and attitudes.

This will be practicable once relevant changes to the proposed campaign and operational management of potential issues are better defined.

- The potential impacts on different sectoral interests and user groups in different parts of the Bay and along the coast as a result of:
  - Amenity, noise, vibration and underwater acoustic effects associated with the proposed dredging program;
  - Turbidity plumes during the proposed dredging program;
  - The operation of the proposed channels, including effects such as possible ship generated waves from larger vessels; and
  - The effects of potential toxic algal blooms occurring during the proposed dredging campaign.

## 8. ENVIRONMENTAL MANAGEMENT

The SEES should demonstrate a best practice approach to minimising and managing environmental impacts and risks. In this context, the SEES will need to demonstrate that the proposed dredging campaign and environmental management regime has been soundly established, based on:

- An understanding of the relevant scientific knowledge, together with verification of predictive modelling and proven technical concepts, to ensure the proposed approaches are reliable;
- Best practice design, technology and approaches that minimise and manage environmental risks and protect key environmental assets;
- A practicable, adaptive management approach that is able to meet environmental protection objectives, taking into account scientific uncertainty; and
- Consideration of relevant legislation and policy, including the precautionary principle.

In addition, the SEES will need to address the following in relation to environmental management for the proposed dredging campaign:

- A transparent assessment of dredging technology and management methods and dredged material management, to demonstrate that best practice methods and alternatives have been adopted for the Proposal; and
- Justification and documentation of the proposed measures to monitor, control and mitigate different environmental impacts and risks in different parts of the Bay (e.g. the combination of technology, core methods, safeguards, mitigation and adaptive management with information-feedback/control systems). The proposed measures and their implementation should be documented in the draft EMP for the proposed dredging campaign (i.e. as part of the SEES to be exhibited).

The environmental management framework for the implementation of the Proposal will need to be developed and described in the exhibited SEES. This needs to include details of the proposed EMS and EMPs, particularly components related to specific works (e.g. capital dredging, berth works, services relocation/removal/protection). The draft EMPs will need to:

- Outline the management measures and methods to monitor and control the different types of environmental impacts and risks identified in the SEES;
- Specify the windows within which different aspects of the dredging works will be scheduled to minimise risks to different environmental assets, beneficial uses (e.g. ecosystem protection, industrial water uptake) and species of the Bay, as well as the proposed dredging schedule for different parts of the Bay;
- Outline stakeholder communication to be conducted during implementation of the Proposal, including for potentially affected business operations;
- Specify the proposed performance criteria (indicators and trigger points) for the protection of environmental assets and beneficial uses, such as ecological communities in Marine Protected Areas and cetaceans and penguins;
- Outline the proposed monitoring program and project evaluation program, to assess compliance during and following the Proposal's implementation;
- Describe measures to mitigate potential impacts on Third Party Infrastructure, services and structures that are likely to be affected, either in relation to incremental risks or predicted impacts;

- Describe industrial uptakes from and discharges to all waters potentially affected by the proposed dredging, characterise the risk to industrial operations and describe intended measures to minimise the risk of adverse effects from dredging on industrial operations;
- Describe the monitoring, reporting and audit arrangements in relation to environmental performance, to help regulatory authorities have the relevant information during the Proposal's implementation;
- Describe any mitigation and rehabilitation plans or measures that are proposed to address any particular environmental risks and impacts; and
- Include a list of all environmental management commitments for the Proposal, including those from the EES and retained in the SEES.

A final EMS as well as specific EMPs may be required for necessary statutory consents. The proposed EMS and draft EMP in the SEES should be designed to:

- Interface with the EMP and Safety Management Plan for the Port of Melbourne, i.e. as required under Section 91C of the *Port Services Act 1995*; and
- Show linkages of relevant emergency response plans.

## GLOSSARY

Adverse	Harmful or damaging
Aim of the Proposal	As specified in section 2.2 of these Guidelines
ANZECC	Australian and New Zealand Environment and Conservation Council
Benthic	Living in or in association with the bottom of the sea (or sea floor)
Best practice (SEPP)	The combination of techniques, methods, processes or technology that demonstrably minimises the environmental impact on beneficial uses
Bioturbation	The disturbance of sediment by organisms
CAMBA	China and Australia Migratory Bird Agreement
Capital Dredging	Dredging to deepen or enlarge existing shipping channels and ports, or to create new channels
DOI	Department of Infrastructure
Draught	Distance between the bottom of a vessel and its water line
DSE	Department of Sustainability and Environment
EMP	Environmental Management Plan
Environment	For the purposes of environmental impact assessment, environment incorporates physical, biological, cultural, economic and social factors
EPA	Environment Protection Authority (Victoria)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Comm.)
Hazard	A source of potential harm or a potential to cause loss or adverse effect
Hydrodynamics	The science of forces exerted by moving liquids, especially water
Hydrogeology	Geological science concerned with the occurrence, distribution, quality and movement of groundwater
Hydrology	The study of the movement and properties of water
Intertidal zone	Area between low and high tide which is subject to daily changes in physical and biological conditions from tide movement
JAMBA	Japan and Australia Migratory Bird Agreement
PoMC	Port of Melbourne Corporation
Proposal	The Channel Deepening project as summarised in section 2.2 of these Guidelines
Risk	The chance of something happening that will have an impact; measured in terms of consequences and likelihood
SEPP	State environment protection policy
Sub-tidal	Below or seaward from the low tide mark
SEES	Supplementary Environment Effects Statement
Third Party Infrastructure	Infrastructure owned or operated by entities other than PoMC

## APPENDIX - 2002 EES Assessment Guidelines

The original EES Guidelines identified the broad range of matters needing investigation to inform an Assessment by the Minister under the *Environment Effects Act 1978*. This Appendix includes the core matters identified in the original EES Guidelines regarding each environmental topic (e.g. Biodiversity and Habitat).

The core content from the original EES Guidelines is contained within this Appendix in order for only the SEES Guidelines document to be used during the remainder of the *Environment Effects Act 1978* process.

### Project Design and Alternatives

The EES Assessment Guidelines needed the context, purpose and components of the project to be documented, including:

- The project's objectives, rationale and components;
- A review of the technical and environmental feasibility of different dredging methods and equipment potentially suitable for the project, including current best practice for capital dredging and management of dredged material;
- The location, design, methods and scheduling, of the proposed dredging works, supported by suitably detailed maps, plans and drawings;
- Alternative locations, designs, depths, and dredging methods;
- Proposed locations and management methods for dredged material;
- How potential alternatives for dredging and management of dredged material were identified and evaluated, including why the preferred alternatives were selected;
- Proposed management of shipping and ports during dredging activities;
- Proposed management of recreational boating, diving and other marine-based activities during dredging activities;
- Necessary works directly associated with the proposal, including upgrading of port berths and the relocation of affected infrastructure services; and
- Proposed environmental mitigation and rehabilitation measures.

The EES Assessment Guidelines needed prudent and feasible alternatives for deepening the channels to be described and assessed. The identification and consideration of alternatives was to take into account:

- The Government's in-principle decision to proceed with improving channel access to the Port of Melbourne, following previous consideration of strategic alternatives, subject to three provisos (environmental, technical and financial);
- The identification of the South Channel alignment as an environmentally and economically superior option (for this Port) through the Stage 2 studies;
- The technical feasibility of different options for both dredging and managing dredged material;
- The shipping access, economic, environmental and other implications of different depths of channel deepening; and
- The economic, navigational safety, environmental and other implications of different options for managing dredged material, including its placement within the Bay, its use for beach renourishment or its removal for land-based disposal or use.

Sufficient information was needed to enable a sound and reasoned choice amongst prudent and feasible alternatives, in the context of:

- Specific statutory and policy requirements; and
- The performance of alternatives relative to relevant evaluation objectives and criteria.

An exhaustive assessment of all alternatives was not required. Rather, assessment effort was to be directed towards informing a reasoned elimination of unsuitable or inferior alternatives.

## Water Movement and Coastal Processes

The EES needed to provide a detailed analysis of potential changes to water and sediment movement and related coastal processes - in both the short and long-term - that may result from the proposed dredging and management of dredged material. This included alterations to the channel depth profiles in The Rip and other channels, as well as from the passage of larger ships through the Bay (e.g. increased shipping wake).

Appropriate modelling was needed to assess the possible impacts, and the analysis was to be sufficiently detailed to inform a sound assessment of risks to:

- Accelerated coastal erosion or accretion, including areas such as Mud Islands, Swan Island and Lonsdale Bight;
- Altered seabed sediment movement patterns and physical processes, as well as associated ecological implications and implications for on-going maintenance dredging;
- Reduced water quality resulting from dredging and management of dredged material or altered estuarine dynamics, and associated ecological implications; and
- Environments in coastal fringe areas, including shorelines, intertidal habitats, wetlands, estuaries, waterways and coastal infrastructure.

In particular, the following matters were to be assessed:

- Potential changes to:
  - tidal levels, ranges and durations;
  - slack water, turbulence, currents and water flow in and around The Rip;
  - seawater movement within the Bay;
  - the movement and volume of seawater flowing into and out of the Bay, and seawater residence times in the Bay;
  - extent of land inundated by tides (i.e. boundaries of wetted areas or intertidal zones);
- Potential changes to currents, wave patterns and refraction in the vicinity of deepened channels, as well as in the vicinity of 'spoil grounds';
- Potential impacts and implications for dispersal of suspended sediment and turbidity during dredging operations (including for different dredging methods, disposal methods and locations) and as a result of subsequent resuspension;
- Potential impacts on seabed and coastal erosion, and sediment movement in Port Phillip Bay and around Port Phillip Heads, including for Swan Island, Swan Bay, Mud Islands, the Bay's beaches, dunes and cliffs, and other foreshore environments;
- Potential impacts on sediment movement in the Hobson's Bay area and the Yarra River estuary, as well as for the salt-water wedge in the Yarra estuary;

- Potential impacts of altered tidal conditions on coastal flooding and drainage infrastructure (including outfalls), as well as upstream effects on tidal streams, rivers and canals and their environments;
- Potential implications for the impacts on the coast from storm surges and other natural events;
- Potential impacts or implications of altered conditions on coastal protection zones, reserves and sensitive intertidal environments;
- Potential impacts of altered conditions on existing boating and recreational infrastructure and assets, such as breakwaters, groynes, marinas, low landings on piers and jetties;
- Potential combined effects of channel deepening and changes in sea level due to climate changes in the future; and
- Potential impacts and implications of changes to local hydrodynamics, water movement and coastal processes due to chosen locations for placement of dredged material, including implications for ongoing maintenance dredging (both for commercial ports and recreational boating channels).

These impact studies were intended to assess the implications of:

- Different depths, designs and methods for channel deepening, through The Rip, the South Channel and approach channels to the Port of Melbourne;
- Different locations, volumes and methods for placement of dredged material; and
- Available management measures to mitigate potential adverse impacts.

## Water and Sediment Quality

The EES needed to assess the effects of the proposed dredging and management of dredged material on the water column and its physical, chemical and biological quality, in both the short and long-term. The effects of changes in the characteristics of ships passing through the Bay on water quality were also to be considered. This analysis needed to be sufficient to inform assessment of risks to:

- Ecological communities (e.g. seagrass beds);
- Spawning, breeding and migration of marine biota;
- Health of both humans and marine biota; and
- Dispersal of exotic organisms.

Appropriate modelling was needed to assess the possible impacts, and the analysis was intended to be sufficiently detailed to inform a sound assessment of risks to:

- Potential impacts of dredging activities (including locations, volume, methods and timing) on turbidity, suspended sediments and other factors that may affect environmental quality;
- Potential release and mobilisation of contaminants (e.g. heavy metals, organic contaminants) from dredged sediments, in relation to different dredging methods, disposal methods and locations;
- Potential impacts on dissolved oxygen levels as a result of the release of nutrients and organic matter from dredged sediments;
- Potential changes to the salt-water wedge salinity and water quality in the lower Yarra and Maribyrnong Rivers;

- Potential effects of dredging activities and sediment dispersal, and changes in shipping, on the dispersal of exotic organisms in Port Phillip Bay and the Yarra River; and
- Potential changes in the frequency and magnitude of accidental spills of chemicals.

These impact studies specifically needed to assess the implications of:

- Different depths, designs and methods for channel deepening, through The Rip, the South Channel and approach channels to the Port of Melbourne;
- Different locations, volumes and methods for placement of dredged material; and
- Available management measures to mitigate potential adverse impacts.

The EES was to address all requirements specified in the *Best Practice Environmental Management Guidelines for Dredging* published by EPA (November 2001) and the *National Ocean Disposal Guidelines for Dredged Material* (NODG), as well as take into account the *ANZECC Guidelines for Fresh and Marine Water Quality* (2000).

## Ecological Processes and Nutrient-Cycling

Benthic (sea-floor living) organisms are important for the health of the Bay's ecosystem, as the water quality and cycling of nutrients (nitrogen, phosphorus and carbon) in the Bay is largely determined by the interaction of sea-floor organisms and sediments. The EES needed to provide an assessment of potential adverse changes – in the short and long-term – and potential risks to benthic populations and processes, as well as to other marine ecological processes important to the health and environmental quality of the Bay. The EES analysis needed to be sufficient to inform assessment of risks to:

- Health of the Bay's ecological communities; and
- Ecology of benthic bacteria and bioturbating organisms.

In particular the EES needed to include assessment of the effects of the proposed dredging and management of dredged material on:

- Potential changes in the biogeochemical activity of seafloor and estuarine sediments;
- Potential impacts on oxygen irrigation of sediments and nutrient cycling (especially of nitrogen), including in intertidal environments; and
- Potential resuspension of algal cysts and stimulation of algal growth, including toxic phytoplankton, and their potential impacts.

Appropriate modelling was identified as necessary to assess the possible impacts on the Bay's ecological processes. DSE was to review and provide advice on the methodology of any proposed field and modelling studies, after receiving appropriate technical advice.

## Biodiversity and Habitat

The EES impact studies were to assess the implications of:

- Different depths, designs and methods for channel deepening, through The Rip, the South Channel and approach channels to the Port of Melbourne;
- Different locations, volumes and methods for placement of dredged material; and
- Available management measures to mitigate potential adverse impacts.

The EES needed to provide an assessment of the potential short and long-term effects on biodiversity, ecological communities and habitats, including effects resulting from:

- Water quality, noise or other impacts associated with construction activities;
- Changes to tidal levels, currents, water movement, sediment movement, water quality or substrate conditions that may result from the proposed dredging and management of dredged material; and
- Hydrodynamics and other environmental changes, as well as any change in risks of fuel or chemical spills or spread of exotic pests as a result of a change in shipping.

In particular, the EES needed to assess associated risks to:

- Habitats of ecological communities and species (including marine benthic, pelagic and surface dwelling, intertidal and coastal and terrestrial);
- Species diversity and structure of affected ecological communities;
- Individual species of particular significance;
- Sites of scientific or conservation significance (heritage, recreational or educational);
- Areas important for breeding or migration of species; and
- Commercial production and/or harvesting of particular marine species.

The following matters needed to be assessed in the EES, in the context of changing seasonal and physical conditions and patterns of species activity:

- Potential impacts and implications of changes in the abundance and distribution of ecologically or commercially significant species;
- Potential impacts and implications for any threatened or migratory species or ecological communities listed under the *EPBC Act* or *Flora and Fauna Guarantee Act 1988*;
- Potential impacts on and implications for ecological communities and sites of particular conservation significance, including:
  - Sub-tidal and intertidal ecosystems and communities in and around southern Port Phillip Bay – e.g. sponge gardens, kelp forests, seagrass meadows and rock platforms – including the ecosystems within the Port Phillip Heads Marine National Park;
  - Other sub-tidal and intertidal habitats in Port Phillip Bay sensitive to the effects of dredging activity such as increased turbidity (e.g. filter feeding organisms); or potentially altered hydrodynamics and coastal processes (e.g. seagrass meadows and rocky platforms near Ricketts Point);
  - The islands, natural channels, mudflats and sand bars of the Great Sands region, including Mud Islands and other areas within the Ramsar wetland sites and the Port Phillip Heads Marine National Park; and
  - Swan Island.

These EES impact studies were to assess the implications of:

- Different depths, designs and methods for channel deepening, through The Rip, the South Channel and approach channels to the Port of Melbourne;
- Different locations, volumes and methods for placement of dredged material; and
- Available management measures to mitigate potential adverse impacts.

DSE was to review and provide advice on the proposed methodology and timing of any biological surveys and related studies, after receiving appropriate technical advice.

## Geotechnical and Hydrogeology

The EES needed to provide an assessment of the potential short- and long-term effects of changes to substrate and hydrogeological conditions that may result from the proposed dredging activities – including management of dredged material – or changes to physical conditions such as wave propagation, in posing risks to:

- Water quality;
- Ecosystems;
- Security of physical infrastructure;
- Stability of coastal cliffs and other geomorphological features; and
- Integrity of important aquifers, such as in the lower Yarra area.

In particular the EES needed to address any geotechnical or related issues impinging on the feasibility of the proposal. In particular, the following were to be assessed:

- Potential changes to substrate as a result of either excavation (e.g. exposure of clayey sediments or acid sulphate soils) or placement of extracted material that may affect water quality or marine and coastal ecosystems (see section 4.7.2 above);
- Potential instability of relocated dredged material (e.g. as a result of erosion, slumping or flow);
- Potential increased erosion or instability of coastal cliffs;
- Potential hazards to infrastructure stability, including the foundations of the West Gate Bridge and any other infrastructure at the land-water interface;
- Potential implications of reduced cover over buried infrastructure services crossing the lower Yarra; and
- Potential implications for shallow aquifers in the lower Yarra area, including the possibility of salt-water intrusion.

The character of sediments to be exposed and deposited as a result of dredging and relocation of extracted material were to be sufficiently assessed to inform accurate predictions of the consequences for sediment transport, water quality and ‘spoil ground’ stability.

Specific attention was to be given to the presence of acid sulphate soils and their implications for the development. The potential environmental impacts of excavating and disposing of acid sulphate soils and the potential measures for their treatment and management was to be detailed. Waste acid sulphate soils must be identified and managed in accordance with the requirements of the *Industrial Waste Management Policy (Waste Acid Sulphate Soils)*. Refer to EPA publication 655 *Acid Sulphate Soil and Rock* (August 1999) for further information on appropriate identification and management.

## Cultural Heritage

**Aboriginal Cultural Heritage.** The potential effects of the proposal or alternatives on known or identified Aboriginal sites of archaeological and/or cultural heritage significance needed to be assessed in the EES. The EES needed to determine the feasibility or otherwise of identifying sites below the current sea or low tide levels. Risks associated with increased tidal levels or changes to waves and their impacts on coastal heritage sites were to be assessed.

The EES needed to consider the knowledge, values and views of Aboriginal traditional owners, and to document both the consultation and investigation undertaken with respect to Aboriginal cultural heritage. The assessment needed to be done in accordance with the relevant legislation, in particular the State's *Archaeological and Aboriginal Relics Preservation Act 1972* and the Commonwealth's *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

Any native title implications were to be assessed with reference to the Commonwealth *Native Title Act 1993* and National Native Title Tribunal.

**Non-Aboriginal cultural heritage.** Sites of historical significance or cultural value in the area were to be identified, and the extent and significance of potential impacts assessed in the EES. The assessment of European cultural heritage sites was to consider the tourism values of maritime and coastal sites that are culturally significant.

The EES investigation was also cover any potential direct or indirect impacts on the values and uses of shipwrecks, in particular those protected under Victoria's *Heritage Act 1995* or the Commonwealth's *Historic Shipwrecks Act 1976*. Amongst other things, this assessment needed to cover any declared 'protected zones' for historical shipwrecks, as well as how shipwrecks and their cultural values might be impacted upon by altering the existing physical conditions (e.g. water currents and sediment transport).

## Tourism and Recreation

The EES needed to assess potential impacts of the proposal on existing and likely future tourism and recreational uses of the Bay's waters and coast – in the short and long-term – including along the lower Yarra and Maribyrnong Rivers. This assessment should consider potential risks to the attractions of different areas, as well as the amenity and health of users, as a result of:

- Noise impacts during the channel deepening operations;
- Navigational and related safety hazards during the channel deepening operations;
- Reduced water quality during the channel deepening operations, as well as subsequently, including as a result of release of algal cysts or stimulation of toxic plankton blooms; and
- Changes in the ecology of affected areas, including the potential for reduced fish abundance and reduced occurrence of animals of special interest such as dolphins.

Particular attention needed to be directed to assessing potential impacts on activity levels for:

- Diving sites (e.g. Lonsdale Wall, Nepean Wall, The Deep, Parkdale Reef);
- Recreational beaches;
- Recreational boating; and
- Eco-tourism activities, such as diving and dolphin tours.

Potential impacts on social and community values related to the potentially affected marine and coastal environments were also to be assessed, through appropriate social research. These impact studies were to assess the implications of:

- Different depths and methods for channel deepening, through The Rip, the South Channel and approach channels to the Port of Melbourne;
- Different locations, volumes and methods for placement of dredged material, including its potential use for beach renourishment, reclamation projects or creation of islands; and
- Available management measures to mitigate potential adverse impacts.

## Economic Impacts

The EES needed to assess the potential short- and long-term effects of the proposed dredging and management of dredged material on economic outcomes, including risks to:

- The direct net economic benefits of the channel deepening works for shipping activities;
- The economic and other social benefits of other Bay uses and coastal activities; and
- The overall level of Victorian economic activity.

In particular, the EES needed to assess the potential effects – both during and after construction – of options for dredging designs and methods, as well as the management of dredged material, for the following:

- Net economic outcomes of improving shipping access to the Port of Melbourne, in relation to the competitiveness of the Port and Victorian industry and agriculture;
- Potential impacts on commercial fishing, recreational fishing and other seafood industries and reserves – including abalone diving, aquaculture ventures, as well as existing and proposed aquaculture zones and other areas/reserves covered by the *Fisheries Act 1995*;
- Potential impacts on marine-based, local economic activities (e.g. fishing charters/businesses);
- Potential economic impacts of changed levels of recreational and tourism activity as a result of the environmental effects of the Channel Deepening project;
- Potential impacts on special management areas or reserves declared under the *Marine Parks Act 2002*;
- Potential implications for infrastructure, including:
  - recreational and commercial marine infrastructure at the Bay land-water interface;
  - provision of adequate berth pockets and swing basins;
  - drainage outfalls and canals; and
- Potential overall, direct and indirect employment implications of the Channel Deepening project.

The economic assessment in the EES needed to provide a cost-benefit analysis of the potential economic costs and benefits of the Port Phillip Bay Channel Deepening proposal as reflected in market transactions. This assessment was to draw upon financial and economic impact studies on port development and channel deepening undertaken either prior to or in parallel to the EES.

Estimates of the equivalent economic value of non-market impacts were to be integrated into the EES cost-benefit analysis to the extent that this was reasonably practicable to achieve on the basis of either published value estimates or limited surveys (e.g. economic valuation of reduced recreational amenity).

## Social Impacts

In considering the proposal's social impacts, the EES needed to identify and qualitatively describe the distribution of impacts relative to different sectoral interests, including different industries, recreational user groups and residents. Relevant categories of impacts included:

- Amenity impacts;
- Cultural heritage values;
- Conservation values;
- Use values; and
- Economic and employment impacts.

This social impact assessment needed to be based, at least in part, on targeted surveys of community or sectoral group attitudes. The outcomes of the PoMC's consultation program may also inform this assessment. Specific attention was to be directed towards the attitudes of relevant groups to options and alternatives, such as for management of dredged material.

## Environmental Management

The EES needed to:

- Describe the environmental management framework for the project, including the proponent's Environmental Management System (EMS), any relevant Environmental Management Plans (EMPs) and performance requirements for the proposed works;
- Describe specific details of the proposed EMS, together with information demonstrating how it would be applied and complied with, including:
  - Consultation requirements;
  - Relevant legislative requirements and any other adopted standards;
  - Contingency planning;
  - Management and safeguards procedures;
  - Monitoring, auditing and reporting procedures for the EMS; and
- Where appropriate, include draft EMPs.

In addition, the EES needed to:

- Specify environmental performance standards and management measures for each environmental issue or impact;
- Provide a table of environmental management commitments for the project;
- Demonstrate how statutory requirements and environmental commitments would be complied with;
- Provide details, where adverse environmental effects are unavoidable, of the proposed safeguards or management measures (e.g. silt control equipment and practices), including:
  - An indication of the extent to which proposed safeguards will minimise anticipated effects;
  - An indication of intended remediation and compensation measures if long-term adverse environmental effects from the project were considered unavoidable, despite the proposed implementation of environmental management measures;
- Specify matters to be addressed solely through the EMP (i.e. rather than on the basis of detailed impact studies), and how they would be addressed;

- Specify proposed data management and access arrangements; and
- Specify the monitoring and post-implementation evaluation program.

The EES guidelines identified the need for the project to comply with:

- The mandatory process for Victorian dredging proposals specified in the *Best Practice Environmental Management Guidelines for Dredging* (BPEMG) (EPA, 2001);
- Specific requirements set out in the BPEMG in order for the dredging and coastal works to be considered under the *Coastal Management Act 1995*. This includes the preparation of an EMP that covers all proposed dredging and dredged material management activities; and
- The *National Ocean Disposal Guidelines for Dredged Material* (Commonwealth, 2002), any requirements that are over and above the BPEMG, and describe how these national guidelines will be adhered to.

## Consultation and Communications

The EES needed to include an outline of:

- The proponent's program for communicating and consulting with the public and stakeholder groups about the Port Phillip Bay Channel Deepening project, undertaken both prior to and during preparation of the EES; and
- The role and composition of any consultation groups or advisory panels convened by the proponent.

The EES also needed to provide details of:

- The key issues, concerns and suggestions raised by stakeholders or members of the public (by theme and source, rather than individually) and the response made by the proponent in the context of either the EES studies or the refined proposal; and
- Consultation undertaken as part of particular impact studies (e.g. recreation and tourism, cultural heritage, social impacts).

## Project Management

The EES needed to describe the:

- EES project management arrangements;
- Coordination between the interrelated investigations and studies, to inform the preparation of the EES and the implementation of the project; and
- Proposed project implementation plan – assuming the proposed design and works will proceed – including assigned responsibilities for implementation, monitoring and compliance with any other environmental commitments.