PILOTAGE ADVISORY COMMITTEE

PAC Paper No. 6/98

GREEN ISLAND DEVELOPMENT - MARINE IMPACT TRAFFIC ASSESSMENT - CONCLUSIONS AND RECOMMENDATIONS

Introduction

The Green Island Development (GID) between the coast of Kennedy Town and Green Island will provide land for housing and improvements in the environmental and traffic conditions in the Western District, and land for a number of major strategic transport routes.

The critical Marine Traffic Impact Assessment (MTIA) objectives have been to ensure that all applicable data is collected to allow an assessment of the marine impacts, and the formulation of practical and cost-effective mitigation measures.

The key tasks included:

- traffic surveys and trips on vessels around Green Island;
- simulation of vessel navigation before and after construction of the GID;
- simulation of marine traffic before and after construction of the GID;
- examination of fairway, mooring buoy and anchorage requirements, and
- assessment of wave environment, GID seawalls and marine facilities layout.

Traffic adjacent to Green Island:

- The Study has surveyed and characterised the high volume and diversity of the marine traffic adjacent to Green Island, and using the Sulphur Channel. Particular constraints associated with the navigation of high speed craft, ocean-going vessels, tug & tows and small craft have been identified.

Present and Future Navigation:

- Navigation near Green Island has been assessed by surveys, transits and computer simulation. The existing turn from the East Lamma Channel into the North Green Island Fairway represents a tight turn for some of the larger ocean-going vessels, who have to navigate in an area of high small craft and fast ferry traffic.

- Presently the most hazardous area for navigation in the Study Area is where the North Green Island Fairway and Sulphur Channel and a large number of traffic streams merge.

- Computer simulation accurately represented the present behaviour of ocean-going vessels

and was used to model key manoeuvres around the proposed GID. It was found that the turn from the East Lamma Channel into the new Southern Fairway is well within the capabilities of the existing large ocean-going vessels.

- The presence of the GID may provide stronger visual cues than currently exists for vessels entering the Southern Fairway from the East Lamma Channel; and as there is no convergence of fairways between the Sulphur Channel and North Green Island Fairway the problems associated with this area will be eliminated.

- Increases in HYF ferry journey times are approximately $2^{1}/_{4}$ minutes for sailings between Central and Cheung Chau, and 4 minutes for sailings to Lamma. This could be absorbed while maintaining schedules with existing number of vessels, with an increase in direct vessel running costs, in the order of 4 – 10%.

Present and Future Marine Traffic Environment:

- The marine traffic near Green Island has been assessed by surveys, transits and computer simulation. A large number of traffic control measures have been tested for marine traffic at 1997 and 2011 levels, and the impact on vessels, particularly high speed ferries, ocean-going vessels and tug & tow barges examined. The benefits of traffic separation for the high speed ferries was identified, but difficulties exist with their practical implementation.

- It was considered that a 480m wide two way Southern Fairway 200m north of the north seawall of the GID should be established, Figure 1, to maintain satisfactory levels of safety. The new Southern Fairway provides twice the width of the current North Green Island Fairway in each direction, with centreline buoyage used to create two structured traffic streams, eastbound and westbound. This arrangement extends the separation present within the Hung Hom and Central Fairways up to the limit of the Western Fairway.

- Establishment of a Marine Department local marine traffic control station on Green Island and the provision of two fast patrol launches, to monitor and administer safe navigation has been recommended as part of the marine traffic control measures adopted for the GID.

- Recommendations associated with construction vessel safety including barge lanes, working quaysides, anchorage areas and vessel identification and movement restrictions have been made to ensure safe operation of the construction craft. The estimated volume of construction craft has been examined, and found to fall within the capacity of the recommended fairway arrangement.

- Publicity, education and enforcement should be used to promote aspects of safe navigation around the new fairway.

Reprovisioning of Government Mooring Buoys and the Western Quarantine and Immigration Anchorage (WQIA):

- An assessment of buoy requirements has been conducted, and a layout featuring 2 "Super A" buoys, 22 "A" buoys and 22 "B" buoys is recommended for Kellett Bank, Figure 2. Associated dredging, will deepen the anchorage to –11.8mCD and –8.8m CD beneath the "A" and "B" buoys, respectively.

- An expanded Immigration service is proposed at the Tuen Mun Immigration

Anchorage to reduce the numbers of small vessels using the WQIA. The WQIA is recommended to be reprovisioned within the North Lamma Anchorage, with the appropriate expansion of shore-based and marine facilities for affected Government Departments. Temporary resiting of the WQIA to Western Anchorage No. 1 may be considered, as an alternative.

- The combined impact of the GID and recent harbour reclamations leads to increasing pressure on the remaining sheltered mid-stream cargo handling operations, that account for 25% of Hong Kong's cargo throughput. Studies to address options for the provision of additional sheltered waterspace, by the Lamma breakwater or some alternative, should be instigated as a matter of priority.

Present and Future Case Wave Activity, Seawalls and Currents

- Assessment of wind driven waves for a GID layout with low reflection sloping or vertical seawalls indicates that the GID will have a small impact on wave conditions in the area, and will result in improved shelter for the eastern half of the Kellett Bank cargo handling area.

- The proposed new fairway structure will result in less wave generated energy impacting the inshore zone and seawalls than at present due to greater separation between the traffic, particularly the fast ferries, and the seawalls.

- The seawalls recommended by the GIRFS were reviewed and recommendations made associated with the design of sloping/vertical face seawalls for the northern face of the reclamation.

- The peak current velocity regime for the present case, and a provisional interim construction phase of the GID were reviewed. It is believed that the GID has a marginal impact on the current regime in the fairways adjacent to Green Island. A localised increase in peak current velocities of approximately 10% at the northwest corner of the GID was identified.

Marine Reprovisioning Requirements and the PCWA

- A review of the Green Island Reclamation Feasibility Study (GIRFS) and current reprovisioning requirements of the Stage 1 reclamation noted that reprovisioning of the marine facilities did not account for the traditional mooring up of vessels within Belcher Bay, and no provision had been made for their relocation.

- An assessment of the PCWA area has been made from a viewpoint of marine operations. Problems associated in the planned port area, with respect to wave action, water quality, moorings, and access have been identified.

- An alternative Stage 1 reclamation layout and phasing has been proposed to address these issues, Figure 3.

Figure 1
Recommended Fairway Arrangement

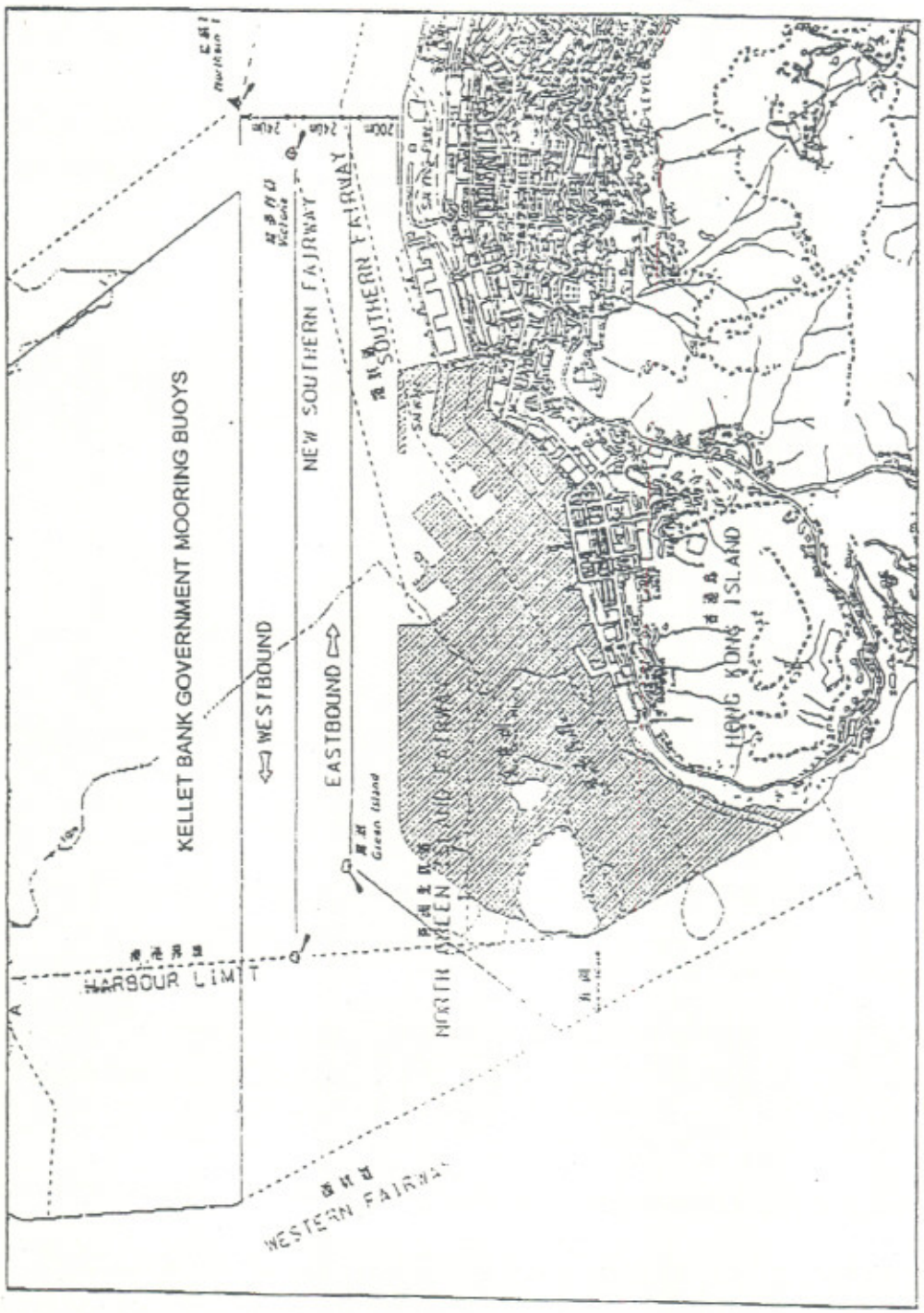

Figure 2

Proposed Buoy Arrangement of Kellett Bank

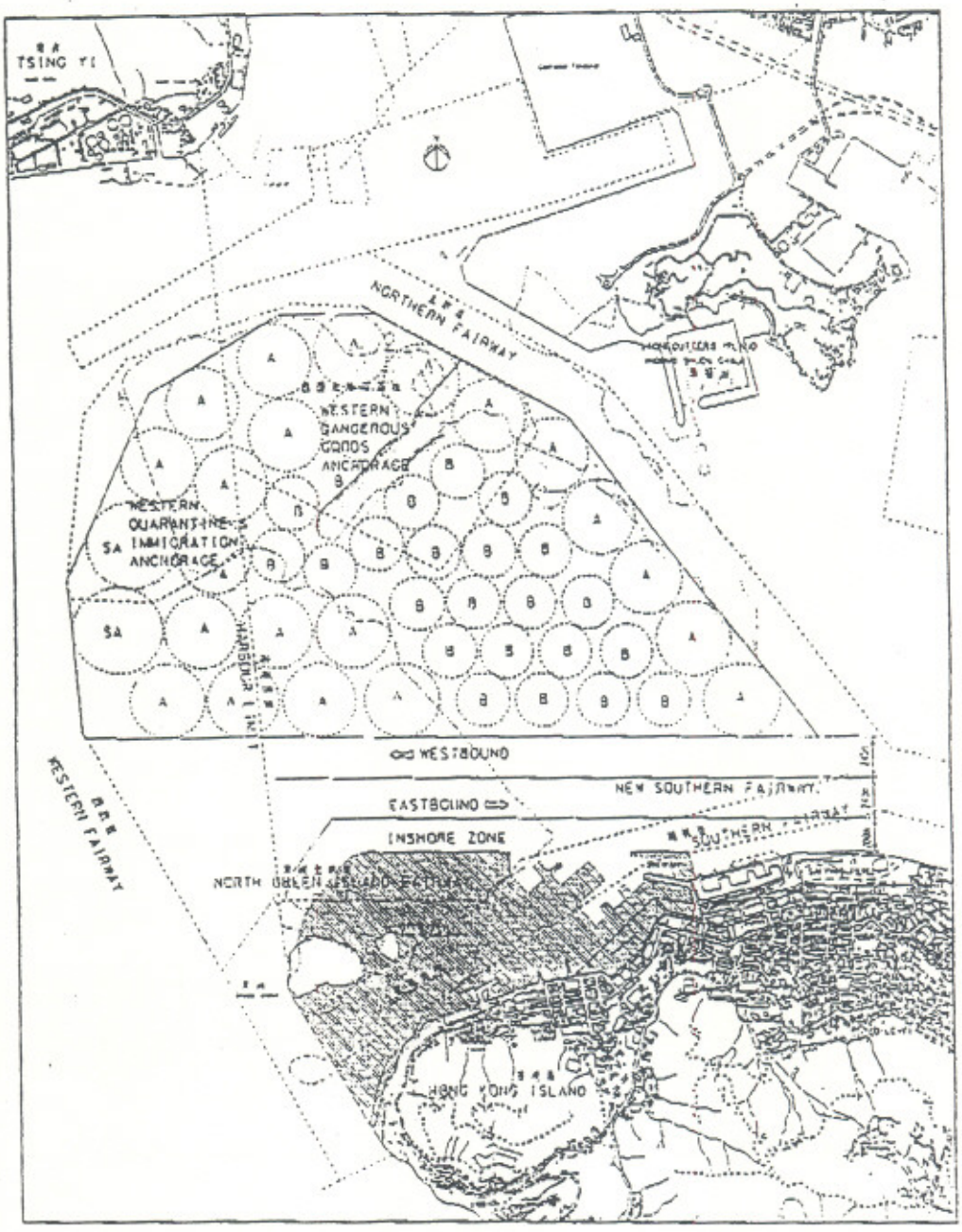

Figure 3

Alternative Conceptual Stage 1 Waterfront Reprovisioning