

Post Construction Requirements - Report on the Implementation of the Environmental Management Plan for the Entrance – September 2009

Background

Office of the Environmental Monitor

The Office of the Environmental Monitor's (the Office) terms of reference outlines the arrangements to report on the implementation of the Channel Deepening Project (CDP).

They include the following tasks:

- Review the management reports of the Environmental Management Plan (EMP) prepared by the Port of Melbourne Corporation (PoMC) and examine any other reports related to the EMP that may be requested by Victorian Ministers;
- Monitor and evaluate the environmental performance of the project, including matters raised by stakeholders and the community to 31 December 2011; and
- Advise PoMC and relevant Ministers, or their delegate, on the above matters, and any other matters referred to the Environmental Monitor by a relevant Minister, as appropriate.

All matters are to be examined against the EMP's requirements.

The terms of reference set out reporting arrangements that include:

- The Environmental Monitor will provide regular reports to the Minister for Environment and Climate Change, or delegate, on all matters monitored against the EMP. Reports will be provided quarterly as a minimum, but more regularly by request of the Minister and/or if the Environmental Monitor considers it necessary.

The Entrance

The Entrance is where the waters of Port Phillip Bay (the Bay) and Bass Strait meet. It is approximately 3.2 kilometres wide between Point Nepean and Point Lonsdale, which extend underwater as rocky banks. Nepean and Rip Banks are approximately 15 metres deep. These banks are separated by the canyon, which is part of the old Yarra River bed system that winds through the Entrance. The canyon is several hundred metres wide and 100 metres deep at its deepest point.

The Entrance is relatively narrow compared to the Bay, and water movements through this area are driven by the differences in water level between Bass Strait and the Bay. This creates strong currents that control the volume of water entering the Bay.

The distribution of plants and animals at the Entrance depends on the amount of light available for plants to photosynthesise. Sunlight readily penetrates to approximately 20 metre depths and the shallower banks are abundant with marine plants such as kelp. Below 20 metres, there is limited light and fewer plants are found. These deeper areas, such as on the canyon walls and the canyon floor, are abundant with marine animals such as sponges and sea squirts.

The deep reef canyon community has been listed under the *Victorian Flora and Fauna Guarantee Act 1988*. The community has been submitted for listing under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and is currently being considered by its Threatened Species Scientific Committee.

Shipping access through the Entrance to the Bay is by a channel called the Great Ship Channel. Prior to the 1990s, the channel was episodically deepened by blasting, with the blasted debris scraped into nearby deeper areas of water.

Parts of the Canyon are within the Port Phillip Heads Marine National Park.

Channel Deepening Project (CDP)

As part of the CDP, dredging to increase the navigable depth of the Great Ship Channel that crosses the Entrance occurred in 2008. The CDP includes an EMP that sets out 58 Project Delivery Standards (PDSs) or environmental rules about where, when and how the project can be delivered. These PDSs includes controls to keep changes to channel width and depth to a minimum. These controls were developed to limit the effects of flushing water through the Entrance and subsequent changes to Bay tidal heights.

The EMP also includes controls to minimise the amount of loose rock left with each pass of the dredger draghead. Minimising loose rock reduces the potential for rock to be swept by currents into the Entrance canyon, including into the Port Phillip Heads Marine National Park. It also reduces the potential for erosion of the rocky banks through a rock-scouring process after dredging is complete.

The EMP required rock removed from the channel to be placed at the South East Dredge Material Ground and buried with clean sand dredged from the South Channel.

Environmental Management Plan (EMP)

It was envisaged that the EMP may require amendment from time to time. The process for considering such amendments was set out in the EMP (Section 1.7). During 2008 there was regulatory approval for amendments to the EMP that were relevant to the Entrance. These amendments arose from an incident in the Entrance in July 2008 (see below) that was investigated by PoMC and was the subject of advice from the Office. The amendments to the EMP addressed:

- PoMC's reporting obligations in the event of an incident;
- Reporting and checking methods for the dredging in the Entrance;
- Reporting of construction plateau inspections; and
- Timing of deep reef video surveys.

Sequence of major activities in the Entrance

Major dredging activities

5 April 2008	Dredging to deepen Great Ship Channel and associated layby area commenced (PDS Nos. 23, 24, 31, 33, 34, 40, 41, 42, 43).
17 September 2008	Design depth (-17.3 m) for deepened Great Ship Channel confirmed.
4 October 2008	Underwater towed video of the dredged banks for construction plateau inspection commenced and concluded on 2 November 2008 (PDS No. 46).
10 December 2008	Underwater video for deep reef assessment commenced and concluded in February 2009 (PDS No. 49).
19 December 2008	Victorian regulatory approval that construction plateau inspection (PDS No. 46) requirements have been met. This followed PoMC's completion of its assessment in December 2008. This set the date for determination of timing for EMP post-construction requirements for the Entrance (PDS Nos. 47, 48, 49).

Office findings on the implementation of the EMP

1. Construction Stage (Summary from previous report on the Entrance)

Entrance dredging works (the construction stage) were completed in 2008. The 'Report on the implementation of the Environmental Management Plan for the Entrance – February 2009' conducted by the Office on this stage forms Appendix 1 to this report. A summary of the findings of the Office are set out below.

Environmental Incidents

The Office investigated two environmental incidents. They related to cleaning up rock-spill in the Entrance (PDS No. 42) and emergency response preparedness (PDS No. 8). Its investigation findings and recommendations for both these incidents are available at <http://www.oem.vic.gov.au/Officeinvestigationsreportsadvice>.

The Office was satisfied that its recommendations for both incidents were adequately addressed by PoMC.

Width and depth of dredging

Controls on the width and depth of dredging in the Entrance were set to primarily limit the extent that tidal changes may occur within the Bay.

An independent audit found full compliance with the channel width and channel depth controls.

The Office was satisfied that the standards set to control the width and depth of dredging were met.

Further, the consent issued by the Victorian Minister for Environment and Climate Change, pursuant to the *Coastal Management Act 1995* sets out eight conditions. Condition 7 is:

'In the event of non compliance with the construction depth in the Entrance, i.e. that the construction depth of 19.1 metres is exceeded in more than 10% of the dredged area, a

financial payment of \$10m, drawn from the environmental bond lodged by the Port of Melbourne Corporation, will be made to the Secretary of the Department of Sustainability and Environment for remedial, offset or Bay improvement works.'

The Office was satisfied that Condition 7 of the consent issued pursuant to the *Coastal Management Act 1995* is closed.

Work methods to reduce rock spill

A hierarchy of controls to reduce rock spill were provided, namely the:

- use of a specifically designed draghead to dredge the rock in the Entrance;
- routines for the conduct of progressive clean ups; and
- specifications for the way in which edges of the Nepean and Rip Banks were to be dredged.

The above controls were supplemented by further requirements set out in PDS Nos. 46, 47, 48, 49. These require monitoring and, if required, action during and beyond the operational phase of the project. (The project operational phase is 2008 – 2009 inclusive.)

Advice from the Independent Expert Group confirmed that the draghead was designed as intended.

In total, 22 clean up cycles were completed during dredging at the Entrance from April to September 2008. One cycle, cycle 15, was not conducted as required, necessitating a make-up clean up cycle.

PDS No. 46 sets out arrangements to determine the requirement for any additional clean up, following the completion of design profile and a final progressive clean up. It required underwater video be reviewed to determine if the final clean up was satisfactory or that an additional clean up be required. Underwater video from Nepean and Rip Banks, taken in October and early November 2008 was, along with other information, used to judge the completeness of the clean up. The Victorian regulator (Department of Sustainability and Environment) determined that PDS No. 46 had been met.

Nevertheless, PoMC subsequently advised that as an additional measure following the settling period post the completion of dredging, it would initiate a further clean up. This was completed by 17 March 2009.

The Office had discussed this measure with PoMC and considered that only a localised area on Rip Bank should be targeted, and that the target area should exclude depressions that were already below -17.3 m (-17.3 m Chart Datum is the depth required for the deepened channel) at April 2008. This was to avoid disrupting spill that has accumulated as a result of blasting during the last 100 years. Disruption of the accumulated material in those depressions may well exacerbate the potential for spill to initiate scour of the underlying rock, or to fall into the canyon where the depressions are immediately adjacent the canyon.

It was noted that in addition to the assessment of deep reef communities (PDS No. 49), PDS Nos. 47 and 48 required the continued assessment of both Nepean and Rip Banks for possible mobilisation of rock spill and rock scour.

With the exception of one incident (referred to above), an independent audit found full compliance with controls to reduce rock spill.

Finding

With the exception of one incident that was subject to remedial action, the Office was satisfied that the standards set to reduce rock spill have been met.

2. Post-construction Stage

Approval was provided by the consent under the *Coastal Management Act 1995* for the Channel Deepening Project, including the requirements set out in the EMP. The EMP requires several post-construction surveys and reports to be conducted at the Entrance, once dredging there has been declared complete. These are described in PDS Nos. 47, 48, 49. Dredging of the Entrance was declared complete on 19 December 2008. The Port Phillip Bay Channel Deepening Project Assessment (the Assessment) under the *Environment Effects Act 1978* by the Minister for Planning provided the context for the post-construction requirements, particularly post-construction deep reef habitat assessment.

Post-construction plateau inspection

PDS 47 requires that a towed video survey be undertaken of Nepean and Rip Bank dredge plateaus to assess the existence of loose rock, within three months following completion of dredging in the Entrance.

The existence of loose rock at Nepean and Rip Banks was conducted using towed video in February 2009. This survey found that the seabed comprised '...mosaics of small rubble (<20 cm diameter), large rubble (20 cm to 50 cm diameter), smooth rock, boulders and solid reef...'. The smooth rock was more common on Rip Bank and large boulders were relatively sparse. Reef was found at the boundaries of the dredged areas of both Banks and in the deeper parts of the dredged area on Rip Bank. The survey concluded that marine biota were colonizing and returning to the dredged areas, some areas had retained mature reef growth, a variety of fish species had returned to dredged areas and the processes of ecological colonisation and succession in the dredged areas were progressing.

Finding

The Office is satisfied that the post-construction plateau inspection survey was conducted appropriately.

Post-construction bathymetric surveys

PDS 48 requires regular post-construction bathymetric surveys of the Entrance be undertaken to identify bathymetric changes. The focus of these surveys is to assess accumulation and mobility of accretion due to scour and confirmation of the declared depth. The reports should identify any management responses required including; no further action, further hydrodynamic modelling, further investigation or risk review and/or additional clean up.

The first post-dredging survey reported that:

- Scour had occurred, with scour holes totalling 19,000 m³ in volume. Most were on Rip Bank and some reached depths of 2.3 m;
- Accretion mounds totalling 11,000 m³ in volume had occurred. Most were on Rip Bank. Some reached heights of 1.2 m and were within 0.2 m of the soon to be declared depth of the shipping channel;

- The difference between scour and accretion volumes is due to rocks being naturally broken down and moving off Nepean or Rip Bank and either entering the canyon or Bass Strait. The impacts of this process are likely to be low;
- Plant growth on the newly-dredged surfaces shows that they are stabilising and scour and accretion rates should slow; and
- All changes to date are within ranges predicted by the Supplementary Environment Effect Statement (SEES).

Finding

The Office is satisfied that the first post-construction bathymetric survey was conducted appropriately. Rock scour is a natural process, creating localised depressions in the dredged surface and mounding up of loose rubble. The SEES predicted that rock scour would increase for a short time after dredging, but would quickly return to natural rates. It is noted that the collection of data for the second (six month) survey has been completed and a report is due out shortly. This survey will provide further information regarding the overall rate of scour occurring at the Entrance.

Post-construction deep reef habitat – impact and recovery assessment

PDS No 49 requires surveys of the deep reefs in the Entrance canyon, as soon as practicable after completion of dredging and approximately four and ten years after completion of dredging.

The Assessment (see especially Assessment Section 4.3.5) sets the context for this requirement. With regard to assessment of the potential impacts in the Entrance, the Assessment noted the advice from the Independent Expert Group:

‘In the SEES and its technical appendices, recovery was predicted to take more than two years. The scenarios presented in the supplementary rock scour reports could result in recovery being delayed by up to 30 years, in the worst case. There is considerable uncertainty associated with the predictions of recovery, although the argument that recovery will be pushed well beyond 5 years seems sound.’

With regard to the impacts that would result, the Assessment found that:

- The project would have a significant temporary impact on the deep reef community, in particular. A full recovery will occur, though over a period in excess of five years; and
- Project dredging could be managed to effectively minimise short-term impacts and enable the progressive recovery of habitat as post-dredging erosion stabilises, so as to avoid a significant long-term reduction in ecosystem function, productivity and biodiversity of reef communities in the Entrance, including within the Port Phillip Heads Marine National Park.

The Assessment then outlined a series of controls to further manage the risk of rockfall into the Canyon. These were subsequently incorporated into the EMP required by the Approval given for the CDP, along with a \$10 million penalty for over-dredging at the Entrance.

The Assessment also required:

- Post-construction monitoring of the recovery of the reef habitats affected by the CDP dredging include surveys four and ten years after dredging; and that
- To offset the CDP impact on the reef community, PoMC makes a \$2.5 million contribution to research on the reef ecology of temperate Australian waters, preferably in Victorian waters.

The EMP requires three post construction surveys. These are to occur in 2009, 2013 and 2019.

2009 Survey

Field work for the 2009 survey was conducted from December 2008 to February 2009. PoMC released a field report in May 2009 and a full report which included a detailed assessment of the field work, in August 2009. The assessment used underwater video to observe and record substratum impacts and the abundance of sessile biota attached to the reef. Percentage cover of each organism or impact category within each sampled frame was determined. The assessment resampled reef patches that were surveyed during the 2006 SEES surveys, focussing on upper canyon depth bands of 27, 37, 47 and 57 m at dredged and control sites. The dredged areas surveyed included six areas around the plateau of Nepean Bank and three areas along the canyon at Rip Bank. Nearby control sites were at Lonsdale Wall, Nepean Bank and Rip Bank. An intermediate Control site was at Portsea Hole and far control sites were at Wilson Promontory.

The report identified 11 key findings. In summary the report and its findings indicated that:

- Sponge communities were present at survey locations at 27, 37, 47 and 57m water depths along Rip Bank and Nepean Bank;
- Physical impacts were largely in the form of scouring of reef surfaces from rock fall and the presence of rubble covering reef surfaces;
- When physical impacts were considered as a whole, they were consistent with the SEES. They were less prevalent along Nepean Bank generally and more prevalent in localised areas along Rip Bank;
- When biological impacts are considered as a whole, 76 per cent of the surveyed 'patches' showed no detectable impact. Ten per cent of the surveyed patches showed an impact and 14 per cent were indeterminate;
- Rockfall impacts at Nepean Bank were within expectations. Recovery was well advanced;
- At Rip Bank rockfall impacts were outside expectations in an area of rubble-blanketing between 37m and 57m. Some stable areas are recovering much faster than anticipated, while in others it is slower than anticipated. Some areas continue to be affected by rock fall;
- Compared with other deep reefs surveyed in Victoria there were substantial before-after changes in ratios between the reef animal species in the canyon. The changes are mainly due to decreases in the number of encrusting ruffled grey sponges; and
- The cause of the canyon-wide change is not known – it may be natural, indirectly related to dredging or a combination of both.

Finding

The Office considers that the impacts as a whole are consistent with predictions by the SEES. Notable, localised variations were seen in rockfall impacts and rates of re-colonisation and recovery. This included that rubble from rockfall along Rip Bank between 37m and 57m was greater than predicted. A decrease in abundance of ruffled grey sponges in both dredged and control areas in Nepean and Rip Banks was noted, with biological impacts evident in 10 per cent of patches surveyed. Of significance is the accelerated recovery in some areas with rapid recolonisation and recruitment being observed.

5. Recommendations

In considering the results of the post-construction surveys and reports released to date, the Office has several recommendations for consideration, focussing on the post-construction deep reef habitat assessment.

1. The EMP sets out timing for further surveys of the deep reef habitat to occur after four and ten years. The reasoning for this time period was based on the expert opinion of the Independent Expert Group, advising the Assessment, which considered that recovery was predicted to take more than two years and up to 30 years under a worse case scenario. However, noting the accelerated recovery rate observed in some areas, it is recommended that the timing of surveys be brought forward – the year 4 survey (the second survey) be brought forward by two years to 2011 and the year ten survey (the third survey) be brought forward by four years to 2015. Note that the time of the third survey should be kept under review and finalised once results of the second survey are available.
2. Finalisation of the Action Statement for the Port Phillip Bay Entrance Deep Canyon Marine Community be accelerated, with completion to occur in early 2010. The Action Statement will provide a knowledge base for cool temperate deep reefs. It will develop a knowledge framework that builds on the work completed in the entrance as part of the Assessment and especially the results of the 2009 survey. Consideration should be given to utilising a significant component of the \$2.5 million provided by PoMC, as part of its \$5.5 million payment to the Department of Sustainability and Environment for the environmental management of Port Phillip Bay (the payment was a requirement of the Approval for the CDP under the *Coastal Management Act 1995*), to fund actions identified in the Action Statement.
3. Consideration should also be given to utilising the Commonwealth Environment Research Facilities (CERF) Marine Biodiversity Research Hub to assist in delivery of the actions identified in the Action Statement. The CERF program is to provide sound advice to inform environmental public policy objectives and to improve the management of Australia's unique environment. Research funded under CERF should be collaborative – involving multiple institutions, other research partners and end-users, and incorporate multiple disciplines. CERF specifically supports national world-class environmental research that does not qualify for assistance under existing programmes.

Source documents

CEE, 2009. Channel Deepening Project, Towed Video Inspection of Rip Bank and Nepean Bank Dredged Areas. March 2009.

Edmunds M, Stewart K, Pritchard K, Cutajar J, Zavalas R, Sheedy B, Ong J, Kerrigan J and Lewis Z, 2009. *Port Phillip Bay Channel Deepening Project. Deep Reef Impact and Recovery Assessment*. Report to Port of Melbourne Corporation. Australian Marine Ecology Report 410. Melbourne. August 2009.

Edmunds M, Stewart K, Pritchard K, Cutajar J, Zavalas R, Sheedy B, Ong J, Kerrigan J and Lewis Z, 2009b. *Port Phillip Bay Channel Deepening Project. Deep Reef Impact and Recovery Assessment – Field Report*. Report to Port of Melbourne Corporation. Australian Marine Ecology Report 407. Melbourne. May 2009.

Office of the Environmental Monitor, 2009. Report on the implementation of the Environment Management Plan for the Entrance – February 2009.

SKM, 2009. Port of Melbourne Corporation Channel Deepening Project 3 month Post-Dredging Scour Assessment Report, The Entrance. June 2009.

Appendix 1

Report on the implementation of the Environmental Management Plan for the Entrance – February 2009

Background

Office of the Environmental Monitor

The Office of the Environmental Monitor's (the Office) terms of reference outlines the arrangements to report on the implementation of the Channel Deepening Project.

They include the following tasks:

- Review the management reports of the Environmental Management Plan (EMP) prepared by the Port of Melbourne Corporation (PoMC) and examine any other reports related to the EMP that may be requested by Victorian Ministers;
- Monitor and evaluate the environmental performance of the project, including matters raised by stakeholders and the community to 31 December 2011; and
- Advise PoMC and relevant Ministers, or their delegate, on the above matters, and any other matters referred to the Environmental Monitor by a relevant Minister, as appropriate.

All matters are to be examined against the EMP's requirements.

The terms of reference set out reporting arrangements that include:

- The Environmental Monitor will provide regular reports to the Minister for Environment and Climate Change, or delegate, on all matters monitored against the EMP. Reports will be provided quarterly as a minimum, but more regularly by request of the Minister and/or if the Environmental Monitor considers it necessary.

Office work program – The Entrance

The Office established a program of work activities for the Entrance during 2008 that includes assessing:

- The Project's compliance with requirements to limit the width and depth of dredging;
- The Project's compliance with requirements to reduce rock spill; and
- Changes in tidal heights in the Bay.

The latter was included in response to considerable community interest in the early reporting of data on whether or not the actual changes in tidal height were as predicted in the Supplementary Environment Effects Statement (SEES).

The Entrance

The Entrance is where the waters of Port Phillip Bay and Bass Strait meet. It is approximately 3.2 kilometres wide between Point Nepean and Point Lonsdale, which extend underwater as rocky banks. Nepean and Rip Banks are approximately 15 metres deep. These banks are separated by the canyon, which is part of the old Yarra River bed system that winds through the Entrance. The canyon is several hundred metres wide and 100 metres deep at its deepest point.

The Entrance is relatively narrow compared to the Bay and water movements through this area are driven by the differences in water level between Bass Strait and the Bay. This creates strong currents that control the volume of water entering the Bay.

The distribution of plants and animals at the Entrance depends on the amount of light available for plants to photosynthesise. Sunlight readily penetrates to approximately 20 metre depths and the shallower banks are abundant with marine plants such as kelp. Below 20 metres, there is limited light and fewer plants are found. These deeper areas, such as on the canyon walls and the canyon floor, are abundant with marine animals such as sponges and seasquirts.

The deep reef canyon community is proposed for listing under the Victorian *Flora and Fauna Guarantee Act 1988* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Shipping access through the Entrance to the Bay is by a channel called the Great Ship Channel. Prior to the 1990s the channel was episodically deepened by blasting, with the blasted debris scraped into nearby deeper areas of water.

Parts of the Canyon are within the Port Phillip Heads Marine National Park.

Channel Deepening Project

As part of the Channel Deepening Project, dredging to increase the navigable depth of the Great Ship Channel that crosses the Entrance occurred in 2008.

The EMP includes controls to keep changes to channel width and depth to a minimum. These controls were developed to limit the effects of flushing water through the Entrance and subsequent changes to Bay tidal heights.

The EMP also includes controls to minimise the amount of loose rock left with each pass of the dredge draghead. Minimising loose rock reduces the potential for rock to be swept by currents into the Entrance canyon, including into the Port Phillip Heads Marine National Park. It also reduces the potential for erosion of the rocky banks through a rock-scouring process after dredging is complete.

The rock removed from the channel will be placed at the South East Dredge Material Ground and buried with clean sand dredged from the South Channel.

Environmental Management Plan (EMP)

It was envisaged that the EMP may require amendment from time to time. The process for considering such amendments is set out in the EMP (Section 1.7).

During 2008 there was regulatory approval for amendments to the EMP that were relevant to the Entrance. These amendments arose from an incident in the Entrance in July 2008 (see below) that was investigated by PoMC and was the subject of advice from the Office. The amendments to the EMP addressed:

- PoMC's reporting obligations in the event of an incident;
- Reporting and checking methods for the dredging in the Entrance;
- Reporting of construction plateau inspections; and
- Timing of deep reef video surveys.

Sequence of major activities in the Entrance

4 March 2008	Preconstruction plateau inspection (PDS 45).
5 April 2008	Dredging to deepen channel commences (PDS Nos. 23, 24, 31, 33, 34, 40, 41, 42, 43).
1 May 2008	Underwater towed video of dredged banks commences and concludes on 3 May (PDS No. 46).
17 September 2008	Design depth (-17.1 m) for deepened channel confirmed.
1 October 2008	PoMC provides notification of final routine clean (PDS No. 42).
4 October 2008	Underwater towed video of the dredged banks commences and concludes on 2 November 2008 (PDS No. 46).
10 December 2008	Underwater video for deep reef assessment commences and is scheduled to conclude in February 2009 (PDS No. 49).
19 December 2008	Victorian regulatory approval that PDS 46 requirements have been met. This followed PoMC's completion of its assessment in December 2008.

Office findings on the implementation of the EMP

Findings

The Office's findings are based on:

- Scrutiny of information generated by monitoring of dredging activities and reporting requirements set out in the EMP;
- Assessment of environmental incidents;
- Expert advice from the Independent Expert Group;
- Independent audits of the Entrance works;
- Assessment of tidal height changes by the National Tidal Centre; and
- Reports from the community, including underwater video from Rip Bank.

1. Environmental Incidents

The Office reviewed and made recommendation on two incidents during the Entrance dredging from April to September 2008. They related to PDS No. 42 (Clean up in the Entrance) and PDS No. 8 (Emergency Response Preparedness).

On 20 July 2008 clean up operations for dredge/clean-up cycle No 15 were not fully completed in line with one of the five requirements set by PDS No. 42. Under this requirement no fewer than 90 per cent of the grid cells created by dredging component of the cycle must be cleaned up. Due to a computer malfunction 78.1 per cent of grid cells were cleaned up, leading to an estimated 94 m³ rock spill on Rip Bank. A make-up cleanup was completed in cycle No 17.

On 30 August 2008, an underwater hydraulic hose on the *Queen of the Netherlands* ruptured while it was dredging on Rip Bank, releasing 800 to 900 litres of hydraulic oil. The oil was of a type that rapidly weathered. The Australian Maritime Safety Authority (AMSA) calculated that within 12 hours of the incident, the remaining oil spill volume had reduced to approximately 20 litres (two percent of the initial spill volume). Modelling from AMSA also showed that the rapidly weathering oil spill was carried from Rip Bank (the spill location) by the ebb tide and currents into Bass Strait, away from environmentally sensitive areas.

The Office investigated both incidents. Its investigation findings and recommendations are available at www.oem.vic.gov.au/Officeinvestigationsreportsadvice.

The Office is satisfied that its recommendations for both incidents were adequately addressed by PoMC.

2. Width and depth of dredging

Controls on the width and depth of dredging in the Entrance were set to primarily limit the extent that tidal changes may occur within the Bay.

Width of dredging

PDS No. 24 sets out limits on the width of dredging in the Entrance. This includes the requirement that all dredging must occur within the construction zone and that the final width be no greater than nine metres outside of the design toe line. The construction zone and toe line are set out in Drawings 35331 and 35332.

An independent audit found full compliance with the channel width controls.

Finding

The Office is satisfied that the standards set to control the width of dredging have been met.

Depth of dredging

PDS No. 24 sets out over-dredge limits in the Entrance. This includes requirements that a minimum of 50 per cent of the area to be dredged and within the toe lines is to be within 1.3 metres of the design depth, and that a minimum of 90 per cent of the area to be dredged and within the toe lines is to be within 1.8 metres of the design depth.

Further, the consent issued by the Victorian Minister for Environment and Climate Change, pursuant to the *Coastal Management Act 1995* sets out eight conditions. Condition seven is:

In the event of non compliance with the construction depth in the Entrance, i.e. that the construction depth of 19.1 metres is exceeded in more than 10% of the dredged area, a financial payment of \$10m, drawn from the environmental bond lodged by the Port of Melbourne Corporation, will be made to the Secretary of the Department of Sustainability and Environment for remedial, offset or Bay improvement works.

An independent audit found full compliance with the channel depth controls.

Finding

The Office is satisfied that the standards set to control the depth of dredging have been met, and PoMC has complied with rules to limit changes in water depth beyond the minimum required to establish the deepened channel. Therefore, the Office is satisfied that Condition 7 of the consent issued pursuant to the *Coastal Management Act 1995* is closed.

3. Work methods to reduce rock spill

PDS Nos. 40, 41, 42, and 43 collectively set out a hierarchy of controls to reduce rock spill, namely the use of a specifically designed draghead to dredge the rock in the Entrance, routines for the conduct of progressive clean ups, and specifications for the way in which edges of the Nepean and Rip Banks were to be dredged.

The above controls are supplemented by further requirements set out in PDS Nos. 46, 47, 48 and 49. These require monitoring and, if required, action during and beyond the operational phase of the project. (The project operational phase is 2008 – 2009, inclusive.)

Advice of the Independent Expert Group has confirmed that the draghead was designed as intended.

In total, 22 clean up cycles were completed from April to September 2008. As described above one cycle, cycle 15, was not conducted as required, necessitating a make-up clean up cycle.

PDS No. 46 sets out arrangements to determine the requirement for any additional clean up, namely that following the completion of design profile and final progressive clean up (see above) underwater video be reviewed to determine the requirement for additional clean up. Underwater video from Nepean and Rip Banks, taken in October and early November 2008 was along with other information, used to judge the completeness of the clean up. The Victorian regulator (Department of Sustainability and Environment) determined that PDS No. 46 had been met.

Nevertheless, PoMC has advised that as an additional measure following the settling period post the completion of dredging, it will initiate a further clean up. This will occur by 17 March 2009.

The Office has discussed this measure with PoMC and considers that only a localised area on Rip Bank should be targeted, and that the target area should exclude depressions that were already below -17.3 m (-17.3 m Chart Datum is the depth required for the deepened channel) at April 2008. This is to avoid disrupting spill that has accumulated as a result of blasting during the last 100 years. Disruption of the accumulated material in those depressions may well exacerbate the potential for spill to initiate scour of the underlying rock, or to fall into the canyon where the depressions are immediately adjacent the canyon.

In addition to the assessment of deep reef communities (PDS No. 49), PDS Nos. 47 and 48 require the continued assessment of both Nepean and Rip Banks for possible mobilisation of rock spill and rock scour, and the implementation of these requirements will be scrutinised by the Office and subject to independent audit.

With the exception of one incident (referred to above), an independent audit found full compliance with controls to reduce rock spill.

Finding

With the exception of one incident that was subject to remedial action, the Office is satisfied that the standards set to reduce rock spill have been met.

4. Tidal height changes

Changes in tidal height were assessed in detail through the Supplementary Environment Effects Statement (SEES). During discussions between the Office and stakeholders in early 2008, there was strong community interest in the assessment of the actual changes against those predicted. Interest was stimulated by surges in water height associated with major storms, for example the storms of 2 April 2008 and 30 June/1 July 2008.

As a result, the Office committed through its work program to provide early technical advice on the predicted tidal height change.

The Office commissioned the Australian National Tidal Centre to systematically examine the tidal height data for the Bay. Data from before dredging commenced in April 2008 was compared the heights recorded after the channel design depth was reached in September 2008. The comparison was made on a month by month basis from the end of September 2008. Monthly intervals allow the progressive separation of the varying effects of the movements of the sun moon and Earth on tides from the effects of wind, atmospheric pressure and variations inherent in measuring tidal height.

This approach allows the immediate determination of any major unpredicted changes and progressively more precise understanding over time of the actual small changes compared with those predicted.

Tidal heights for the period January 2000 to March 2008 have now been compared with tidal heights for the periods:

- October 2008;
- October – November 2008; and
- October – December 2008.

Three months after the completion of dredging to reach the design depth in the Entrance (September 2008) the results show no consistent widespread detectable change to tide height within the Bay above the limit of uncertainty. Where changes could be found that were statistically significant they were consistent with the predictions outlined in the 2007 SEES. For example, consistent with the SEES predictions of a six millimetre increase, the M2 tide at Williamstown was found to have increased by 7 mm \pm 5 mm

Finding

The measured changes in tidal height following the completion of dredging in the Entrance are consistent with those predicted in the Supplementary Environment Effects Statement.

5. Future activities required by the EMP

Controls set by the EMP continue to be active for the Entrance. These are set by PDS Nos. 47, 48, 49 and 50.

PDS No. 47 (Post-construction plateau inspection) requires towed videos of Rip and Nepean Banks by 19 March 2009.

PDS No. 48 (Pre and post-construction bathymetric survey) requires bathymetric surveys to determine bathymetric changes. Such changes may arise from scour or movement of residual spill. In the coming year four surveys are required by 19 March, 19 June, 19 September, and 19 December respectively. Further surveys are then required at intervals to December 2018.

In addition bathymetric and towed video surveys must take place prior to any programmed major maintenance dredging campaigns within the Entrance. These campaigns are to maintain channels within the Bay.

PDS No. 49 (Post construction of deep reef habitat – impact and recovery assessment) requires video of the deep reefs. The first survey is underway and subsequent surveys are required in approximately four and 10 years time, 2013 and 2019 respectively.

PDS No. 50 (Post construction tide monitoring report) requires a report on any change to tide conditions at six locations within the Bay, based on tidal data to October 2009.

In addition PoMC is to provide notifications and associated reports on:

- Deep reef, Entrance plateau marine pest post construction inspection programs; Entrance bathymetry survey, post construction towed video;
- Tide monitoring report; and
- Protected areas in the Entrance.

Action by the Office

The Office will continue to scrutinise the implementation of the PDS that continue to apply in the Entrance and publicly report its findings. This will include the progressive release of reports on tidal heights changes for the period October 2008 to October 2009 and the results of independent audits.

4. Source documents

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National Tidal Centre, 2009. Tide Height Assessment Following Dredging in Port Phillip Bay. Report 1: October 2008. Prepared for the Office of the Environmental Monitor.

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Office of the Environmental Monitor, 2008. Report and Advice on Environmental Incident at the Entrance on July 20, 2008.

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