

**In the matter of the *Commissions of Inquiry Act 1950*
Commissions of Inquiry Order (No.1) 2011
Queensland Floods Commission of Inquiry**

First Witness Statement of Peter McGinnity

I, Peter McGinnity of Reef HQ Building, Flinders Street East, Townsville in the State of Queensland, say as follows:

1. I was appointed to my current position of General Manager for Environment and Sustainability with the Great Barrier Reef Marine Park Authority (**the Authority**) on 30 June 2008 having started my career with the Authority in February 1983.
2. I have an Honours Degree in Australian Environmental Studies from Griffith University, Brisbane, conferred in 1981.
3. As General Manager with the Authority I am responsible for the Authority's programs addressing:
 - ecosystem conservation and sustainable use
 - Indigenous partnerships
 - coastal ecosystems
 - water quality
 - climate change, and
 - science coordination.
4. The Great Barrier Reef stretches more than 2,000 km along Queensland's north-east coast. Most of the Great Barrier Reef is protected in the Great Barrier Reef Marine Park (**the Marine Park**). The Marine Park extends to the low water mark along the Queensland coast between the tip of Cape York and south to just north of Bundaberg. Specified areas which are generally associated with ports, coastal estuaries and fresh waters streams are outside of the boundaries of the Marine Park. Attached hereto and marked **PM1** is a map showing the Marine Park boundaries.

5. The Queensland Parks and Wildlife Service is responsible for managing the parts of the Great Barrier Reef that are outside the Marine Park and the three marine parks that are outside the Marine Park, namely:
 - the Great Barrier Reef Coast Marine Park
 - the Great Sandy Marine Park, and
 - the Moreton Bay Marine Park.
6. The Authority is a statutory authority established under the *Great Barrier Reef Marine Park Act 1975* (Commonwealth) and is responsible for the care and development of the Marine Park. A joint Field Management Program has been established by the Commonwealth and Queensland governments. Under this program the Authority and the Queensland Parks and Wildlife Service have a coordinated program for day-to-day management of the Great Barrier Reef Marine Park and the Great Barrier Reef Coast Marine Park.
7. I make this statement in response to a request for information from the Queensland Floods Commission of Inquiry dated 16 November 2011. The headings in this statement are taken from the Commission's request for information.
8. Except where otherwise stated, I make this statement from my own knowledge and on information and belief after making enquiries within the Authority.

Item 1. Brief overview of the ecological situation related to the reported deaths of large numbers of dugongs, turtles and dolphins in Queensland waters, and the diseases affecting fish in the Gladstone harbour since the 2010/2011 floods

9. The summer of 2010-11 was characterised by extreme weather events in the Great Barrier Reef Region. Intense rainfall caused major flooding in Great Barrier Reef catchments from December 2010 to March 2011, which led to prolonged flood plumes in all inshore areas. In northern Queensland, the impacts from the floods were exacerbated by Tropical Cyclone Yasi, which was the first cyclone since 1918 to cross the Queensland coast as a category 5, and caused extensive damage to coastal communities between Cairns and Townsville in early February 2011. This exposed several hundred kilometres of the Great Barrier Reef to destructive winds. At its peak, Tropical Cyclone Yasi created wind gusts of 285 km per hour and its immense size

meant that gale force winds were experienced along nearly 760 km of coastline between Mackay and Cooktown.

Impacts on Dugong, Turtle and Dolphins

10. As a result of these extreme weather events there has been a significant decline in seagrasses along the urban coast of Marine Park (Cairns south). Prior to the extreme weather events of 2010-11 monitoring had identified that seagrass meadows in the affected area were already in a vulnerable condition with declining trajectories reported throughout much of this region.¹ The extreme weather impacts exacerbated the already stressed seagrass ecosystems. Overall there are indications that seagrass meadows along the urban coast are continuing to decline and are now in a very poor state.
11. One of the primary drivers for the seagrass declines is that these plants have become stressed by repeated periods of turbid water and low salinity that occurs following flooding in the coastal catchments. Seagrass is the main food for dugong and green turtles. The Authority, in collaboration with the Queensland Department of Environment and Resource Management (DERM), has an established marine strandings reporting program that records reported strandings of dugong and turtle. The information collected through the marine strandings reporting program has identified that the increased number of deaths of marine mammals and turtles along the Queensland coast including the Gladstone area is primarily related to the loss of seagrass meadows. The seagrass decline was exacerbated by the impacts of Tropical Cyclone Yasi, which also caused significant physical damage to seagrass meadows in waters around Hinchinbrook Island and south as far as Townsville.
12. The ecosystem-level impacts of the seagrass decline are demonstrated by the poor body condition of many of the dugongs and marine turtles turning up dead between Cairns and Hervey Bay. This finding has been supported by in-water assessments of live marine turtles conducted by the Authority, DERM and James Cook University experts at a range of locations including Gladstone Harbour, Edgecombe Bay, Cleveland Bay and waters around Hinchinbrook Island and that indicate that a high proportion of animals are in poor condition, with some animals in very poor condition. From these assessments it

¹ The monitoring was conducted by the Authority's Reef Water Quality Protection Plan's Paddock to Reef Integrated Monitoring, Modeling and Reporting Program. For further details, see <http://www.reefplan.qld.gov.au/measuring-success/paddock-to-reef.aspx>.

is clear that the reduction of seagrass has led to a loss of body condition, and subsequent high levels of mortality. Marine animals in poor health are also less able to fight diseases, strong ocean currents or escape entanglement in fishing gear. The poor body condition also contributes to turtles becoming sluggish and having reduced breath-holding capacity, which means turtles are spending more time at the surface and travelling further distances in search of food, increasing the likelihood of boat strikes.

13. The level of mortality of dugongs and marine turtles in 2011 is the highest recorded since the marine stranding reporting program began in 1996. For the period 1 January 2011 to 14 November 2011 there have been 181 reports of dugong strandings compared with 74 for 2010, 49 for 2009 and 41 for 2008 during the same period. Turtle strandings for the same period in 2011 were 1317; compared with 672 in 2010, 772 in 2009 and 691 in 2008. Reports on marine wildlife strandings are available at: http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/caring_for_wildlife/marine_strandings.html.

Fish Disease in Gladstone Harbour

14. The regulation of water quality and fish health is the responsibility of States and Territories. Since September 2011, Fisheries Queensland along with Biosecurity Queensland have been conducting tests on marine life to assess reports of an infection outbreak in barramundi and other fish species in Gladstone Harbour. The area under investigation is not within the Marine Park and therefore the Authority has not been directly responsible for any aspects of the investigation of the infection outbreak. The Authority is liaising closely with Fisheries Queensland and is an observer on the Gladstone Fish Health Scientific Panel that has been established by the Queensland Government to review the monitoring and test results.
15. Test results provided by Fisheries Queensland on marine life samples taken from Gladstone Harbour have confirmed a parasitic flatworm as the cause of cloudy eyes in barramundi, and found no parasitic, bacterial or fungal pathogens on other species tested so far. Red skin discoloration and abrasions are being found in other species including shark in the harbour but these discolorations are thought to be due to parasites and samples have been taken by Fisheries Queensland and sent for confirmation.
16. No direct link between the observed water quality monitoring data and the outbreak of fish disease in Gladstone Harbour has been found and the cause of the outbreak has not been determined, although Fisheries Queensland have suggested that: "*Overtopping events at Awoonga Dam between December 2010 and March 2011 resulted in a*

*significant number of stocked barramundi moving into the Boyne River estuary and Gladstone Harbour. These fish suffered physical stress during the floods, including changes in salinity and turbid water, and were subsequently exposed to low temperatures during winter. The overall effect of these events was increased stress levels in the fish, which made them more susceptible to diseases and /or parasites."*²

17. Fisheries Queensland and DERM advise that they are continuing to conduct further sampling, including water quality monitoring and toxicology testing on samples to examine fish tissue residues of heavy metals, agrichemicals and hydrocarbons. Further results are expected in late November 2011.

Reports detailing fish sampling results are available at:

http://www.dpi.qld.gov.au/28_20943.htm.

Water quality data and management plans for Gladstone harbour works are also publically available at:

<http://www.gpcl.com.au/OperationsDevelopment/CurrentProjects/WesternBasinDredgingandDisposalProject.aspx>

<http://www.westernbasinportdevelopment.com.au/>

http://www.derm.qld.gov.au/environmental_management/water/water_quality_monitoring/gladstone.html

Item 2. Brief overview of any other major ecological damage observed in Queensland waters (fresh and salt) which is temporally connected with the 2010/2011 floods (confine to those parts of Queensland where non-cyclonic flooding occurred)

18. The extreme weather events of the 2010-11 summer have resulted in extensive impacts on the Great Barrier Reef ecosystem, however, these events are significant not only because of their individual impacts, but also because of their longer-term cumulative impacts. The speed and success of ecosystem recovery (resilience) after an extreme weather event is influenced by the temporal and spatial distribution of past events (Figure 1) and by the chronic effects of background pressures.

² See http://www.dpi.qld.gov.au/28_20898.htm.

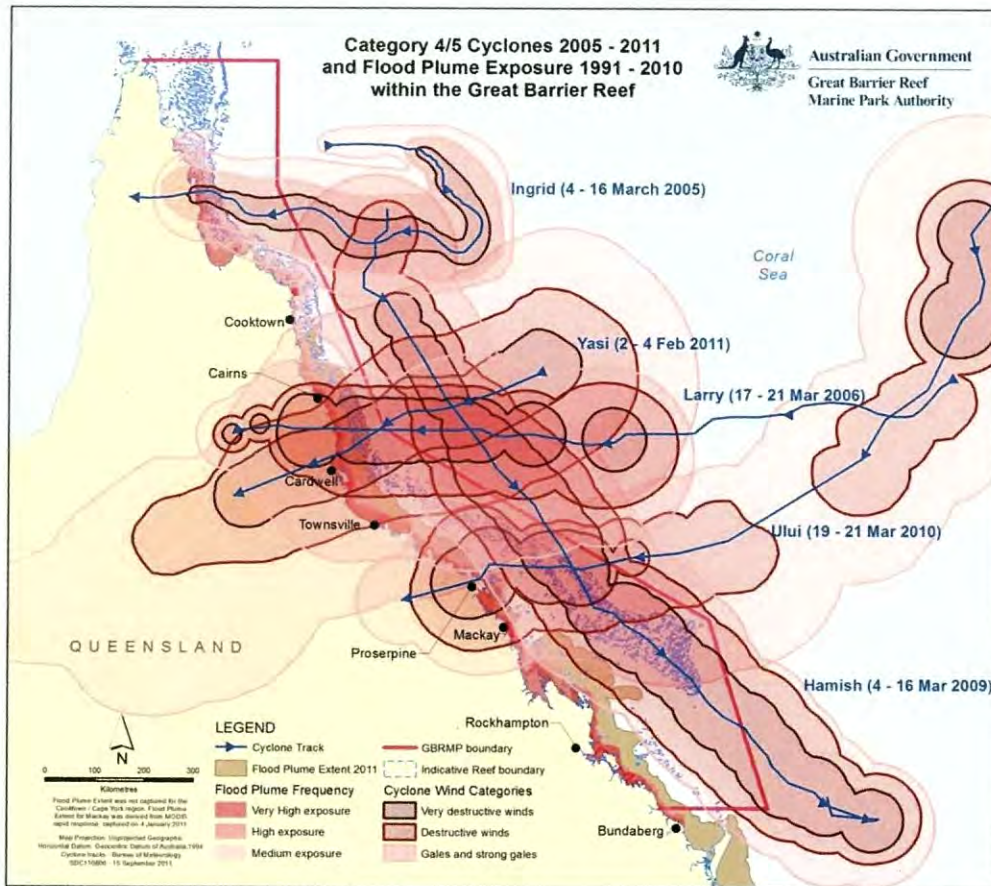


Figure 1 Paths of Category 4/5 cyclones incident on the Great Barrier Reef Region from 2005 – 2011 overlaid with an estimation of the long term coastal flood plume exposure.

19. Extensive coral damage from Cyclone Yasi extended across an area of approximately 89,090 km² of the Marine Park. In total, approximately 15 per cent of the total reef area in the Marine Park sustained some coral damage and six per cent was severely damaged. Most of the damage occurred between Cairns and Townsville. Reefs beyond the northern limit of the destructive wind band (around Port Douglas) appear to have escaped severe damage, although tourism operators reported minor damage at some sites, especially those characterised by high cover of fragile branching and plate corals. Surveys of inner shelf reefs between Townsville and the Whitsundays recorded low levels of recent reef damage.
20. Low levels of flood-related coral damage occurred on shallow inshore fringing reefs along much of the coastline, however the most significant flood-related coral damage centered on the Keppel Bay region in central Queensland, where corals in shallower areas suffered very significant impact.

Item 3. Actions taken by the GBRMPA to determine the cause of the ecological damage described in items 1 and 2 above

21. The Authority, in partnership with the Queensland management agencies (DERM and Department of Employment, Economic Development and Innovation (**DEEDI**)), research agencies and reef stakeholders, implemented the Extreme Weather Response Program 2010/2011 (**the Program**). The Program was supported by \$1.08 million of funding under the Commonwealth Government's Caring for Our Country initiative.
22. The Authority is also represented on the Environment Sub-Committee of Operation Queensland: The Community, Economic and Environmental Recovery and Reconstruction Plan, led by DERM and established to provide environmental advice and coordinate environmental response planning for Operation Queensland. Through its representation on this Sub-Committee, the work of the Program is integrated with the work of Operation Queensland.
23. Wherever practical, the Program also built upon existing management programs including:
- the Authority's Integrated Eye on the Reef community based monitoring program³
 - the Marine Park Field Management Program⁴
 - the Reef Rescue Marine Monitoring Program⁵, and
 - the joint Commonwealth Government and Queensland Government Reef Water Quality Protection Plan⁶.
24. The bulk of the Program's activities were completed by 30 June 2011. Some longer running projects, such as satellite tracking of dugong and green turtles, continue into 2011-12. Attached hereto and marked **PM2** is a report of the impact assessments and initial management responses resulting from the program.

³ <http://www.gbrmpa.gov.au/about-the-reef/how-the-reefs-managed/science-and-research/our-monitoring-and-assessment-programs/eye-on-the-reef>

⁴ <http://www.gbrmpa.gov.au/about-the-reef/how-the-reefs-managed/field-management-of-the-great-barrier-reef-marine-park>

⁵ <http://www.gbrmpa.gov.au/about-the-reef/how-the-reefs-managed/science-and-research/our-monitoring-and-assessment-programs/reef-rescue-marine-monitoring-program>

⁶ <http://www.reefplan.qld.gov.au/about.aspx>

Item 4. Were the actions identified in Item 3 above intended to determine the causal contribution of:

- a. displacement of sediment by the 2010/2011 floods**
 - b. agricultural runoff, including the impact of chemicals and fertilisers, which occurred during the 2010/2011 floods**
 - c. discharge of water from mines, power stations and/or coal seam gas projects due to an excess of water caused by the 2010/2011 floods to the ecological damage.**
25. The Authority's monitoring addresses water quality in the Marine Park broadly, and is conducted in conjunction with the Reef Water Quality Protection Plan's Paddock to Reef Integrated Monitoring, Modeling and Reporting Program (**the Reef Water Quality Program**) that targets agricultural run-off specifically.⁷
26. The Reef Water Quality Program sampled suspended sediment and conducted sampling to estimate the loads of agricultural chemicals and fertilisers for each river catchments adjacent to the Great Barrier Reef.
27. While the Reef Water Quality Program may detect other pollutants, besides suspended sediment and agricultural chemicals and fertilisers, it does not target or seek to identify specifically sources of possible pollution from mines, power stations and/or coal seam gas projects. DERM is responsible for regulating the water discharges from flooded mines under conditions specified under the *Environment Protection Act 1994* (Queensland). A transitional environmental program can be applied for under the *Environment Protection Act 1994* (Queensland) when an approval holder cannot comply with the conditions.
28. The Extreme Weather Response Program enabled tactical additions to the Authority's regular water quality monitoring (ie, the Reef Rescue Marine Monitoring Program (**Marine Monitoring Program**)), which is undertaken in collaboration with the Australian Institute of Marine Science, James Cook University, the University of Queensland, Fisheries Queensland, and the CSIRO. Through this enhanced collaboration, the Marine Monitoring Program was able to gather more comprehensive information about the

⁷ See <http://www.reefplan.qld.gov.au/measuring-success/paddock-to-reef.aspx>.

effects of the recent floods and cyclones on water quality, intertidal seagrass and inshore coral reefs.

29. Technical reports for each component of this work are currently being finalised through peer review. However, integrated assessment and modeling of the results is yet to be commenced, and this modeling and assessment will be required in order to estimate the relative contribution of the various pollutants. This integration is scheduled to be completed for inclusion in the Reef Water Quality's Annual Report for 2011-12.
30. The integration of the special extreme weather response impact assessment into the Marine Monitoring Program provides valuable synergies in effort and knowledge outcomes. The results of the additional monitoring will be delivered as part of the annual reporting schedule for the Reef Water Quality's Annual Report for 2011-12. Some preliminary results are outlined below.

Water quality

31. Given the abnormally large and persistent flood plumes in the summer of 2010-11, the Authority increased the water quality-sampling component of the Marine Monitoring Program, with a particular focus on the Fitzroy region. Parameters measured included measures of suspended sediment, chlorophyll-*a* (as a proxy for phytoplankton biomass), colored dissolved organic matter (CDOM), dissolved and particular nutrients, salinity, temperature and pesticides. Depth profiles of temperature, light attenuation and salinity were also taken at a number of locations. Impacts seen included elevated concentrations of dissolved nutrients, fine suspended sediment, chlorophyll-*a* and some pesticides. Flood water exposure maps are also produced based on satellite imagery of visible flood plumes collected over multiple days.
32. The additional water quality sampling work funded by the Extreme Weather Response Program has improved the spatial and temporal extent, and resolution, of water quality analyses in the wake of the floods, particularly for inshore areas. It will also help grow our understanding of links between short term (acute) impacts associated with elevated pollutant concentration levels in flood plumes and the long term (chronic) impacts of increases in annual mean supply of pollutants to the Reef.

Seagrass

33. Additional sampling was conducted within the seagrass health-monitoring component of the Marine Monitoring Program. This work aimed to deliver improved geographic mapping of seagrass health in affected areas of the Marine Park. Initial analysis of

monitoring data has identified that intertidal and sub-tidal seagrass loss has occurred in areas between Cairns and Hervey Bay as result of prolonged flooding, and these impacts were exacerbated by Cyclone Yasi particularly around Hinchinbrook Island, but also more broadly between Cairns and south to Townsville.

34. The Australian Institute of Marine Sciences re-surveyed a series of deepwater locations in the Townsville region where significant areas of seagrass had been identified previously. Results from video collected by their autonomous underwater vehicle indicate deepwater seagrass has declined markedly at these sites. The physical impacts of Cyclone Yasi are the most likely cause of this decline.
35. The floods and cyclones of 2010-11 have come on top of a long-term decline in water quality along the urban coast which has resulted in reduced seagrass resilience.⁸ As a result, the ability of seagrasses to recover is uncertain in some areas.

Coral Reefs

36. In the weeks immediately after the cyclone hit, the Authority completed a rapid assessment of the impacts of cyclone Yasi on reefs. The survey teams completed 882 rapid reef health surveys (using the Reef Health and Impact Survey protocol) to provide an assessment of damage at 76 reefs spanning 500 km of the Marine Park between Port Douglas and Airlie Beach. Teams included participants from the Authority, the Queensland Parks and Wildlife Service, the tourism industry, and the Australian Institute of Marine Science. Data were entered into the recently developed integrated Eye on the Reef knowledge management system.
37. Exposure of coral reefs to Cyclone Yasi was extensive. Surveys indicate that 15 per cent of the total area of the World Heritage Area sustained some coral damage, with six per cent severely damaged. Most of the damage to coral reefs occurred between Cairns and Townsville, with many reefs near the eye of the cyclone suffering extensive damage.
38. Low levels of flood-related coral damage occurred on shallow inshore fringing reefs along much of the coastline, however the most significant flood-related coral damage centred on the Keppel Bay region in central Queensland, where corals in shallower areas suffered very significant impact.

⁸ See: <http://www.reefplan.qld.gov.au/measuring-success/report-cards/first-report-card.aspx>.

39. Initial reports from various sources early in 2011 suggested that many reefs in Keppel Bay had suffered coral bleaching and mortality as a result of floodwaters, particularly the large discharge from the Fitzroy River. Preliminary and follow up flood impact surveys were conducted by a range of partners between February and June 2011. During follow up surveys in May and June the Authority and Queensland Parks and Wildlife Service worked together to conduct 68 rapid reef health surveys (using the Reef Health and Impact Survey protocol) at six sites: Big Peninsula, Barren Island, Humpy Island, Monkey Beach, Miall Island and Sloping Rocks. These sites were selected because the Authority had collected comparable benthic cover data at each of these sites in January 2010.
40. Results from these surveys were consistent with findings from earlier preliminary surveys in the Keppel Islands: extensive coral bleaching and mortality at fringing reefs from protracted exposure to low salinity and high turbidity conditions. In general, near-shore south/western aspect fringing reefs at depths less than 5 metres showed 85 to 100 per cent mortality. Depth was a crucial factor as freshwater tends to sit on top of the more dense saltwater, creating a low salinity layer. In Keppel Bay, the freshwater from the Fitzroy River flood plume formed a low salinity layer within the first 1.5 meters of water, and generally did not impact organisms below this depth.
41. Across the six sites listed above, coral cover decreased on average by around 44 per cent between January 2010 and June 2011. The nature and extent of this flooding impact is similar to that following the 2006-07 thermal bleaching event, where there was an estimated 40 per cent coral mortality. Disease was also prevalent in the wake of the 2011 flooding event, with much of the remaining live coral at sites surveyed by the Authority and various partner organisations exhibiting signs of coral disease (White Syndromes). This is consistent with Australian Institute of Marine Sciences observations of increased coral disease prevalence following previous flood events at other locations in the Marine Park.
42. The loss of corals was not uniform even in the worst cyclone and flood affected locations, with some areas of relatively undamaged reef remaining that will assist in the recovery process; nevertheless full recovery of reefs will take decades. Fortunately, coral damage in the tourism centres of Cairns, Port Douglas and the Whitsundays was only minor.

Biodiversity

43. Understanding the impacts on species of conservation concern, such as dugong and marine turtles, was an important focus for the Extreme Weather Response Program. Seagrass meadows are critical foraging areas for both species, and significant changes in movements and health have been recorded following declines in seagrass associated with similar extreme weather events in the past.
44. Early in 2011 the Authority met with leading dugong researcher Professor Helene Marsh from James Cook University who advised that the likely impacts from the extreme weather events would be:
- Seagrass dieback, especially of sub-tidal seagrasses.
 - Increased movement of dugongs in search of food. Change of diet to include less nutritionally desirable species; more fibrous seagrasses not often eaten and more algae.
 - Increased dugong mortality manifested in increased dugong strandings.
 - Delayed reproduction.
45. Based on these predictions, the Authority's seagrass and biodiversity response was designed to enhance or initiate programs to collect information to better understand the flow-on effects of the floods and cyclone to seagrass meadows and the dugongs and green turtles that rely on this habitat as a critical food source.
46. The level of mortality of dugong and marine turtles in 2011 is the highest ever recorded since the marine stranding reporting program began in 1996. Symptoms of poor nutritional status in recently stranded animals are consistent with observations of reduced distribution and health of seagrass in the wake of the extreme weather, and further extensive mortality is expected over the coming months.

Item 5. Whether the actions taken by the GBRMPA have allowed a definitive conclusion as to the causes of the ecological damage or relative contributions of different causes, and

a. if so, what conclusion has been reached and the basis for that conclusion

b. if not:

i. what does the GBRMPA consider to be the likely causes of the ecological damage or relative contributions of different causes, and the basis for that opinion

- ii. **what further work would be required to come to a definitive conclusion, the timeframes over which that work could be completed and any barriers to its completion**

47. As stated above, while the extensive flooding and the impacts of Cyclone Yasi have had very substantial ecological impacts in the Marine Park, these impacts are exacerbated by the cumulative effects of cyclones and flooding events over several years, and by the long-term decline in water quality from coastal pollutants. Consequently, the observed impacts on the Great Barrier Reef ecosystems are not likely to have occurred as a result of a single event, but are likely to be the result of a series of impacts that have occurred over the last 5 years or longer.

Item 6. What actions can be taken, if any, to minimise the impact of displacement of sediment by flooding on marine and freshwater ecosystems and for each action that can be taken:

- a. **whether that action has been taken by the GBRMPA, and if so when,**
- b. **whether or not the GBRMPA intend to take that action and in either case, the reason for that intention**
- c. **the timeframe over which that action could be completed for areas significantly affected by sediment displacement**
- d. **any barriers to the completion of that work**

48. The priority actions required to address pollutants from catchment run-off and flooding affecting the Marine Park are set out in the Reef Water Quality Protection Plan (**the Reef Plan**). These actions need to be undertaken in the catchment, outside of the direct jurisdiction of the Authority.

49. The Reef Plan is a joint Australian and Queensland Government initiative that specifically focuses on catchment sources of pollutants including sediments, nutrients and pesticides affecting the Great Barrier Reef. The Reef Plan sets targets for water quality and land management improvement, and identifies actions to improve the quality of water entering the reef. Initially established in 2003, the plan was updated in 2009. It details specific actions and deliverables to be completed.

50. The goal of the Reef Plan is:

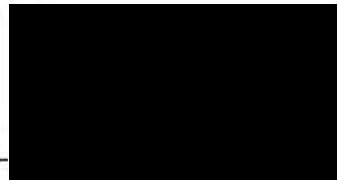
- To halt and reverse the decline in water quality entering the reef by 2013.
- To ensure that, by 2020, the quality of water entering the reef from adjacent catchments has no detrimental impact on the health and resilience of the Great Barrier Reef.

Further details of the Reef Plan actions are available at:

<http://www.reefplan.qld.gov.au>.

51. A recent review of the progress towards implementing Reef Plan identified that: *"Significant progress has been made with implementing Reef Plan actions and activities. Partners are also engaged and committed to Reef Plan. These are all positive signs that we are on the right trajectory to achieving the 2013 targets and longer term goals."*⁹ The Authority has been very closely engaged in the development and review of the Reef Plan, and considers that the actions identified are addressing the highest priority needs and supports the conclusion that significant progress is being made. While the current signs are positive further review will be required to determine whether this progress will be sufficient to achieve the 2020 goal.¹⁰

Date: 24 November 2011



Peter McGinnity

⁹ See <http://www.reefplan.qld.gov.au/measuring-success/report-cards/assets/interim-activity-report.pdf>

¹⁰ See <http://www.reefplan.qld.gov.au/measuring-success/report-cards/assets/interim-activity-report.pdf>.