*Parliamentary Standing Committee on Public Works*

# REPORT

**relating to the**

## PROVISION OF NAVIGATIONAL AIDS, HYDROGRAPHERS PASSAGE

## GREAT BARRIER REEF

**(Eleventh Report of 1983)**

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA
1983

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PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

# R E P O R T

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# PROVISION OF NAVIGATIONAL AIDS, HYDROGRAPHERS PASSAGE,

Great Barrier Reef

(Eleventh Report of 1983)

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE
ON PUBLIC WORKS

(Twenty-Seventh Committee)

Senator Dominic John Foreman (Chairman)

The Honourable Wallace Clyde Fife, M.P. (Vice-Chairman)

| Senate | House of Representatives |
|---|---|
| Senator Gerry Norman Jones | David Bruce Cowan, Esq., M.P. |
| Senator Bernard Francis Kilgariff | Peter Hertford Drummond, Esq., M.P. |
| | Leonard Joseph Keogh, Esq., M.P. |
| | Eamon John Lindsay, Esq., M.P. |
| | John Saunderson, Esq., M.P. |

EXTRACT FROM

THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES
NO. 28 DATED 6 OCTOBER 1983

PUBLIC WORKS COMMITTEE - REFERENCE OF WORK - GREAT BARRIER REEF - NAVIGATIONAL AIDS: Mr Hurford (Minister for Housing and Construction), pursuant to notice, moved - That, in accordance with the provisions of the Public Works Committee Act 1969, the following proposed work be referred to the Parliamentary Standing Committee on Public Works for consideration and report: Provision of navigational aids, Hydrographers Passage, Great Barrier Reef.

Mr Hurford presented plans in connection with the proposed work.

Debate ensued.

Question - put and passed.

## WITNESSES

Clague, I.M., Esq., Senior Engineer, Technical Division, Premier's Department, P.O. Box 185, Brisbane North Quay, Queensland

Cochrane, J., Esq., Chairman-Technical Committee, Australian Chamber of Shipping, 60 Pitt Street, Sydney, New South Wales

Eaton, D.R., Esq., Associate Director Projects, Department of Housing and Construction, 145 Eagle Street, Brisbane, Queensland

Eccles, P.B., Esq., First Assistant Secretary, Marine Operations Division, Department of Transport, P.O. Box 594, Civic Square, Australian Capital Territory

Emmery, M.K., Esq., Assistant Director, Economic Assessment Branch, Bureau of Transport Economics, P.O. Box 501, Civic Square, Australian Capital Territory

Gilmour, Dr A.J., Executive Officer, Great Barrier Reef Marine Park Authority, P.O. Box 1379, Townsville, Queensland

Grant, Captain D.J., Navigation Spokesman, The Queensland Coast and Torres Strait Pilot Service, G.P.O. Box 1573, Sydney, New South Wales

Holden, Captain J.D.

(1) General Manager, Dalrymple Bay Coal Terminal Pty Ltd, M.S. F283, Mackay, Queensland

(2) Invited Representative, Queensland Coal Owners' Association, G.P.O. Box 908, Brisbane, Queensland

Osborn, Captain RAN (Retd) J.H.S., Part-time Employee, Marine Operations Division, Department of Transport, P.O. Box 594, Civic Square, Australian Capital Territory

Snelgrove, Captain J.R., Representative, The Queensland Coast and Torres Strait Pilot Service, G.P.O. Box 1573, Sydney, New South Wales

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Toomey, J.J., Esq., Member, Queensland Coal Owners' Association, G.P.O. Box 908, Brisbane, Queensland

Wilkinson, F.L., Esq., Assistant Secretary Maritime Works Branch, Department of Housing and Construction, 470 Northbourne Avenue, Dickson, Australian Capital Territory

Wohlfahrt, B.E., Esq., Project Manager, Department of Housing and Construction, 145 Eagle Street, Brisbane, Queensland

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APPENDIX A

CONSTRUCTION



ILLUSTRATIONS

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

# PROVISION OF NAVIGATIONAL AIDS, HYDROGRAPHERS PASSAGE, GREAT BARRIER REEF

## R E P O R T

By resolution on 6 October 1983 the House of Representatives referred to the Parliamentary Standing Committee on Public Works for investigation and report to Parliament the proposal for the provision of navigational aids, Hydrographers Passage, Great Barrier Reef.

The Committee has the honour to report as follows:

## THE REFERENCE

1. The proposal is for the provision of maritime navigational aids to mark a deep water channel through the Great Barrier Reef known as Hydrographers Passage. It will enable ships operating between central Queensland ports and the North Pacific and Asian regions to safely use the passage with resultant savings in shipping costs due to reduced steaming times.

2. The proposal will comprise four major lighthouse towers, each equipped with automatic lights, and a smaller structure surmounted by a radar reflector.

3. The estimated cost of the proposed work when referred to the Committee was $4.75 million at September 1983 prices.

## THE COMMITTEE'S INVESTIGATION

4. The Committee received written submissions and drawings from the Department of Transport and the Department of Housing and Construction and took evidence from their representatives at a public hearing in Mackay on 22 and 23 November 1983. Written submissions were also received from the Great Barrier Reef Marine Park Authority, the Queensland Government, the Queensland Coast and Torres Strait Pilot Service, the Australian Chamber of Shipping, the Queensland Coal Owners' Association, and the Dalrymple Bay Coal Terminal Pty Ltd, and evidence was taken from their representatives at the public hearing. Submissions only were received from Southern Pacific Petroleum NL, and the Queensland Chamber of Mines Ltd.

5. On 23 November 1983 a Sectional Committee made an aerial inspection of Hydrographers Passage and the sites for the proposed navigational aids by arrangement with Whitsunday Airways.

6. The Committee's proceedings will be printed as Minutes of Evidence.

## BACKGROUND

7. With the development of the coal mines in central Queensland and the establishment of the first coal loading terminal at Hay Point in 1972, it became apparent that considerable savings in steaming distance for ships could be achieved if a new deep water shipping channel could be found through the Great Barrier Reef.

8. The existing shipping passages used by bulk carriers from central Queensland ports are Palm Passage in the vicinity of Townsville, and Capricorn Channel in the Rockhamptown/Gladstone area. A new shipping passage in the Mackay area would offer a more direct route to Japan and other North Pacific ports. See Illustration A.

9. Satellite photography in the early 1970s indicated that there were several possibilities for a deep draught passage through the Reef to the northeast of Mackay. Possible routes were examined, and the RAN Hydrographic Service confirmed the existence of Hydrographers Passage by surveying work carried out between September 1981 and April 1982.

10. Further surveying work in January and February 1983 confirmed the suitability of the proposed outer extremity of the route, and demonstrated that the channel could be navigated safely by large bulk carriers provided suitable navigational aids are established.

## THE NEED

11. Benefits of Hydrographers Passage The need for developing Hydrographers Passage as a new shipping route has arisen mainly as a result of increasing coal exports from Hay Point since 1970. Hydrographers Passage will provide the shortest exit to the Coral Seal from Hay Point and will reduce the round trip distance to Japan and other North Pacific ports by approximately 450 nautical miles.

12. The major users of Hydrographers Passage will be bulk carriers of 60,000 to 175,000 deadweight tons, engaged in the coal export trade between Hay Point and the North Pacific. About 2 to 3 vessels per day are expected to use the passage when it is established.

13. The opening of Hydrographers Passage for navigation will not in itself result in an increase in shipping in Great Barrier Reef waters. Vessels using the passage will be those which would otherwise use the previously mentioned alternative routes.

14. Economic Evaluation In August 1982 the proposal was referred to the Bureau of Transport Economics (BTE) for economic evaluation. The BTE published a report on the proposal in December 1982 - Occasional Paper No. 56.

15. In its report the BTE estimated that a commercial ship operating between Hay Point and the North Pacific region would save on average about $22,300 per round trip if total vessel operating costs are taken into account. If only direct voyage costs (fuel only) are taken into account, the savings will be about $5,500 per round trip. The cost of using a pilot at $5,000 per transit was allowed for in these estimates, but if regular users of the Passage do not use a pilot, the estimated savings will be greater.

16. The report also indicates that a substantial share of the benefits of Hydrographers Passage will flow to foreign interests. However, this will be offset by cost recovery from overseas ship operators and a long term improvement in the competitive position of Australian coal.

17. Need for Navigational Aids Ships leaving Hay Point will first encounter Hydrographers Passage some 45 nautical miles northeast of the wharf. The passage is approximately 65 nautical miles in length from its inshore end, some 25 nautical miles southwest of Creal Reef, to its seaward entrance at White Tip Reef. See Illustration B.

18. For most of its length the Passage is relatively open and should present no navigational difficulties. However, the Passage is fairly confined for 10 nautical miles in the White Tip Reef/Litte Bugatti Reef area. See Illustration C. At its narrowest point, the seaward entrance between White Tip Reef and Bond Reef, the Passage is 1.5 nautical miles wide.

19. Ships will be required to make five changes of course to safely negotiate Hydrographers Passage. The five navigational aids are therefore required to guide ships between the reefs and shoals, all of which will be substantially submerged at all times, and to mark a track for them to follow. The aids will act as reference points for ships following particular bearings, and they will also indicate when changes of direction are necessary.

20. Committee's Conclusions Hydrographers Passage is required to provide a more direct route to Asian and North Pacific markets for coal export ships operating from central Queensland ports.

21. Five navigational aids are required to mark Hydrographers Passage to facilitate the safe passage of ships.

## THE PROPOSED WORK

22. Design The proposal consists of navigational aids at five locations as follows:

- White Tip Reef (South) - a rear main landfall light of 20 nautical miles range, a separate rear lead light of 14 nautical miles range, and a racon. (A racon, or radar transponder beacon, gives a distinctive morse code echo on a ships radar screen and enables the aid to be readily identified for position fixing.) The height of the light will be 40 metres above the reef surface, and a daymark of 20 square metres will be visible from true bearing 218 degrees.

- White Tip Reef (North) - a front lead light of 13 nautical miles range, and a standby light of 11 nautical miles range. The light will be 13 metres above the reef surface and a daymark of 20 square metres will be viewed from true bearings 002 and 218 degrees.

- Bond Reef - an unlit day beacon fitted with a radar reflector. The centre of the daymark will be 12 metres above the reef surface.

- Little Bugatti Reef - a light of 17 nautical miles range, and a standby light of the same range. The light will be 26 metres above the reef surface, and a daymark of 20 square metres will be viewed from true bearing 202 degres.

- Creal Reef - a light of 20 nautical miles range, a standby light of 17 nautical miles range, and a racon. The light will be 36.5 metres above the reef surface and a daymark of 20 square metres will be viewed from true bearings 061 and 165 degrees.

23. All light towers will be orientated north-south to suit solar energy collecting arrays. The towers have been designed for a life expectancy of at least 50 years and will provide a post disaster function by being capable of resisting cyclones.

24. Plans of the navigational aids are at Illustrations D and E.

25. Construction Offshore construction is costly and sensitive to variable environmental conditions. Also it is difficult to achieve high quality control for concrete in a marine environment. The preferred method of construction therefore minimises the amount of offshore work.

26. It is proposed that the reinforced concrete tower bases will be constructed on-shore in a dry dock to be constructed at Mackay Outer Harbour. The bases will then be towed to their respective sites with the assistance of pontoons.

27. The concrete base structures will be surmounted by a reinforced concrete equipment room, which will be supported above the largest waves likely to be generated under the most adverse weather conditions. They will be anchored by steel piles driven into the reef.

28. Stainless steel lattice towers will be erected above the equipment rooms, to give the required focal plane height of the navigation lights. The towers will suppport the lantern housing and the daymarks.

29. Construction details are at Appendix "A".

30. Cost Recovery The costs of operating the Commonwealth's marine navigational aids system are recovered through the imposition of light dues on commercial shipping. Light dues are currently 53 cents per net registered ton per quarter.

31. Light dues are applied uniformly to all ships required to pay them. Therefore the cost of Hydrographers Passage aids will be borne by all commercial ships engaged in Australian trade and not just those ships using Hydrographers Passage. It is expected that light dues will need to be increased by 1.9 cents per registered ton per quarter to recover the cost of the proposed navigational aids.

32. Supplementary Report The Department of Housing and Construction intends calling tenders for the work in January 1984, to enable scheduling of construction activities in accordance with likely favourable periods in the weather. To enable the Department to meet this self-imposed deadline, the Committee had no alternative but to complete its report within two weeks of the public hearing. Unreasonable demands have been placed on the Committee in this regard, and it is therefore critical of the Department for not referring the proposal to the Committee at a much earlier date. In this instance insufficient recognition has been given to the role of the Committee in the planning process for the proposed work.

33. In making a special effort to complete this report before the end of the 1983 parliamentary sittings, the Committee was not able to fully consider certain matters due to insufficient evidence.

34. When further information is received, the Committee intends preparing a supplementary report which will deal with maintenance arrangements for the proposed navigational aids. Specifically the Committee is seeking further evidence on cost comparisons of servicing the aids by ship or by helicopter. This has implications with regard to the need for helipads at each of the proposed sites.

35. The Committee is also awaiting further information, that the Department of Transport has undertaken to provide, about environmental protection measures that are adhered to by maintenance personnel. During the site inspection the Committee was concerned to find that old batteries from the automatic weather station had been discarded on Creal Reef. This conflicts with assurances that wastes were always removed by maintenance personnel, who generally have a high regard for the environment of the reef.

36. The supplementary report will be available early in 1984.

37. Committee's Conclusion The design of the proposed navigational aids is suitable.

38. Through the cost recovery process the proposed navigational aids will be self-financing.

## SITES

39. As previously indicated, the navigational aids will be constructed on White Tip Reef, Bond Reef, Little Bugatti Reef, and Creal Reef. See Illustrations B and C.

40. The sites were precisely determined to accurately mark the optimum route through Hydrographers Passage.

41. All structures will be situated on coral foundations. Coral is a difficult foundation material because of the uncertainty of the material that is under the surface. Tests have shown that there is a relatively thin hard crust, and there are layers of soft material and cavities underneath. Because of these conditions the towers have been designed with a large spreadfooting to distribute the weight over the entire foundation area.

42. The bases will have a composite gravity and pile foundation system to ensure stability under the worst design conditions of wind and waves.

43. Committee's Conclusions The sites have been precisely determined to accurately mark the optimum route through Hydrographers Passage.

44. The sites selected are suitable for construction of the towers, provided that the design of the bases compensates for the difficult site conditions.

## ENVIRONMENTAL CONSIDERATIONS

45. In January 1983 the Department of Transport submitted a Notice of Intention on the Hydrographers Passage proposal to the Department of Home Affairs and Environment, in accordance with the requirements of the Environment Protection (Impact of Proposals) Act.

46. Following consultations with the Great Barrier Reef Marine Park Authority, the Australian Heritage Commission and the Department of Defence, the Department of Home Affairs and Environment advised that the preparation of an environmental impact statement would not be required, subject to a number of environmental protection measures being implemented.

47. Consultation between the Department of Transport, the Department of Home Affairs and Environment, and the Great Barrier Reef Marine Park Authority on the implementation of these measures is continuing.

48. The Committee notes that the proposed work will have an impact on the Great Barrier Reef in two ways. Firstly, the effects of physical construction on the Reef, and secondly, the impact of shipping operations in Hydrographers Passage, with the potential for accidents.

49. The Notice of Intention prepared by the Department of Transport essentially deals with construction of the navigational towers and the routine operation of ships in Hydrographers Passage. However, it fails to fully address the possibility of shipping accidents.

50. This point was a central issue in the submission to the Committee by the Great Barrier Reef Marine Park Authority. The Authority believes that Hydrographers Passage should not be open to large ships carrying substantial quantities of oil or toxic cargoes until it has been demonstrated, in terms of probabilities, that the degree of risk to the Reef is not increased over the risk from the use of alternative routes.

51. The Authority is of the view that a risk analysis should be undertaken. This analysis would address the probability of a shipping accident, the damage that would possibly occur to the Reef, contingency plans for a clean-up, and the possible costs of such an accident. It would take into account the physical conditions in Hydrographers Passage (rock outcrops, tides, currents), weather conditions, comparison with other routes in the region, pilotage, and the effect of future resource developments in central Queensland on shipping.

52. The Committee received evidence from the Department of Transport to suggest that the Passage will be lightly trafficked in comparison to many other confined shipping passages around the world. The Committee therefore accepts that the risk of an accident should not be great, and believes that the opening of the Passage should not be delayed until completion of a risk analysis.

53. However, with the long term further development of mineral resources in the area, shipping through Hydrographers Passage is expected to steadily increase. Also, with the proposed development of oil shale projects, oil tankers may also use the Passage in future years. In these circumstances the Committee agrees with the Great Barrier Reef Marine Park Authority in its call for a risk analysis, but believes that it can be undertaken concurrent with the development of the navigational aids, or during the early years of operation of the Passage.

54. Committee's Conclusions Environmental measures to be implemented in relation to the construction of the navigational aids are satisfactory.

55. A risk analysis should be undertaken, concurrent with the development of Hydrographers Passage, to assess the likely impact of long term shipping operations in the Passage.

## LIMIT OF COST

56. The limit of cost estimate for the structures required to support the navigational aid equipment, to mark Hydrographers Passage, is $4.75 million at September 1983 prices. This includes a contingency of $450,000 to allow for 25 days stand down due to adverse weather conditions during construction.

57. The estimate does not include the navigational aid equipment which will be installed in the towers.

## PROGRAM

58. The Department of Transport intends inviting tenders for fabrication and installation of the tower structures in January 1984.

59. The Passage will be available for daylight navigation in November 1984, on completion of off-shore construction, and for night-time navigation in April 1985, after installation of all optical and radio equipment.

60. Committee's Conclusion The Committee recommends construction of the work in this reference.

## PILOTAGE

61. Most of the organisations who gave evidence at the public hearing presented views on the question of pilotage. All parties agreed that pilotage services should be available but not all agreed with the concept of compulsory pilotage.

62. The Department of Transport will encourage users of the Passage to use any pilot service which may be available, although it does not agree that pilotage should be compulsory. The Department believes that there could be difficulties at law in requiring compulsory pilotage on the high seas, and that a unilateral declaration of compulsory pilotage would not be well received by members of the International Maritime Organisation (IMO). Nevertheless, the Department is currently pursuing at the IMO a recommendation that pilots be carried on vessels carrying oil, noxious, or hazardous substances in Barrier Reef waters.

63. The Queensland Coast and Torres Strait Pilot Service put forward a case in favour of compulsory pilotage. The Service emphasised the skills, experience and local knowledge of its pilots, and the hazardousness of these waters to mariners without local knowledge. The task of providing a service, either compulsory or non-compulsory, would undoubtedly fall to the Queensland Coast and Torres Strait Pilot Service, and the provision of infrastructure facilities to mount this service will be very costly. There is therefore a commercial element in the Pilot Services' argument for compulsory pilotage as it would help guarantee the long-term viability of the service, and a return on the capital that will have to be invested in facilities.

64. The Great Barrier Reef Marine Park Authority also favours compulsory pilotage. Compulsory pilotage would provide an added element of safety for the environment of the Reef.

65. The Australian Chamber of Shipping will recommend that its members use the services of a pilot although it opposes the concept of compulsory pilotage. The Chamber emphasised the skills and competence of ships' masters, and expressed confidence in their ability to safely navigate Hydrographers Passage in good conditions so long as it was marked with the proposed navigational aids.

66. The Dalrymple Bay Coal Terminal Pty Ltd, and the Queensland Coal Owners' Association believe that a cost effective pilot service should be available, although they also oppose compulsory pilotage. They, too, emphasised the qualifications and abilities of ships masters. Nevertheless, these organisations have a legitimate commercial interest in keeping shipping costs to a minimum and would see pilotage as a cost that they do not believe would always be necessary.

67. As well as the abovementioned arguments for and against compulsory pilotage, other relevant factors were considered by the Committee.

68. Compulsory pilotage presently exists in Australian ports - for the protection of the port facilities as much as to protect the ships concerned. There is a similarity between the protection of port facilities and Hydrographers Passage, because in this instance the aim is to protect the Great Barrier Reef, rather than the ships concerned.

69. A precedent exists in the international scene for compulsory pilotage. Canada has declared its Arctic waters to the north as a compulsory pilotage zone. Although evidence was given that the international shipping community was not supportive of this unilateral declaration, there have been no legal challenges to its validity.

70. A declaration of compulsory pilotage in Hydrographers Passage may be acceptable to the International Maritime Organisation. The Department of Transport stated in evidence that there is an article in the 1958 Convention on the High Seas which lays down a procedure by which special laws can be made for special areas. It would seem to the Committee that the Great Barrier Reef would qualify as a special area.

71. Although there is compulsory pilotage in Australian ports, there are systems of exemptions on examination for suitably experienced masters in certain ships. Although many anomalies exist in the administration of exemptions, the principle appears sound, and may be acceptable to the shipping industry.

72. Consideration The Great Barrier Reef is a special area, and it deserves special protection measures. The Committee therefore favours a system of compulsory pilotage in Hydrographers Passage, with a system of exemptions, on examination, for suitably experienced masters.

73. The Committee suggests that the Department of Transport seek advice from the Attorney-General's Department on the legality of declaring compulsory pilotage in Hydrographers Passage. In the meantime, the Committee recommends that the Department pursue through the International Maritime Organiation, agreement for compulsory pilotage with exemptions in Hydrographers Passage.

74. The Committee is concerned that pursuing this matter through the IMO may be unduly time consuming. If the IMO has not resolved the matter by the time the navigational aids are complete, the Committee recommends that Australia consider making a unilateral declaration for compulsory pilotage, subject to a favourable opinion from the Attorney-General's Department as to the legality of such a course of action.

75. Committee's Conclusion The Committee recommends that the Department of Transport pursue through the International Maritime Organisation, agreement to compulsory pilotage in Hydrographers Passage, with a system of exemptions, on examination, for suitably experienced masters.

## RECOMMENDATIONS AND CONCLUSIONS

76. A summary of the recommendations and conclusions of the Committee and the paragraph in the report to which each refers is set out below:

| | | Paragraph |
|---|---|---|
| 1. | HYDROGRAPHERS PASSAGE IS REQUIRED TO PROVIDE A MORE DIRECT ROUTE TO MARKETS FOR COAL EXPORT SHIPS OPERATING FROM CENTRAL QUEENSLAND PORTS. | 20 |
| 2. | FIVE NAVIGATIONAL AIDS ARE REQUIRED TO MARK HYDROGRAPHERS PASSAGE TO FACILITATE THE SAFE PASSAGE OF SHIPS. | 21 |
| 3. | THE DESIGN OF THE PROPOSED NAVIGATIONAL AIDS IS SUITABLE. | 37 |
| 4. | THROUGH THE COST RECOVERY PROCESS THE PROPOSED NAVIGATIONAL AIDS WILL BE SELF-FINANCING. | 38 |
| 5. | THE SITES HAVE BEEN PRECISELY DETERMINED TO ACCURATELY MARK THE OPTIMUM ROUTE THROUGH HYDROGRAPHERS PASSAGE. | 43 |

6. THE SITES SELECTED ARE SUITABLE FOR CONSTRUCTION OF THE TOWERS, PROVIDED THAT THE DESIGN OF THE BASES COMPENSATES FOR THE DIFFICULT SITE CONDITIONS. 44

7. ENVIRONMENTAL MEASURES TO BE IMPLEMENTED IN RELATION TO THE CONSTRUCTION OF THE NAVIGATIONAL AIDS ARE SATISFACTORY. 54

8. A RISK ANALYSIS SHOULD BE UNDERTAKEN, CONCURRENT WITH THE DEVELOPMENT OF HYDROGRAPHERS PASSAGE, TO ASSESS THE LIKELY IMPACT OF LONG TERM SHIPPING OPERATIONS IN THE PASSAGE. 55

9. THE LIMIT OF COST FOR THE PROPOSED WORK IS $4.75 MILLION AT SEPTEMBER 1983 PRICES. 56

10. THE COMMITTEE RECOMMENDS CONSTRUCTION OF THE WORK IN THIS REFERENCE. 60

11. THE COMMITTEE RECOMMENDS THAT THE DEPARTMENT OF TRANSPORT PURSUE THROUGH THE INTERNATIONAL MARITIME ORGANISATION, AGREEMENT TO COMPULSORY PILOTAGE IN HYDROGRAPHERS PASSAGE, WITH A SYSTEM OF EXEMPTIONS, ON EXAMINATION, FOR SUITABLY EXPERIENCED MASTERS. 75

D.J. Foreman.

(D.J. FOREMAN)
Chairman

Parliamentary Standing Committee
on Public Works,
Parliament House,
CANBERRA A.C.T. 2600

7 December 1983

APPENDIX A

CONSTRUCTION

1. Design The proposed works include:

- Light towers at three locations, White Tip Reef Main and Rear Lead, Little Bugatti Reef, and Creal Reef, each comprising:

  . a concrete footing structure;
  . a concrete equipment room; and
  . an upper tower of stainless steel.

- A light tower at White Tip Reef Front Lead, comprising:

  . a concrete footing structure; and
  . a concrete equipment room.

- A radar and daymark at Bond Reef comprising:

  . a concrete footing structure.

2. In each location the concrete footing structure will be supported on the reef surface and anchored by piles driven into the underlying coral. This will be a composite gravity base with piles foundation system.

3. Construction Arrangements - On Shore The reinforced concrete light tower bases comprising a bottom platform, four circular columns supporting an upper platform, and an equipment room will be fabricated in a dry dock. The support for the daymark comprising a bottom platform, a single concrete column, and top platform will also be fabricated in the dry dock.

4. The dry dock will be constructed at the northern end of Mackay Outer Harbour, and twin steel pontoons will be fabricated nearby.

5. All of the bases will be constructed concurrently. On completion the dry dock will be opened and the pontoons floated in and attached to the first base. Each base will in turn be towed to its site on the Great Barrier Reef. Towing to site by tug is expected to take approximately 30 hours for each base structure.

6. Construction Arrangements - Off Shore Prior to delivery of each base assembly, the sites will be cleared to a reasonably even coral surface. Four concrete pads approximately 2.5 metres square and 150mm will be placed and levelled to provide a seating for the precast base.

7. The base and pontoon assembly will be precisely positioned and orientated over the site at high tide. The pontoons will then be flooded to settle the base on the prepared bed pads.

8. After the pontoons are disconnected, mild steel piles approximately 20 to 25m will be driven through performed holes in the bottom platform of each base. The piles will be driven into the coral to either a predetermined depth or to an acceptable driving resistance.

9. Any excess pile length will be cut off to a level just below the upper surface of the bottom platform. The pile heads will then be encased in concrete and bonded to the surrounding base concrete. Piles thus protected will not corrode away during the expected life of the tower.

10. The area under the bottom platform will be enclosed by means of a prefabricated metal form or "skirt". Cement grout will then be injected through performed holes in the platform to fill the cavity between the base and the reef surface.

11. Equipment Rooms Concrete equipment rooms will be located at the upper platform level of the reinforced concrete bases. They will provide weatherproof ventilated enclosures for the storage of battery banks and associated navigational aid equipment. Work space and facilities, including fresh water storage, hand basin, and toilet will be included in these rooms for maintenance personnel.

12. The structure of these rooms at White Tip Reef Rear, Creal Reef, and Little Bugatti Reef, will be designed to support the stainless steel towers, while at White Tip Reef Front the lantern housing will be fixed directly to the roof. A monorail will be installed at all four light locations to facilitate the lifting of equipment from service craft, thence through a doorway on the leeward side of the tower. A walkway fitted with a safety handrail will give access to the equipment room and to solar arrays that will be fixed at this level.

13. Stainless Steel Towers The lanterns and daymarks will be supported on stainless steel lattice towers at White Tip Reef Rear, Little Bugatti Reef, and Creal Reef.

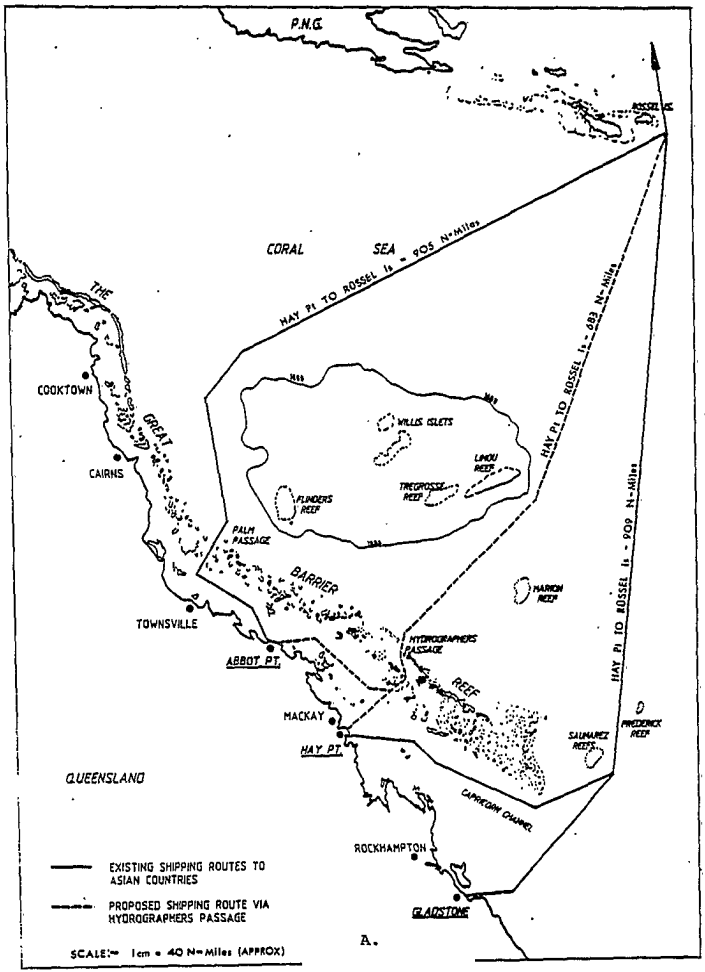
14. Modular stainless steel sections will be fabricated under factory controlled conditions. The towers will then be easily and quickly assembled on site above the concrete equipment rooms.

15. Stainless steel is the preferred material for the towers as it is corrosion resistant above the splash zone, and the grade of steel chosen has a long 50 year life.

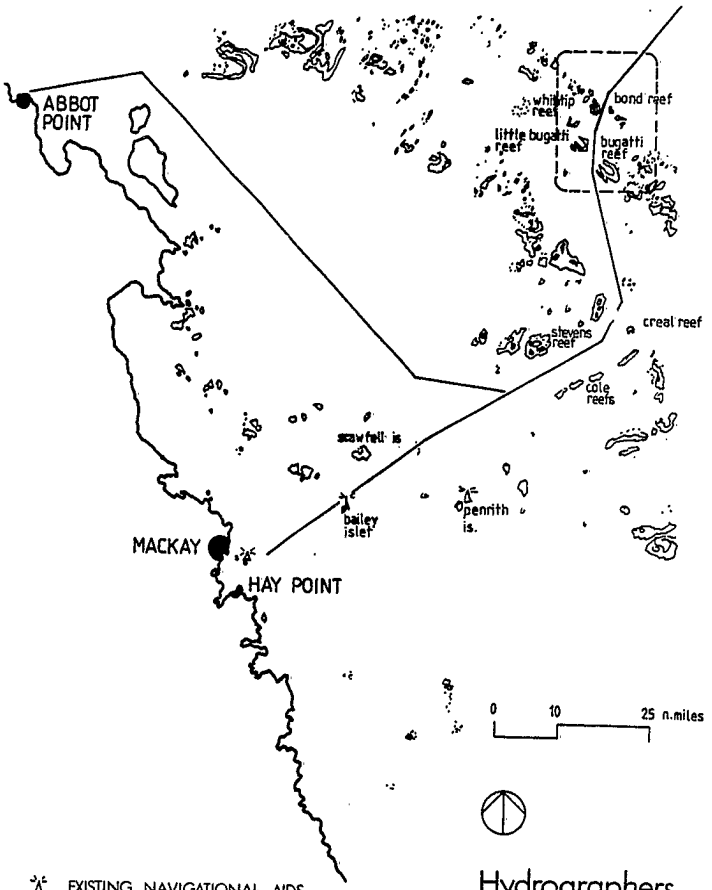
16. Consultation and Liaison The following authorities were consulted during the design development stage of the project:

- Royal Australian Naval Hydrographer
- Bureau of Meteorology
- Bureau of Mineral Resources, Geology and Geophysics
- Mackay Harbour Board

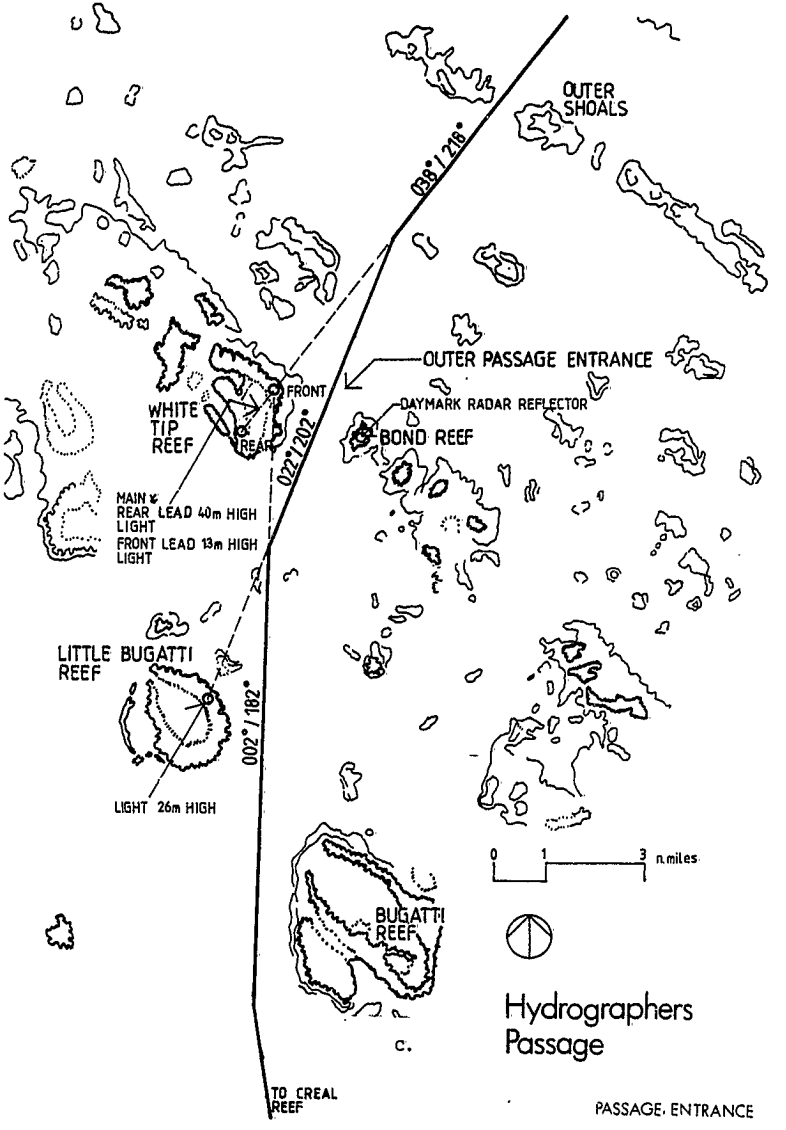
- The Great Barrier Reef Marine Park Authority
- Australian Institute of Marine Science
- Department of Home Affairs and Environment

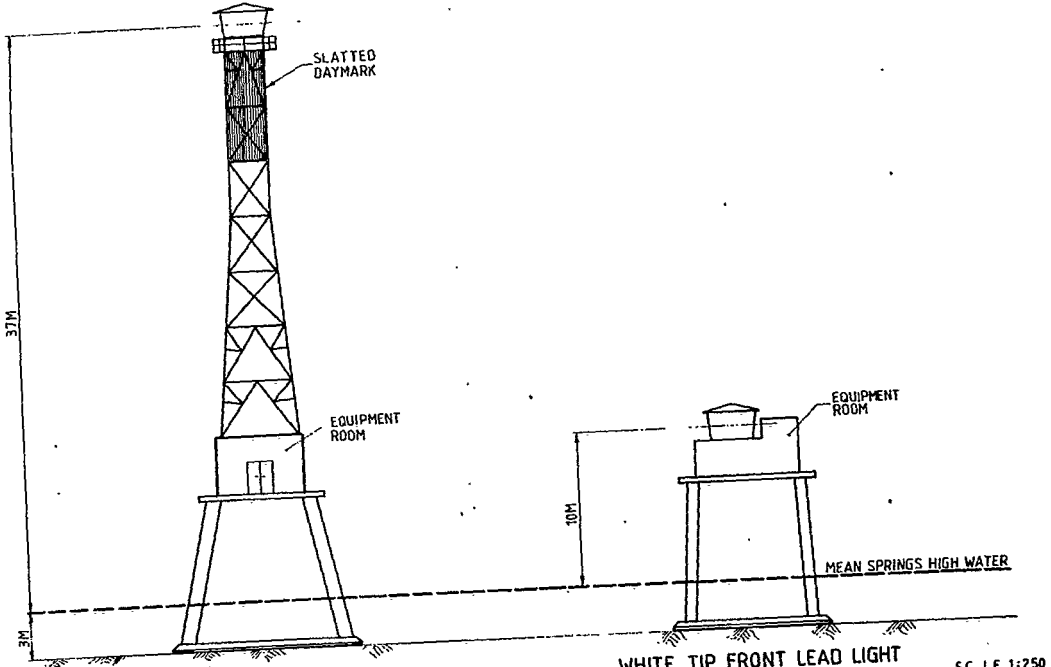

P.N.G.
ROSSEL IS.
CORAL SEA
HAY PT. TO ROSSEL Is. - 905 N°Miles
HAY PT. TO ROSSEL Is. - 683 N°Miles
HAY PT. TO ROSSEL Is. - 909 N°Miles
THE GREAT BARRIER REEF
COOKTOWN
CAIRNS
TOWNSVILLE
ABBOT PT.
MACKAY
HAY PT.
ROCKHAMPTON
GLADSTONE
QUEENSLAND
WILLIS ISLETS
LIHOU REEF
TREGROSSE REEF
FLINDERS REEF
PALM PASSAGE
MARION REEF
HYDROGRAPHERS PASSAGE
D'ENTRECASTEAUX REEF
SAUMAREZ REEFS
CAPRICORN CHANNEL
EXISTING SHIPPING ROUTES TO ASIAN COUNTRIES
PROPOSED SHIPPING ROUTE VIA HYDROGRAPHERS PASSAGE
SCALE:- 1cm = 40 N°Miles (APPROX)

A.




LOCALITY PLAN

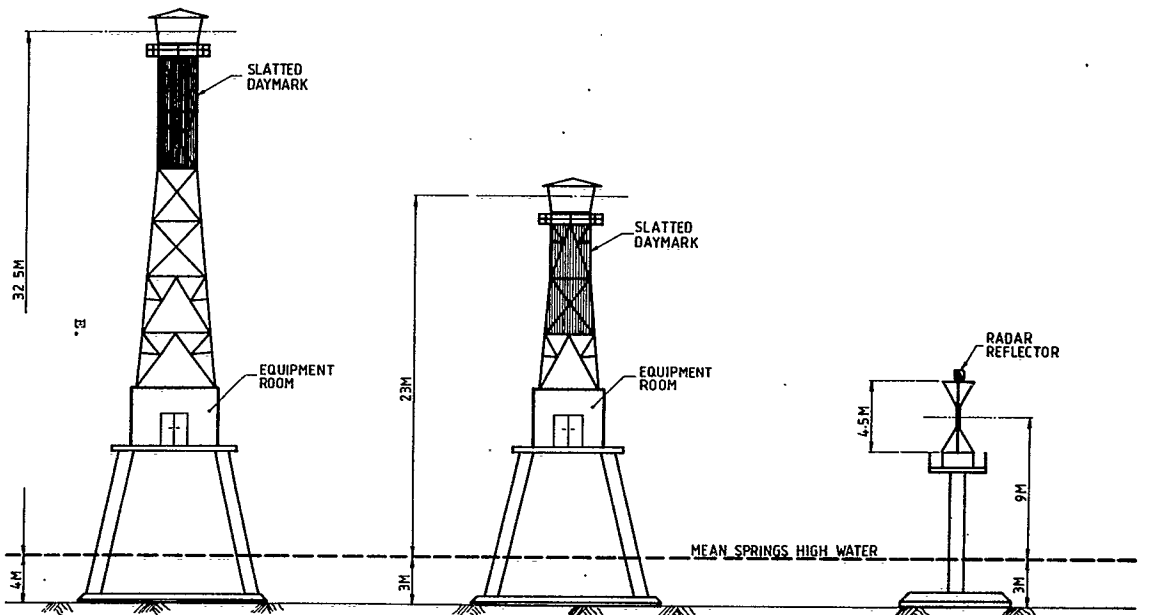

OUTER SHOALS
038° / 218°
OUTER PASSAGE ENTRANCE
FRONT
REAR
WHITE TIP REEF
DAYMARK RADAR REFLECTOR
BOND REEF
022° / 202°
MAIN & REAR LEAD 40m HIGH LIGHT
FRONT LEAD 13m HIGH LIGHT
LITTLE BUGATTI REEF
002° / 182°
LIGHT 26m HIGH
0 1 3 n.miles
BUGATTI REEF
Hydrographers Passage
c.
TO CREAL REEF
PASSAGE: ENTRANCE




WHITE TIP REAR MAIN LIGHT

WHITE TIP FRONT LEAD LIGHT

SC 1 F 1:250


SLATTED DAYMARK
32.5M
EQUIPMENT ROOM
4M
CREAL REEF LIGHT
SLATTED DAYMARK
23M
EQUIPMENT ROOM
3M
LITTLE BUGATTI REEF LIGHT
RADAR REFLECTOR
4.5M
9M
3M
BOND REEF
MEAN SPRINGS HIGH WATER