Provisional Airport Authority - Hong Kong

New Airport Master Plan

Environmental Impact Assessment Supplement

Greiner - Maunsell

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October 1992

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in association with

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Introduction 1

1.1 Background

The Provisional Airport Authority (PAA) has proposed a modification to the layout of the replacement airport at Chek Lap Kok. The original layout is depicted in Exhibit 2.1 of the New Airport Master Plan Environmental Impact Assessment (EIA) approved in December 1991. The proposed improvement is based on additional engineering and cost considerations and results in savings for the construction works. The modification meets all recommendations of the International Civil Aviation Organization (ICAO) and retains the overall airport size of 1,248 hectares as per the original plan.

1.2 Description of the Proposed Modification

The proposed modification involves relocating the passenger terminal complex along with road and rail links approximately 190 metres to the west. This shift allows more of the terminal building to be constructed on land which had formerly constituted Chek Lap Kok Island rather than on reclaimed land. This results in significant cost savings by reducing the amount of piling for the Terminal Building and shortening the lengths of both the road and rail links.

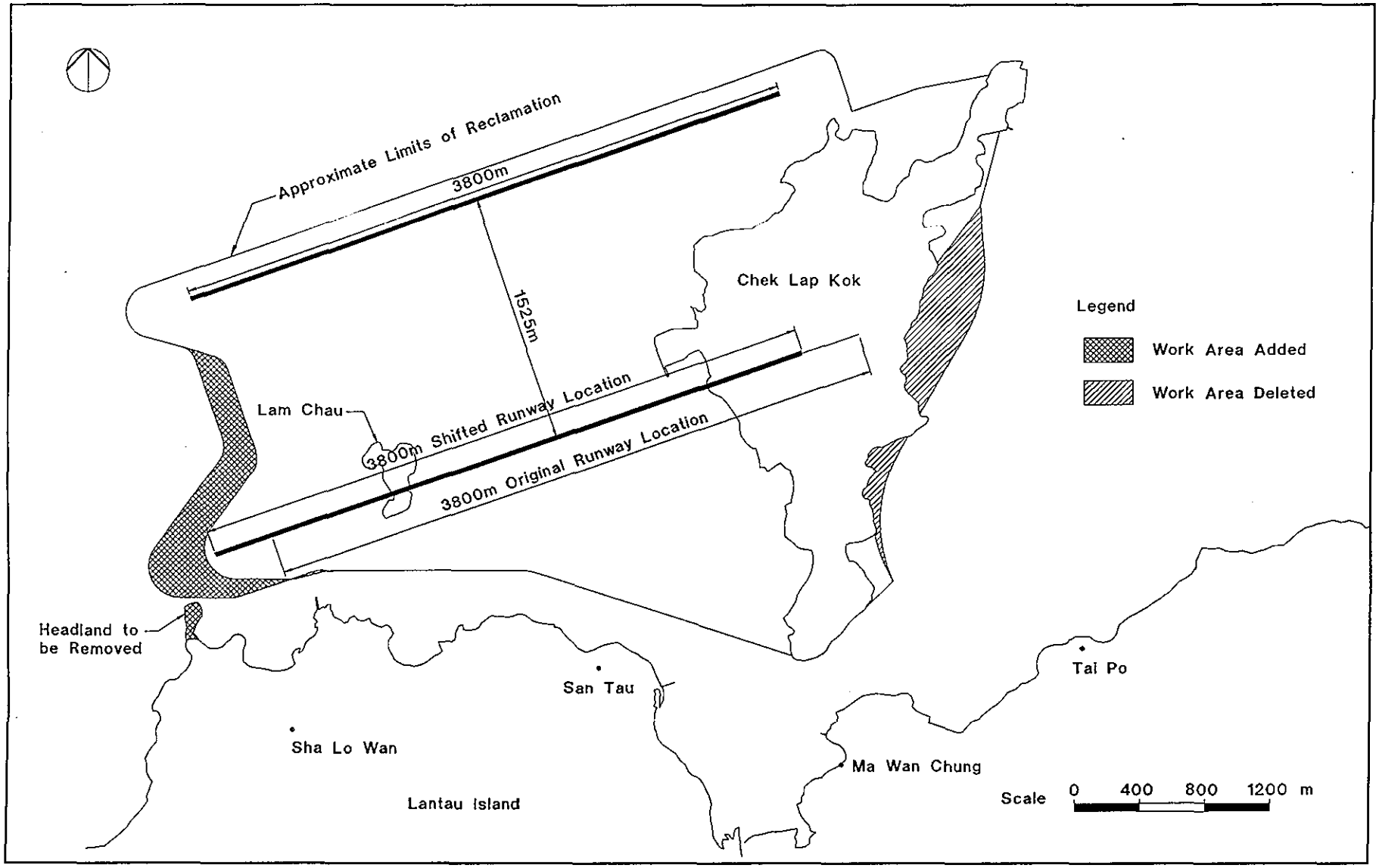
The relocation of the terminal complex, together with the realignment of the road and rail links, has also necessitated a 360-metre shift of the southern runway to the west in order to retain its design profile and to avoid any conflict with those links. The 1,525 metre runway separation and the length of the runways remains unchanged.

The move westwards of the southern runway produces a requirement for reconfiguration of the western boundary of the airport island (see Exhibit 1.1). There is no net increase in the amount of required reclaimed land, since the shift to the west is compensated by a reduction in reclamation requirements to the east. Moreover, by eliminating the eastern reclamation approximately 2.5 kilometres of natural shore is preserved, eliminating the need to construct approximately 1175 metres of seawall. Also, with the new runway configuration the quantity of mud that needs to be removed is reduced by approximately 2 million m^3. These reductions in turn result in additional cost savings.

The westward shift of the southern runway will require the partial removal of a small headland on Lantau Island, west of Sha Lo Wan (see Exhibit 1.1). Access to the Sha Lo Wan pier will be maintained during headland excavation and construction activities (albeit by permit) as well as during normal airport operations. In addition, marine access to the pier will be improved by the reconfigured channel entrance.

1.3 Purpose

The purpose of this Environmental Impact Assessment Supplement is to describe changes in construction and operation related environmental impacts as well as associated changes in mitigation and monitoring programs resulting from the proposed modification to the airport layout. The document is a supplement to the original New Airport Master Plan EIA document and should be reviewed in conjunction with the previous study. The original EIA was approved by both EPD and PAA in December 1991. Only those environmental areas where impacts have changed as a result of the modification are addressed in this Supplement. All other areas are as described in the New Airport Master Plan EIA. The scope of this Supplement was agreed upon with EPD.



Revised Master Plan Configuration *Exhibit* *1.1*

Part B Issues Relating To Airport Construction

2.1 Assessment Methodology

In order to assess changes in construction noise impacts caused by modification to the Master Plan, the plant in the affected reclamation areas was redistributed as shown in Exhibit 2.1. A potential list of plant which may be used in the excavation of the headland on west of Sha Lo Wan was also developed and numbers of each piece of equipment and associated sound Power Levels (SPLs) are shown in Table 2.1 Notional positions of the new and redistributed plant were established as appropriate and noise levels (CNLs) were estimated using the same methods as described in the New Airport Master Plan EIA.

Table 2.1 Representative Equipment and Associated Sound Power Levels (SPLs)

*PME Item	Number	dB(A)
Rock Drill (100 mm)	4	110
Hydraulic Shovel	4	112
35 Tonne Truck	16	117
Dozer	1	115
Small Truck	1	112
Grader	1	113

Source : PAA and Greiner-Maunsell, 1992
** PME : Powered Mechanical Equipment*

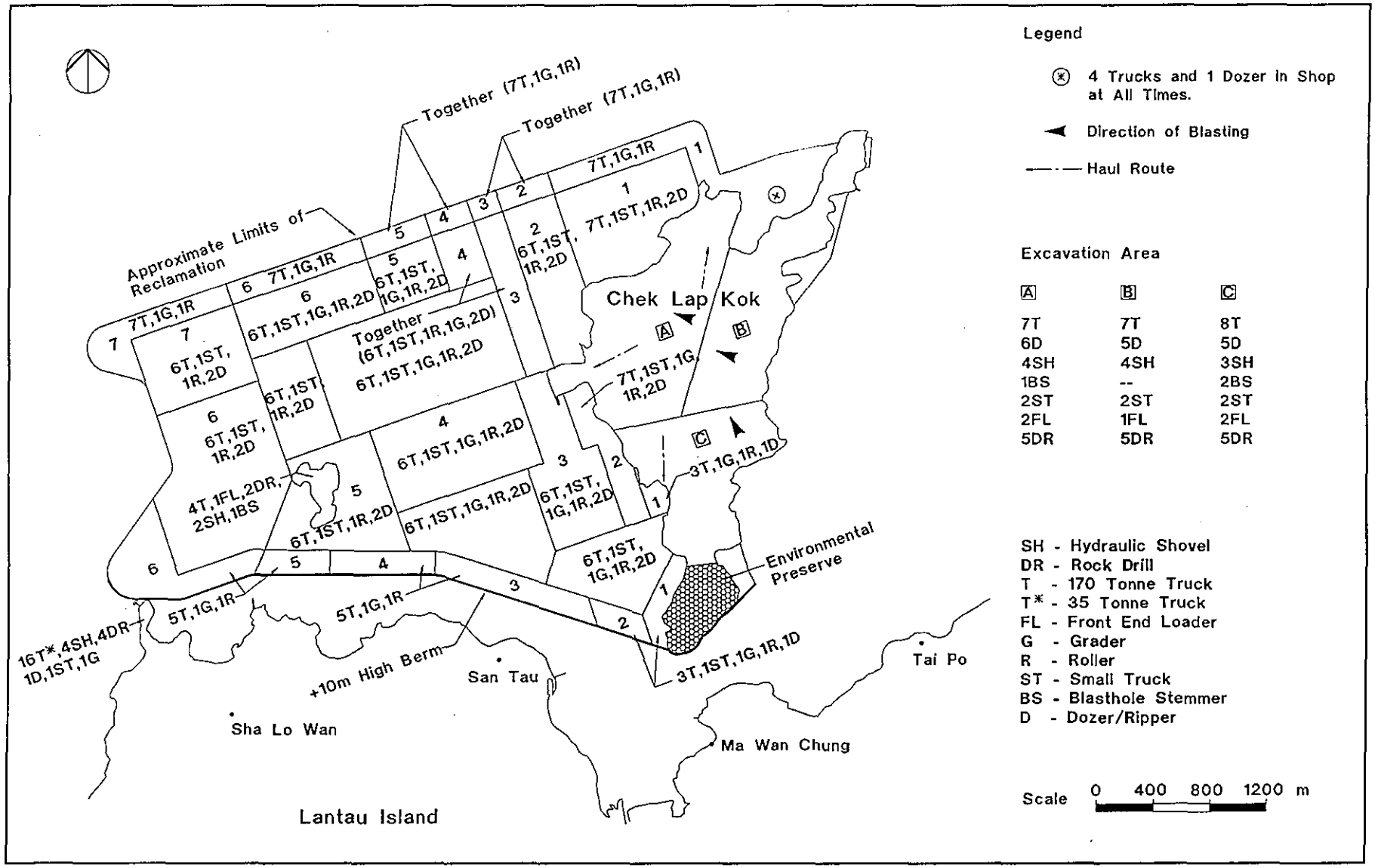
2.2 Noise Impacts

Noise levels at Sha Lo Wan, generated by the modified reclamation and berm construction activities, will be 53 and 63 dB(A) respectively. The excavation of the headland on North Lantau will generate a noise level of 56 dB(A) at Sha Lo Wan. With all these activities occurring at the same time, a noise level of 64 dB(A), as projected for Sha Lo Wan, would exceed the evening, nighttime and holiday Allowable Noise Levels (ANLs). However, this noise level is well below the 70 dB(A) target limit established for daytime activities.

Reclamation and berm construction activities will generate noise levels of 57 and 69 dB(A) respectively at Sha Lo Wan (shore). Excavation of the headland will generate a noise level of 62 dB(A). With these activities occurring at the same time, a noise level of 70 dB(A), as projected for Sha Lo Wan (shore), would exceed the evening, nighttime and holiday ANLs, but would comply with the target limit established for daytime activities.

2.3 Mitigation Measures

The excavation of the headland and construction of the berm will be constrained during evenings, nights and on holidays in order to comply with established ANLs. The only activity which must continue at all hours is the reclamation which, under "worst case" conditions, will generate a nighttime noise level of 53 dB(A) at Sha Lo Wan and 57 dB(A) at Sha Lo Wan (shore). This is below the 55 dB(A) and 60 dB(A) ANLs which have been agreed to with EPD for these respective areas.

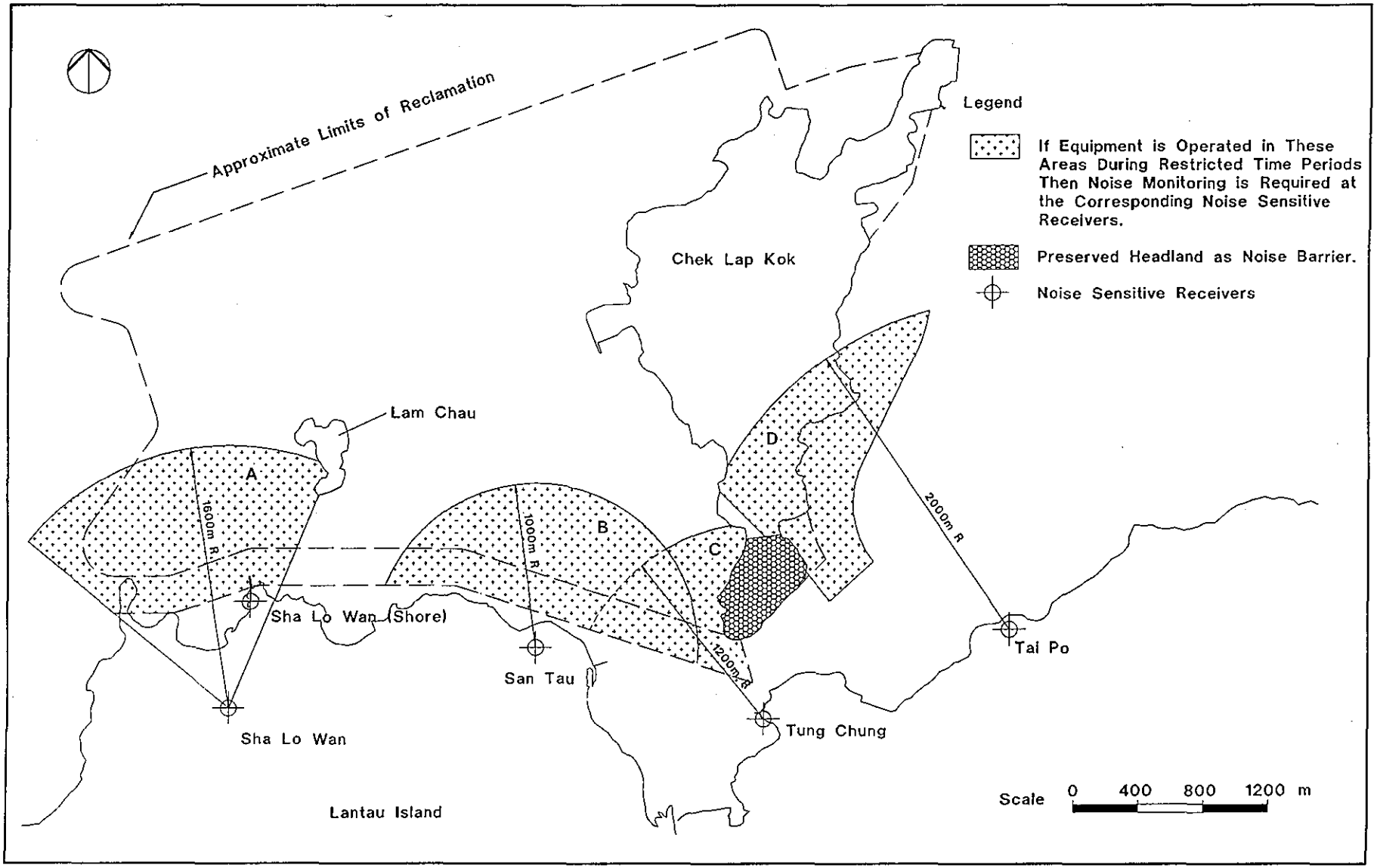


Phasing Sequence and Distribution of PME (Revised) *Exhibit 2.1*

In as much as the noise levels at Sha Lo Wan are still projected to be below 55 dB(A), there is no need to consider the installation of any additional air conditioners. All NSRs at Sha Lo Wan (shore) had previously been projected to receive funding for the acquisition and operation of air conditioners and the ANL of 60 dB(A) for this area was based on this assumption.

2.4 Monitoring and Audit

The general monitoring and audit programme is discussed in Section 4.5 of the New Airport Master Plan EIA. If equipment is operated in the vicinity of Sha Lo Wan, as shown within revised area A on Exhibit 2.2, during restricted time periods, then noise monitoring will be required to ensure that noise levels do not exceed the ANL's.



Noise Monitoring Requirements (Revised) *Exhibit 2.2*

3.1 Assessment Methodology

In order to assess changes in dust levels associated with the modified master plan, four additional area sources were created for the Industrial Source Complex (ISC) Model. Two of these source areas cover the extended reclamation area located to the west of the original master plan configuration. The remaining two source areas were created to assess the impacts of blasting and excavation operations on the headland west of Sha Lo Wan. Other aspects of this assessment were performed utilizing the same methods and assumptions described in the New Airport Master Plan EIA. The 13 receptor locations and worst case meterological parameters were also obtained from the previous study.

The two modelling source areas developed for the new reclamation area are 160,000 square metres (m^2) and 90,000 m^2 in size. This compares with a size range of 250,000 m^2 to 2,250,000 m^2 for the original 18 source areas developed for the New Airport Master Plan EIA. Based on a review of the project schedule, these two new source areas were modelled in Quarters 5, 6 and 7 of the excavation plan. Since there will be no additional equipment required or overall increase in the production rate from the original excavation/reclamation plan, the previously calculated area source strengths were decreased to account for the percentage of material transported to the two new areas.

The two modelling source areas created to assess the impacts of blasting and excavating the headland west of Sha Lo Wan are each 10,000 m^2 in size. Based on a review of the anticipated excavation plan schedule, both areas were modelled in Quarter 7. The excavation rate for the headland will be much less than that required for Chek Lap Kok, therefore, the corresponding production rate is also much less than was simulated in the New Airport Master Plan EIA. Based on the proposed excavation of 1,080,000 tonnes of material over a three month period, source strengths for both areas were calculated using an excavator production rate of 250 tonnes/hour.

3.2 Air Quality Impacts

As previously stated, construction activities in the two additional reclamation source areas will occur in Quarters 5, 6 and 7, while excavation in the headland source areas will occur in Quarter 7. Therefore, the total suspended particulates (TSP) and respirable suspended particulates (RSP) levels reported for Quarters 1, 2, 3 and 4, in the New Airport Master Plan EIA will not be affected by the master plan modifications.

Tables 3.1 and 3.2 contain the predicted worst case one hour and 24 hour TSP and RSP levels. The results indicate that in Quarters 5, 6 and 7, the worst case one hour TSP and RSP levels associated with the excavation/reclamation activities may vary slightly from the results found in the New Airport Master Plan EIA. The highest predicted TSP and RSP levels of 82 micrograms/cubic metre (ug/m^3) and 16 ug/m^3 respectively, occur at Receptor No. 11 in Quarter 5. As in the Master Plan EIA, predicted TSP and RSP one hour levels generally decline in subsequent quarters and all predicted TSP levels associated with excavation/reclamation activities are within the EPD Dust Suppression Guideline of 500 ug/m^3.

The variation in predicted levels from the New Airport Master Plan EIA is primarily a result of shifting haul routes to account for material transported to the two additional reclamation source areas. The proposed excavation of the headland west of Sha Lo Wan would have no effect on the worst case excavation/reclamation levels because (1) the two source areas representing the headland are very small compared to the modelling areas representing Chek Lap Kok, (2) the production rate for excavating the headland is much less than the production rate for excavation of Chek Lap Kok and (3) at worst case wind angles, the excavation activities at the headland and Chek Lap Kok would not have a cumulative impact at any of the receptor locations.

Blasting of the headland will occur in Quarter 7; therefore, predicted one hour worst cast TSP and RSP levels resulting from blasting will not change for Quarters 5 and 6. In Quarter 7, blasting activities on the headland will increase TSP and RSP levels at Receptor Nos. 1, 2 and 3 because of the proximity of the headland to these receptors. The worst case levels at all other receptors would not be affected by the headland blasting because (1) blasting on Chek Lap Kok will remain the dominant source at these receptors and (2) at worst case wind angles, the blasting activities at the headland and Chek Lap Kok would not have a cumulative impact at any of the receptor locations.

Compared with the results in the New Airport Master Plan EIA, predicted worst case TSP levels associated with blasting exceed the EPD Dust Suppression Guideline of 500 ug/m^3 at Receptor Nos. 1, 2 and 3 in Quarter 7. Under most probable meteorological conditions, or when the wind is blowing from the east, none of the receptors on Lantau Island would be impacted by construction activities on the headland. It should be noted that the worst case wind conditions occur only 20% of the time.

The Hong Kong Air Quality Objectives (AQO) establish standards for TSP and RSP for a 24 hour averaging time. For quarters affected by the revised airport layout plan (Quarters 5, 6 and 7), the highest predicted, worst case 24 hour TSP and RSP levels are 158 ug/m^3 and 28 ug/m^3, respectively. The highest levels, occurring at Receptor 11 in Quarter 5, are well within the 24 hour AQO of 260 ug/m^3 for TSP and 180 ug/m^3 for RSP.

3.3 Mitigation Measures

The results of the analysis indicate that, except for potential increases in predicted one hour worst case TSP levels at Receptor Nos. 1, 2 and 3 in Quarter 7, excavation of the headland and modifications to the reclaimed area will have a very minor effect on the results presented in the New Airport Master Plan EIA. Furthermore, the previous assessment showed potential exceedances of the EPD Dust Suppression Guideline of 500 ug/m^3 during blasting including exceedances at Receptor Nos. 1, 2 and 3 in Quarter 2. Therefore, the mitigation measures documented in Section 5.4 of the New Airport Master Plan EIA will be adequate to mitigate for any additional impacts.

3.4 Monitoring and Audit

Receptor Nos. 1, 2 and 3, which may be potentially impacted by the headland excavation/blasting activities, represent the existing village of Sha Lo Wan. In Section 5.5 of the New Airport Master Plan EIA, Sha Lo Wan is recommended as a TSP monitoring site. Therefore, the monitoring requirements, audit requirements and remedial action plans documented in the previous study will adequately address any additional impacts.

Table 3.1 ***Worst Case One Hour and 24 Hour Total Suspended Particulates (TSP) Levels (ug/m^3)***

No.	Receptor Location	Quarter No. 5			Quarter No. 6			Quarter No. 7		
		Blast	Exv/Rec	24/Hr	Blast	Exv/Rec	24/Hr	Blast	Exv/Rec	24/Hr
1	Sha Lo Wan	251	16	14	170	12	10	947	12	40
2	Sha Lo Wan	206	23	20	134	23	19	1136	23	48
3	Sha Lo Wan	324	31	25	217	30	24	935	30	40
4	Kau Liu	1268	49	72	784	20	42	346	20	23
5	Tin Sam	1445	47	98	889	21	54	440	19	27
6	San Tau	1364	47	80	843	23	46	400	14	27
7	Tung Chung (Ruin)	865	36	65	544	18	37	192	11	17
8	Tung Chung (Rec. Camp)	942	38	70	590	19	40	270	11	20
9	Sha Tsui Tau	941	40	71	586	19	39	253	11	18
10	Ma Wan Chung	1740	61	122	1066	28	67	418	15	30
11	Ma Wan Chung	2313	82	158	1404	35	87	509	18	36
12	Tai Po (Youth Camp)	1393	53	84	860	18	48	393	10	24
13	Tai Po	1289	38	81	798	15	45	423	9	24

Notes :

1) TSP sizes range 0 to 30 um.

2) Reported values represent highest predicted levels for each receptor from all potential worst-case wind directions. Background values not included.

3) Worst-case wind angles are from the north across the project site or from the west across the Lantau Island headland.

4) Blast levels based on a single one-hour event per day.

5) Exv./Rec. (Excavation/Reclamation) levels based on a single one-hour combined contribution for excavation/loading, hauling, unloading, drilling and overburden removal.

6) 24-Hr. (24-hour) levels based on a single one-hour blast event + 19.35 hours of Exv./Rec. operations.

7) EPD Dust Suppression Guideline for TSP is 500 ug/m^3.

8) AQO 24-Hour standard for TSP is 260 ug/m^3.

Source : Greiner-Maunsell, 1992

Table 3.2 ***Worst Case One Hour and 24 Hour Respirable Suspended Particulates (RSP) Levels (ug/m³)***

No.	Receptor Location	Quarter No. 5			Quarter No. 6			Quarter No. 7		
		Blast	Exv/Rec	24/Hr	Blast	Exv/Rec	24/Hr	Blast	Exv/Rec	24/Hr
1	Sha Lo Wan	76	5	5	57	3	3	59	2	3
2	Sha Lo Wan	60	5	5	45	3	3	58	2	3
3	Sha Lo Wan	92	5	5	68	3	4	61	2	4
4	Kau Liu	255	10	17	176	5	10	89	2	6
5	Tin Sam	277	10	20	190	6	12	110	3	7
6	San Tau	270	11	16	186	6	10	103	3	7
7	Tung Chung (Ruin)	197	9	16	137	6	11	57	3	5
8	Tung Chung (Rec. Camp)	209	10	17	145	6	11	79	3	6
9	Sha Tsui Tau	201	10	16	140	6	10	72	3	5
10	Ma Wan Chung	319	13	24	219	7	15	107	3	7
11	Ma Wan Chung	386	16	28	265	8	17	122	3	7
12	Tai Po (Youth Camp)	274	12	19	188	4	11	101	2	6
13	Tai Po	260	9	16	179	4	11	108	2	6

Notes

1) RSP sizes range 0 to 10 um.

2) Reported values represent highest predicted levels for each receptor from all potential worst-case wind directions. Background values not included.

3) Worst-case wind angles are from the north across the project site or from the west across the Lantau Island headland.

4) Blast levels based on a single one-hour event per day.

5) Exv./Rec. (Excavation/Reclamation) levels based on a single one-hour combined contribution for excavation/loading, hauling, unloading, drilling and overburden removal.

6) 24-Hr. (24-hour) levels based on a single one-hour blast event + 19.35 hours of Exv./Rec. operations.

7) AQO 24-Hour standard for RSP is 180 ug/m³.

Source : Greiner-Maunsell, 1992

4.1 Assessment Methodology

A study was made of the possible effect of the removal of the headland west of Sha Lo Wan on tidal flow and discharges through the sea channel created between the airport and North Lantau island. The assessment was based on previous work on the sea channel geometry and discharge characteristics carried out by others under the North Lantau Development Study, which has been accepted by EPD. The methodology for the desk-top study was as follows.

The original channel was approximately 4400 metres long and the new layout would add approximately 120 metres to this length. Assuming steady flows, the area mean water speed can be related to the surface slope along the channel by the quadratic friction law:

$$\frac{fu^2}{d} \propto g\frac{\Delta h}{\Delta x}$$

where f = friction factor
u = water speed (m/s)
d = water depth (m)
g = acceleration of gravity (m/s^2)
Δh = head difference
Δx = channel length

$$\Rightarrow u^2 = \frac{kgd\Delta h}{f\Delta x}$$

where k = constant

Assuming friction factor, depth and head difference remain unchanged, then if the length (Δx) increases to $(1 + 120/4400)\Delta x = 1.02727\Delta x$, the water speed should reduce to u'say where

$$u'^2 = \frac{kgd\Delta x}{f1.027\Delta x}$$

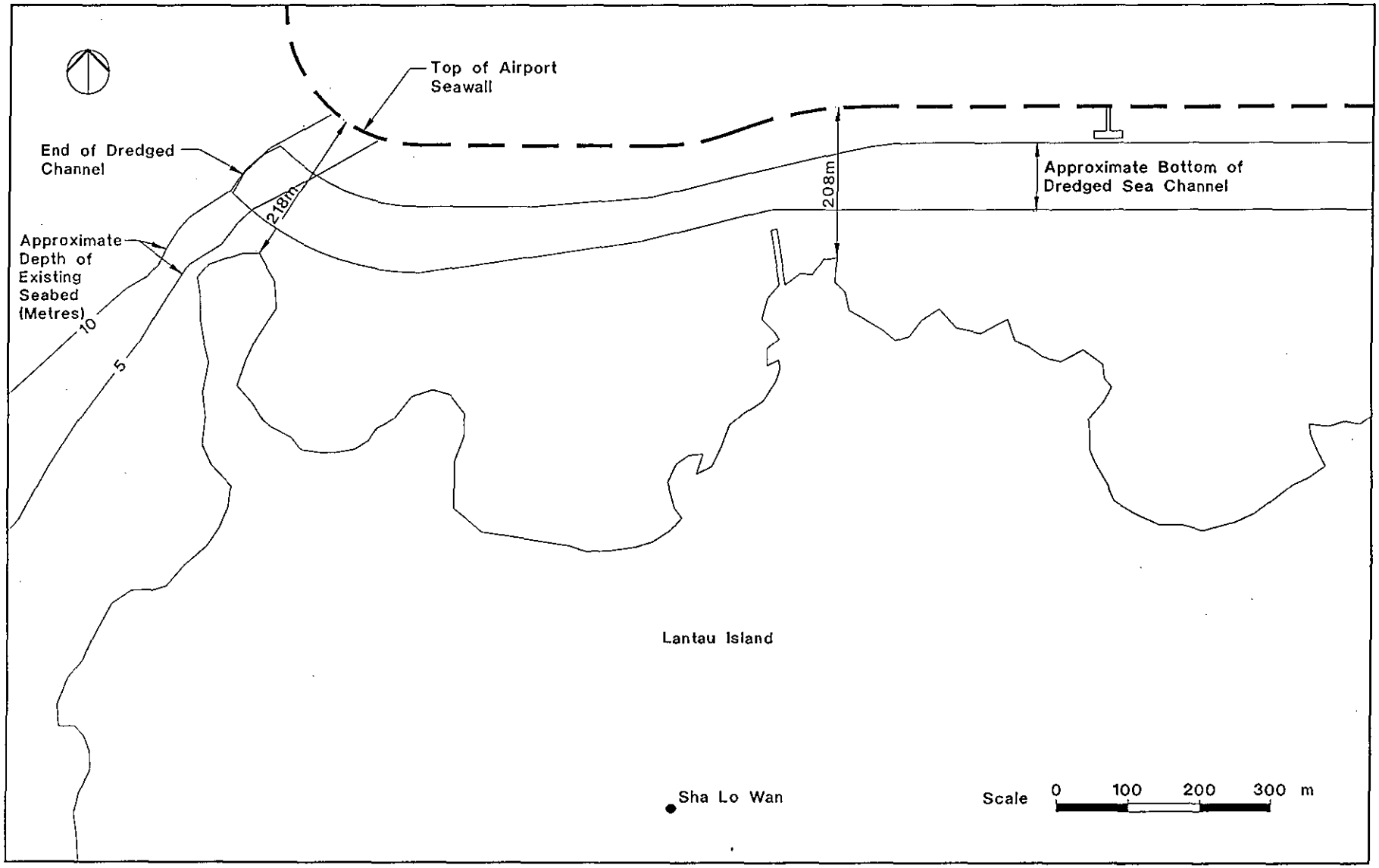
$$= \frac{1}{1.027}u^2$$

$$\Rightarrow u' = 0.99u$$

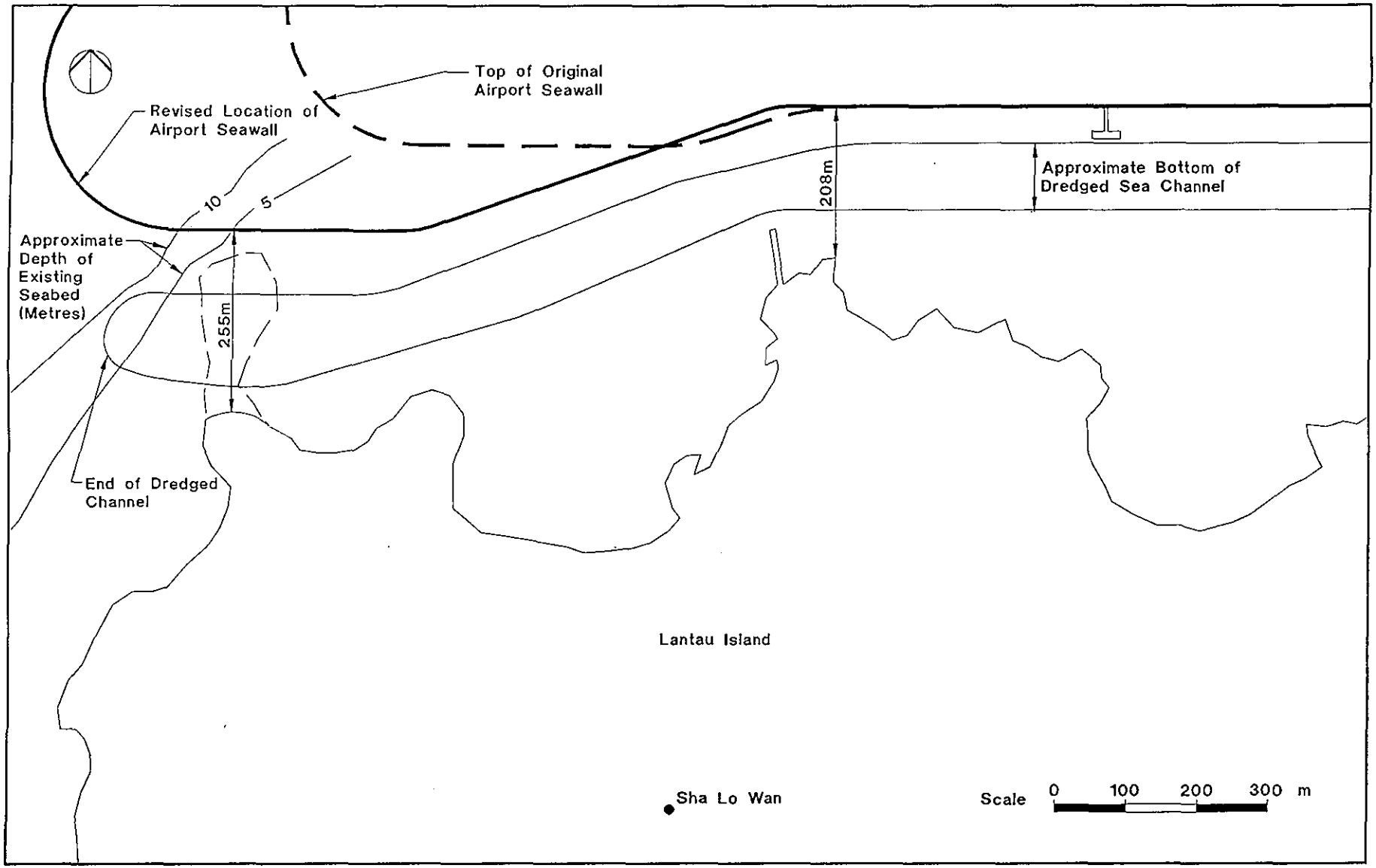
4.2 Hydraulic Impacts

From examination of the revised geometry (Exhibit 4.1 and 4.2) and the above calculations, the following observations can be made on the revised sea channel section;

- The new layout adds approximately 120 metres to the length of the channel or approximately <3% of the total length.



Original Channel Layout *Exhibit* *4.1*



Revised Channel Layout *Exhibit* *4.2*

- The new layout increases the surface width of the western entrance from approximately 220 metres to 255 metres. The new layout entrance width is also now perpendicular to the flow direction; in the original layout the maximum entrance width is not perpendicular to the main channel.

- The narrowest section remains the same in both layouts at 208 metres just to the east of the western entrance.

- In the original layout, there is a sudden expansion at the entrance for ebb flows and a large eddy can be expected to form in the bay to the east of the Sha Lo Wan headland. This expansion is greatly reduced in the proposed new layout and the plan area of the bay in which an eddy could form is greatly reduced.

- The previous one-dimensional model study, from the information available, would not have simulated the energy losses due to rapid expansions and contractions and eddy generation. The proposed new layout reduces the expansion at the entrance and the scope for eddy shedding.

- The seawall and width of the dredged channel along the new layout is the same as at the entrance to the original layout. The Sha Lo Wan headland will be removed to -8mPD while the dredged channel remains at -7mPD along its extended length east of the headland.

If all geometric parameters remain the same, then the increased channel length could result in a minimal reduction (1%) in velocities for the same head difference across the channel. However, this is only valid if all factors other than the channel length remain the same i.e. water depth, friction losses per unit length, width, channel "shape" or more precisely, wetted perimeter of the channel. The original layout had a rapid expansion on either side of the headland at the entrance to the channel but the proposed new layout eliminates this rapid expansion and the entrance width is 15% larger than for the original layout. The new entrance is also perpendicular to the main flow direction whereas in the original layout, the maximum entrance width was not perpendicular to the main channel direction.

The new entrance layout is considered more efficient in that the tendency to generate eddies is reduced because the rapid expansions have been reduced and the flow area is larger than that for the original layout. The hydraulically improved entrance will reduce head losses but it is not possible to quantify the improvement in flow this might allow.

To within the accuracy of the modelling approach used in the previous study, it must be concluded that the proposed new layout would have no significant impact on the expected tidal discharges. On this basis it is also concluded that in the absence of additional effluent loads to the sea channel, significant changes in water quality and siltation resulting from removal of the headland would not be expected from those discussed in the New Airport Master Plan EIA.

4.3 Mitigation Measures

No additional mitigation measures are recommended beyond those presented in Sections 6.3 and 7.4 of the New Airport Master Plan EIA.

5.1 Assessment Methodology

The proposed modifications to the alignment of the sea channel between the new airport site at Chek Lap Kok and Lantau will result in modification of the Lantau coastline and the direct removal of an estimated 700 metres of shoreline, with corresponding changes to the structure of the marine littoral and sublittoral ecology. The focus of the following section is identification of potential impacts associated with the proposed removal of the headland to the west of Sha Lo Wan, the significance of the direct habitat loss associated with this, and further short term impacts associated with the construction activities; and the benefits of maintaining 2.5 kilometres of natural coastline along Chek Lap Kok's eastern shore.

The assessment is based on the field data collected for the New Airport Master Plan EIA, in conjunction with field observations made by study team members.

5.2 Existing Environment

5.2.1 Sublittoral

The sublittoral of Sha Lo Wan shows a more abundant and diverse fish population than adjacent sites due to the local tidal currents. Sha Lo Wan is on the edge of the demarcation zone where on the ebb tide, well oxygenated nutrient rich estuarine water passes close inshore before being diverted to the west around the Sha Lo Wan promontory. Previous surveys in the area (Richards and Wu, 1985) have corroborated the marked seasonal effects water quality changes have an species composition and abundance. Species inventories for the area have been compiled in the New Airport Master Plan EIA.

Evidence suggests that the bay at Sha Lo Wan may also serve as a nursery area for a number of commercially important fish species including snappers (*Lutjanids)* and sea bream *(Mylio* and *Rhadosarga*). This is attributable to the shallow sheltered conditions, abundant food supplies and the nutrient flows from the streams discharging to the sea at the head of the bay. The significance of the fish resources at Sha Lo Wan is reflected in the presence of three of the four remaining traditional fish traps that continue to be operated in this part of the Territory.

5.2.2 Littoral

The area of Sha Lo Wan Point that will face direct habitat loss comprises largely rocky shore habitat with granite cliffs on the promontory passing into moderately deep waters inshore. Current speeds are significant on both ebb and flood tides and this has limited the presence of any soft deposits. On the northern side of the headland facing Sha Lo Wan Bay where conditions are more sheltered the cliff/rock shore gives way to a short stretch of large boulders and subsequently to a medium grained sand beach backed by *Hibiscus, Pandanus* and a range of common succession species, and secondary broadleaf growth Towards the seaward end of the point vegetation becomes sparse. On the southern side of the peninsula the cliffs fall away to a more exposed mobile boulder shore with large cobbles.

The beach zone on the inner northern side of the promontory sustains a fauna typical of this part of the territory and is characterised by ghost crabs (*Ocypodid* sp.) and several unidentified bivalves (probably *Donax* or *Tapes)*. The transition between the sheltered sandy beach and the rocky shoreline is characterised by a range of animals typical of boulder shores and dominated by the rock oyster *Saccostria* in association with the predatory gastropod *Thais*. Small areas of soft sediments sustain moderate populations of littorinids.

The exposed cliffs and rocky shores of the headland have a more limited fauna confined largely to animals with strong holdfast mechanisms and dominated by barnacles *(Tetraclita* and *Capitulum)* due to the relative increase in wave exposure The fish population around the headland is none the less prolific and a traditional fish trap operates from the rocky shore at the eastern (least exposed) side of the headland. Although not observed in adjacent areas in the survey for the previous EIA, the rocky shoreline of the promontory sustains a large population of chitons *(Liolophura)*.

The boulder shores to the western side of the promontory and adjacent to the village dwellings on the upper shore are typical of shallow boulder shoreline with a fauna dominated by rock oysters *Saccostria cucullata,* associated gastropods *Thais* and *Murela,* and in the crevices of larger rock formations the stalked barnacle *Capitulum mitella.*

5.3 Impacts

5.3.1 Habitat Loss

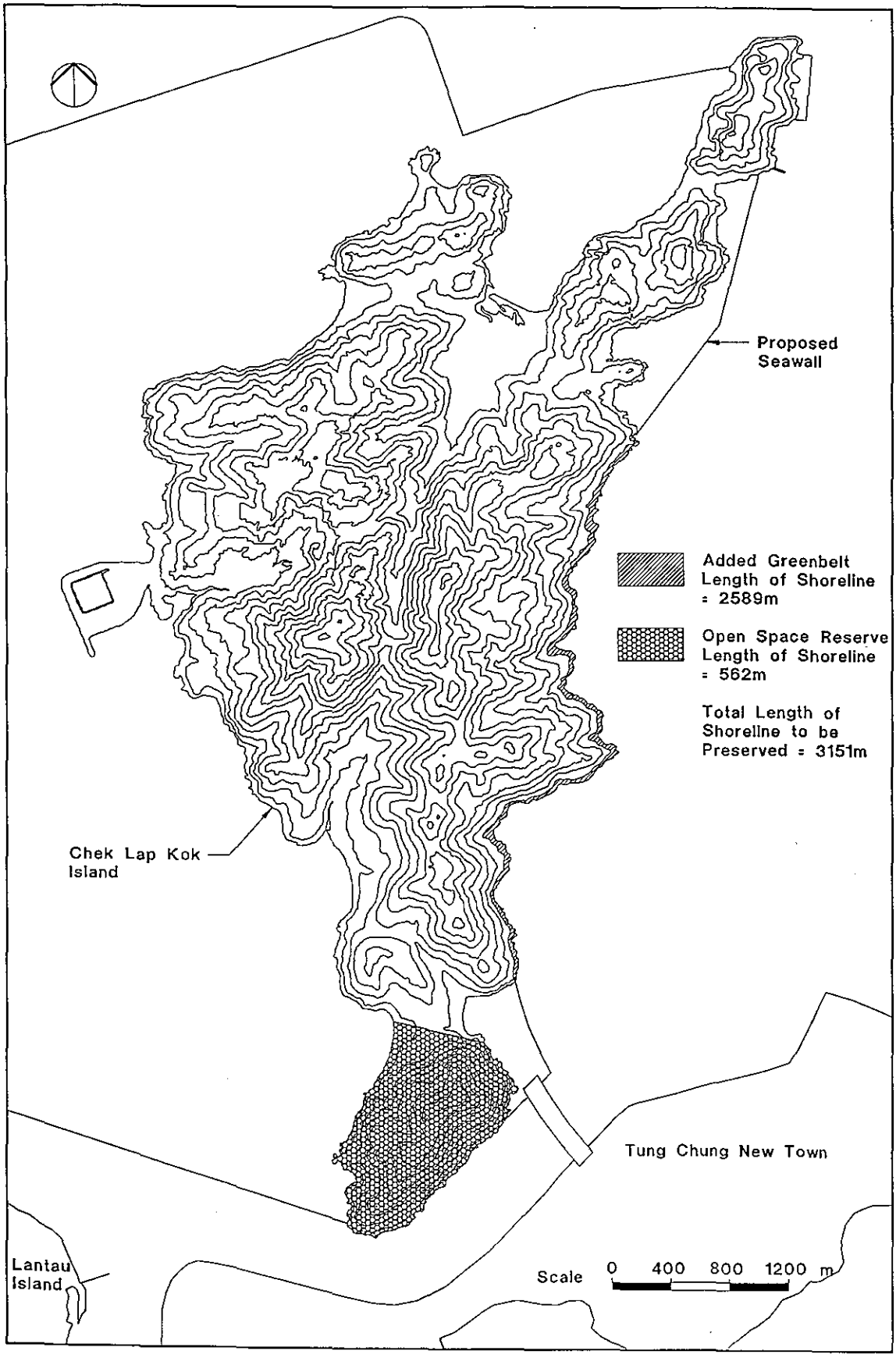
Sublittoral Biota

The westward shift of the airport reclamation will result in no net change in the area of seafloor affected by reclamation activities. On the basis of observations made during the benthic survey in this area for the New Airport Master Plan EIA, it is not considered likely that the shift in location of the reclamation is of environmental significance.

The magnitude of the changes in the sublittoral communities resulting from removal of the headland will be small, in comparison to the changes predicted as a result of the airport reclamation and formation of the sea channel. As stated in the New Airport Master Plan EIA, Section 8.3.2, the reduction in wave exposure and localised tidal flushing along this section of the North Lantau coastline will result in the biota of exposed rocky cliffs or sandy shores being lost and replaced by sheltered rocky communities dominated by oysters, or by sedimentary shores subject to deposition of mud from suspension. In comparison with such predicted changes, further changes resulting from removal of the headland are unlikely to be distinguishable. Removal of the headland may, however, mitigate this effect locally as it will increase tidal action at the western end of the sea channel and reduce the tendancy for sediment deposition within Sha Lo Wan bay.

Littoral Communities

Direct impacts at Sha Lo Wan will be associated with habitat loss on the peninsula at the western end of Sha Lo Wan Bay. The littoral ecology of the peninsula typifies that found in similar habitat types on the North Lantau coast and there is no evidence of the presence of any unusual, rare or protected species. The removal of the peninsula will be effectively compensated for by the retention of approximately 2.5 kilometres of coastline on the eastern side of Chek Lap Kok as a result of the westward shift in the reclamation footprint (Exhibit 5.1). Habitats are similar, with rocky cliff communities predominating. There are also a number of small sandy beaches on the east coast of Chek Lap Kok supporting a range of bivalves and crustaceans.



Preserved Shoreline of Chek Lap Kok *Exhibit* *5.1*

5.3.2 Construction Activities

The main concern over construction activities in relation to marine ecology is the possibility that blasting below sea level will be employed to reduce the granite headland to a level of -8mPD. Initial estimates of blasting requirements suggest that charges of 50 kg of dynamite per delay would be used in a potential worst case scenario. Exact requirements cannot be determined until actual construction commences.

Detonation of high explosive such as dynamite underwater produces a strong shock wave with a steep, high pressure front. The pressure generated from an explosion is rapidly attenuated in water, however, typically decreasing inversely as the cube of the distance. This means that at a point 10m away from an explosion, the pressure will be approximately eight times the force at a point 20m away. Pressure is also attenuated approximately 10 fold when explosive are contained, i.e. placed in drillholes in the rock as would be done in the removal of headland rock formations.

Underwater blasting can kill or cause damage to fish and marine mammals if they are within a range where pressure exceeds tolerable limits. The main physiological effect on fish caused by blasting is the rupture of the swim bladder; blood vessel and other organs can also be ruptured as a result of the rapid pressure changes. Fish without swim bladders, for example flatfish, are less susceptible. Marine mammals may be subject to damage to internal organs.

5.4 Mitigation Measures

5.4.1 Habitat Loss

It is evident that there are no effective means of mitigating against the longer term impact of removing the headland at Sha Lo Wan. However, the loss of the rocky shore littoral communities will be compensated for by retention of part of the east coast of Chek Lap Kok, which is predominantly cliff and rock, with some sand beaches.

5.4.2 Construction Activities

In view of concern over potential impacts to fish during blasting activities and the known presence of the Chinese White Dolphin (*Sousa chinensis*) in the area around the airport site, the following mitigation practices will be adopted :

- In the event that underwater blasting is required, efforts will be made to minimize pressure wave transmissions by containing the explosive in drill holes.

- To further minimize impacts to dolphins and pelagic fish species, small non-lethal "seal bombs" will be utilized to scare marine fauna from the construction area, prior to a blasting event.

- If a dolphin or other marine mammal species is observed in the construction area, blasting will cease until the animal leaves the area.

6.1 Assessment Methodology

The area of the headland is small and there are no special habitats, such as streams, where high animal diversity would be expected. A survey was therefore made on foot on 20 August 1992, covering all of the coastal strip and representative transects across the headland. The survey concentrated on vegetation floristics and structure. Potential animal diversity was inferred from knowledge of similar habitats elsewhere. A survey of avifauna was made on 26 September 1992 to identify species of birds present or expected on the basis of habitat types.

In addition, due to the 360 metre shift in the southern runway, a revised evaluation of the runway's approach and departure surfaces was made to evaluate any potential change in the location and degree of terrain cuts. This analysis also considered whether there would be any change in the location of obstruction lights or other types of electronic equipment.

6.2 Existing Environment

6.2.1 Sha Lo Wan Headland

The headland to be removed has no streams, marshes or other permanently wet areas. The coastline is entirely rocky and is backed by a belt of coastal plants typical of rocky shores in Hong Kong. Inland from the coastal strip, the headland is covered in dense shrubland, 0.5-3.0 metres in height, dominated by *Aporusa dioica* (= *A. chinensis*), *Cratoxylon cochinchinense* (= *C. ligustrinum*), *Lantana camara, Microcos paniculata, Vitex negundo*, and *Wikstroemia indica*. This combination of species, particularly the abundance of *Vitex* and the exotic *Lantana*, is characteristic of abandoned dry cultivation, an impression reinforced by the presence of several relict longan trees. The current state of development of the vegetation suggests that all but the steepest and most inaccessible areas were in cultivation 10-15 years ago and that there has been continued, patchy, disturbance since.

A brief visit in summer is insufficient to assess the significance of the headland to vertebrates. The faeces of the Chinese Pangolin *(Manis pentadactyla)* were found on the path just inland of the headland. Other mammals and reptiles would be expected, given the density of the vegetation but the area is probably too dry for amphibla.

Species of birds observed on the Sha Lo Wan headland are listed in Table 6.1. Other species recorded in nearby areas included single individuals of Black Baza *(Aviceda jerdoni)*, Black-naped Oriole *(Oriolus chinensis)*, Broad-Billed Roller (*Eurystomus orientalis*), Brown Flycatcher (*Muscicapa latirostris*) and several great tits (*Parus major*) and Black Drongos (*Dicrurus macrocercus*). A wide range of species would be expected to visit the site during the course of a year including flycatchers, warblers, robins, thrushes and buntings. The species mix is likely to be similar to that recorded for Chek Lap Kok (described in Section 9.2 of the New Airport Master Plan EIA).

6.2.2 East Coast of Chek Lap Kok

A description of the flora and fauna on Chek Lap Kok is given in Section 9.2 of the New Airport Master Plan EIA.

6.2.3 Remote Sites

A description of the existing environment for the remote sites relevant to this study is given in Section 9.2 of the New Airport Master Plan EIA.

Table 6.1 Birds Observed at Sha Lo Wan Headland, North Lantau

Reef Egret 1 on coast	*Egretta sacra*
Black Kite 4 flying over peninsula	*Milvus migrans*
Eastern Marsh Harrier 1 immature/female flying over peninsula	*Circus aeruginosus*
Common Sandpiper 5 on coast	*Actitis hypoleucos*
Grey-rumped Sandpiper 1 on coast	*Heteroscelus brevipes*
Spotted Dove 1 in woodland	*Streptopelia chinensis*
White-breasted Kingfisher 1 flying over sea	*Halcyon smrynensis*
Magpie 2	*Pica pica*
Chinese Bulbul 1 over scrub	*Pycnonotus sinensis*
Black-faced Laughing Thrush 2 flocks of 6 birds	*Garrulax perspicilatus*
White Wagtail 1 feeding on sandy beach	*Motacilla alba*
Tailorbird 2 calling inside woodland	*Orthotomus sutorius*

6.3 Impacts

6.3.1 Sha Lo Wan Headland

The Sha Lo Wan headland is botanically unexceptional and, although the density of the vegetation makes it attractive to many vertebrates, the history of recent disturbance and the absence of permanent fresh water suggests it is unlikely to be of major significance. The area does not appear to support any particularly rare or unusual bird species.

These conclusions apply only to the area to be removed. Construction of a vehicular access road/or a landing site could destroy a much larger, and probably more valuable, area inland from the headland. However, since marine access only will be provided to the headland construction area, off-site impacts on terrestrial ecology are not expected to be significant.

6.3.2 Remote Sites

An analysis of the revised departure and approach surfaces indicates that in some areas terrain cut requirements remain the same and in some areas they are slightly reduced from those reported in the New Airport Master Plan EIA. There are also no required changes in the location of any obstruction lights or electronic equipment. As a result, impacts on remote sites are slightly less than was reported in the New Airport Master Plan EIA.

6.4 Mitigation Measures

No mitigation measures are recommended. However, if land access to the Sha Lo Wan headland is subsequently reconsidered, mitigation measures to reduce impacts may be required and would need to be reviewed.

6.5 Monitoring

The Birdstrike Control Unit will include observations of birds along the natural coastline (east side of Chek Lap Kok) as part of their regular monitoring programme.

Solid Waste 7

There are no significant changes in potential solid waste impacts from those assessed in the New Airport Master Plan EIA. Under the proposed modification approximately 2.5 kilometres of natural coastline along Chek Lap Kok's eastern shore will remain intact. However, the revised configuration will also require the excavation of part of a headland located to the west of Sha Lo Wan. All vegetative wastes resulting from this excavation will be removed to off-site landfills. All other excavated portions of the headland will be used as fill material for airport reclamation. Disposal alternatives for all types of solid wastes remain the same as those discussed in Section 10.2 of the New Airport Master Plan EIA.

Hazardous Materials 8

There are no significant changes in potential hazardous material impacts from those assessed in the New Airport Master Plan EIA. All mitigation measures and recommendations discussed in Section 11.3 of the New Airport Master Plan EIA are still valid and have not changed as a result of the modification to the Master Plan.

Land Use 9

Land use impacts resulting from the modified master plan configuration are similar to impacts assessed in the New Airport Master Plan EIA. However, as a result of the altered configuration approximately 2.5 kilometres of natural coastline along Chek Lap Kok's eastern shore will now be retained (see Exhibit 6.1). In addition, a portion of a headland located to the west of Sha Lo Wan will have to be removed to maintain adequate flushing of East Tung Chung Bay and to provide marine access.

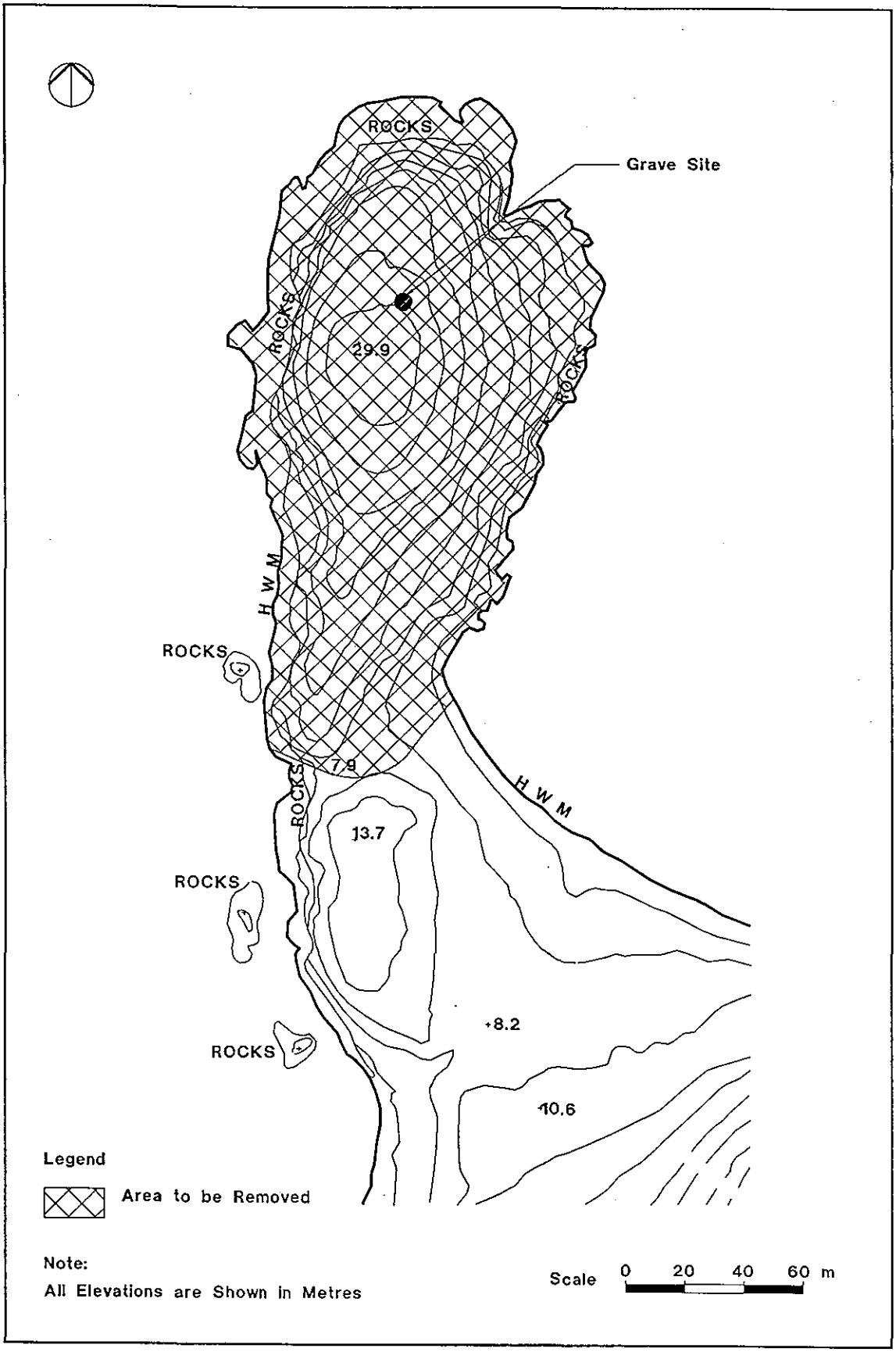
10.1 Assessment/Impacts

During field surveys of the headland west of Sha Lo Wan, a grave dating from early this century was located (See Exhibit 10.1). The grave site is situated near the top of the headland and faces north/north east. This grave site will be eliminated by the proposed removal of the headland. With this exception, there are no significant changes in the socio-economic impacts described in the New Airport Master Plan EIA. Impacts to the aesthetic environment as well as noise and air quality related impacts are discussed elsewhere in this report.

The proposed modification to the Master Plan layout and configuration results in construction cost savings. A reduction in the cost of the airport's construction will be a direct economic benefit to the territory.

10.2 Mitigation Measures

The Provisional Airport Authority is currently coordinating with the Building and Lands Department to ensure that appropriate procedures for relocating this grave site are followed. In addition, marine access to the Sha Lo Wan ferry pier will be maintained during and after the excavation of the Sha Lo Wan headland. With these exceptions, all mitigation measures and recommendations discussed in Section 13.3 of the New Airport Master Plan EIA are still valid and have not changed as a result of the modification to the Master Plan.



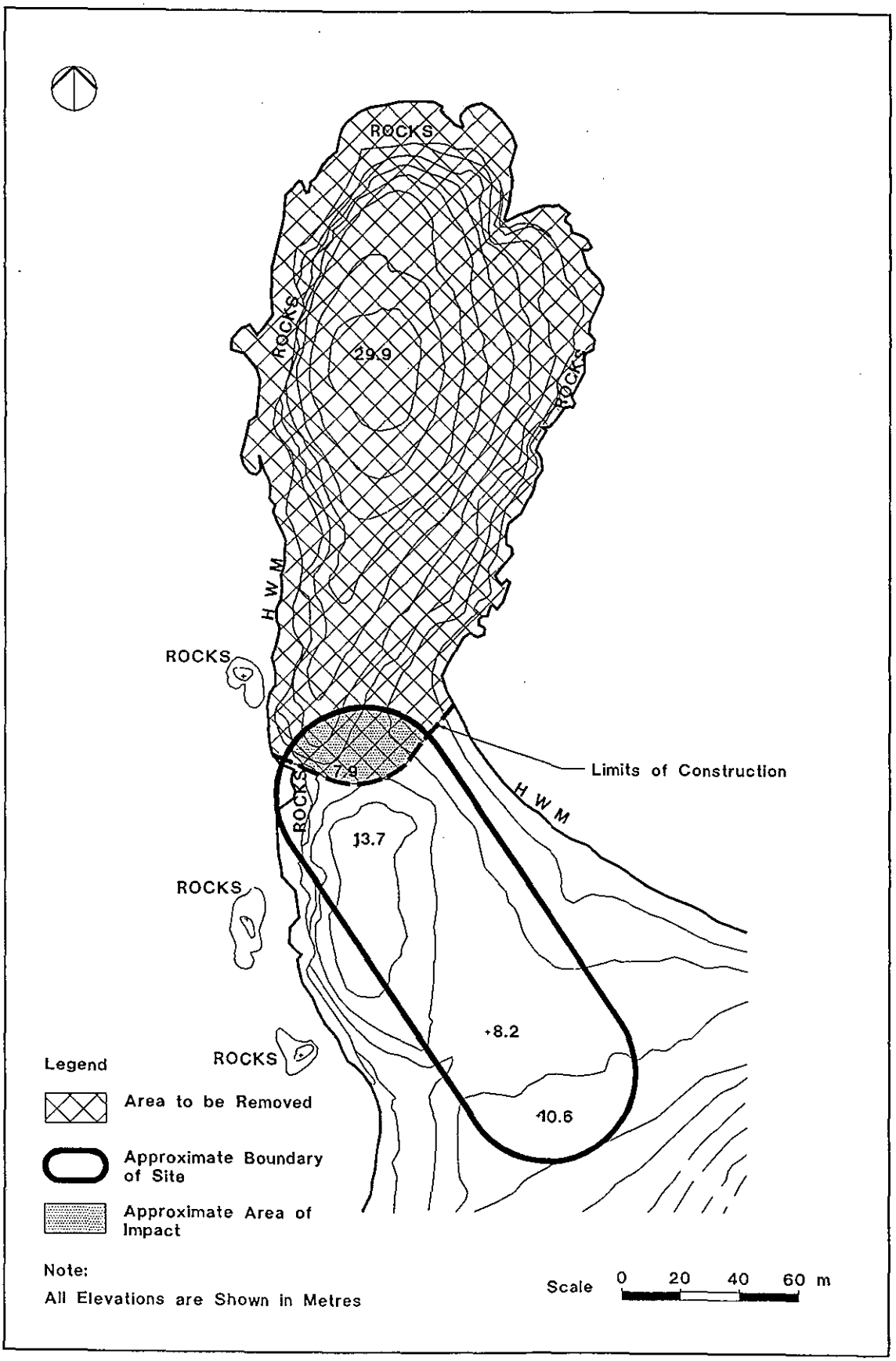
Sha Lo Wan Headland Grave Site *Exhibit 10.1*

11.1 Assessment/Existing Environment

The modification to the airport configuration does not alter impacts to archaeological and historic sites described in the New Airport Master Plan EIA. However, coordination with the Antiquities and Monuments Office of the Government Recreation and Culture Branch has indicated that a significant archaeological site is located on the headland west of Sha Lo Wan proposed for partial excavation (see Exhibit 11.1). The archaeological site, known as the Sha Lo Wan West Site is known to contain artifacts of the Neolithic and Bronze Age periods.

11.2 Impacts/Mitigation Measures

The excavation of the headland will result in the loss of a portion of the Sha Lo Wan West archaeological site (see Exhibit 11.1). This impact is unavoidable since the headland must be excavated in order to maintain water circulation in East Tung Chung Bay. To help mitigate impacts, the PAA will not commence construction operations on the headland until September 1993. This will allow the Antiquities and Monuments Office to excavate that portion of the archaeological site to be physically impacted and recover scientifically significant features and artifacts. Although some of the valuable information within the site may be lost, the extensive scientific excavation and documentation of findings, which might otherwise not have occurred, will mitigate much of the unavoidable destruction. The Antiquities and Monuments Office has indicated that 6-months will be required for it to conduct its excavation and data recovery efforts.



Sha Lo Wan West Archaeological Site *Exhibit* ***11.1***

Aesthetics 12

The modification to the Master Plan configuration will have both positive and negative aesthetic impacts. As a result of the altered configuration approximately 2.5 kilometres of additional natural coastline along Chek Lap Kok's eastern shore will now be retained. This shoreline area will act as a visual buffer of the airport for residents of Tai Po and other communities east of the airport. This would also provide a visually interesting approach for the rail and road access to the airport.

The revised configuration will also require the excavation of part of the headland located to the west of Sha Lo Wan. This headland rises sharply from the sea and is a visually attractive topographical feature. The excavation of this headland is required in order to allow for adequate flushing of East Tung Chung Bay and marine access following airport construction. The remaining portion of the headland will be left in a natural and aesthetically pleasing state. An excavated face of less than 8 metres in height and approximately 75 metres long will remain which will be contoured to match the existing irregular coastline.

Part C Issues Relating To Airport Operation

13.1 Assessment Methodology/Data Inputs

The noise evaluation for the Master Plan EIA as well as the noise evaluation for the modified master plan were conducted in accordance with standards established by ICAO and the U.S. Federal Aviation Administration (FAA). The FAA's Integrated Noise Model (INM), Version 3.9, which was used in the original analysis, was used to generate noise contours for the EIA Supplement.

In the modified master plan the southern runway has been shifted 360 metres to the west along its centerline. In order to maintain the same turning points of the original flight tracks, a 360 metre adjustment for both easterly and westerly operations was made in the straight portion of the flight tracks associated with this runway. This shift in flight tracks was reviewed and approved by the Civil Aviation Department who noted that there would be increased operational advantages to the new revised flight track. In order to allow for an effective comparison of the changes, all other parameters and data inputs for both the New Airport Master Plan EIA and the Supplemental evaluation are identical.

13.2 Noise Impacts

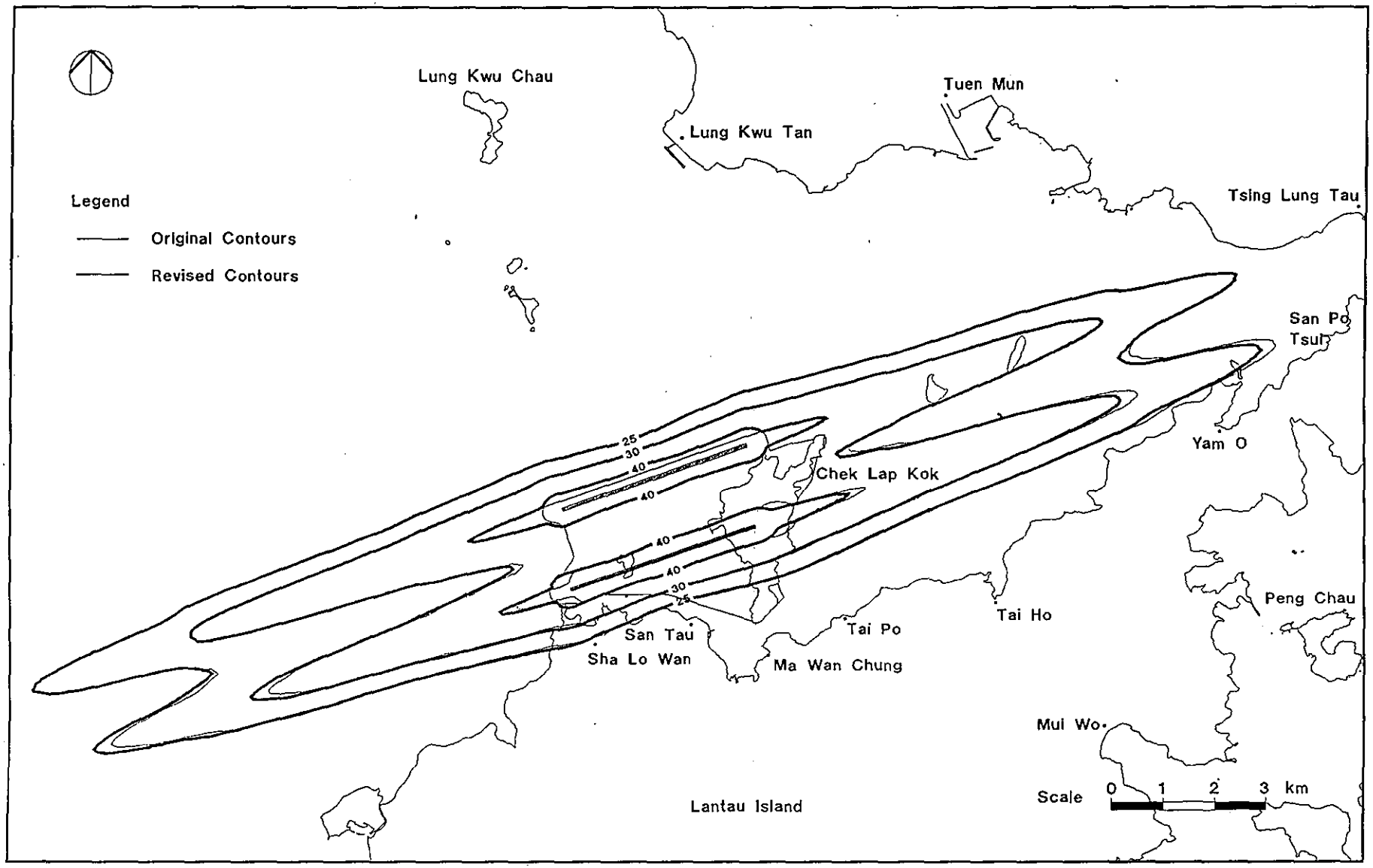
13.2.1 Arrivals and Departures

Noise Exposure Forecast (NEF) contours for 25, 30 and 40 values were generated for the years 2000 and 2030, and are shown on Exhibits 13.1 and 13.2. The contours for the revised master plan footprint now cover slightly less land area (1.20 ha less for year 2000, 17.85 ha less for year 2030) than the noise contours presented in the Master Plan EIA. Impacts are identical, however, since there are no NSRs within this land area which is now outside of the 25 NEF contour. For the year 2000, there are still approximately 14 NSRs, all along the shore of Sha Lo Wan, within the 25 NEF contour. Moreover, for the year 2030 there are still approximately 500 NSRs projected to be within the 25 NEF contour. As reported in the Master Plan EIA, these NSRs are still primarily located in and around the village of Sha Lo Wan and on the island of Ma Wan, with a few being scattered along the north coast of Lantau and along Castle Peak Road. Approximately 14 of these NSRs, all along the shore of Sha Lo Wan, are projected to be within the 30 NEF contour in the year 2030.

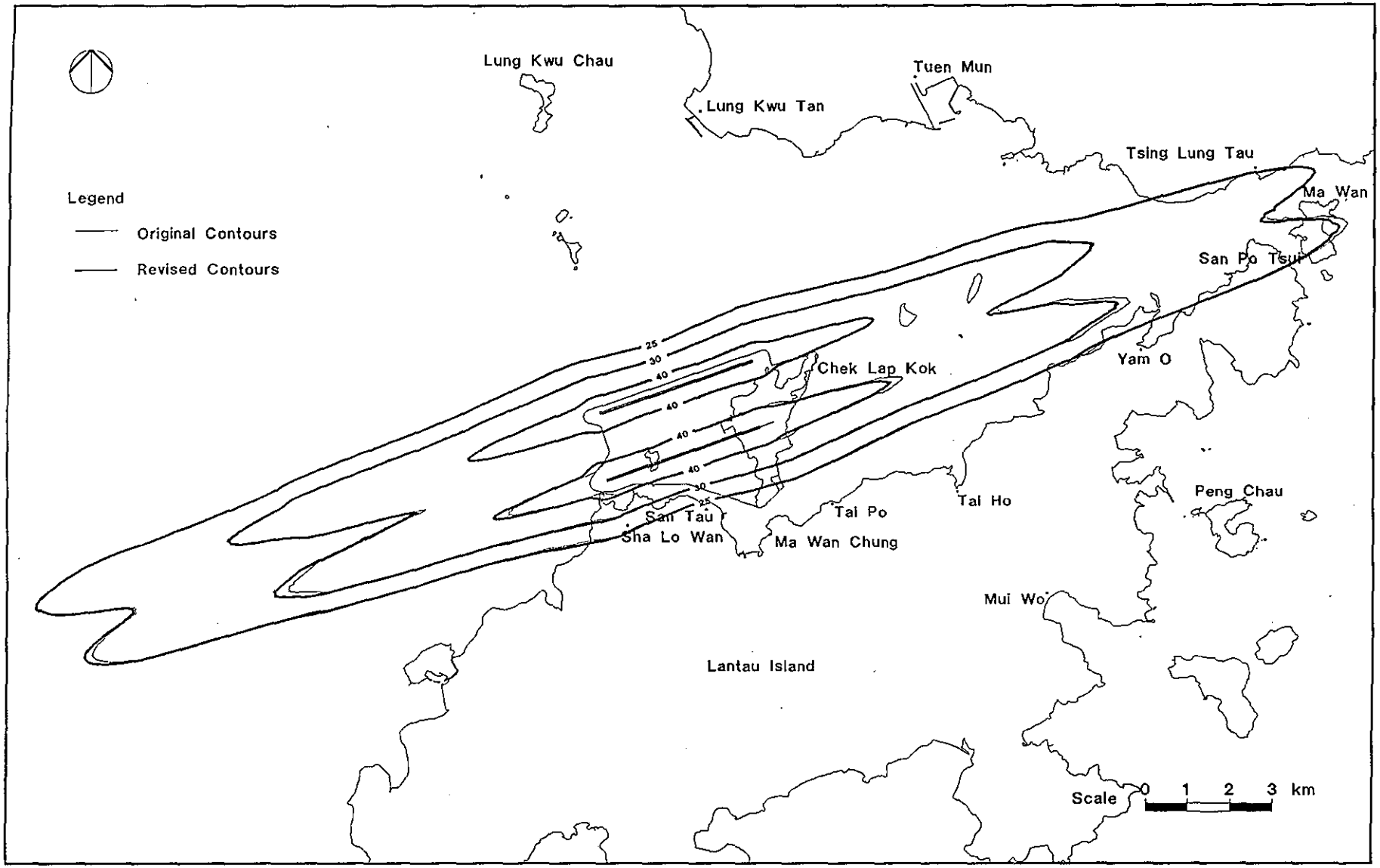
13.2.2 Ground Operations

The location of the air cargo facilities remains the same in the modified master plan and therefore no changes in ground operational impacts are expected from this source. However, there is a slight westward shift of other midfield airport facilities (i.e. passenger terminal and aircraft maintenance). Because of this shift, the maintenance runup pad adjacent to the northern runway has been moved approximately 160 metres to the west (see Exhibit 13.3). The new location for this runup pad places it approximately 40 metres closer to Sha Lo Wan relative to the pad's position described in the Airport Master Plan EIA. The distance from the runup pad's new location to the nearest NSR in Sha Lo Wan village is now approximately 2280 metres, while the runup pad's distance to the Sha Lo Wan shore area is approximately 1690 metres.

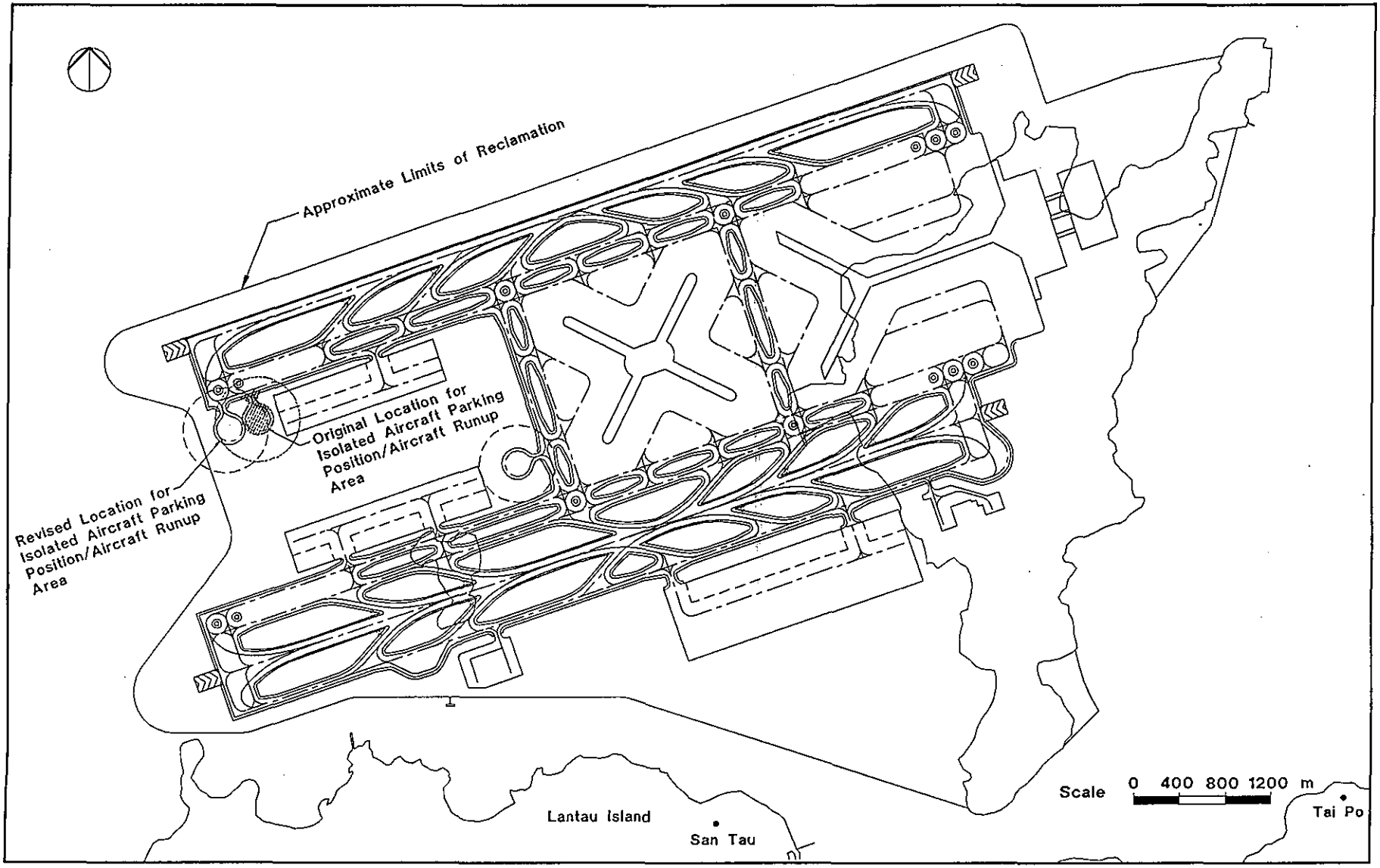
As reported in the Master Plan EIA, studies have determined that unattenuated noise levels from runup pads were at acceptable levels in all cases where the aircraft was more than 1000 metres from the NSR. Given that the location of the runup pad is greater than this distance and the fact that a noise barrier will be provided, noise levels produced from the new runup pad location are anticipated to remain within acceptable levels for neighbouring NSR's. In fact, the westward shift of the runup pad will place it further from Ma Wan Chung reducing noise impacts from this source. Since the new location is only marginally closer to NSR's in the Sha Lo Wan Area, noise levels generated by engine runups are expected to remain within the 50 to 55 dB(A) range at these NSRs.



NEF Noise Contours for Year 2000 (Revised) *Exhibit* ***13.1***



NEF Noise Contours for Year 2030 (Revised) *Exhibit 13.2*



Revised Location of Runup Pad *Exhibit* *13.3*

13.3 Mitigation Measures

All mitigation measures and recommendations discussed in Section 16.4 of the Airport Master Plan EIA are still valid and have not changed as a result of the modification to the Master Plan.

Other Impacts Related to Airport Operations 14

With the exception of noise impacts discussed in Section 13 of this supplement, there are no other operational impacts resulting from the modification to the Master Plan. All impact assessments and mitigation program discussed in Section 17 through 27 of the Airport Master Plan EIA are still valid and have not changed as a result of the modification.

Part D Summary

15.1 Noise Impact

15.1.1 Summary of Construction Impacts

An analysis of the combined construction noise impacts resulting from the modified reclamation and berm construction activities, as well as the headland excavation work, was conducted for the Sha Lo Wan village and shoreline areas. Noise levels, as projected for the village of Sha Lo Wan, were shown to exceed the evening, nighttime and holiday Allowable Noise Levels (ANL), but were below the 70 dB(A) target level established for daytime activities. The same situation was projected to occur at the Sha Lo Wan (shore) NSRs.

As mitigation for these impacts, the excavation of the headland and construction of the berm will be constrained during evenings, nights and holidays in order to comply with established ANLs.

15.1.2 Recommendations

Continued adoption of all recommendations made in section 28.1.2 of the New Airport Master Plan EIA. In addition, constraining excavation of the headland and construction of the berm during evenings, nights and holidays in order to comply with established ANL's.

15.1.3 Summary of Operational Impacts

Noise Exposure Forecast (NEF) contours for 25, 30 and 40 values were generated for the years 2000 and 2030. The contours for the revised master plan configuration now cover slightly less land area (1.20 ha less for year 2000, 17.85 ha less for year 2030) than the contours presented in the New Airport Master Plan EIA. Impacts are identical however, since there are no NSRs within this land area.

The revised Airport Master Plan configuration also places a maintenance runup pad adjacent to the northern runway approximately 40 metres closer to Sha Lo Wan relative to the pad's position described in the New Airport Master Plan EIA. However, this pad is still over 1600 metres from the nearest NSR and noise levels produced from the new runup pad location are anticipated to remain within acceptable levels.

15.1.4 Recommendations

Continued adoption of all recommendations made in Section 28.1.4 of the New Airport Master Plan EIA.

15.2 Air Quality

15.2.1 Summary of Construction Impacts

In order to assess changes in dust levels associated with the modified Master Plan, four additional source areas were created for the atmospheric computer dispersion model. A worst case scenario was evaluated so as to fully evaluate the maximum potential increase in dust levels. It should be noted that worst case conditions occur only 20% of the time at the Chek Lap Kok project area.

The results indicate that for Quarters 5, 6 and 7, the worst case one hour Total Suspended Particulates (TSP) and Respirable Suspended Particulates (RSP) levels associated with the modified excavation/reclamation activities vary slightly from the results presented in the New Airport Master Plan EIA. However, the maximum predicted TSP level is still well within the EPD Dust Suppression Guideline of 500 ug/m^3.

In Quarter 7, blasting activities on the headland west of Sha Lo Wan will increase TSP and RSP levels at Receptors Nos. 1, 2 and 3 because of the proximity of the headland to these receptors. The predicted worst case TSP levels for these three receptors range from 935 ug/m^3 to 1, 136 ug/m^3, thus exceeding the EPD Dust Suppression Guideline of 500 ug/m^3. However, under most probable meteorological conditions, or when the wind is blowing from the east, none of the receptors on Lantau Island would be impacted by construction activities on the headland.

The Hong Kong Air Quality Objectives (AQO) establish standards for TSP and RSP for a 24 hour averaging time. For quarters affected by the revised master plan (Quarters 5, 6 and 7) the highest predicted worst case 24 hour TSP and RSP levels are 158 ug/m^3 and 28 ug/m^3 respectively. These highest levels are well within the 24 hour AQO of 260 ug/m^3 for TSP and 180 ug/m^3 for RSP.

15.2.2 Recommendations

The results of the analysis indicate that, except for potential increases in predicted one hour worst case TSP levels at Receptor Nos. 1, 2 and 3 in Quarter 7, excavation of the headland and modifications to the reclaimed area will have a very minor effect on the results presented in the New Airport Master Plan EIA. Furthermore, the previous assessment showed potential exceedances of the EPD Dust Suppression Guideline of 500 ug/m^3 during blasting including exceedances at Receptor Nos. 1, 2 and 3 in Quarter 2. Therefore the recommendations made in Section 28.2.2 of the New Airport Master Plan EIA should be adequate to mitigate for and monitor any additional impacts.

15.3 Hydrodynamics and Water Quality

15.3.1

A study was made of the possible effect of the removal of the headland west of Sha Lo Wan on tidal flow and discharges through the sea channel created between the airport and North Lantau Island. The assessment was based on previous work on the sea channel geometry and discharge characteristics carried out by others under the North Lantau Development Study, which has been accepted by EPD.

The revised channel geometry results in a 120 metre increase in the channel's length as well as a 35 metre (15%) increase in the western entrance width of the channel. Moreover, the revised channel entrance is now perpendicular to the flow direction. This results in a reduction in eddy effects created by the original channel configuration. Within the limits of the study, it was calculated that the increased channel length could result in a 1% decrease in peak channel flows, using the original channel's entrance configuration. However, the original channel entrance had a rapid expansion on either side of the Sha Lo Wan headland which has been eliminated by the revised entrance layout.

The new entrance layout is considered more efficient in that the tendency to generate eddies has been reduced and the flow area is larger than that for the original layout. Moreover,the hydraulically improved entrance will reduce head losses although it is not possible to quantify the improvement in flow this might allow.

Given these factors, the revised channel geometry would not have a significant impact on tidal discharges. On this basis, it was also concluded that in the absence of additional effluent loads to the sea channel, major changes in water quality resulting from removal of the headland would not be expected from those discussed in the New Airport Master Plan EIA.

15.3.2 Recommendations

The results of the analysis indicate that there are no significant changes in tidal discharges or water quality from those described in the New Airport Master Plan EIA. Therefore the recommendations made in Sections 28.3.2 and 28.3.4 are still valid and should be adopted.

15.4 Marine Ecology

15.4.1 Summary of Impacts

An assessment was made of the marine impacts resulting from the proposed modifications to the airport configuration. Since the westward shift of the airport configuration results in no net change in the area of seafloor affected by reclamation activities, this assessment focused upon the removal of the headland to the west of Sha Lo Wan.

The sublittoral of Sha Lo Wan shows a more abundant and diverse fish population than adjacent sites due to local tidal currents. Evidence suggests that the bay at Sha Lo Wan may also serve as a nursery area for a number of commercially important fish species including snappers (*Lutjanids)* and sea bream (*Mylio* and *Rhadosarga*). This is attributable to the shallow sheltered conditions, abundant food supplies and the nutrient flows from the streams discharging into the sea at the head of the bay.

The area of the Sha Lo Wan headland is comprised of rocky shore habitat with granite cliffs passing into moderately deep waters inshore. The beach zone on the inner northern side of the headland sustains a fauna typical of this part of the territory including ghost crabs and bivalves. The transitional area between beach and shore is characterized by a range of animals typical of boulder shores including rock oysters (*Saccostria cucullata*), and associated gastropods and molluscs.

The magnitude of the changes in the sublittoral communities resulting from the headland removal will be small, in comparison to the changes predicted as a result of the airport reclamation and formation of the sea channel. In comparison to the changes predicted in the New Airport Master Plan EIA, further sublittoral changes resulting from removal of the headland are unlikely to be distinguishable.

Direct impacts to littoral communities will result from the loss of the headland west of Sha Lo Wan. The littoral ecology of the peninsula typifies that found in similar habitat types on the North Lantau Coast and there is no evidence of the presence of any unusual, rare or protected marine species. Moreover, the removal of the headland will be effectively compensated for by the retention of approximately 2.5 kilometres of coastline on the eastern side of Chek Lap Kok as a result of the westward shift in the reclamation footprint.

Blasting activities associated with the removal of the headland could result in short term impacts to marine fauna. Detonation of high explosives below sea level produces a strong shock wave with a steep, high pressure front. Underwater blasting can kill or cause damage to fish and marine mammals if they are within a range where pressure exceeds tolerable limits.

15.4.2 Recommendations

In view of the concern over potential impacts to fish during construction and the known presence of the Chinese White Dolphin (*Sousa chinensis*) in the area around the airport site, the following mitigation practices will be adopted.

- In the event that blasting is required, efforts will be made to minimize pressure wave transmissions by containing the explosive in drill holes.

- To further minimize impacts to dolphins and pelagic fish species, small non-lethal "seal bombs" will be utilized to scare marine fauna from the construction area, prior to a blasting event.

- If a dolphin or other marine mammal species is observed in the construction area, blasting will cease until the animal leaves the area.

15.5 Terrestrial Ecology

15.5.1 Summary of Impacts

Brief surveys of flora and fauna on the Sha Lo Wan headland were made in August and September of 1992. In addition, due to the 360 metre shift in the southern runway, a revised evaluation of the runways approach and departure surfaces was made to evaluate any potential change in the location and degree of terrain cuts. This analysis also considered whether there would be any change in the location of obstruction lights or other types of electronic equipment.

The Sha Lo Wan headland was evaluated as being botanically unexceptional and lacking in a permanent freshwater source. Although the density of vegetation makes it attractive to many vertebrates, the lack of fresh water suggests that the headland is unlikely to be of major significance. However, these conclusions only apply to that portion of the headland to be removed. Construction of an access road could result in significant impacts. However, since only marine access will be provided to the headland construction area, off-site impacts on terrestrial ecology are not expected.

An analysis of the revised departure and approach surfaces indicates that all previously reported terrain cut requirements are either the same or slightly less than those reported in the New Airport Master Plan EIA. There are also no required changes in the location of any obstruction lights or electronic equipment. As a result, impacts on remote sites are the same as those reported in the New Airport Master Plan EIA.

15.5.2 Recommendations

All recommendations presented in Section 28.5.2 of the New Airport Master Plan EIA should be adopted. In addition, it is recommended that the Birdstrike Control Unit include observations of birds along the natural coastline as part of their regular monitoring programme.

15.6 Solid Waste and Hazardous Materials

15.6.1 Summary & Recommendations

There are no significant changes in potential solid waste impacts from those assessed in the New Airport Master Plan EIA. Under the proposed modification approximately 2.5 kilometres of natural coastline along Chek Lap Kok's eastern shore will remain intact. However, the revised configuration will also require the excavation of part of a headland located to the west of Sha Lo Wan. All vegetative wastes resulting from this excavation will be removed to off-site landfills. All other excavated portions of the headland will be used as fill material for airport reclamation efforts. Disposal alternatives for all types of solid wastes remain the same as those discussed in Section 10.2 of the New Airport Master Plan EIA. All recommendations discussed in Sections 28.6.2 and 28.6.4 of the New Airport Master Plan EIA are still valid and have not changed as a result of the modification to the Master Plan.

There are no significant changes in potential hazardous material impacts from those assessed in the New Airport Master Plan EIA. All recommendations discussed in Sections 28.6.2 and 28.6.4 of the New Airport Master Plan EIA are still valid and have not changed as a result of the modifications to the Master Plan.

15.7 Aesthetics and Land Use

15.7.1 Summary & Recommendations

Land use impacts resulting from the modified master plan configuration are similar to impacts assessed in the New Airport Master Plan EIA. As a result of the altered configuration approximately 2.5 kilometres of natural coastline along Chek Lap Kok's eastern shore will now be retained (see Exhibit 6.1). In addition, a portion of a headland located to the west of Sha Lo Wan will have to be removed to maintain adequate flushing of East Tung Chung Bay and to provide marine access.

The modification to the Master Plan configuration will have both positive and negative aesthetic impacts. As a result of the altered configuration approximately 2.5 kilometres of additional natural coastline along Chek Lap Kok's eastern shore will be retained. This shoreline area will act as a visual buffer of the airport for residents of Tai Po and other communities east of the airport.

The revised configuration will also require the excavation of part of the headland located to the west of Sha Lo Wan. This headland rises sharply from the sea and is a visually attractive topographic feature. The excavation of this headland is required in order to allow for adequate flushing of East Tung Chung Bay and marine access following airport construction. The remaining portion of the headland will be left in a natural and aesthetically pleasing state.

No additional mitigation is recommended other than that presented in Sections 28.7.2 and 28.7.3 in the New Airport Master Plan EIA.

15.8 Socioeconomics, Archaeology & Historic Sites

15.8.1 Summary of Impacts

During field surveys of the headland west of Sha Lo Wan, a grave dating from 1959 was located (See Exhibit 10.1). The grave site is situated near the top of the headland and faces north/north east. This grave site will be eliminated by the proposed removal of the headland. The PAA is currently coordinating with the Buildings and Lands Department to ensure that appropriate procedures for relocating the grave site are followed. With this exception, all mitigation measures and recommendations discussed in Section 13.3 of the New Airport Master Plan EIA are still valid and have not changed as a result of the modification to the Master Plan.

In addition, the proposed modification to the Master Plan layout and configuration results in construction cost savings. A reduction in the cost of the airport's construction will be a direct economic benefit to the territory.

The modification to the airport configuration does not alter impacts to archaeological and historic sites described in the New Airport Master Plan EIA. However, coordination with the Antiquities and Monuments Office of the Government Recreation and Culture Branch has indicated that a significant archaeological site is located on the headland west of Sha Lo Wan proposed for partial excavation (see Exhibit 11.1). The archaeological site, known as the Sha Lo Wan West Site is known to contain artifacts of the Neolithic and Bronze Age periods.

The excavation of the headlands will result in the loss of a portion of the Sha Lo Wan West archaeological site (see Exhibit 11.1). This impact is unavoidable since the headland must be excavated in order to maintain water circulation in East Tung Chung Bay. To help mitigate impacts, the PAA will not commence construction operations on the headland until September 1993. This will allow the Antiquities and Monuments Office to excavate that portion of the archaeological site to be physically impacted and recover scientifically significant features and artifacts. Although some of the valuable information within the site may be lost, the extensive scientific excavation and documentation of findings, which might otherwise not have occurred, will mitigate much of the unavoidable destruction. The Antiquities and Monuments Office has indicated that 6-months will be required for it to conduct its excavation and data recovery efforts. In addition, marine access to the Sha Lo Wan ferry pier will be maintained throughout the excavation of the Sha Lo Wan headland. All other mitigation measures and recommendations discussed in Sections 14.2 and 27.4 of the New Airport Master Plan EIA are still valid.

Appendix A References

Richards, J and R.S.S. Wu (1985) Inshore Fish Community Structure in a Subtropical Estuary. Asian Marine Biologist (2) : 57-68