PROJECT PROFILE
FOR
SUBMARINE CABLE LANDING INSTALLATION AT TUEN MUN
FOR
HGC OPTICAL FIBRE SUBMARINE CABLE SYSTEM
BETWEEN TUEN MUN AND CHEK LAP KOK

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1. BASIC INFORMATION

1.1 PROJECT TITLE

Submarine Cable Landing Installation at Tuen Mun for Hutchison Global Crossing Ltd. (HGC) Optical Fibre Submarine Cable System between Tuen Mun and Chek Lap Kok.

1.2 PURPOSE AND NATURE OF THE PROJECT

HGC is planning to install a submarine optical fibre network between Tuen Mun and Chek Lap Kok across Kap Shui Mun.

The purpose of this submarine optical cable project is to connect HGC's main exchanges at Kwai Chung and Chek Lap Kok through the network along Route 3, Tai Lam Tunnel, Yuen Long, Tuen Mun and the Airport. This submarine optical cable provides diversity to the Airport and Lantau Island in case of network contingencies occurring at Tsing Ma Bridge and the North Lantau Expressway.

The route map of the proposed submarine optical cable is attached as Appendix 1.

Based on detailed study and site investigation, it is devised that the submarine optical cable will be landed near the west end of Butterfly Beach, Tuen Mun.

The proposed work covered in this Project Profile involves construction of landing structures at the cable landfalls and laying of submarine optical cables from Tuen Mun to Chek Lap Kok.

1.3 NAME OF PROJECT PROPONENT

Hutchison Global Crossing Limited (HGC)

1.4 LOCATION AND SCALE OF PROJECT AND HISTORY OF SITE

1.4.1 Location of Project

The proposed work covered in this Project Profile involves construction of landing points at Tuen Mun and Chek Lap Kok and associated submarine optical cables landing installation. The landfall at Tuen Mun is located at west of Butterfly Beach.

The submarine cable landing point at Tuen Mun TM1, which may be a designated project under the Environmental Impact Assessment Ordinance as detailed in Section 1.5, is shown in Appendix 2.

1.4.2 Scale of Project

The scope of work under this Project Profile involves the following works at the submarine cable landing point TM1 constructed on a rubble mound seawall and seabed extending from it:

(a) At land portion:

- Construct an underground concrete structure as Armour Clamp Bay to fix submarine cables [Typical size: 2.4m(W) x 2.4m(L) x 2.0m(D)]; and
- Construct an underground concrete manhole for jointing of submarine and land cables [Typical size: 1.6m(W) x 4.0m(L) x 2.5m(D)].

(b) At seawall:

- Excavate the rubble mound seawall to designed level;
- Prepare bedding for laying precast cable trough;
- Place precast units on top of bedding;
- After laying of submarine cables, backfill the precast units; and
- Restore rubble mound seawall to original position.

(c) Excavate a short underwater trench (~500m length depending on seabed profile and hardness conditions) at shallow waters near shore; and Kap Shui Mun

(d) Lay submarine optical cables from a cable laying barge across Kap Shui Mun to the opposite shore at Chek Lap Kok by a simultaneously laying and burying method. The cables will be buried at a depth of 3.5m (typical) below the sea bed.

1.4.3 History of Site

The landfall at TM1 is a rubble mound seawall. A similar submarine cable landing point at 300m west of TM1 was constructed by CLP Power Hong Kong Ltd. in 1997.

1.5 NUMBER AND TYPE OF DESIGNATED PROJECTS TO BE COVERED BY THE PROJECT PROFILE

This Project Profile involves a landing point at Tuen Mun (TM1) which may be classified as a Designated Project under Category C.12(a) (iii) in Schedule 2 (Part 1) of the EIA Ordinance:

Schedule 2 (Part 1)

C12 A dredging operation which:-

(a) is less than 500m from the nearest boundary of an existing:-

(iii) bathing beach (Butterfly Beach).

1.6 NAME AND CONTACT PERSONS AND CORRESPONDENCES

2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 PROJECT TEAM AND PROJECT MILESTONES

The project is led by Hutchison Global Crossing Ltd. (HGC). Planning and construction will be undertaken by the following team:

- Project Management - Associated Technical Services Ltd.
- Civil & E&M Design - Associated Technical Services Ltd.
- Landing Point Construction and Submarine Optical Cable System Installation - International Cable Supplier to be appointed.

Major project milestones are:

- Application to Office of Telecom Authority (OFTA) - 13 Jan 2000
- Approved in-principle by OFTA - 31 Jan 2000
- Application to District Land Office (DLO) for Route Approval - 5 Jan 2000
- Issue of Wayleave of submarine cable route by DLO – 31 Mar 2001 (tentative)
- Commencement of Civil Work at Landing Point:
  (Chek Lap Kok) - Aug 2001
  (Tuen Mun) - Nov 2001
- Submarine Optical Cable Installation - Jan - Feb 2002
- Optical Cable Commissioning - 31 Mar 2002

2.2 PROJECT IMPLEMENTATION

The project will be constructed through the following activities:

2.2.1 Cable Landing at Start Point

All the works at the landing start point TM1 are scheduled to be completed in around 5 months within the period November 2001 - March 2002. Typical sections showing design of landing point is shown in Appendix 3.

The major works to be carried out at TM1 are:

(i) Part of the rubble mound seawall will be temporarily removed. A ramp trench in 1:15 cut slope of approximately 50m in length and 5.0m wide will then be formed on the sea bed by conventional open excavation.

(ii) Levelling stones will be placed on the trench as bedding. A concrete trough will be installed on top of the levelling stones bedding at 1.0m under the seawall to 1.75m below ground.

(iii) A reinforced-concrete structure of typical size of 2.4m (W) x 2.4m (L) x 2.0m (D) will be built as an Armour Clamp Bay for fixing of submarine optical cables.

(iv) A reinforced-concrete structure of typical size of 1.6m (W) x 4.0m (L) x 2.5m (D) will be built as a manhole for jointing submarine and land optical cables. The headroom of the manhole is 2.0m.

(v) A short underwater trench of approx. 1m (W) x 1m (D) will be excavated by dredging at the shallow water using a small powered backhoe machine on a barge up to ~500m from shore.

(vi) The cables will be paid out from a cable barge staying at deep water, floated on buoys and pulled to the landing manhole by a winch installed on land.

(vii) The optical cables will be protected by Polycon F.R.P. (or equivalent) pipes and then placed on the concrete trough. The trough will be covered up with tremie concrete.

(viii) The optical cables on the sea bed close to the concrete trough will be backfilled/ protected by concrete mat (mattress) or rubble of adequate size up to the original sea bed level.

(ix) The optical cables at the landward side will be anchored inside the Armour Clamp Bay and jointed inside the Manhole to the land cables.

(x) The rubble mound seawall will be restored to its original state after the completion of cable installation.

2.2.2 Submarine Optical Cable Installation

After completion of the landing and anchoring of the cable, the main vessel will commence cable laying while simultaneously burying the cable across the Kap Shui Mun to the landing point at east of Chek Lap Kok International Airport.

The cable installation will involve ploughing a (maximum of 3 nos.) small cable trench(s) of 3.5m depth in the seabed by water jetting method and the cables will be laid in the trenches simultaneously.

The trenches will be allowed to backfill by settling of the sediment disturbed during the ploughing process and natural sedimentation.

2.2.3 Cable Landing at the Opposite Shore

Similar cable landing structure will be constructed at opposite shore (CLK2) in around August 2001. When the cable laying barge reaches the opposite shore (CLK2), the cable will be detached from the burying machine and paid out from the cable laying barge to form a loop line on the sea surface.

2.2.4 Optical Cable Commissioning

The commissioning of the optical cable is scheduled to be in March 2002.

3. POSSIBLE IMPACT ON THE ENVIRONMENT

3.1 POTENTIAL ENVIRONMENTAL IMPACTS

The environmental issues given in the Annex 1 of the Technical Memorandum on Environmental Impact Assessment Process (Environmental Impact Assessment Ordinance, Cap. 499, S.46) have been considered and summarised in Table 3.1. Key environmental issues identified are described in the following sections.

Table 3.1 Potential Sources of Environmental Impacts

No.	Types of likely environmental issues	Construction Phase	Operational Phase
1.	Gaseous emissions	×	×
2.	Dust	✓	×
3.	Odour	×	×
4.	Noisy operations	✓	×
5.	Night-time operations	×	×
6.	Traffic generation	×	×
7.	Liquid effluents, discharges, or contaminated runoff	✓	×
8.	Generation of waste or by-products	×	×
9.	Storage, handling, transport, or disposal of hazardous materials or wastes	×	×
10.	Risk of accidents which would result in pollution or hazard	×	×
11.	Disposal of spoil material, including potentially contaminated material	×	×
12.	Disruption of water movement or Bottom Sediment	✓	×
13.	Unsightly visual appearance	×	×
14.	Ecological Impacts (Marine)	✓	×

Key : ✓ Potential to cause concern

× Unlikely to cause concern

3.2 CONSTRUCTION STAGE

3.2.1 Noise

For construction of landing points, the nearest Noise Sensitive Receiver (NSR) is Melody Garden which is about 800m from the landing point TM1 as shown in Appendix 5. The construction work will only be carried out at daytime, and the construction noise levels at the nearby noise sensitive receivers will be kept within the ProPECC $L_{eq\ (30mins)}$ 75 and 70 dB(A) guidelines for dwellings and schools respectively.

Noise generated from the barge and cable laying equipment during the submarine cables installation will be minimal, therefore, no unacceptable noise impacts upon the nearest NSR will result from this project.

3.2.2 Dust

The only dust generating activities that will occur at the project site are construction works at the cable landing site. The construction works will be small in scale and no significant dust impacts will result from these works. The dust control measures stipulated under the Air Pollution Control (Construction Dust) Regulations would be applied.

3.2.3 Waste Management

For work to be carried out at the rubble mound seawall, the boulders would be reused for reinstatement. No waste material or disposal problem would be left causing adverse impact on the environment.

For the excavation of the underwater trench near the seashore, if marine disposal of the seabed material is opted, the requirements as stipulated in WBTC No. 22/92 shall be followed. The procedures to be followed include:

i) Notification of disposal requirement

ii) Determination of sediment quality

iii) Allocation of marine disposal site

iv) Application for marine dumping licence

A proposal for sampling and testing the material will be prepared and implemented by the Proponent to determine whether the mud is contaminated in accordance with WBTC No. 22/92 and such proposal should be agreed by EPD. Upon completion of sampling and testing, a Sediment Quality Report (SQR) will be submitted to EPD for endorsement prior to commencement of excavation works.

The near shore trench will be backfilled by concrete mat or boulders which will not contaminate the water.

3.2.4 Water Quality

The key concern of this project is that it involves dredging close to a gazetted beach as it may potentially generate a sediment plume that could possibly carry suspended solids with the tide to the beach. The impacts to water quality during cable laying will occur as a result of disturbance of seabed sediments during jet ploughing of the submarine section of the cable. The impacts to water quality from jet ploughing would be in the form of seabed sediments being suspended into the water column. These suspended sediments would form a dense cloud in the immediate vicinity of the cable laying operations and, due to the high concentrations and nearness of the release to the seabed, would settle back onto the seabed rapidly.

Impact assessment of the potential transport of sediments suspended in the water column for cable laying by dredging and jetting has been undertaken and is attached in Appendix 6 for reference. Water quality impacts at three sensitive receivers namely Butterfly Beach, seawater intakes at Chek Lap Kok Airport and Lung Kwu Chau and Sha Chau Marine Park were predicted. The assessment indicates the seawater intakes and marine parks will not be impacted by cable installation work because of their sufficient distances (1500m and 5500m) from the cable route. Butterfly Beach would be potentially affected any very fine sediment leaking from the dredger during the dredging operations. However, any impact will be temporary as the dredging operation will only be for a few days. In order to minimise the impact to the users of Butterfly Beach, it is recommended the dredging operation for this landing point be carried out outside the peak bathing season.

Other sources of water quality impacts during the land-based activities, primarily relate to surface water run-off and discharge of pumped water. The following measures will be incorporated to prevent any adverse impacts.

- Care will be taken during removal of the section of the seawall to avoid spillage of material to the adjacent marine waters;
- Surface run-off from the construction site will be directed into storm drains via adequately designed sand/silt removal facilities;
- Any water pumped from the excavated trenches will pass through silt removal facilities prior to discharge to storm drains;
- Silt removal facilities, channels and manholes will be maintained regularly, at the onset of and after each rainstorm; and
- Stockpiles of material will be covered with taupaulin or similar fabric.

3.2.5 Marine Ecology

A key marine ecology issue of this project is in relation to the potential impact on Indo-Pacific Humpbacked Dolphin, S*ousa chinenis*, commonly referred to as Chinese White Dolphin. North Lantau represents the major area of distribution of Chinese White Dolphins in Hong Kong waters. The short term increase in suspended solids (SS) which results from the cable laying operation would not have direct impacts to these marine mammals because dolphins have the ability to avoid areas where suspended solids (SS) levels have increased, thus avoiding any impacts. In reality,

dolphin are tolerant of highly varied conditions and in particular, the Chinese White Dolphin is naturally exposed to high levels of SS in the Pearl Estuary[1]. The main potential impacts from the project are related to disturbance caused by noise generated from the cable laying barge and associated equipment. It has therefore been important to consider the timing of the works in relation to the natural seasonal distribution of dolphins in the area. The cable laying operation will be scheduled to take place in spring (January-February), when dolphin abundance is reportedly lowest[2]. Therefore these impacts can, to a large extent, be avoided and at least be minimised. In addition, the speed of cable laying is very slow and the chance of injury to the dolphin is unlikely.

A group of further sensitive receivers to the jet ploughing for cable laying operations would be the artificial reef complex at the north of Chek Lap Kok. However they are located at sufficient distance (over 100m) from the proposed cable route, such that the cable laying operations would be unlikely to cause any impacts at these areas because of the highly localised nature of the impacts.

The short-term loss of benthic organisms directly along the cable routes is not considered to present a significant ecological impact. The rapid natural reinstatement of the seabed will result in the area being available for prompt recolonization and hence, no permanent impacts would occur.

The proposed work also involves construction of landing points at Tuen Mun and Chek Lap Kok. Major works to be carried out at these two landing points are given in Sections 2.2.1 and 2.2.3 respectively. It is not expected that the proposed works at these two landing points will cause any significant impacts on marine ecology.

3.2.6 Cultural and Heritage

A Marine Archaeological Investigation (MAI) will be conducted to ascertain if any marine archaeological deposit would be affected by the cable alignment. The MAI shall be conducted by a qualified marine archaeologist before the cabling works commence. If anomalies were found on the sea bottom by the MAI, such findings will be reported to the Antiquities and Monuments Office of the Leisure and Cultural Services Department for their further investigation. In any event, the HGC's submarine cables will not be placed on top or within 10m of any detected bottom anomaly. As such, no adverse impact on any possible underwater antiquity is expected.

3.3 OPERATIONAL STAGE

The whole submarine optical cable will be buried. The optical cables consist of stable silicon optical fibres protected by corrosion resistant polyethylene and steel wire

1 Hyder Consulting, River Trade Terminal at Tuen Mun Area 38 Supplementary EIA for Sand Extraction from the Brothers' Marine Borrow Area, Final Report for Zen Pacific-Dredging International Joint Venture, January 1998.

2 Scott Wilson (Hong Kong) Ltd in association with ERM Hong Kong, Theme Park and Associated Developments Final EIA Report for Civil Engineering Department, February 2000.

armours and are designed for a normal working life-time of 40 years. No significant environmental impacts in terms of noise, gaseous emissions and water quality are expected to occur during the operation of the submarine cable. Other issues such as waste and marine ecology should be unlikely.

4. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

The locations of the various major elements of the area surrounding the site are shown in Figure Appendix 1.

4.1 GAZETTED BEACH

Butterfly Beach is a gazetted public bathing beach. Since the landing point TM1 is about 200m from the boundary of the beach which is constructed under controlled methods and also the submarine optical cables are buried, there is no significant visual impact and inconvenience to the beach users during either the construction or operation stages.

4.2 MARINE PARK OR MARINE RESERVE

The Sha Chau and Lung Ku Chau Marine Park (not shown in Appendix 1) is over 5.5km from the closest proposed cable segment, it was designated in 1996 to protect the coastal habitat around these islands including for the Chinese White Dolphin.

4.3 ARTIFICIAL REEF

The artificial reefs at the north of Chek Lap Kok are deployed by Agriculture, Fisheries and Conservation Department to conserve and enhance the existing marine habitats and fisheries and they are situated over 100 m from the closest proposed cable segment.

4.4 CONTAMINATED MUD DISPOSAL AREA

The East Sha Chau Contaminated Mud Disposal Area is situated 550 m from the closest proposed cable segment.

5. ENVIRONMENTAL PROTECTION MEASURES TO BE INCORPORATED IN THE DESIGN AND FURTHER ENVIRONMENTAL IMPLICATIONS

5.1 LANDING POINT CONSTRUCTION AND OPERATION

The construction of the cable landing point will take less than 3 months. Potential environmental impacts will be the dust and noise generated during the construction stage which can be controlled by observing the relevant noise and construction dust regulations.

There is no anticipated environmental impact during the operation stage of the landing point.

5.2 SUBMARINE CABLE

The total submarine cable installation work including preparation and cable protection works will take about 3 months but the actual cable laying from one seashore to the opposite seashore would take about 2 weeks. The residual environmental impacts to the submarine cable laying activities will be localised to the immediate vicinity of the cable alignment, short duration, low severity and acceptable.

There is no environmental impact predicted during the operation of the submarine cable.

5.3 FURTHER IMPLICATIONS

The geotechnical environment around the proposed landing point has been confirmed to be suitable for submarine optical cable landing by electronic surveys. The nearby site has been employed for the landing of 132kV submarine power cables belonging to CLP Power and the cables have been operated for several years without any environmental issues arising.

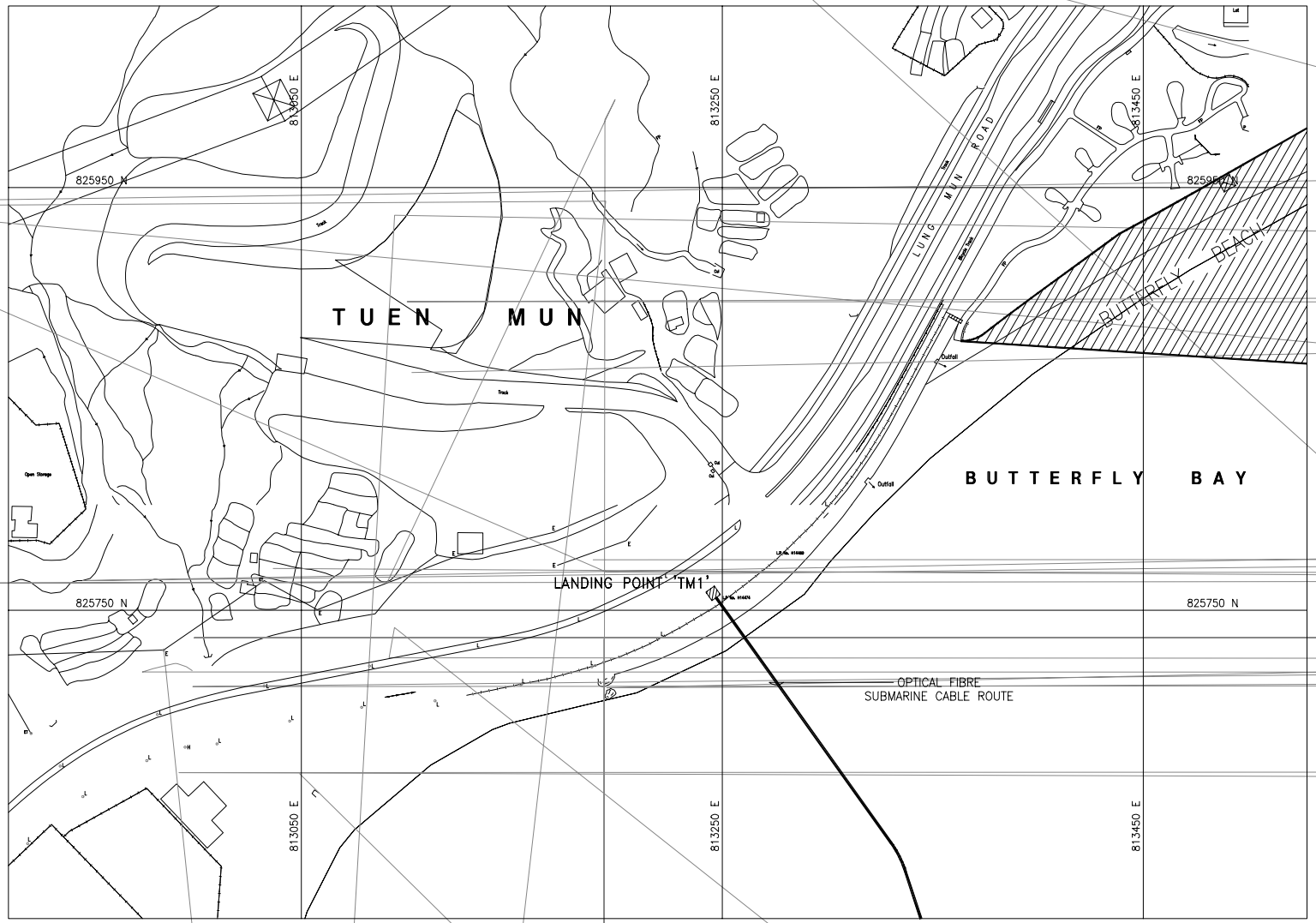
The above-mentioned construction method is a common method for the installation of submarine optical cables. It has been widely used around the world and is widely accepted to have no significant impact on the surrounding environment. The working period is normally very short. Also there is no waste disposal issue and excessive noise will not be generated in these operations.

In respect to a concern regarding a Dry Weather Flow Interceptor (DWFI) to be installed at Butterfly Beach which may interact with this project, discussion with the consultant for the DWFI project has been held. It is noted that the DWFI is currently at the stage of Preliminary Project Feasibility Study. Details such as tentative programme and elevation of the DWFI are not available but the HGC Optical Cable is likely to be installed ahead of the DWFI project. The design team of the DWFI will take account of the proposed optical cable during detail design stage by adjusting the elevation of the DWFI to avoid a clash with the proposed optical cable.

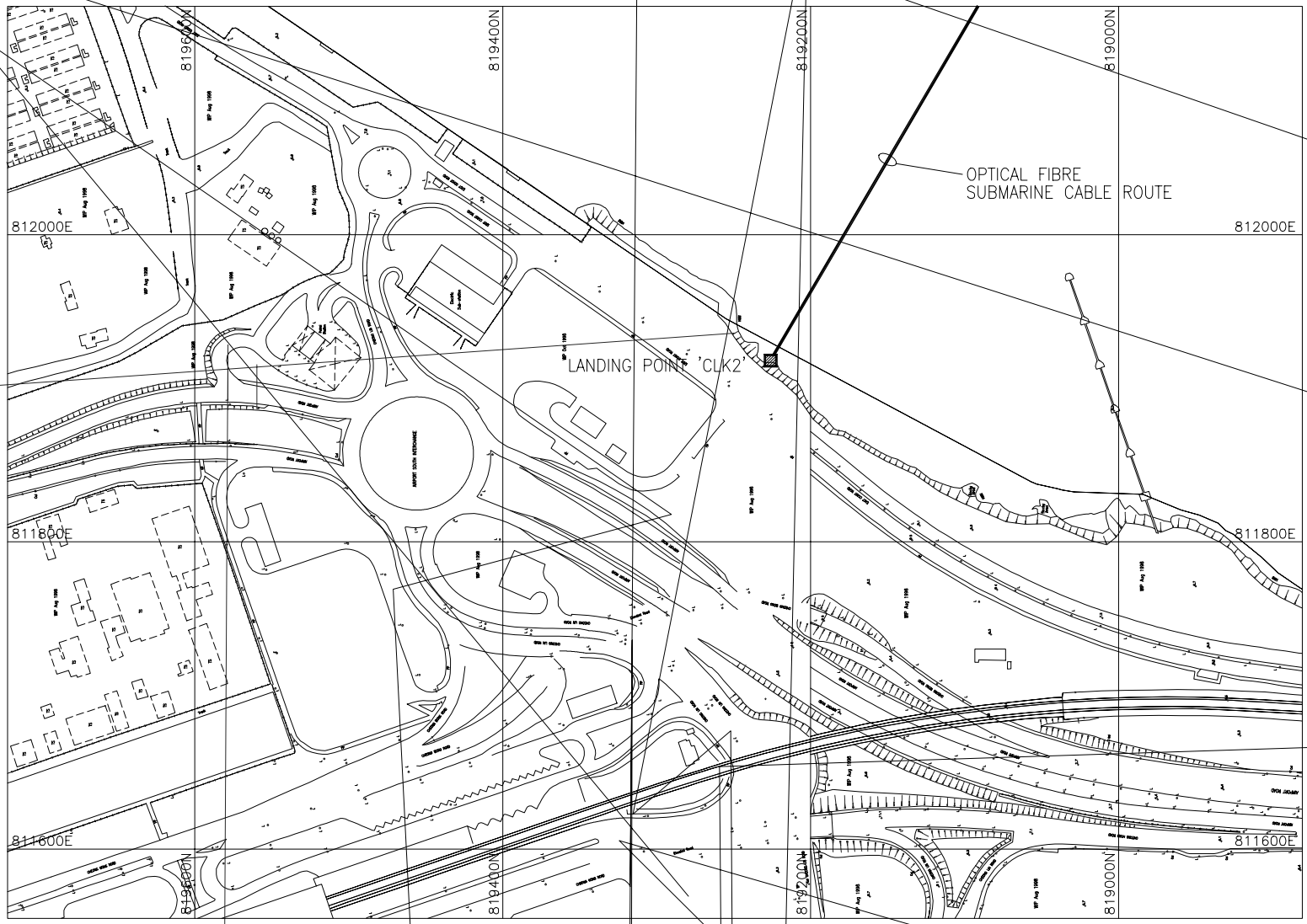
5.4 ENVIRONMENTAL MONITORING & AUDIT

No environmental monitoring and audit measures have been recommended for this project.

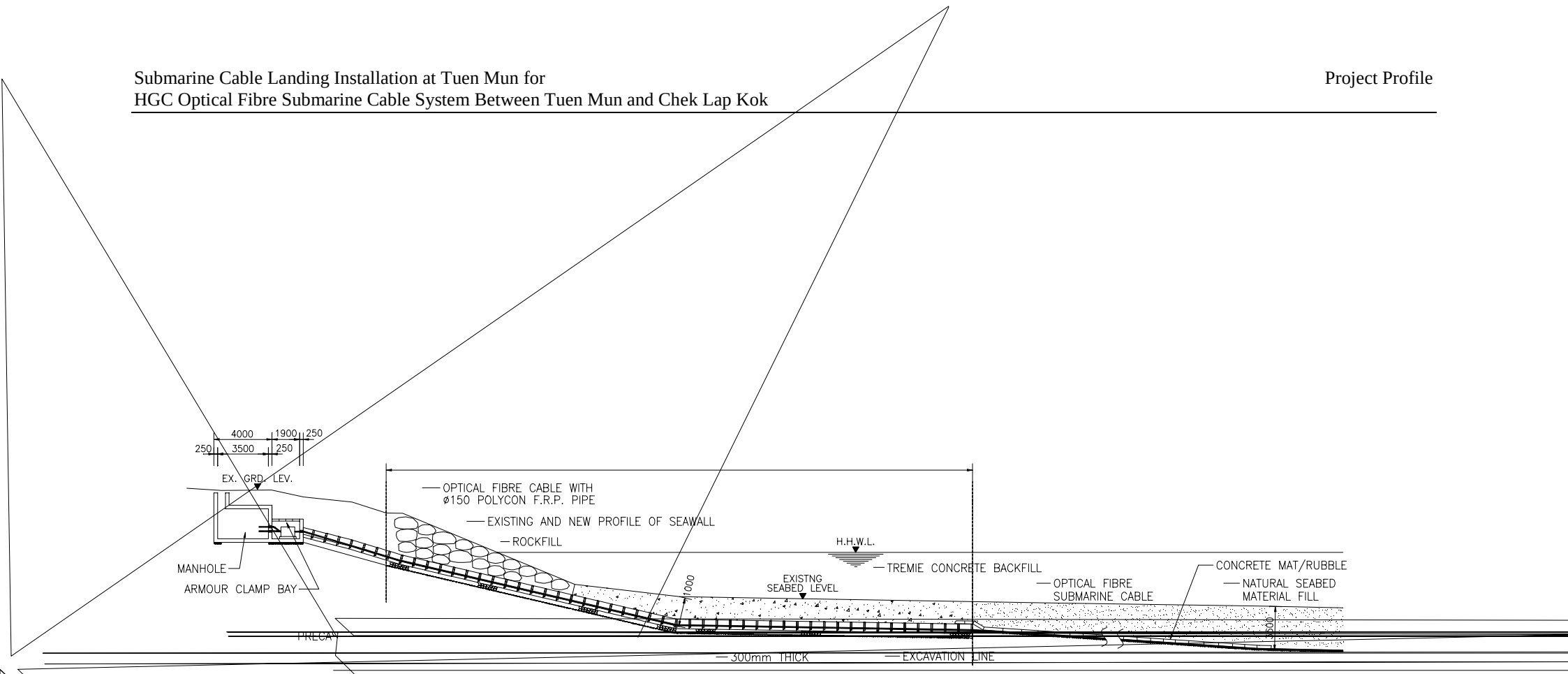
APPENDIX 1 - PROPOSED CABLE ROUTE



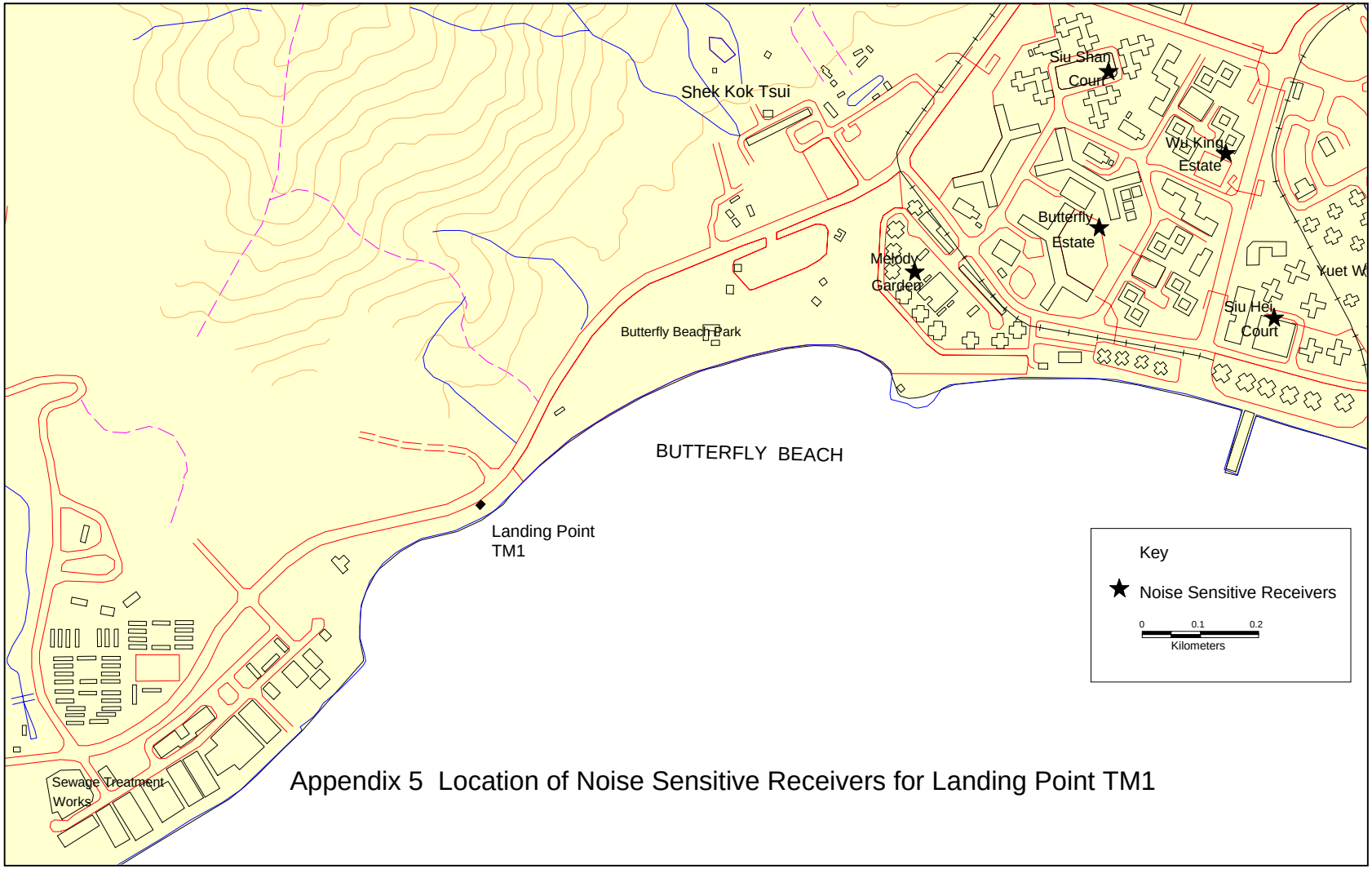
APPENDIX 2 - PROPOSED TUEN MUN LANDING POINT TM1



APPENDIX 3 - PROPOSED CHEK LAP KOK LANDING POINT CLK2



APPENDIX 4 - TYPICAL SECTION OF LANDING POINT



Appendix 5 Location of Noise Sensitive Receivers for Landing Point TM1

APPENDIX 6 WATER QUALITY IMPACT ASSESSMENT

1. INTRODUCTION

In constructing the cable crossing, a trench will be dredged near the landing points by a small powered backhoe dredger and by jetting for the remaining sections. Both dredging and jetting will release the marine sediments into the water column. Three sensitive receivers which may be subject to the impact of the dredging and jetting operations have been identified as shown in Figure A6.1. They are the three seawater intakes around Chek Lap Kok Airport, the Lung Kwu Chau and Sha Chau Marine Park and Butterfly Beach. The impact of the dredging and jetting operations on these sensitive receivers are assessed as follows.

2. IMPACT ASSESSMENT

2.1 SEAWATER INTAKES AROUND CHEK LAP KOK AIRPORT

The shortest distance between the seawater intakes and the cable crossing route (Point A) is about 1500m as shown in Figure A6.1. At Point A, the tidal currents are almost as strong as in the middle of the main channel. Hence, the assessment of the cable crossing constructing on the seawater intakes based on the jetting operation at Point A would represent the most adverse scenario.

According to our knowledge, the surface tidal current speed at Point A during mid flood tide of a spring tide is about 0.5m/s (Ref. 3) during the wet season. The dredging would not impact upon the seawater intakes during the ebb tide as sediments will be travelling away from Chek Lap Kok. To be conservative, this speed is used for calculating the transport distance of the suspended sediment from Point A.

The seabed along the entire cable crossing route is generally sand. It is likely that silt and other fine particles at the proposed site will be flushed away due to the strong current in the area and only sandy material would be able to resist the strong current. In addition, there are a number of Marine Borrow Areas (MBA) in the vicinity of the site area such as Brothers MBA, North Lantau MBA and East Sha Chau MBA which could be the major contributors of sandy material at the site area. The typical particle size of sand is 200 μm, which would give rise to a settling velocity of 0.02061 m/s according to the Van Rijn's Formula. A particle size of 60 μm (silt material) corresponds to a settling velocity of 0.00239m/s.

Ref. 3 CE42/97 Updated on Cumulative Water Quality and Hydrological Effect of Coastal Developments and Upgrading of Assessment Tool, Report on the Assessment of Cumulative Hydrodynamic and Water Quality Effects, Oct 2000.

The details of the jetting machine to be deployed are not known yet. A typical jetting machine with the last jetting nozzle at 3 m from the end has been assumed for the assessment. As such, the longest time for the suspended sediments to remain in suspension would be:

3m/0.02061m/s = 146s for the typical sandy material, and

3m/0.00239m/s=1255s for silt or very fine sand

The longest distance it would travel will be:

0.5m/s × 146s = 73m for the typical sandy material, and

0.5m/s × 1255s = 628m for silt or very fine sand

Both distances are considerably shorter than the distance between Point A and the nearest seawater intake. It is therefore concluded that the proposed trench jetting operation would not adversely affect the seawater intakes.

In the above calculation, the flocculation and high concentration effects have not been taken into account, which would be expected to result in an increased settling velocity and a decreased travelling distance.

2.2 LONG KWU CHAU AND SHA CHAU MARINE PARK

The strongest tidal currents in the surface layer along the cable crossing route have a speed of 0.75m/s (Point B) (Ref. 3) approximately at the mid-flood of a spring tide in the wet season. There will be no effect during the ebb tide as the sediments will be travelling away from the marine park.

Based on the similar calculations, the longest distance the suspended sediments resulting from the jetting operation can travel is estimated to be:

0.75m/s × 146s = 109m for the typical sandy material, and

0.75m/s × 1255s = 941m for silt or very fine sand

Both distances are considerably shorter than the shortest distance between the cable crossing route and the marine park which is about 5500 m.

It is therefore concluded that the construction of the cable crossing would not adversely affect the marine park.

2.3 BUTTERFLY BEACH

Butterfly Beach is about 350 m to the east of the landing point at Tuen Mun. The potential impact of the cable construction will be assessed for the ebb tide as the sediments resulting from the dredging operations will be travelling away from the beach during the flood tide.

The tidal current speed in the surface layer at the mid-ebb of a spring tide around the beach ranges from very low to 0.5m/s (Ref. 3) during the wet season, and the water

depth along the cable crossing route near the beach is up to 5m (Point C). As the cable laying trench will be excavated by dredging near the landing point, the marine deposits can be released at the surface during the course of the dredging operation.

As such, the longest time for the suspended sediment resulting from the dredging to remain in suspension can be:

5m/0.02061m/s = 243s for the typical sandy material, and

5m/0.00239m/s = 2092s for silt or very fine sand

Therefore the longest distance the suspended sediment can travel from the dredging location is:

0.5m/s × 243s = 122m for the typical sandy material, and

0.5m/s × 2092s = 1046m for silt or very fine sand

It is therefore concluded that the bathing water at Butterfly Beach can be potentially affected by any very fine sediments leaking from the dredger during the dredging operations during the ebb tide. However, any impact will be temporary as the dredging operation will only be for a few days. The impact is quantified in the following.

This part of the trench is about 500m long, 1m wide and 1m deep, and the dredging operation using a small powered backhoe dredger is estimated to take 3 days. The leakage from the dredger is typically 1.5%[1]. The typical dry density of sand is 2650kg/m^3. The sediment release rate from the dredging operation can then be estimated to be:

500m/3days/24hours/3600s × 1m × 1m × 1.5% × 2650 kg/m^3 = 0.0767 kg/s

Assuming that on leaking from the dredger the sediment will be fully mixed with the water column above the seabed over the width of the trench, then the resulting initial concentration of the suspended sediment will be:

$$\frac{0.0767\text{kg/s}}{5\text{m/1m/0.5m/s}} = 0.031\text{kg/m}^3 = 31\text{mg/l}.$$

It should be borne in mind that due to dilution and settlement, the elevation of the suspended sediment concentration in the bathing water would be considerably lower. The baseline sediment concentration in the area is 8mg/l in 1999, according to the EPD's routine monitoring data at the nearby monitoring stations NM2 and NM3. The baseline sediment concentration in the Butterfly Beach will be higher as it is much shallower at the beach than at NM2 and NM3. In view of the above and that the sediment in this area may be contaminated, it is recommended that the dredging operation for this landing point be carried out outside the bathing season.

[1] The number "1.5%" is based on a major CED study "Territorial Land Drainage and Flood Control Strategy Study Phase III Sedimentation Study" and a research on dredging methodology by HR Wallingford, UK.