



SHIPPING OIL SPILL IMPACTS ON WESTERNPORT BAY

New research shows that Westernport Bay's globally significant marine and coastal wetlands could be exposed to huge damage from only relatively minor oil spills.

The Victorian Government is proposing to drastically increase shipping capacity of the Port of Hastings in Westernport, bringing with it an increase in shipping traffic of fewer than 100 ships a year to more than 3000 annually.

Major dredging, land reclamation, road and rail transport corridors through suburban Melbourne, the Mornington Peninsula and Gippsland will also be required.

As a result the Victorian National Parks Association and Westernport and Peninsula Protection Council commissioned expert research into the impact of potential oil spills on Westernport's marine and coastal environment due to the heightened risk of accidents such an increase in shipping traffic will bring.

The VNPA is an independent community-based conservation group. The Westernport and Peninsula Protection Council has been active for 42 years.

WESTERNPORT: A REMARKABLE ECOSYSTEM

Westernport is Victoria's marine playground, a unique tidal bay and wetland with remarkable environmental and recreational values right on the fringe of Melbourne.

Unlike the large, deep, cold ports of the northern hemisphere, Westernport is warm and shallow, resulting in an exceptionally high productivity of marine vegetation

that supports a very wide range of invertebrates, fish and marine mammals.

Phillip Island, which lies across the bay's entrance, is home to colonies of Little Penguins supporting a tourism industry worth up to 1.9 billion dollars a year to the Victorian economy.

High tides dominate water movements within the bay, and around 40% of the area is exposed at low tide. A natural channel exists along an ancient riverbed, but substantial dredging was required to establish a port in the 1960s, and further major dredging will be required in the proposed Port of Hastings expansion to deepen and widen the channel. There will also be large areas of coastal land reclamation.

French Island is in the middle of the bay, and provides refuge for large numbers of vulnerable shorebird and migratory bird species including the Pied Oystercatcher and Red-capped Plover. There are at least 1350 species of marine animals living within the bay including Victoria's state marine emblem, the Weedy Seadragon, as well as Pot-bellied Seahorses and dolphins. The open waters of Westernport and approaches are also important feeding areas for many of these animals, including the popular Little Penguins.

The whole of the bay was listed in 1981 on the Ramsar Convention as a wetland of international importance and there are three marine national parks within the bay protecting areas of especially high conservation value.

WILDLIFE OF WESTERNPORT BAY

- Weedy Seadragon (pictured)
- Pot-bellied Seahorses
- Dolphins
- Little Penguins
- Pied Oystercatcher
- Seahorses
- Flathead
- Elephant Fish
- Snapper
- Australian Salmon
- King George Whiting
- School Sharks
- Stalked Hydroid
- Ghost Shrimps
- Australian Fur Seal
- Red-capped Plover
- Eastern Curlew
- Australian Pelican
- Fairy Tern
- Black Swan



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In 2002, the United Nations awarded the Westernport region the prestigious title of a UNESCO biosphere reserve because of its outstanding natural values.

The wide spread of the ecologically vital but sensitive seagrass meadows, extensive tracts of mangroves and saltmarshes, intertidal and subtidal reefs and mudflats within the bay, coupled with strong tidal movements and seasonal wind patterns, makes it especially vulnerable to oil spills.

FEDERALLY LISTED SPECIES

The proposed port expansion in Westernport will require federal approval under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC), because the bay and its intertidal shorelines are listed as Ramsar wetlands.

These are wetlands of international importance and provide roosting, feeding and breeding habitat for a number of waterbird species, 32 of which are listed under the Act. There are seven fish species that are listed under the Act, including for example the Pipefish, seahorses and School Sharks as well as six marine invertebrate species including the Stalked Hydroid at Crawfish Rock and Ghost Shrimps.

There are essentially four levels of assessment under national environmental laws. These include:

- Assessment on referral information with the decision made based on submitted or requested information.
- Assessment by a public environment report, which is shorter than an Environmental Impact Statement but has public consultation.
- Assessment by Environmental Impact Statement, which is a more thorough assessment completed by the project proponent.
- Assessment by public inquiry, which is the most comprehensive form of environmental assessment.

RISK OF INCREASED SHIPPING

All shipping traffic entering Westernport and navigating the channel carries substantial loads of oil either as fuel or cargo. Shipping activities, particularly an international container port, bring with them the potential for oil spills due to collisions, ship groundings, fuel transfer spills or other accidents.

Between 1970 and 2012 there were 27 oil spills in

Australia, including the 1995 *MV Iron Baron* disaster on the Tasmanian coast, which spilt 325 tonnes of bunker fuel oil. Despite the relatively small amount of oil spilt, the impact on wildlife and beaches was extensive, with an estimated total kill of Little Penguins from oil pollution being between 7000 and 17,000.

STUDY METHOD

The consultants that conducted this research, Asia-Pacific Applied Science Associates (APASA), are the leading oil spill modelling consultants in Australia for industry, government and Marine Safety Victoria.

This study updates and confirms the results of past oil spill modelling work including research commissioned by a local group, the Westernport and Peninsula Protection Council.

The oil spill modelling used a SIMAP three-dimensional spill trajectory and weathering model, which is designed to simulate the transport, spreading and weathering of specific oil types under the influence of changing weather conditions and ocean movements to determine potential exposure to the bay's environmental assets.

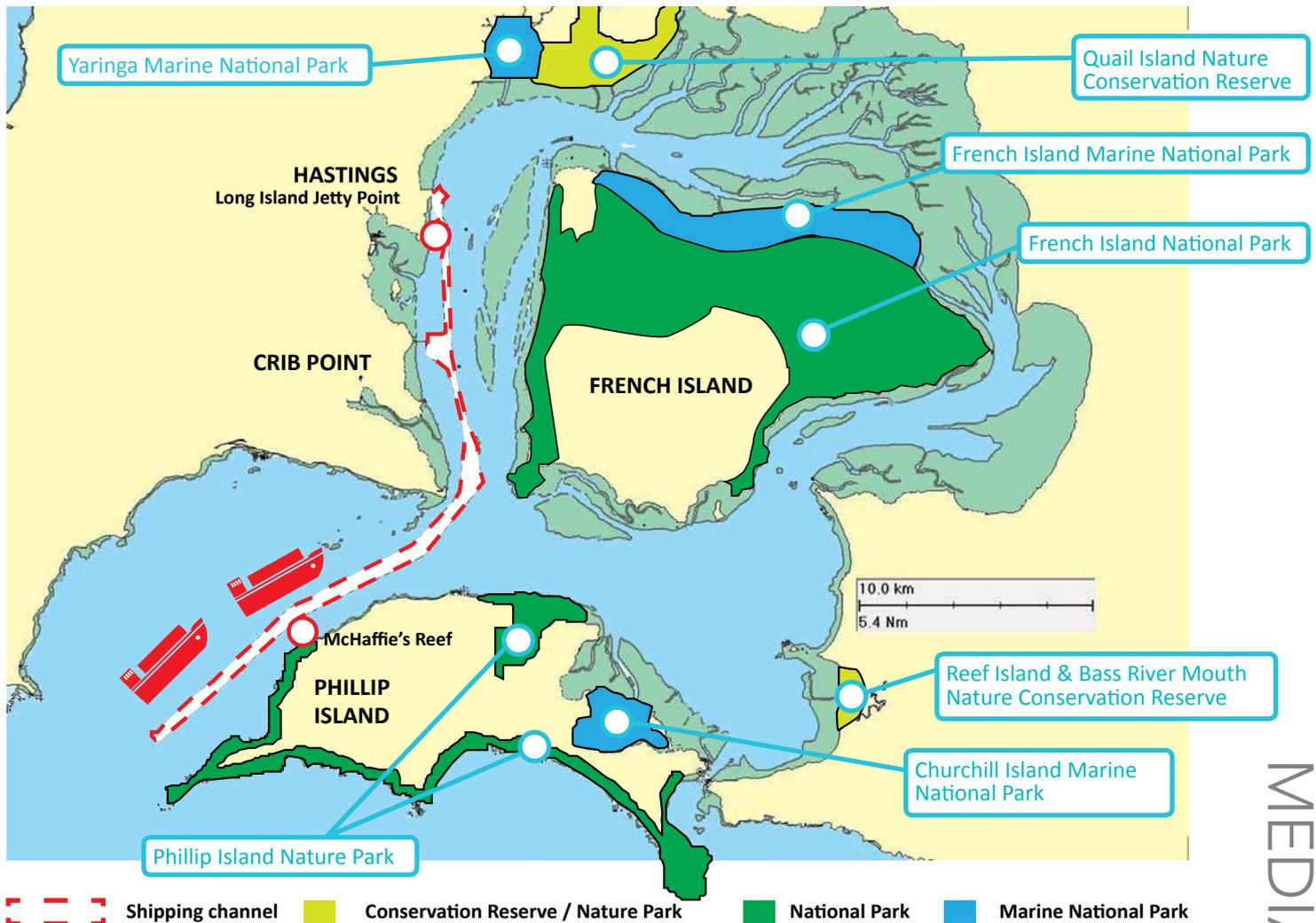
This model has been applied widely in Australia and other countries to assess risks associated with oil handling operations, support oil spill response and to hind-cast the outcomes of real spill events.

The six oil spill scenarios used are credible and considered conservative compared with the magnitude of many spills that have previously occurred from shipping operations in Australian waters and elsewhere.

Four scenarios were used to model spills of 200 metric tonnes of heavy fuel oil from McHaffie's Reef and Long Point Jetty as well as two scenarios of 66 metric tonnes diesel spills from Long Point Jetty. Two seasons were chosen for both locations because of the predominance of offshore northerly winds during winter and onshore southerly winds during summer.

As shown in the map of Westernport, McHaffie's Reef runs under the shipping channel close to the western entrance to the bay. Long Point Jetty is an existing jetty in the northern part of Westernport, where a major part of the port expansion is likely to occur.

Over one hundred replicate simulations were completed for each combination of spill scenario and season. Simulations were run for 14 days from the spill start times to allow ample time for oil to migrate and redistribute within the study area due to the influence of tides and winds.



Drogue deployments were undertaken on two occasions in 2012 to ground truth and test the model in forecasting current speed and directions. According to APASA the results showed an excellent fit between the observed and modeled data and further validated the robustness of the model.

DIFFERENCE BETWEEN HEAVY FUEL OIL & DIESEL

Heavy fuel oil and diesel act differently when exposed to water and therefore would likely have different impacts on Westernport's environmental values.

Heavy fuel oil spills are resistant to evaporation and tend to stay on the water surface and increase in volume by 30-70% because the oil takes up water droplets to form a water in oil emulsification forming a thick, sticky fluid. In

comparison, a proportion of diesel will evaporate when spilled, but will spread rapidly to thin sheens and becomes entrained or mixed into the water column.

Diesel fuels tend to be used by support and work vessels, while heavy fuel oils are used as fuel by larger ships, like container ships. Heavy fuel oil spills would have the greater likelihood of generating negative effects from oil on the water surface, or accumulating on shorelines, while diesel presents the additional risk of exposure to entrained oil for marine animals on the seabed or in the water column.

KEY OIL SPILL MODELLING FINDINGS

- The spill modelling indicated that oil spilled under any of the oil spill scenarios has a high probability of

spreading widely throughout Westernport by tidal and wind forces.

- Exposure to local shorelines and seagrass meadows could occur in minutes if winds are directly onshore and the bay's marine national parks could be exposed to oil within less than six hours; but dispersal in and on the water can continue for days into many parts of the bay.
- Most of the areas designated as national parks with a shoreline and marine national parks within the bay are at risk of contamination from oil spills.

HOW OIL WILL BE SPREAD

- While earlier models showed that the net movement of water in the bay was clockwise around French Island, the model used in this research indicated that patterns are more complex, with both clockwise and anticlockwise flows along each estuary, which has implications for how oil spills will spread.
- Oil that does not bind to the sediments will tend to be redistributed as the tide rises again, potentially polluting other areas, while oil that enters the sediment may remain as a persistent source of hydrocarbon contamination for years or decades.
- The simulations indicated that floating oil will tend to oscillate (swing back and forth with a steady, uninterrupted rhythm) along the channel over multiple tidal cycles, but will be subject to winds blowing towards shorelines over an extended period (days to weeks).
- The predominance of southerly winds during summer and northerly winds during winter is forecast to result in higher likelihoods that floating oil will drift northward at a greater rate during summer – the reverse trend is indicated for spills that occur in winter.

DAMAGE TO MARINE PLANTS AND ANIMALS

- The smothering effect of heavy fuel oils spills and toxicity of diesel are likely to result in extensive impacts on marine ecosystems. For example, the churning of diesel into the water at shorelines from past spills has been observed to cause high mortality of invertebrate and large marine animals as well as fish that occupy shoreline habitat.
- There will be longer-term impacts from oil spills,

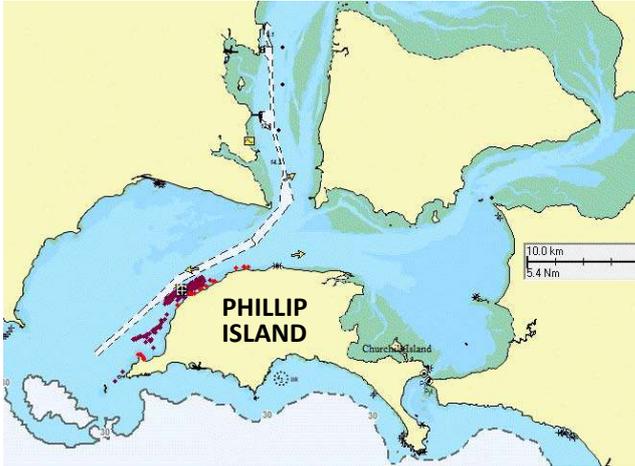
particularly for heavy fuel residues that have the potential to pollute the extensive mudflats and wetlands to become a source of leaching hydrocarbons for decades.

CAN OIL SPILLS BE CONTAINED AND CLEANED UP?

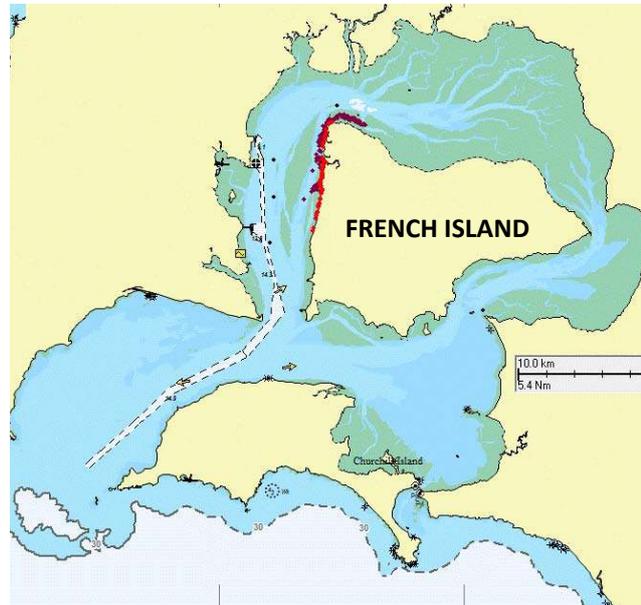
- Chemical dispersants are often used in oil spill clean-up responses but previous research commissioned by Marine Safety Victoria and conducted by APASA found that using chemical oil dispersants on oil slicks in Westernport would likely have a negative impact by increasing exposure of the bay's marine and coastal environment over a wider area.
- The modelling indicates that the speed of tidal streams would be too great for boom equipment currently available – oil would tend to entrain under booms that were fixed in place as barriers across the tidal streams as current speeds exceed these performance limits.
- The high viscosity of residual oil also makes it difficult to isolate it from polluted shorelines such as beaches and mudflats, with the removal of contaminated sediments the only option. This would cause destruction of seagrass meadows, which support the bay's biodiversity.
- Past oil spill events of a similar nature to those represented in the modelling also indicate the high potential for long-term legacy effects lasting multiple decades due to slow leaching of oil from contaminated sediments that remain despite clean-up efforts.
- The indications from the modelling that large areas of shoreline might be affected by a single spill event suggests that the effort and cost of this effort would also be high in Westernport Bay, while the nature of the sensitive habitats suggest that long-term contamination of areas that receive heavy fuel oil would be highly likely.
- Clean-up efforts for past spills have proven to be of limited effectiveness – for example only 7% was recovered during the Exxon Valdez disaster in Alaska in 1989, and a mere 2% from the application of the Australian national oil spill response plan procedures to the Iron Baron grounding across Bass Strait in Tasmania. The oil remaining in the sea, the ship, the ocean and shorelines resulted in the estimated deaths of 7000 to 17000 Little Penguins, as well as many other living creatures.

EXAMPLES OF HEAVY FUEL OIL & DIESEL SPILLS

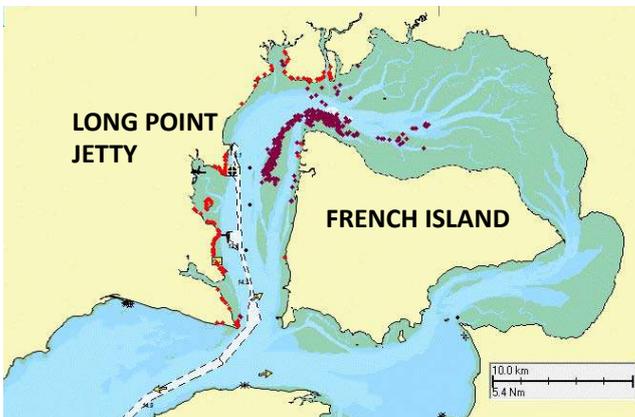
Modelling of heavy fuel oil spills show that over 80% of the oil mass could wash ashore over periods of days to a few weeks.



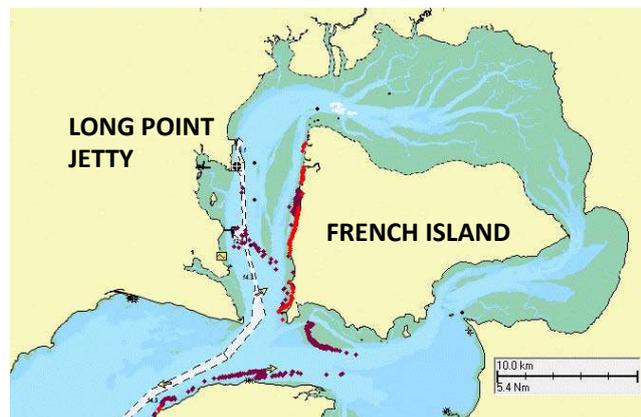
- **Phillip Island Nature Park** was highlighted as an area that is particularly vulnerable to heavy fuel oil spills originating at McHaffie's Reef, with forecasts showing this region as a potential site of high oil accumulation, especially during winter.



- **French Island National Park** is also shown to be at risk to oil pollution during summer, with the minimum amount of time for the oil to reach the shore forecast at six hours.



- **For heavy fuel oil spills from Long Point Jetty**, the modelling indicated that a high proportion of the oil mass would likely strand on shorelines and seagrass meadows at some point. Yaringa Marine National Park and Quail Island Nature Conservation Reserve were highlighted to be at greatest risk to oil pollution.



- **For diesel spills from Long Point Jetty**, forecasts show that during summer, French Island Marine National Park is likely to have the highest potential of exposure to oil. During winter both French Island Marine National Park and Phillip Island Nature Park are shown to have the highest probability of exposure to surface film.

-  Projections of oil spill hitting the shoreline
-  How a projected oil spill would move through the channel and pushed around by winds and tides

Note: Fully animated modelling can be seen at www.savewesternport.vnpa.org.au

STOP THE PORT EXPANSION

The VNPA and local community groups are concerned that in addition to Port Phillip Bay, Westernport Bay is another key community asset on Melbourne's doorstep being put at risk. Port expansions require major dredging and heighten the risk of collision and grounding, hence of oil spills due to the increase in shipping traffic.

An oil spill could have serious economic impact on Phillip Island's tourism industry and on the bay's recreational fishing and other marine pastimes. This research has demonstrated that even a relatively small oil spill could have disastrous impacts on the bay's unique ecosystems and further damage would occur during attempted removal of oil from mangrove-saltmarsh, seagrass, mudflats and reef habitats.

The VNPA and a number of other groups, including the Westernport and Peninsula Protection Council, Blue Wedges Coalition and Surfrider Foundation Australia were signatories to a joint statement in 2012 that among other points called on both state political parties to commit to a comprehensive modelling following and extending on earlier studies. The research presented in this APASA report goes a long way towards completing this task.

The VNPA and the WPPC consider that expanding the

Port of Hastings in Westernport is a mistake because of the unacceptable risk it poses to the bay's environmental, social and recreational values.

The groups are calling on both major federal political parties to commit to:

A comprehensive and independent assessment using the full force of federal environmental laws and the highest level of assessment before any further work or money is spent on developing a new port.

This assessment should also consider environmental impacts, risks and alternative port locations to Westernport with links to national transport planning.

MEDIA IMAGES AND VIDEO

High resolution images and video footage of Westernport, as well as video simulations of the oil spill modelling scenarios, are available to the media.

Media contacts:

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- Chris Chandler, Westernport & Peninsula Protection Council – 0407 705 450.