Removal of Temporary Rock Bund from Existing Seabed at Ha Pak Nai

Project Profile

May 1999

Civil Engineering Department

Content **Page No.**

1. Introduction

A portion of the shoreline at Ha Pak Nai experienced severe shore erosion and ground subsidence. The local residents had been complaining about the situation and requesting some remedial work be done to protect the shoreline and their properties. Some form of shore protection was necessary to abate further erosion before the completion of a shore erosion study for formulating a long-term solution.

It was decided after consultation with the local residents and the adjacent occupant, namely, the EPD's West New Territory (WENT) Landfill, the existing shoreline should be protected immediately by placing rockfill to prevent further erosion.

As there is no land access to the shoreline in question, marine transport is required. However, the water depth at the beach is too shallow for the barge to reach directly to deliver the rockfill to the shore, a temporary rock bund made of rockfill has been formed for access. Approval had been obtained from the Facilities Management Group of EPD to stage the temporary rock bund within WENT Landfill's site limit to carry out the shore protection for the beach at Ha Pak Nai.

The maintenance shore protection work was finished in mid-April 1999. The temporary access platform must be removed before the onset of the wet season. The total quantity of rockfill to be removed is about 7,000 m^3, of which only about 2,000 m^3 is below Principal Datum.

This Project Profile spells out the environmental related matters.

Removal of Temporary Rock Bund from Existing Seabed at Ha Pak Nai.

2.2 Purpose and Nature of the Project

To remove the temporary rockfill bund placed on top of the existing seabed offshore the WENT Landfill site and the village of Ha Pak Nai.

2.3 Name of the Project Proponent

Technical Services Division,
Civil Engineering Department

2.4 Location and Scale of Project

The temporary rock bund made of rockfill is located offshore the village of Ha Pak Nai. The village is next to the WENT Landfill site. See Appendix A for the location of the WENT Landfill, the village of Ha Pak Nai, the area of coastal protection works carried out in this year and the bund. The bund is about 130 m x 30 m. The footprint of the bund lies on a tidal flat with water depth ranging from -2.0 mPD to +0.8 mPD. The top of the bund is at +2.5 mPD. The entire bund is within the site limit of the WENT Landfill.

The bund was recently formed in February 1999 by placing Grade 700 rockfill (ie. rocks of about 700 mm in size) onto the seabed. The total volume of the bund is estimated to be 7,000 m^3 based on the record during placement, amongst which only about 2,000 m^3 of rockfill is below the Principal Datum.

2.5 Name and Telephone Number of Contact Person

3. Planning and Implementation Programme

3.1 Planning and Implementation

The whole project is planned and implemented by the Technical Services Division of Civil Engineering Department (CED) in close collaboration with the EPD's WENT Landfill. The removal of the temporary access platform will be carried out by a term contractor appointed by CED.

3.2 Project Programme

The removal work is scheduled to start by end June 1999 and finished by end July 1999. It is necessary to complete the removal of the platform before the onset of incoming wet season so that the potential flooding could be avoided.

4. Possible Impact on the Environment

4.1 Seabed Condition

This temporary rock bund is presently situated on a mud flat at the estuary of the Tai Shui Hang within the site boundary of the WENT Landfill. The bund was sited just outside of a sea area of turning circle for the marine vessels. The existing seabed was dredged and a portion of land, a sand spit, was removed for the river training for Tai Shui Hang River and for the construction of seawall for the WENT Landfill between 1993 and 1995. Please refer to Appendix B for the Outline Zoning Plan S/YL-PN/1 dated 10.06.94 showing the original coastline before the WENT Landfill development. Appendix C shows the original seabed level at about 1991 before the removal of the sand spit and the dredging for the turning circle for marine vessels. See also the aerial photos of the area since 1963 to 1998 and note the change of coastline between 1993 and 1995 in Appendix D1 to D3. Dredging of the seabed was also carried out to deepen the seabed to –4.5 mPD to maintain adequate water depth in the fairway and turning circle for the marine vessels for the WENT Landfill operation in 1997. The dredged area is shown in Appendix F.

Prior to the placement of this rock bund on the seabed in January 1999, the seabed level was surveyed as a record. A sounding record of the area is shown in Appendix E. One would note that the seabed level at the rock bund is ranging from +0.9 mPD near the shore down to –2.0 mPD at the deep end in October 1998. In general the seabed level of the rock bund is deeper than the depth shown in Appendices C and F which shows +0.9 mPD to +0.6 mPD in 1994. It confirms that the seabed there was dredged before. It should be pointed out that the seabed level in that whole area is constantly changing due to the sedimentation from Tai

Shui Hang river water, the disturbance due to the vessel movement, the wave and current effects. The sand on the beach is eroded and some sand is attracted towards the fairway and turning circle. Therefore maintenance dredging would be carried out at intervals in future.

4.2 Removal Process

Plant and equipment:
Land plant:- Backhoes, trucks.
Marine plant:- Derrick lighters

Procedure:
The rock bund removal would start from the shallow end of the bund near the shore and retreat towards the deep end of the bund in the sea.

Process:
(Refer to Appendix E)

(a) Derrick lighter would be berthed along side the deep end of the rock bund for exporting of recovered material.

(b) Excavation of rockfill with backhoe would start at the shallow end near the shore to shave off the rockfill from the top layer and progress to the seabed. The spoil is loaded onto a truck and transferred to the deep end of the rock bund.

(c) The spoil is then picked up with a grab by the derrick lighter. The material is returned to the contractor's storage yard for future reuse.

(d) When the size of the rock bund is reduced to a size too small to accommodate the backhoe, ie, about 10 m x 10 m on plan, the truck and backhoe would be removed from the top of rock bund and be loaded onto the derrick lighter.

(e) The remainder of the bund, roughly 500 m^3 of rockfill in the vicinity of water deeper than 2 m would be removed with a derrick lighter with a grab.

4.3 Rate of Removal

Two backhoes would be employed for the excavation. Hoe size of between 0.75 to 1.0 m^3 would be used. The rate is about 40 m^3 per hour per machine.

4.4 Water Quality

As the area is inside the Deep Bay, the current is not significant. The seabed of the rock bund was originally a mud flat. The level was at +0.6 to +1.0 mPD in 1991. It was dredged in 1994 as a turning circle and fairway for the marine vessels calling the WENT Landfill. The vicinity is still dredged at intervals to maintain 4.5 m of water depth for marine vessels. The seabed level at the rock bund was at +0.9 to –2.0 mPD in October 1998.

The major concern of dredging is the effect on oysters. Oysters are likely to be affected by an increase level of suspended solids released due to the removal of spoil from the seabed and vessel movements. Oysters are highly susceptible to clogging of their gills and total burial. This effect was studied in the Environmental Impact Assessment of WENT Landfill. However since 1996, oyster farming in the area is not popular anymore due to consumers' scare of pollution of chemical discharge across the border. There is no active oyster farmer in Ha Pak Nai. During the placement of the temporary access platform, no complaint was received from any residents or fish farmers in the area, it served as an indication that oyster farming is non-existing in the area. While dredging of the seabed can cause suspended solid in the water, the effect of the removal of temporary rock bund is expected to be very minimal due to the following factors:

(a) The temporary rock bund is composed of selected rockfill; the size of the particles are typically larger than 450 mm, and there is very little fine content in the material that would attribute to suspended solids in the water.

(b) The majority of the removal would be in very shallow water, and most of the material are excavated by means of backhoes. Since most of the material is above water surface and only about 2,000 m^3 of which is below Principle Datum, the effect to the surrounding due to the process of the removal is very little.

(c) As the material to be removed is above the seabed, the fine particles of the seabed are untouched.

4.5 Noise Impact

The operation of the machinery would generate some noise. The same equipment used to form the rock bund and for the protection of the beach would be re-deployed to remove the rock bund. A slight disturbance may be caused to the villagers of Tai Shui Hang. As the village is very sparsely populated, the distance to the nearest residents is about 200 m away, the shore line is heavily sheltered with broad leaf plants and trees, the noise that would penetrate through the

vegetation is expected to be very little. During the initial construction of the rock bund, no report of noise complaint was received. This served as an indication of the minimal effect on the residents. Furthermore, this shore protection works was instigated by the villagers, therefore it is not anticipated to have complaint from the villagers.

4.6 Ecological Habitat

The sandy shore, about 400m away from the temporary rock bund is suspected to be a breeding site for horseshoe crabs. Based on this, the shore protection works was modified according to the advice from the Department of Agriculture and Fisheries (AFD). There is no adverse comment from AFD on the proposed removal of this rock bund.

4.7 Rare/ Endangered Species

The mud flat in the vicinity is also said to grow a kind of sea grass rare in Hong Kong. Site inspection and discussion with AFD were held to reduce the scope of the shore protection works so as to retain more of the sandy beach.

4.8 Village Development

The removal of the rock bund (placed in February 99) would take about 20 days to complete, the purpose is to restore the seabed to the same as before January 99. There is no change to the existing condition. It will not pose any long or short term impact on the village development. The rock bund was placed to enable the shore protection work completed in April 99, it is highly unlikely that the removal of this rock bund would receive objection from the villagers.

4.9 Possible Environmental Impacts arising from the Removal Process

Dust Generation:

The material used for the rock bund is of rock fill of 700 mm maximum in size. The fine content is very low and as the bund is socked in water for a length of time, it is therefore very unlikely that any dust would be released during the excavation process. In case where the surface layer of the bund is still dry, it is very easy to splash some water onto the surface to bind the dusty particle together during the excavation to prevent the dust from coming off during transportation.

4.10 Summary of Sensitive Receivers

The existing sensitive receivers of the surrounding area have been examined. Since the time required for the removal of the temporary rock bund can be completed in about 3 weeks, the planned sensitive receivers are not examined.

Sensitive Receivers	Presence	Effect
Residential development	No	
Temporary housing area	No	
Educational institutions	No	
Health care facilities	No	
Temple	400 m away	Very little effect due to the noise. Since this shore protection works was requested by the temple keeper, the noise during the removal of this bund is unlikely to attract objection.
Water course	Yes	As the bund is at the mouth of Tai Shui Hang, it is best to remove the rock bund as soon as possible.
Beaches	400 m away	Non-bathing beach. Since rocks on top of the seabed only are to be removed, the sediments on the seabed is very lightly disturbed. Considering the distance of the bund from the beach and the short duration of agitation, the effect is expected to be very minimal.
Marine water resources	No	
Industries which are sensitive to pollution	No	
Places of high visual value	No	
Site of cultural heritage	No	

5. Mitigation Measures

5.1 Comparison with EIAO Requirement

The EIAO stipulates that an Environmental Permit (EP) is required for dredging over 500,000 m^3. Under normal circumstance, this small quantity of 7,000 m^3 removal of rockfill for this rock bund would not need an EP application. However, as the location of the rock bund is within 500 m from the "Coastal Protection Area (CPA)", an EP is needed to meet the EIAO requirement. Since the rockfill bund was originally placed to enable the coastal protection works to take place, the removal of it after completion of the main part of works is part of the coastal protection procedures. It is very different from a dredging at a close distance to a coast that might have adverse effect to the coast. This application for an EP is actually contradictory to the purpose of the EIAO intent. Furthermore, the CPA was defined based on an outdated "Zoning Plan" that has not included the addition of the WENT Landfill that has caused very significant change to the local layout in the vicinity.

5.2 Choice of Equipment

From our long experience in dredging and after careful consideration of the potential impacts detailed in Section 4 above, we propose the following equipment as mitigation measures to minimise disturbance to the seabed and sea water.

Size of Backhoe. 1 m^3 hoe size would be used for easier and efficient pick up of rockfill.

Derrick lighter with closed bottom cargo hold rather than split bottom barge to transport the rockfill to avoid leakage of sea water during voyage.
Size of Grabs: 3 m^3 grab would be used.

5.3 Long Term Effect

Since the volume of rockfill is very small, it requires about 8 trips of the derrick lighter to clear this small quantity. Our past experience indicates that it would require about 8 to 10 hours to fill the derrick lighter. The removal works could be completed in about two weeks. As there is very little fine particle content in the rockfill, there would not be much suspended particles that would cause a plume of pollution to the surrounding water for a long time. There is no sustained effect to the surrounding.

5.4 Working Hour

All the works will be carried out during day hours and **no** works on Sunday or public holidays will be allowed to avoid disturbance to the villagers.

5.5 Comparison with Local Works History

The construction of the WENT Landfill involved 200,000 to 300,000 m^3 of capital dredging to form the seawall foundation and the removal of 7,500 m^2 of land at the mouth of the present Tai Shui Hang. The maintenance dredging carried out once every two to three years disturbs the seabed of the navigation fairway and turning circle of area over 350,000 m^2. In fact, the seabed in the fairway is disturbed eight times daily during the berthing, unberthing and movement of the four marine vessels that deliver the waste containers to the WENT Landfill. The drafts of the vessels are between 3.0 to 3.8 m and the water depth in the fairway and turning circle is about 4.5 m. Due to the small clearance between the vessel and the seabed, the propellers of the vessel stir up the siltation when the vessel travels in the fairway and turning circle. Therefore the removal of this total quantity of 7,000 m^3 of rockfill, placed on top of the seabed recently in a very concentrated area of about 4,000 m^2, should not stir up the siltation very much nor should pose much disturbance to the environment in comparison.

6. Reference

West New Territories (WENT) Landfill Environmental Impact Assessment

7. Appendix to Project Profile

A. Site Limits Plan (P-17) of WENT Landfill showing the location of the shore Protection works, Rock Bund, the fairway and turning circle near Ha Pak Nai.

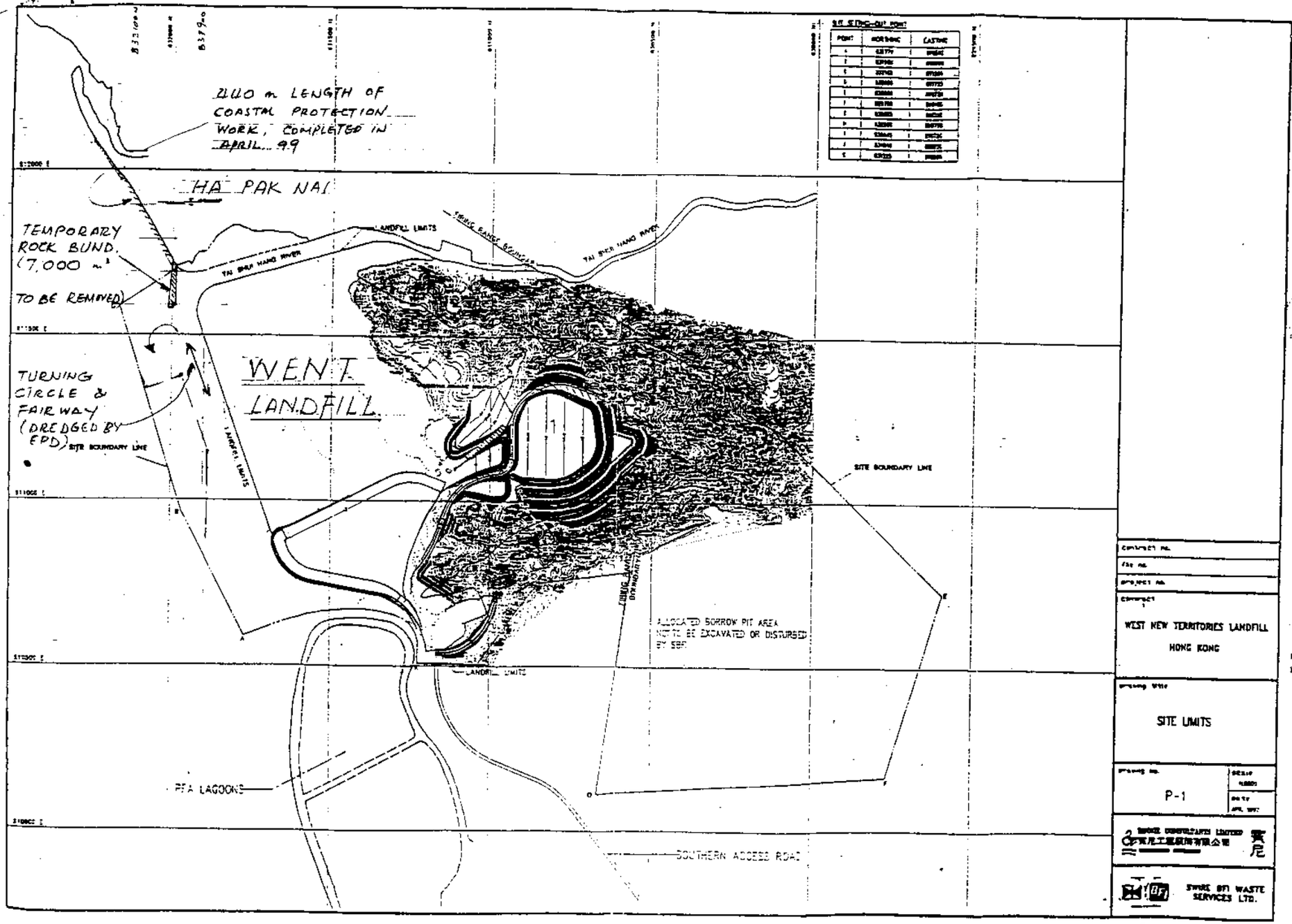
B. Part of Plan No. S/YL-PN/1 dated 1994-06-10 of Outline Zoning Plan of Ha Pak Nai showing the original coastline before 1994 and mark-up showing the change of coastline due to the development of the WENT Landfill.

C. Dredging Plan (P-15, May 92) showing the dredging area and the original seabed level.

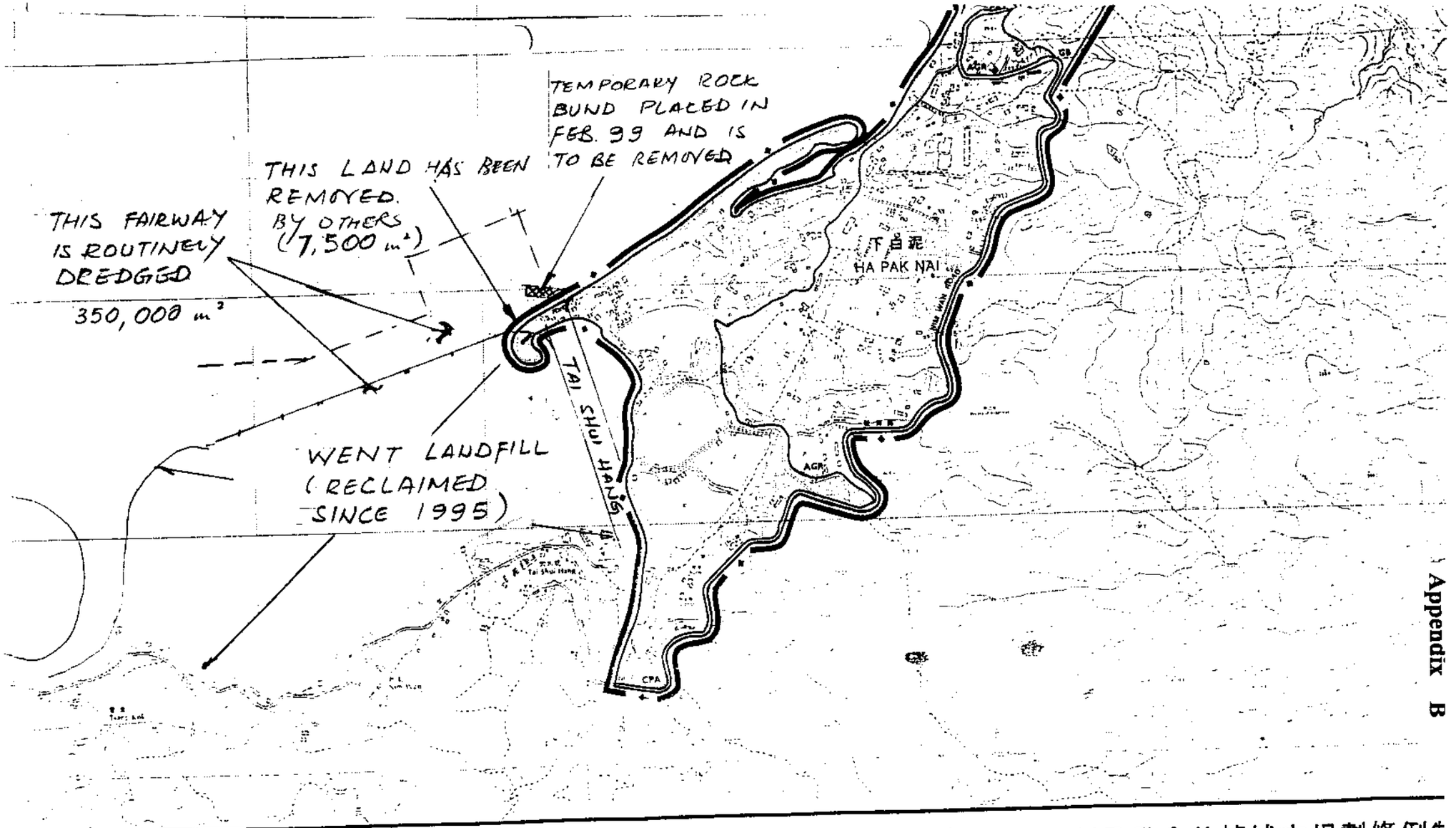
D. Aerial Photos showing the village of Ha Pak Nai and the change due to WENT Landfill between 1963 to 98. (3 sheets)

E. Sounding survey of the seabed conducted in October 1999 before the placement of the rock bund.

F. Marine Works—Dredging Plan (W-00.00-0001-1, 29-03-93) showing the dredging for the navigation channel, turning circle for marine vessels, seawall foundation.


2100 m LENGTH OF COASTAL PROTECTION WORK, COMPLETED IN APRIL 99
HA PAK NAI
TEMPORARY ROCK BUND (7,000 m³ TO BE REMOVED)
TURNING CIRCLE & FAIRWAY (DREDGED BY EPD)
WENT LANDFILL
LANDFILL LIMITS
SITE BOUNDARY LINE
TAI SHUI HANG RIVER
ALLOCATED BORROW PIT AREA NOT TO BE EXCAVATED OR DISTURBED BY EBP
PFA LAGOONS
SOUTHERN ACCESS ROAD
WEST NEW TERRITORIES LANDFILL
HONG KONG
SITE LIMITS
P-1
SWIRE BFI WASTE SERVICES LTD.

Appendix A



Appendix B

1994 年 6 月10日按照城市規劃條例第5條的規定公開展示的草圖。

DRAFT PLAN EXHIBITED UNDER SECTION 5 OF THE TOWN PLANNING ORDINANCE ON THE 10th DAY OF JUNE 1994

SECRETARY 城市規劃委員會秘書

PART OF PLAN No. S/YL-PN/1

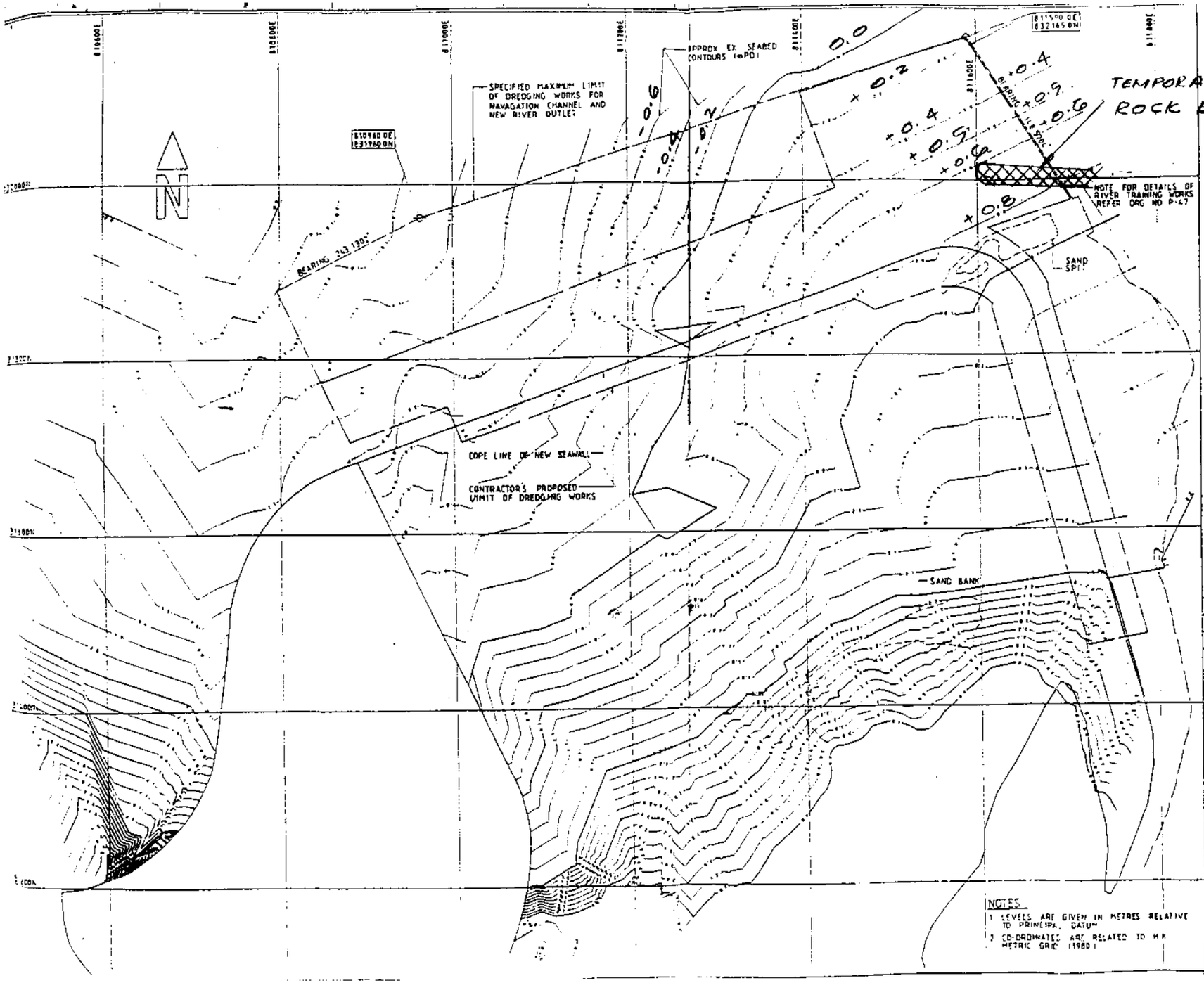
香港城市規劃委員會依據城市規劃條例制

TOWN PLANNING ORDINANCE, HONG

SHEUNG PAK NAI & HA PAK NA

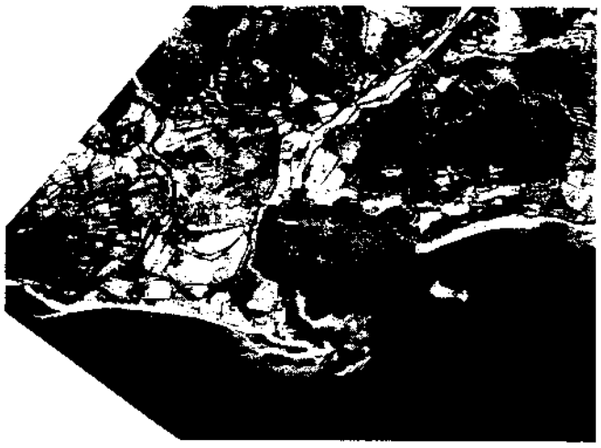
SCALE 1:75

METRES

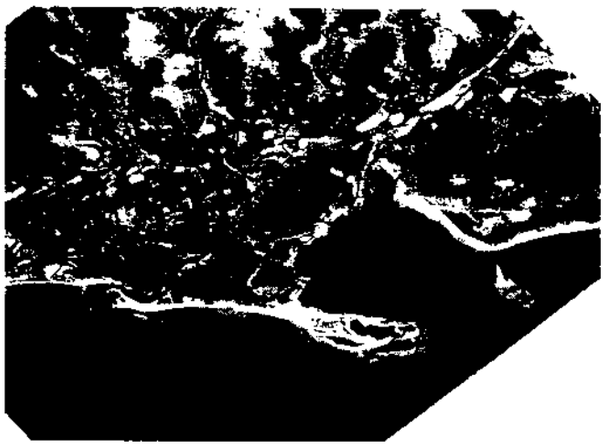

APPROX EX. SEABED CONTOURS (mPD)
SPECIFIED MAXIMUM LIMIT OF DREDGING WORKS FOR NAVAGATION CHANNEL AND NEW RIVER OUTLET
TEMPORARY ROCK BUND
BEARING 243 130"
SAND SPIT
SAND BANK
COPE LINE OF NEW SEAWALL
CONTRACTOR'S PROPOSED LIMIT OF DREDGING WORKS
NOTE FOR DETAILS OF RIVER TRAINING WORKS REFER DRG NO P-47
NOTES
1 LEVELS ARE GIVEN IN METRES RELATIVE TO PRINCIPAL DATUM
2 CO-ORDINATES ARE RELATED TO HK METRIC GRID (1980)
WEST NEW TERRITORIES LANDFILL HONG KONG
DREDGING PLAN – EXISTING SEA BED
P-15
1 : 2000
25-05-92
SWIRE BFI WASTE SERVICES LTD.

Appendix C

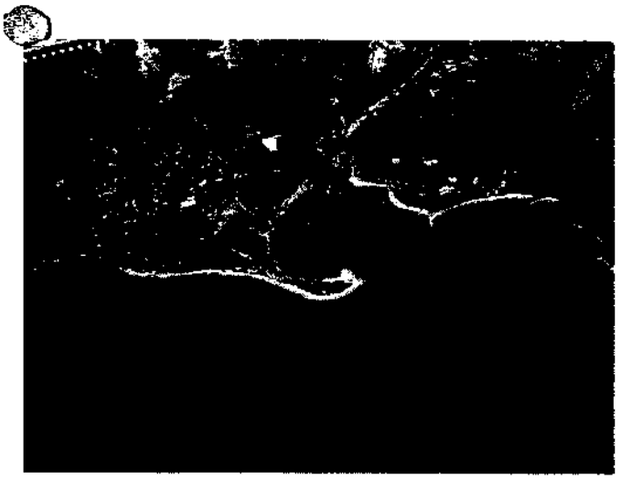
HA PAK NEI



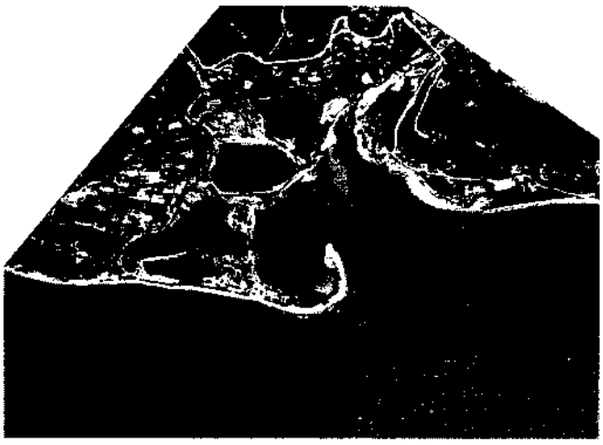
1963



1964



1969



1979

1987

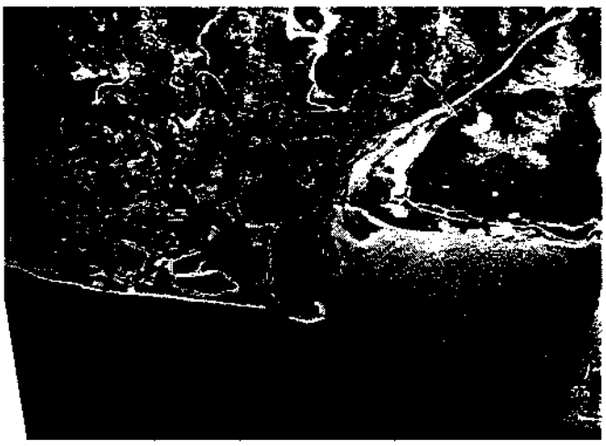
1988

HA PAK NEI

1989

1990

1992

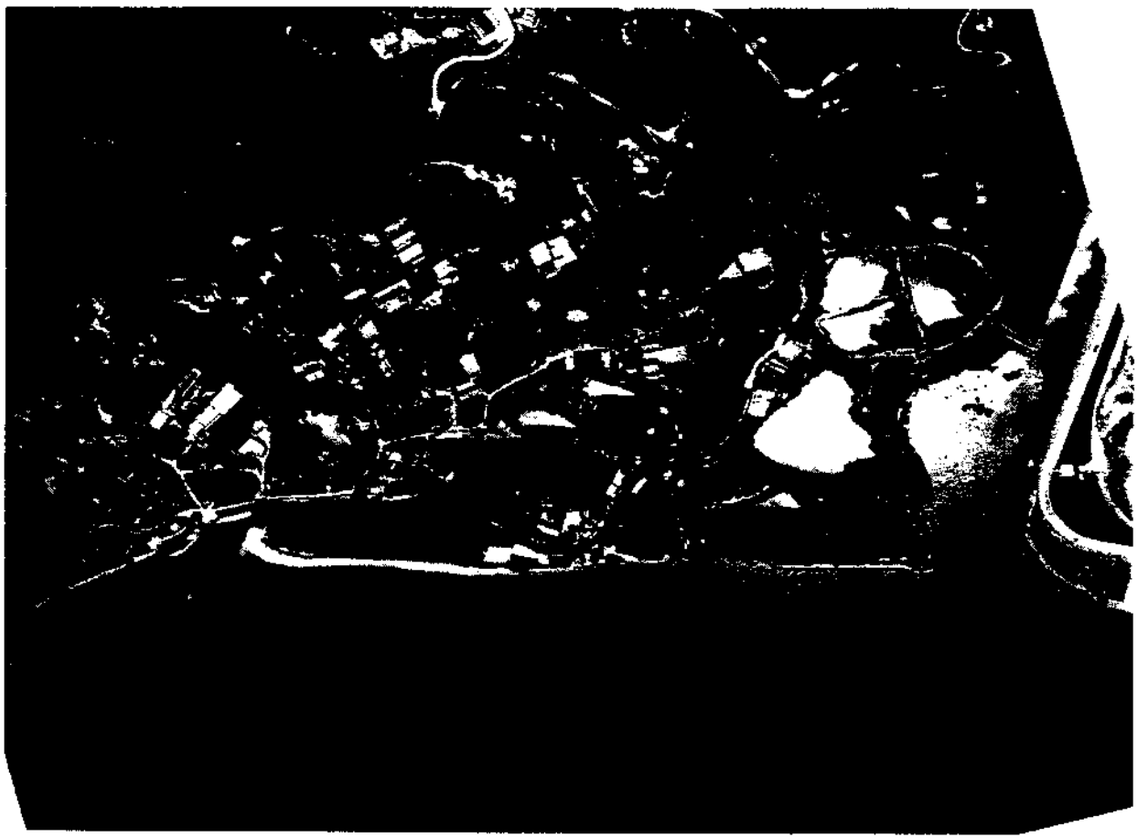


1993

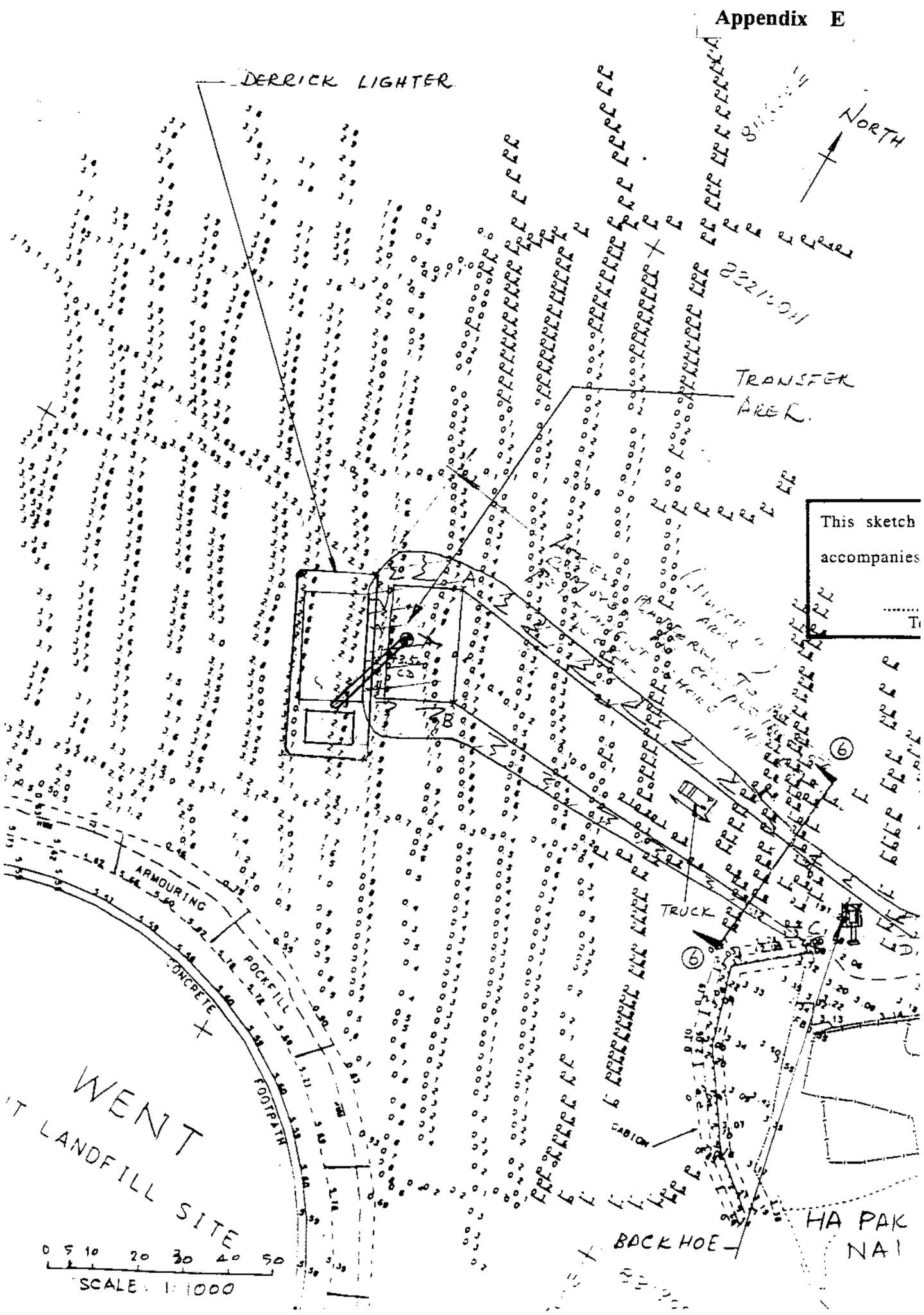
1995

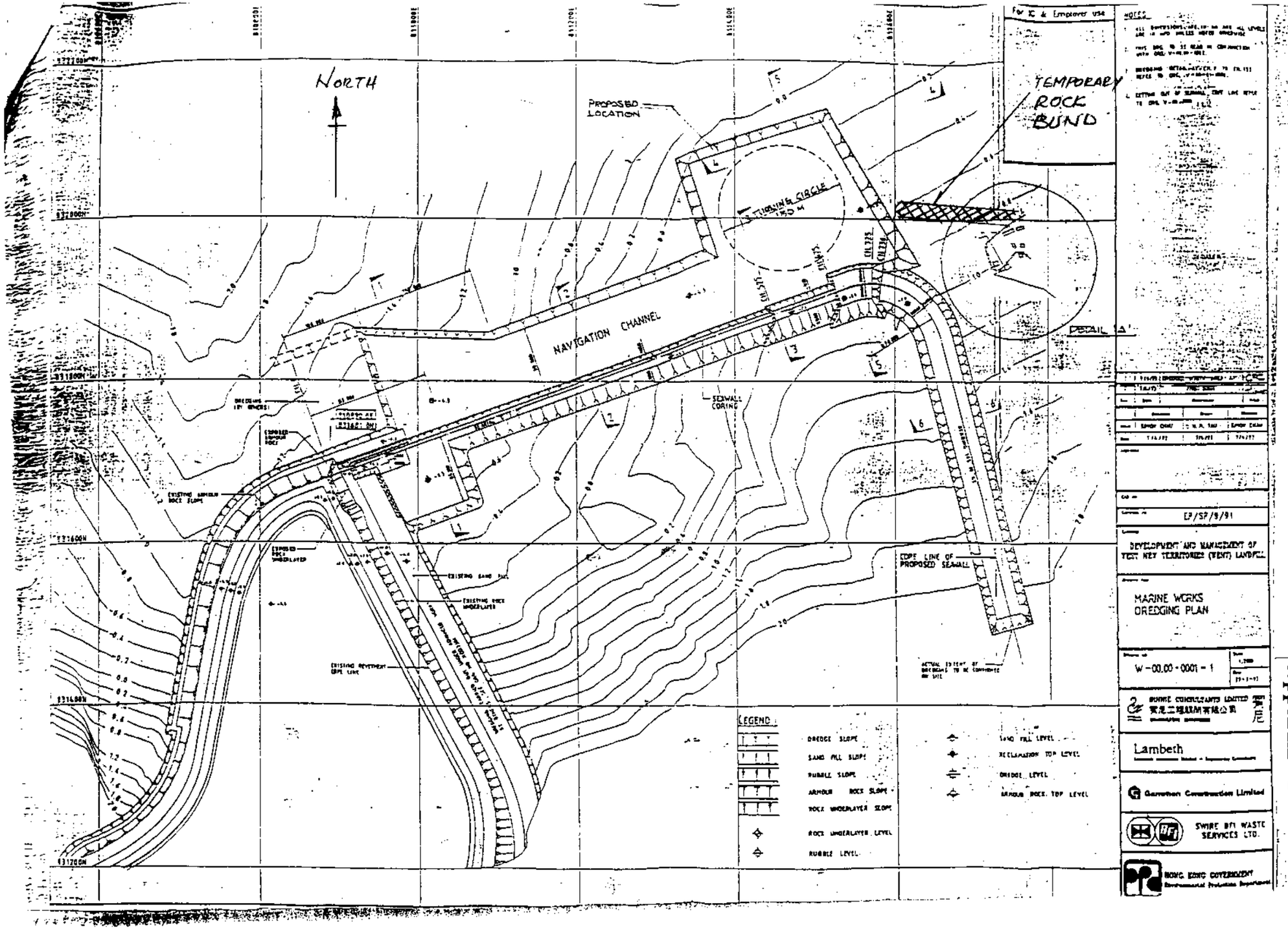
1996

HA PAK NEI



1998


DERRICK LIGHTER
NORTH
TRANSFER AREA
This sketch
accompanies
A
B
ARMOURING
ROCKFILL
CONCRETE
FOOTPATH
TRUCK
GABION
BACKHOE
WENT
LANDFILL SITE
0 5 10 20 30 40 50
SCALE : 1:1000


NORTH
PROPOSED LOCATION
TEMPORARY ROCK BUND
NAVIGATION CHANNEL
DETAIL 'A'
SEAWALL CORING
EXISTING ARMOUR ROCK SLOPE
EXISTING SAND FILL
EXISTING ROCK UNDERLAYER
EXISTING REVETMENT TOPE LINE
TOPE LINE OF PROPOSED SEAWALL
LEGEND :
DREDGE SLOPE
SAND FILL SLOPE
RUBBLE SLOPE
ARMOUR ROCK SLOPE
ROCK UNDERLAYER SLOPE
ROCK UNDERLAYER LEVEL
RUBBLE LEVEL
SAND FILL LEVEL
RECLAMATION TOP LEVEL
DREDGE LEVEL
ARMOUR ROCK TOP LEVEL
EP/SP/9/91
DEVELOPMENT AND MANAGEMENT OF TSEUNG KWAN O (WEST) LANDFILL
MARINE WORKS DREDGING PLAN
W-00.00-0001-1
Lambeth
Gammon Construction Limited
SWIRE BFI WASTE SERVICES LTD.
HONG KONG GOVERNMENT

Appendix F