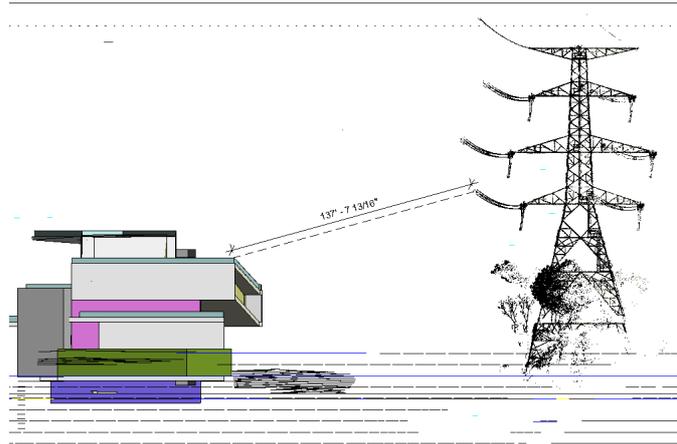


Appendix 12.9

## Potential Impacts of Construction Works on the 400kV Power Line

This Appendix presents a study undertaken by AECOM to identify and assess the potential risk to human life due to the construction works impact on the operation of the 400kV overhead power line and to propose measures to mitigate the impacts as per the requirement under clause 2.1(v) of the EIA Study Brief (ESB-220/2011)



A CLP Power's 400kV overhead power line traveling from north to south at the eastern side of the Sha Tin WTW has been identified. Construction works area for the proposed new administration building would be the closest site to the overhead power line. Apart from the new administration building itself, other construction works includes substructure and superstructure and road paving. Bored piling will be used for construction of foundation to avoid extensive excavation and vibration although excavation will also be adopted for the rest of works. Major equipment including bored piling machine, concrete pumps and trucks, excavators, poker vibrators, tower cranes, mobile cranes, diesel generators, water pumps and road rollers will be used for undertaking the construction works.

The minimum horizontal distance between the site boundary of Sha Tin WTW and the overhead power line would be approximately 20 m. With reference to the Code of Practice on Working near Electricity Supply Lines (the CoP), the reprovisioning works for the Sha Tin WTW – South Works do not fall into the "works in the vicinity of overhead lines" category<sup>1</sup> assuming no blasting for the proposed works. With the precaution measures such as site inspection / survey prior to commencement of works, adopting safe working distance and ground level barriers, in place as required in the CoP, it is not anticipated that construction activities would interfere with the power line leading to secondary impact to the surrounding population.

Construction works area for the new administration building will be sited at the southwest direction from the closest pylon of the overhead power line. The works area and the pylon are separated by the existing access road and nullah. The distance between footings of the pylon and the nearest project site boundary would be over 20 m. As no deep excavation at construction works area for the new administration building is expected, ground settlement affecting stability of the pylon would not be credible hazard.

Excessive vibration would lead to damage and even collapse of a structure. In order to assess impact of construction vibration on the pylon, the propagation law adopted by CEDD for prediction of the Peak Particle Velocity (PPV) in excavation / blasting would be applied. This same assessment method was also adopted in the Hazard to Life assessment as part of the EIA study for the

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<sup>1</sup> "works in the vicinity of overhead lines" means any works, except for blasting works, found within a horizontal distance of 9m from the outermost conductor of an overhead electricity line (O/H line). For blasting works, they are considered as works in the vicinity of O/H lines if any blasting point is within a horizontal distance of 25m from the nearest O/H conductor or radial distance of 50m from the centre of any O/H line footing.

Shatin to Central Link - (Hung Hom to Admiralty Section (SCL EIA). The propagation law has the following formula:

$$V = KQ^d R^{-b}$$

where

V is the Peak Particle Velocity in mm/second

R is the distance in m between the blasting source and the measuring point

Q is the explosive charge weight equivalent to TNT per delay in kg

K, d and b are site specific constants namely, rock constant, charge exponent and attenuation factor. For Hong Kong, d = 0.5 and b = 1.22 are considered applicable. K = 1200 is selected for the upper range as specified in GEO Guide 4.

Blasting energy is much larger than energy of other sources of construction vibrations. The energy released by 0.5 kg of TNT is 5400 kJ (Dowding, 1996). Such energy is 50 to 1000 times the energy transferred to piles during driving and 15 to 80 times the energy transferred to the ground during dynamic compaction of soils. By adopting a reasonably conservative approach, charge weight of 0.5 kg is assumed to represent the worst case. Having applied the propagation law together with site specific constants, the amount of ground vibration at footings of the pylon is estimated to be 22 mm/s.

According to SCL EIA, the criteria for building risk assessment are 229 mm/s and 100 mm/s for building structural element collapse threshold; and object falling threshold respectively. On the other hand, the CoP specifies the maximum particle velocity caused by blasting activities at overhead line footings is 25 mm/s. Since blasting is not involved in the upgrading works, the criteria stipulated in the CoP is not a mandatory requirement in this case. However, the CoP provides a reference for a stringent requirement on the vibration limit. Based on the estimated vibration level of 22 mm/s, construction activities at the project works site to the closest pylon would not generate excessive vibration damaging the structural integrity of the pylon. Therefore, it is not anticipated that both the pylon and the 400kV overhead power line would be adversely affected by ground works or construction activities at the project works site leading to hazard to life issue.

#### **REFERENCE**

Dowding, C.H., *Construction Vibrations*, Prentice Hall Professional Technical Reference, Upper Saddle River, 610 p., 1996.