

9 HAZARD TO LIFE

9.1 Introduction

Essentially this project comprises construction of drainage tunnel, three intake structures and an outfall. The main drainage tunnel will be driven by Tunnel Boring Machine (TBM) with the three intake structures adopting hand dug excavation then a drill and blast method for the shafts and the underground structures.

This section of this report addresses the issues with regard to the Hazard Assessment as specified in the *EIA Study Brief (ESB-069/2001)*.

9.2 Technical Requirement for Hazard to Life Assessment

The EIA Study Brief for this project requires an assessment to be carried out if there is overnight storage of explosives on site, and the storage or blasting location could adversely impact on populated areas or on any Potential Hazardous Installations nearby (particularly the Yau Kom Tau Water Treatment Works). The assessment must follow the criteria for evaluating hazard to life as stated in *Annexes 4 and 22* of the *TM to the EIAO* must be conducted. The hazard assessment needs to address the following:

- (i) Identification of all hazardous scenarios associated with the transport, storage and use of explosives for blasting operation;
- (ii) Execution of a Quantitative Risk Assessment expressing population risks in both individual and societal terms;
- (iii) Comparison of individual risk and societal risks with the Criteria for Evaluating Hazard to Life stipulated in *Annex 4* of the *TM to the EIAO*; and
- (iv) Identification and assessment of practicable and cost-effective risk mitigation measures.

9.3 Hazard Identification

Potential hazards relate to the potential storage and use of explosives at the three Intake Structures and initially at the tunnel portal, as well as the vibration effects on the Yau Kom Tau Water Treatment Works from the TBM used for the main tunnel.

For the Intake structures I2 and I3 where the drill and blast method will be adopted for part of the works, safety and storage issues regarding the use of explosives are discussed in the following subsections.

As the storage of explosives relates to the extent of the drill and blast component of works, it is important to review the rate of work (i.e. number of blasts per day), storage/delivery arrangements and the duration of the works. It is also important to note that blasting will only taken place at Intake Structures I2 and I3. Sensitive receptors are the temple at I2 and squatters in the vicinity of I3. Assessments undertaken, refer to *Section 4*, indicate that the vibration criteria of 25 mm/s (the relevant vibration criterion for a temple/residential

dwelling) can be achieved at 8m below ground at I2. The drilling and blasting activities will therefore take place from 8m below streambed level. There will be only 1 blast per day. As there are short lived albeit disturbing effects, it is suggested that the explosive charge should be activated at the same time each day (say during lunch time) and the contractor should notify all villagers of this activity before works commence, thereby minimising the surprise and potential objection. Blasting (refer to *Section 2.3*) is expected to be completed in the order of 4 months for the shafts, adits and stilling basins.

This section of the EIA is concerned with the hazards associated with blasting. There will be no explosives stored on site and delivery will be once/day. The explosives will be charged and detonated, then debris and materials will be cleared and the worksite prepared for the next days activity. With only 4 months required for the blasting work (considering one charge/day) the establishment of an explosive store (magazine) on-site is not required. Instead the explosives will be delivered to the intakes (I2/I3) each day, for one charge to be detonated. The delivery of explosives from Government Explosives Depots to the blasting site is controlled by the Explosives Delivery Unit of the Mines Division. Explosives are classified as Category 1 Dangerous Goods and use of explosives is controlled under the *Dangerous Goods Ordinance (Chapter 295)*. Effective and adequate precautions are required to be taken to prevent endangering the public. Warning signals must be given over a radius of not less than 150 m from the blast by the display of red flags and the beating of gongs for not less than five minutes prior to firing and be continued until all charges have fired.

The main tunnel drive is proposed to be constructed at depths of 7m to over 200m below the existing ground level using a TBM. TBM is a mature technique and commonly used elsewhere in Hong Kong and the assessments (refer to *Section 4*) indicate that no vibration effect (vibration criterion of 13 mm/s for water treatment facilities) will be experienced at the nearby Potential Hazardous Installations (PHI) - the Yau Kom Tau Water Treatment Works.

In accordance with the requirements of the Main Study Brief a detailed Blasting Assessment (not part of the EIA) will be carried out in order to evaluate the potential impacts on slope, utilities and structures and specify the limitation on charge weights per delay. According to our programme, the detailed Blasting Assessment will be submitted to the Mines and Quarries Division (MQD) of the Civil Engineering Department on September 2005 for approval.

With the rigorous application requirement for the blasting operation, adversely impact to the nearby PHI - Yau Kom Water Treatment Works (shown in **Figure 9.1**) and the areas adjacent to the blasting location (I2 and I3) will not be expected.

9.4 Conclusion

There will be no overnight storage of explosives for this project. Transportation of explosives to site for the intake structures I2 and I3 will be undertaken on a daily basis, with warnings given as described above. In addition, with stringent control procedures in place, adverse impacts on areas adjacent to I2/I3 or on the nearby PHI due to the blasting operation are not expected.