

Independent Evaluation:
***Environmental Effectiveness of
SEQ Oil Spill Response***

March 2009

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Contract sheet

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Figure 1: Satellite image of Moreton Island showing the approximate locations of main sites referenced in this report

1. Introduction

On Tuesday 17 March 2009 Maritime Safety Queensland (MSQ) engaged Steve Raaymakers of EcoStrategic Consultants (www.eco-strategic.com), to undertake an independent evaluation of the environmental effectiveness of the South East Queensland (SEQ) oil spill clean-up, being mounted in response to the discharge of an estimated 250 tonnes of Heavy Fuel Oil (HFO) from the container ship *Pacific Adventurer*, following Cyclone Hamish the previous week.

Oil had impacted on the shores of the Sunshine Coast, Bribie Island and Moreton Island in SEQ, and a response and clean-up operation was mounted under both the Queensland State and Australian National oil spill contingency plans. The brief from MSQ to Steve Raaymakers was specifically to provide expert, independent advice in relation to:

- oiled beaches on Moreton Island,
- oiled creeks and wetlands on Moreton Island, and
- oiled rocky shores and headlands on Moreton Island.

The brief requested an objective evaluation of the environmental effectiveness of the response and clean-up operations to date (to 18 March 2009), and any recommendations to improve effectiveness.

Following engagement, the consultant traveled from home base in Cairns to arrive on Moreton Island at approximately 1700 on Tuesday 17 March 2009. The helicopter transfer from Brisbane included a reconnaissance over-flight of the affected areas of Moreton Island. Steve Raaymakers was accompanied by Jamie Storrie, the Manager of Marine Environmental Protection Response at the Australian Maritime Safety Authority (AMSA).

Upon arrival on Moreton Island, Raaymakers and Storrie met with the on-site Incident Coordinator Patrick Quirk and his relief Cynthia Gillespie, both of the Queensland Department of Transport, as well as Chris Artiemiew of Emergency Management Queensland (EMQ) and Dr Munro Mortimer of the Queensland Environmental Protection Agency (EPA). Activities were coordinated for the following day.

On Wednesday 18 March 2009 Raaymakers, Storrie, Artiemiew and Mortimer traveled by 4WD vehicle to closely inspect the east coast beaches and creeks and wetlands, as well as the northern rocky shores and headlands, of Moreton Island. At approximately 1630 Raaymakers and Storrie returned to Brisbane by helicopter. This report presents the findings of Steve Raaymakers from the site inspections. This report relates to Moreton Island only.

It should be noted that given the extremely short time-frame spent on the island (one night and day), this report presents extremely cursory, summary findings only. It should also be noted that this assessment is qualitative only, does not include any quantitative scientific sampling, and represents the professional opinion of the consultant only, and does not address oiled wildlife, sub-tidal environments and fisheries issues at all.

2. Summary assessment

In general, my assessment is as follows:

- Moreton Island and Moreton Bay are of major environmental/ecological and socio-economic importance to Queensland and Australia.
- Moreton Island is a National Park containing ecologically important forests, wetlands, wildlife and sand-dune systems, as well as vast expanses of white sand beaches. The island is heavily used for four-wheel driving, camping, fishing, surfing, diving, sailing and other recreational activities, by both people from Brisbane and surrounding areas as well as nationally and internationally.
- Moreton Island supports a valuable tourist industry, including a long-established resort at Tangalooma, and is a major focus for marine eco-tourism, including the feeding of wild dolphins in Moreton Bay.
- Moreton Bay is also of major environmental/ecological and socioeconomic importance, is declared as a Queensland Marine Park, and supports significant biodiversity resources, including:
 - extensive mangroves,
 - extensive inter-tidal flats,
 - extensive seagrass beds,
 - rocky reefs and corals
 - numerous islands,
 - various sea- and shore-bird species, many of major conservation significance; and
 - marine species of major conservation significance including marine turtles, dugong, whales and dolphins,
- Moreton Bay also supports significant recreational and commercial fisheries, recreational boating and sailing and commercial shipping.
- Moreton Island and Moreton Bay are potentially extremely sensitive to oil pollution.
- Despite these values and sensitivities, and while some environmental damage has certainly been caused (the quantification of which requires more scientific assessment than this review), it is my professional opinion that the *Pacific Adventurer* oil spill does not constitute an ecological “disaster” as portrayed by some media.
- The type of oil spilled (Heavy Fuel Oil or HFO) is one of the less toxic oils – and environmental issues relate more to its high viscosity (thick, ‘gooey’ nature) than its toxic effect on the environment. As HFO weathers under natural conditions it becomes even less toxic.

- It relation to Moreton Island it appears that oil has only impacted on the seaward shores and does not appear to have entered Moreton Bay (except for subsequent leakage from the ship on entering safe-haven in the Port of Brisbane).
- It relation to Moreton Island the oil appears to have mainly impacted on sandy beaches and rocky shores – the two least sensitive shorelines when it comes to oil impacts. While dark oil on white beaches may “appear” to “look bad” environmentally, it is of (relatively) limited ecological consequence and is (relatively) easy to clean-up, compared to oiled mangroves, seagrasses or coral reefs. Additionally, the seaward surf beaches and rocky shores of Moreton Island are very high-energy environments, with (relatively) low biological diversity and productivity, and will "self-clean" due to wave action and other natural processes.
- It appears that the oil has not impacted on sensitive mangrove areas, seagrass beds and inter-tidal flats, and oiling of seabirds and other wildlife appears to have been relatively minimal to date.
- The main ecological concern in relation to Moreton Island to date is the ingress of oil into Spitfire and Eagers Creeks. Ideally, very high priority should have been given to protecting these most sensitive resources, and a damage assessment and response plan should have been initiated for the wetland areas very early in the response, consistent with best practice and pre-determined sensitivity gradings and response priorities, as outlined in relevant contingency plans. However, the wetland is recoverable and repairable – especially with some careful, targeted clean-up and ecological rehabilitation efforts. A recommended clean-up and recovery plan (*Wetlands Response Plan*) is outlined.
- In general, the beach clean-up effort on Moreton Island appears to be running well, with most of the sandy beaches being cleaned very effectively using environmentally-friendly manual methods. However, there is some potential for oil to re-appear on the seaward beaches in coming days, weeks and months, as initial oiling will have been covered by wave- and wind-borne sand movement (these beaches are extremely dynamic and change hourly). In some cases significant layers of oil and/or tar balls may become re-exposed. Authorities therefore need to prepare to carry out small-scale, follow-up manual clean-ups in isolated areas, as previously buried oil is re-exposed by natural sand movements in coming days/weeks and possibly months.
- The oiling on the rocky shores and cliffs at the northern tip of Moreton Island does not present a major ecological threat. It is best left in place to weather and breakdown naturally by the effects of micro-organisms, the sun, wind, waves and storms. Clean-up operations in these very rugged and difficult areas could be unsafe to clean-up crews. As well as being dangerous, inappropriate clean-up attempts may also cause greater ecological impacts than if the oil is left to degrade naturally.

- The exception is Honeymoon Bay – where it is recommended that a plan be developed and implemented to clean this bay completely, for human health, social amenity and socio-economic reasons. Methods are available and this should be achievable without too much difficulty if implemented carefully. A recommended clean-up and recovery plan (*Rocky Shores Response Plan*) is outlined.
- Overall, it is recommended that the response to and clean-up of this spill should adopt a Net Environmental Benefit Approach, under which the advantages and disadvantages of different clean-up options are weighed up and compared with each other and with natural clean-up processes – in order to ensure that the end result is a net benefit and to avoid unnecessary side-effects and additional impacts from clean-up activities. It is also recommended that the clean-up should seek to utilize and enhance natural processes of recovery as far as possible, and minimize active human intervention. Such approaches are consistent with international best practice.

3. Area assessments

3.1 East coast sandy beaches

- The east coast beaches from just north of Camel Rock in the south to Cape Moreton in the north were inspected by 4WD vehicle and on foot between 0630 and 1100 on Wednesday 18 March 2009.
- There appeared to be limited oiling from Eagers Creek south to Camel Rock, although digging into the sand at several random locations indicated thin layers of oil that has been covered by sand (Figure 2). These beaches are extremely dynamic and change hourly. There is therefore potential for oil to re-appear on apparently clean beaches in coming days, weeks and months, as initial oiling will have been covered by wave- and wind-borne sand movement.
- A greater degree of beach-surface oiling was observed from Eagers Creek north to Cape Moreton - with some areas of light re-oiling on the beach either side of and to the north of Spitfire Creek. This appears to be emulsified oil (brown colour) and to have come from the sea (perhaps re-mobilized from the oiled rocky headland) (Figure 3).
- There is some oiling of the dune-face in certain areas along the entire area surveyed (Figure 4), including considerable oiling of spinnafex rhizomes that hang over the front of the dune face along the coast (Figure 5). It is recommended that such oiled vegetation be cut to remove this oil from the system. Such oiled vegetation should be treated as oily waste, bagged appropriately and managed in the existing oily waste stream that has been established on the island.
- There were numerous items of oiled debris (plastic and glass bottles, plastic sheeting, other garbage and coconuts and other organic material) along the strand line of the whole east coast (Figure 6). It is recommended that a daily patrol be designated to collect all of these items in order to remove this oil from the system. Such oiled debris should be treated as oily waste, bagged appropriately and managed in the existing oily waste stream that has been established on the island.
- There are several areas, especially north of Eager's Creek – where beach vehicle access points remain oiled (Figure 7). Removal of oil from these areas should be given urgent priority before the oil becomes covered by wind-driven sand, and becomes a reservoir for possible spreading into the island's interior by vehicles when the areas are opened in future.
- The beach clean-up effort on Moreton Island appears to be running well, with most of the sandy beaches being cleaned very effectively using environmentally-friendly manual methods. Best management practices are being used – including equipping all crews with proper protective gear, and

provision of shade, water, toilets and on-site health and safety, ambulance and other support services at each work site (Figure 8).

- Contamination control is highly supervised, with designated clean and dirty areas and highly effective systems in place for decontaminating personnel and equipment before allowing them to leave oiled areas. This is extremely important on a highly sensitive National Park island like Moreton Island (Figure 9).
- Management of oily waste appears to be highly controlled, with strict systems and procedures in place, including bagging of all oily-waste; lining of storage and transfer areas, covering of storage piles and bins, and supervision by EPA officers at each site (Figure 10). However, improvements could be made at the Eagers Creek waste transfer station (see section 3.2.2 below).
- As highlighted above, there is some potential for oil to re-appear on the seaward beaches in coming days, weeks and months, as initial oiling will have been covered by wave- and wind-borne sand movement. In some cases layers of oil and/or tar balls may become re-exposed. Authorities therefore need to prepare to carry out small-scale, follow-up manual clean-ups in isolated areas, as previously buried oil is re-exposed by natural sand movements in coming days/weeks and possibly months.
- In relation to the east coast beaches, the following Recommended Immediate Actions (RIAs) should be implemented immediately:

Recommended Immediate Actions (RIAs) for east coast sandy beaches

- It is recommended that all oiled vegetation (e.g. spinafex rhizomes) be cut to remove this oil from the system. Removed oiled vegetation should be treated as oily waste, bagged appropriately and managed in the existing oily waste stream that has been established on the island.
- It is recommended that a daily patrol be designated to collect oiled debris along the strand-line in order to remove this oil from the system. Such oiled debris should be treated as oily waste, bagged appropriately and managed in the existing oily waste stream that has been established on the island.
- Removal of oil from beach vehicle access points should be given urgent priority before the oil becomes covered by wind-driven sand, and becomes a reservoir for possible spreading of oil into the island's interior by vehicles when the areas are opened in future.

Figures for Section 3.1.

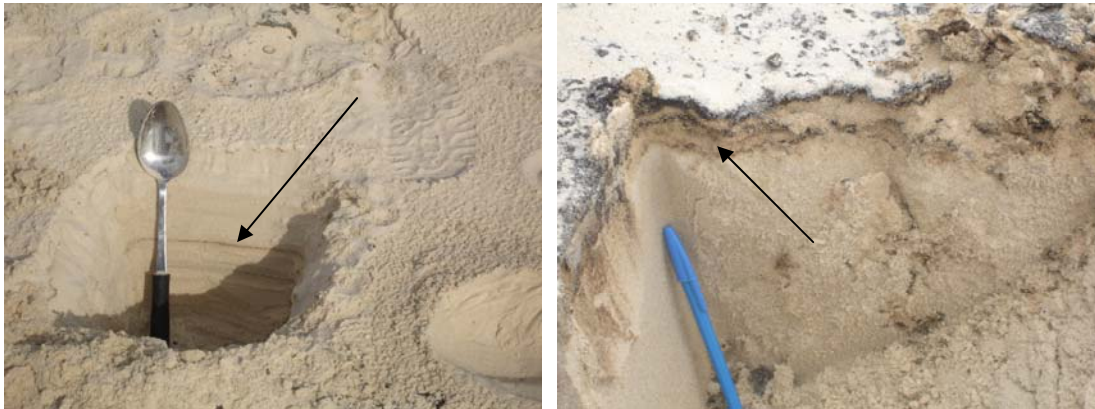


Figure 2: Examples of oil strata covered by sand that has accumulated since oil came ashore. These beaches are extremely dynamic and oil may re-appear in currently “clean” areas in coming weeks/months (Moreton Is. East Coast 18/3/09).



Figure 3: Light re-oiling to the north of Eagers Creek (Moreton Is. East Coast 18/3/09).



Figure 4: Oiled dune face – including oiled spinifex rhizomes (Moreton Is. East Coast 18/3/09).



Figure 5: Oiled dune face – including oiled spinifex rhizomes – which should be cut and removed from the system (Moreton Is. East Coast 18/3/09).



Figure 6: Oiled debris along the strand line – which should be collected and removed from the system (Moreton Is. East Coast 18/3/09).



Figure 7: Oil accumulation at beach vehicle access point – these areas should be cleaned immediately before the oil becomes covered by wind-driven sand, and becomes a reservoir for possible spreading of oil into the island’s interior by vehicles when the areas are opened in future (Moreton Is. East Coast 18/3/09).



Figure 8: Beach clean-up operations using environmentally friendly manual methods – and showing best practices such as equipping all crew with protective gear, providing shade, water, toilets, health and safety, first-aid and similar facilities on-site (Moreton Is. East Coast 18/3/09).



Figure 9: Decontamination of personnel and equipment on leaving oiled areas – best practice oil spill management (Moreton Is. East Coast 18/3/09).



Figure 10: Management of oily wastes (oiled sand) – best practices include ground-lining and covering of waste bag stacks (left) and waste skips (right), and removing waste to controlled facilities ASAP (Moreton Is. East Coast 18/3/09).

3.2 East coast creeks & wetlands

3.2.1 Spitfire Creek

- Oil has ingressed into Spitfire Creek and its associated wetland (Figures 11 to 17). These are highly valuable and sensitive ecological resources which also support various wild-life species. The longer that oil is allowed to remain in this system the greater impact it will cause, including providing a reservoir of oil for the ongoing oiling of birds, white-tailed water rats and other wildlife, and possibly contaminating the groundwater aquifer.
- Ideally, very high priority should have been given to protecting these most sensitive resources, and a damage assessment and response plan should have been initiated for the wetland areas very early in the response, consistent with best practice and pre-determined sensitivity gradings and response priorities outlined in relevant contingency plans. However, the wetland is recoverable and repairable – especially with some careful, targeted clean-up and ecological rehabilitation efforts. A recommended clean-up and recovery plan (*Wetlands Response Plan*) is outlined.
- URGENT PRIORITY should therefore be given to developing, agreeing and implementing a *Wetlands Response Plan*, as outlined below, and the following Recommended Immediate Actions (RIAs) should be implemented immediately:

Recommended Immediate Actions (RIAs) for creeks and wetlands:

- All and any access to the wetlands must be under strict supervision of EPA/QPWS.
- Other than these RIAs – NO ACTIONS should be taken in relation to the wetlands until a *Wetlands Response Plan* has been approved by EPA/QPWS and the MSQ State Marine Pollution Controller.
- There must be NO USE of heavy machinery or high impact, potentially destructive methods in the wetlands – only low-impact, manual, labour-intensive methods may be used. Even walking activities should be minimized to prevent oil being pushed into the sediments, and to avoid compacting the wetland substratum. Ideally all work in the wetlands should be undertaken from flat-bottomed, low-draft punts, powered manually using poles.
- It is recommended that surface oil on the sand at the mouths of both Spitfire and Eagers Creeks should be removed using standard manual techniques IMMEDIATELY – and placed into the waste stream. Workers undertaking this should be supervised by QPWS and should not access the actual wetlands.

- It is recommended that the mouths of both creeks be opened completely to allow egress of water and oil from the wetlands onto the beach and to facilitate self-flushing of the system. Any oil that leaves the creeks and ends up on the beach can be cleaned-up manually. The open creek mouths should be monitored in relation to high tides and any approaching storms – and the creek mouths should be re-closed should a chance of ingress arise, which might push oil further into the system.
- It is recommended that EPA/QPWS should URGENTLY and thoroughly map the extent of oiling in the wetlands (a SCAT field sheet is inadequate). Vertical, geo-referenced aerial photography should be undertaken ASAP. Oil extent should be ground-truthed and marked on aerial photographs in the field, referenced to D-GPS coordinates and mapped onto GIS. This will provide immediate post-spill data for impact assessment and long-term monitoring. The ground-truthing should be done using flat-bottomed, shallow-draft punts to provide access without causing physical damage. As above even walking activities should be minimized to prevent oil being pushed into the sediments, and to avoid compacting the wetland substratum.
- It is recommended that EPA should test for hydrocarbon levels in the groundwater, sediments, surface water and biota (fauna and flora) at a comprehensive grid of sampling points throughout each wetland – and at equivalent control sites - *as soon as possible* (identification of pre-existing baseline data is important here). This will provide immediate post-spill data for impact assessment and long-term monitoring. Again this should be done from punts with minimal access by foot.
- It is recommended that QPWS conduct twice daily surveys of both wetlands to check for oiled wildlife, as these oiled wetlands represent major sources of potential oiling for wildlife.
- To inform the development of the *Wetlands Response Plan*, it is recommended that EPA/QPWS should *immediately* start identifying, compiling and reviewing all existing information and baseline data on the creeks and wetlands – including:
 - fauna and flora species lists,
 - presence of species of conservation concern,
 - possible key species for use as indicators of eco-system health and recovery,
 - previous ecological studies,
 - physical dynamics,
 - water table dynamics,
 - water quality /chemistry,
 - aerial photographs (including historical series to show changes over time),
 - topographic maps, geological maps, vegetation maps,
 - GIS outputs,
 - indigenous values

- etc.
- All other actions in relation to Spitfire (and Eagers) Creeks must await approval of the *Wetlands Response Plan*.

Suggested principles and elements of Wetlands Response Plan

- It is recommended that the *Wetlands Response Plan* adopt the following principles:
 - It should seek to achieve the objective of restoring the ecological integrity and functioning and the biodiversity and National Park values of the wetlands, and minimize/ameliorate contamination of associated groundwater resources, within the concept of net environmental benefit.
 - It should give preference to using and facilitating natural processes of recovery and minimize active human intervention, to minimize associated impacts.
 - It should be formulated and agreed by a ***small*** Wetlands Response Team comprising MSQ, EPA/QPWS plus external wetlands ecologist(s) and relevant experts (e.g. from University, NGO), and with appropriate operational inputs (e.g. re. use of absorbent pads, skimmers, booms etc).
 - It should be approved by EPA/QPWS as well as MSQ State Marine Pollution Controller prior to implementation.
 - No use of heavy machinery or high impact, potentially destructive methods – use low-impact, manual, labour-intensive methods only. Even walking activities should be minimized to prevent oil being pushed into the sediments.
 - Any and all methods used should initially be applied on a ***trial basis*** to a small area of the wetland only – evaluated for effectiveness and adapted as required.
- In terms of actual cleanup methods, it is recommended that the *Wetlands Response Plan* trial the following methods (in general chronological order of implementation):
 - Place ab/ad-sorbant pads over as much of the surface area of the wetland as possible to physically remove as much mobile oil and sheen as possible.
 - Cut and remove oiled vegetation by hand, above the stump-line to allow re-growth later (subject to expert botanical advice as to the acceptability of this approach for the reed species present).

- Use low-pressure, high-volume flushing of the system with water to lift and flush as much remaining oil from the system as possible. This might involve placing multiple hose outlets along the perimeter of the headwaters of the wetland, and pumping water through to allow it to flush into the system. It must be “low pressure” to avoid high-pressure water damage to the wetland and it must be “high volume” to achieve any flushing effect. The flushing may have to take place over days, even weeks – and will need to be closely monitored and evaluated for effectiveness – and adapted as required.
- Ensure the whole operation is highly supervised and continuously evaluated to allow adaptive management as needed.
- Implement a comprehensive ecological impact assessment and also a long-term ecological recovery monitoring program, as well as ongoing monitoring of hydrocarbon in groundwater, sediments, surface water and biota (identification of pre-existing baseline data is important here).
- Investigate the need for and viability of ecological rehabilitation measures (it is my view that the wetland will recover naturally if the oil is removed to the maximum extent and active rehabilitation will not be necessary. Ideally nature should be left to run its course).

3.2.2 Eagers Creek

- Oil has also ingressed into Eagers Creek and its associated wetland (Figures 18 to 20). While this system is somewhat smaller than Spitfire Creek, the types of impacts will be similar, including possible contamination of the groundwater aquifer (the local response crew is drinking from this aquifer using a spear-pump).
- It is recommended that the *Wetlands Response Plan* and RIAs outlined under section 3.2.1 should also be applied *as appropriate* to Eagers Creek.
- It should be noted that the oily-waste transfer station at Eager Creek is impacting directly on the southern bank of the creek – including placement of waste skips right on the creek bank and movement of heavy machinery right along the bank (Figures 20). This presents potential for further contamination of the creek, including pushing of oil down into the substrate and possible contamination of the groundwater aquifer (the local response crew is drinking from this aquifer using a spear-pump, and may be exposed to contaminated water). A 20m buffer should be established along the creek banks, cleaned up and revegetated.

3.2.3 Blue Lagoon

- It is understood that Blue Lagoon is not currently open to the sea and is therefore unlikely to have been oiled – and we did not inspect it. However, birds and other wildlife may carry oil from other areas, including Spitfire Creek into Blue Lagoon. It is therefore recommended that an on-foot survey be conducted of Blue Lagoon as a precaution – with a focus on potentially oiled wildlife.

Figures for Section 3.2.



Figure 11: Aerial view of oiling of Spitfire Creek and wetland. Development and implementation of a Wetland Response Plan for this area should be given urgent priority (Moreton Is. East Coast 12/3/09) (image courtesy of Maritime Safety Queensland).



Figure 12: Aerial view of oiling of Spitfire Creek and wetland. The heavy oiling on the foreshore (lower right) was typical of much of the north east coast of Moreton Island during the first few days of the spill. Although much was cleaned up – it is likely that much would have been covered by sand movement – and may re-appear in the system later (Moreton Is. East Coast 12/3/09) (image courtesy of Maritime Safety Queensland).



Figure 13: Aerial view of oiling of Spitfire Creek and wetland (Moreton Is. East Coast 12/3/09) (image courtesy of Maritime Safety Queensland).



Figure 14: Oiling of Spitfire Creek and wetland (Moreton Is. East Coast 18/3/09).



Figure 15: Oiling of Spitfire Creek and wetland (Moreton Is. East Coast 18/3/09).



Figure 16: Oiling near the mouth of Spitfire Creek. This needs to be removed ASAP using standard manual methods (shovels etc) to prevent potential re-pollution of the wetland (Moreton Is. East Coast 18/3/09).



Figure 17: Oiling on beach near the mouth of Spitfire Creek. This needs to be removed ASAP using standard manual methods (shovels etc) to prevent potential re-pollution of the wetland (Moreton Is. East Coast 18/3/09).



Figure 18: Oiling near the mouth of Eagers Creek. This needs to be removed ASAP using standard manual methods (shovels etc) to prevent potential re-pollution of the wetland (Moreton Is. East Coast 18/3/09).



Figure 19: Oiling at Eagers Creek – development and implementation of a Wetland Response Plan for this area should be given urgent priority (Moreton Is. East Coast 18/3/09).



Figure 20: The oily waste transfer station impacting right on the bank at Eagers Creek – a 20m or more buffer zone needs to be implemented and the creek bank cleaned-up and rehabilitated (Moreton Is. East Coast 18/3/09).

3.3 North coast bays, rocky shores and cliffs

- The north coast bays, rocky shores and cliffs were inspected by 4WD vehicle and on foot between 1130 and 1430 on Wednesday 18 March 2009.
- There is significant oiling of this area, including on the sand beaches within the small coves and bays between the rocky headlines and along the cobblestone beaches, as well as oiled bands along the cliff-lines up to the upper wave splash-line. In some areas pools of liquid oil remain in nooks and crannies in the rocks (Figures 21 to 27).
- These are extremely high-energy areas subject to significant wave and wind action and we did not observe much sessile fauna on the clean areas of the rocky shores.
- The area off Cape Moreton is known to be regularly used by sea turtles and we did observe one individual swimming and occasionally surfacing in this area, when surveying the coastline from the cliff-top. The area is zoned as Marine National Park (Green Zone) under the Moreton Bay Marine Park Zoning Plan.
- The oiling on the rocky shores and cliffs at the northern tip of Moreton Island does not present a major ecological threat to the shoreline itself, as these rocky surfaces have very little biological activity. Oil will be washed back off the rocks during storm events however it will be in highly weathered form and in small clumps and patches, so is unlikely to pose a threat to turtles and other marine life in the area.
- If turtles use the small beaches/coves in the area for nesting there may be some chance of oiling if they move through the oil line on these beaches – and this should be investigated further.
- Clean-up operations in these very rugged and difficult areas could be unsafe to clean-up crews. As well as being dangerous; clean-up attempts may also cause greater ecological impacts than if the oil is left to degrade naturally. It is therefore recommended that the oil is best left in place to weather and breakdown naturally by the effects of the sun, wind, waves and storms.
- The exception is Honeymoon Bay – where it is recommended that a *Rocky Shores Response Plan* be developed and implemented to clean this bay completely, including rocky and cliff areas, for human health, social amenity, and socio-economic reasons. Methods are available and this should be achievable without too much difficulty if implemented carefully.

Suggested principles and elements of Rocky Shores Response Plan

- It is recommended that the *Rocky Shores Response Plan* adopt the following principles:

- It should give highest priority to protecting safety of human life and health, especially in relation to the rugged, in-accessible, surf-pounded rocky cliffs and foreshores.
 - It should seek to achieve the objective of restoring the social amenity of Honeymoon Bay, within the concept of net environmental benefit.
 - It should be formulated and agreed by a *small* Rocky Shores Response Team comprising MSQ, EPA/QPWS plus external rocky shores ecologist(s), and with appropriate operational inputs (e.g. re. use of high-pressure sprays, dispersants, skimmers, booms etc).
 - It should be approved by EPA/QPWS as well as the MSQ State Marine Pollution Controller prior to implementation.
 - Any and all methods used should initially be applied on a trial basis to a small area of the rocky shores only – evaluated for effectiveness and adapted as required.
- It is recommended that the *Rocky Shores Response Plan* trial the following methods:
 - Remove the small boulders/rocks from the strand-line on the south-west curve of Honeymoon Bay (Figure 25) and wash/de-oil these individually using fully enclosed rock-washing buckets (ideally without dispersant). Contain all wash waste and treat as oily waste.
 - Remove all surface oil from the sand where the boulders are removed from – using standard manual techniques (shovels and rakes). Replace the cleaned rocks along this area.
 - Trial high pressure washing (with seawater only – NO dispersant) of the oiled strandlines along the cliffs immediately within Honeymoon Bay (Figures 26 & 27). Ensure appropriate containment of wash-off (e.g. absorbent pads and sausages along base of areas being washed).
 - Cordon-off and sign-post the oiled cliff areas to north-west of Honeymoon Bay area.
 - Implement a simple long-term monitoring program (including regular aerial photography) to assess and document rates of natural weathering and de-oiling of the whole rocky foreshore and cliff area from Honeymoon Bay to the north side of Moreton Island.

Figures for Section 3.3.



Figure 21: Oiling on rocky shorelines and cliffs at the north eastern end of Moreton Island
(Moreton Is. North East Coast 18/3/09).



Figure 22: Oiling on rocky shorelines and cliffs – such oil in these in-accessible, high energy areas should be left to degrade naturally and self-cleaning of these areas should be systematically monitoring into the future (Moreton Is. North East Coast 18/3/09).



Figure 23: Oiling on rocky shorelines and cliffs – leave to degrade naturally and systematically monitor the self-cleaning process over time (Moreton Is. North East Coast 18/3/09).



Figure 24: Oiling on rocky shorelines and cliffs (Moreton Is. North East Coast 18/3/09).



Figure 25: Oiled boulders on strand line at Honeymoon Bay. This is a high-use recreational area and it is recommended that these boulders be cleaned on site using rock-washing buckets (Moreton Is. North Coast 18/3/09)



Figure 26: Oiled rocks and cliffs at Honeymoon Bay. This is a high-use recreational area and it is recommended that bulk oil pools be removed manually and cleaning of the oiled cliffs be *trialed* using high-pressure water jets (NO dispersants) – and strictly controlled and evaluated (Moreton Is. North Coast 18/3/09).



Figure 27: Oiled rocks and cliffs at Honeymoon Bay – trial cleaning with high-pressure water jets (Moreton Is. North Coast 18/3/09).