Annex B

EIA report on
"Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road"
"Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities"
"Tuen Mun-Chek Lap Kok Link"

A summary of issues discussed by the EIA Subcommittee
at the meeting on 21 September 2009

The Environmental Impact Assessment (EIA) Subcommittee discussed three EIA reports related to Hong Kong-Zhuhai-Macao Bridge (HZMB), namely "HZMB Hong Kong Link Road" (HKLR), "HZMB Hong Kong Boundary Crossing Facilities" (HKBCF) and "Tuen Mun-Chek Lap Kok Link (TMCLKL) at its meeting on 21 September 2009. The issues discussed are summarized below.

Marine ecology

2. Regarding the possible impact on Chinese White Dolphin (CWD) habitat especially in the waters around Northwest Lantau where the viaduct of HKLR connecting to HZMB Main Bridge would be constructed, the project proponent explained that a number of options on siting of HKBCF had been considered. The proposed location of HKBCF in the water adjacent to the north-eastern side of the Airport Island was the option which would cause the least impacts on CWD habitat. As regards the construction of bridge columns in the Western Lantau waters, mitigation measures would be taken to minimize the impacts on CWD. Previous examples showed that living of dolphins would not be affected by the presence of bridge columns after completion of construction works.

3. On the spacing of bridge columns, the project proponent explained that the span between columns would be about 75 m for typical spans and about 150 m at the main navigation channel at the western waters of the Airport. From the engineering point of view, the 75 m span was the practicable limit for adopting the precast segmental viaduct form. If a longer span was required, the construction method of in-situ balanced cantilever had to be used which would require a longer construction time. The current proposed span between the columns should be sufficient for dolphin activities.

4. Regarding the dolphin monitoring programme, the project proponent explained that a monitoring plan would be put in place to ensure that dolphins would not be affected by the construction activities or trapped in the silt curtains. A dolphin exclusion zone would be set up and construction works would stop immediately in case any dolphin moved close to the construction site. There would be a full package of surveys for dolphin monitoring in the North and West Lantau waters, including vessel-based and land-based surveys during pre-construction, construction and operation phases. Vessel-based monitoring would be conducted twice a month to monitor the pattern of sighting density and individual usage. The line-transect survey would cover the North and West Lantau waters. Land-based surveys would focus on migratory movement and response of dolphins to bridge structures before and after construction, especially along the travel corridor between Sha Chau/Lung Kwu Chau and West Lantau waters. There would be specific behavioural monitoring on dolphins' response to construction works. The specific monitoring stations would be determined by dolphin experts. Underwater noise monitoring would also be conducted to collect data for verifying the anticipated low impact of bored-piling works.

5. On the manpower resources for dolphin monitoring, the project proponent explained that a designated environmental team, comprising a dolphin expert and qualified dolphin observers, would be responsible for both land-based and vessel-based monitoring works. They would assess the data and make recommendations on response plans. There would be an Environmental Project Office to coordinate all the survey and monitoring work for the three projects as well as liaising with the Mainland side on the HZMB Main Bridge project.

6. On measures to prevent dolphins from being hurt or killed due to additional marine traffic in the construction phase, the project proponent explained that a carefully chosen route would be designated for use by construction vessels and most of the construction vessels would be equipped with Global Positioning System to track their activities. The speed limit of construction vessels within the construction area would be about 10 knots which was in line with the speed limit imposed within the marine park. The number, route and speed of vessels were flexible and would be designed to suit the result of dolphin monitoring programme. Resident site staff would be stationed to monitor the vessel movement and dolphin activities in the vicinity of the route. After completion of the HZMB, it was envisaged that the number of high-speed vessels travelling between Hong Kong and Zhuhai or Macao might be reduced. This would help protect the CWD in the long

run.

7. Regarding the data on additional marine traffic volume during the construction period, the project proponent indicated that the data was available in the EIA report. Upon Members' request, the project proponent provided the information after the meeting as follow: the volume of marine construction traffic was about 12 vessels per hour during peak construction period.

8. Some Members suggested the dolphin monitoring programme to take into account the normal behaviour and sighting locations of dolphins in a comprehensive manner rather than merely watching whether dolphins would enter into the construction area as the dolphins might not come close to the construction site in response to the intense marine works.

9. Regarding the cumulative impacts on marine ecology as revealed in the EIA study undertaken by the Mainland, the project proponent explained that extensive EIA on CWD in the Pearl River Estuary had been conducted by the Mainland experts. The findings showed that with mitigation measures and a monitoring programme, the construction works would not cause any long-term adverse effect on the CWD habitat in the Pearl River Estuary. As there was a designated nature reserve for CWD near the Hong Kong boundary, the Mainland Authority had given approval for the construction works of the HZMB Main Bridge across the protection zone on the condition that, among others, a monitoring programme would be put in place during the construction phase.

10. The project proponent explained that the HKBCF would occupy about 138 ha of seabed. The construction and operation of TMCLKL would also cause direct loss of about 47 ha of sea area. Mitigation measures would be adopted to minimize impacts on marine habitat. After completion of construction works and with the designation of the marine park, it was anticipated that the marine ecology of the area would be greatly improved. The provision of a marine park would help enhance CWD habitat.

11. On measures to ensure that the proposed marine park would be sufficient to compensate the loss of CWD habitat, the project proponent explained that the boundary and extent of the proposed marine park would depend on the findings of a study. Relevant stakeholders and green groups would be consulted. If necessary, the findings and recommendation would be submitted to the Advisory

Council on the Environment for comments and advice. The current proposal was considered by the green groups as an appropriate location for compensation. In case there was any major hurdle for the designation of the marine park at the Brothers Islands, alternative locations would be explored.

12. On the management of the proposed marine park, the project proponent explained that Highways Department had committed to carry out a study after all the statutory procedures and funding application for the projects in question were completed in order to recommend the boundary and extent of the proposed marine park. They would also seek funding resources for designation and future management of the proposed marine park by going through the necessary statutory procedures with the assistance of the Agriculture, Fisheries and Conservation Department (AFCD). The management of the proposed marine park would then be passed to AFCD.

13. On the possibility of advancing the designation of the proposed marine park, the project proponent explained that the designation would involve statutory procedures under the Marine Park Ordinance and the anticipated extent of the proposed marine park would be close to the boundary of HKBCF. The designation of the proposed marine park would probably have interface problems with the construction works. Moreover, the data collected in the dolphin monitoring surveys during the construction would provide additional important data for the study. Some Members considered that the designation of the proposed marine park was not only a compensatory but also a mitigation measure for marine habitat. They urged that further thoughts be given to the timing of the designation of the marine park.

14. On the effectiveness of using bubble jackets as a mitigation measure for marine works, the project proponent explained that findings of previous projects showed that it would depend on a number of factors, such as water depth and water current. The level of attenuation would be about 5 to 10 dB(A) depending on situations. It should be noted that bubble jackets would not be used unless under contingency situation where forming of sockets into rock, the relatively acoustically disturbing procedure involved in bored-piling, was necessary for the HKLR project during the peak calving season of CWD in May and June. The contingency measure was to cater for any unforeseeable slippage of construction programme.

15. On the possibility of not carrying out forming of sockets into rock

during peak dolphin calving season, the project proponent explained that in view of the large scale of the projects, there would be uncertainties in the construction process. Should there be any unforeseeable delay of the project, measures would have to be taken to catch up with the construction programme. In case of need, the possibility of forming of sockets of bored piles into rock in May and June could not be ruled out.

16. On the source of boulders to be used in the sloping seawall, the project proponent indicated that the boulders would be available from local and Mainland quarries.

Air quality impact

17. Regarding the assumptions on background air quality, the project proponent explained that emission inventory data from the Pearl River Delta (PRD), power stations, other roads, marine vessels, the Airport and planned concurrent projects were added to the predicted emissions from the three projects for calculating cumulative air quality. This was the established practice stipulated in the Technical Memorandum on the EIA process (TM).

18. On the basic assumptions used in assessing regional air quality which were related to the PRD emissions, the project proponent explained that all the assumptions were stated in the EIA reports. One of the assumptions was to include various emission reduction measures taken in PRD only up to 2015 for the assessment year 2031. The information was based on《珠江三角洲環境保護規劃綱要 (2004-2020 年)》(Environmental Protection Framework Plan for the PRD) prepared by the Guangdong Provincial Government in 2003 which outlined the plans to control and reduce emissions from 2004 to 2020. To adopt a conservative approach, it was assumed that only half of the emission reduction in the PRD from 2010 (as in the Mid Term Review Report) to 2020 (as in the 綱要) would be materialized in 2031.

19. The project proponent indicated that another assumption was that cross-boundary vehicles would comply with the requirement in Hong Kong as it was a statutory requirement. In the modelling, a more conservative approach was adopted. By adopting a profile of vehicles with different age from traffic statistics, a gradual replacement process of vehicles was assumed. A sensitivity test was undertaken for different operational years to identify the highest emission scenario

for the projects. It was concluded that the worst-case assessment scenario for the projects was Year 2031 and hence the year was used as the assessment year in the EIA studies for air quality impact. The Mainland had started to adopt Chinese III emission standard (Euro III equivalent) in 2007. The Environmental Protection Bureau in the Mainland had committed that Chinese IV (Euro IV equivalent) and Chinese V (Euro V equivalent) emission standards would be adopted in 2010 and 2012 respectively.

20. On the assumption of fuel standard in the modelling, the project proponent explained that it was a common practice to assume that the same standard of fuel would be available in the market to cater for the needs of the vehicle design. The Macao SAR Government had conducted some tests on the fuel quality which revealed that the fuel quality had attained emission standard as Hong Kong few years ago. It was expected that the fuel standard in Macao and the Mainland would continue to be upgraded.

21. On the possibility that drivers might not switch to higher fuel quality in view of economic consideration, the project proponent explained that this was the reason for conducting a sensitivity test at different operational years to cater for such situation as behavioural change would need some time. The implementation programme of different fuel and vehicle emission standards were incorporated in the modelling to find out the worst-case scenario for the projects.

22. On the reliability of adopting the assumptions related to the Mainland side, the project proponent explained that the Guangdong Provincial Government and HKSAR Government had committed to implement a series of emission reduction measures to improve the overall air quality of PRD. For example, a joint review was conducted in 2007 on the progress and effectiveness of the measures. The result revealed that the measures committed were implemented earlier than expected. It demonstrated the commitment and determination of the Mainland Government to implement the plan. As regards the plans in upgrading the fuel and vehicle emission standards, there were commitments documented in official documents.

23. Regarding the assumption on initiatives recommended in the package of proposed new Air Quality Objectives (AQOs) in Hong Kong, the project proponent explained that only one initiative of assuming the power stations would use 50% natural gas for power generation by 2031 was adopted in the modelling.

None of the other initiatives was taken into account. This was a conservative assumption since the power companies had stated in their publications that they would increase the utilization of natural gas to 50% by early next decade. The percentage of utilizing natural gas should be even higher by 2031. If some of the other initiatives under the package of proposed AQOs were implemented, the air quality would be even much better than the predicted level.

24. On some Members' concern about the realization of the assumption of the use of 50% natural gas, EPD advised that the current arrangement of the power companies was the use of 28% natural gas for power generation. In the Financial Plans submitted to the Government, the power companies had formally and openly committed to the use of 50% natural gas by 2015. Moreover, the fossil-fuel burning plants of the power stations would reach the end of useful life in the coming 10 to 15 years.

25. On the yardstick of assessing the air quality impacts by using the prevailing AQOs instead of the proposed AQOs recently announced by the Government, the project proponent explained that the proposed AQOs were still in the public consultation stage. The standards required for assessing air quality impact under the EIA Ordinance (EIAO) were the prevailing set of AQOs. In recognition of the proposed AQOs, an informal comparison had been done for the predicted air quality level in 2031 versus the proposed AQOs. The result showed that even without the other initiatives, the levels of 1-hour nitrogen dioxide (NO_2), 24-hour Respirable Suspended Particulates (RSP) and annual RSP in all air sensitive receivers (ASRs) would comply with the new criteria under the proposed AQOs. For annual NO_2, some "exceedances" were predicted in a few areas such as Sha Lo Wan (47 $\mu g/m^3$) and Tung Chung (54 $\mu g/m^3$) as against the proposed AQO of 40 $\mu g/m^3$. It should be noted that these so-called "exceedances" were mainly attributed to the impacts of the Airport, power plants and PRD emissions. The contribution of NO_2 from the three projects was very insignificant. It was important to note that the proposed AQOs would couple with a set of new initiatives to improve the air quality. For the comparison exercise, none of the initiatives had been taken into account except the assumption on the use of 50% natural gas for power generation. The result still showed a general compliance with NO_2 and RSP levels except a few exceedances in annual NO_2.

26. On the feasibility of using the proposed AQOs in assessing the air quality impact of the three EIA reports, the project proponent explained that as

shown in the findings of the EIA, the contribution from the projects was not significant. If the proposed set of AQOs was accepted by the public, the Government would need to achieve the new standards by implementing a series of emission reduction measures. It was envisaged that the overall air quality would be improved by implementing the series of measures.

27. Some Members expressed reservation for the air quality assessment by adopting the prevailing AQOs as the yardstick in considering the acceptability of predicted air quality level in the future. Some Members considered that the consideration of the EIA reports had to be considered under the EIA framework and thus the prevailing AQOs should be adopted for assessment. The proposed new AQOs were only new standards and aspirations yet to be discussed and agreed upon. Assessment of the EIA report had to be based on legal framework of established standards.

28. EPD advised that the EIA mechanism was a statutory process. Under the statutory requirement, assessment of air quality impact had to be based on prevailing AQOs in considering the approval of the EIA report. The purpose of EIA studies was to conduct surveys and assessments to predict the anticipated environmental impacts of the projects in the future. A set of standards had to be adopted on whether the predicted level was acceptable and the standards were set out in the EIAO.

29. On the contribution of vehicular emissions arising from the three projects, the project proponent explained that two main sets of models were adopted in the modelling. One was the regional far-field model (PATH model) to quantify the impact from the background at PRD, the Airport, power stations and marine vessels, etc. Another model was the near-field dispersion model (CALINE/ISCST model) to quantify air quality impact at local scale from open road emission and idling emission at HKBCF as well as existing roads in North Lantau and Tuen Mun. The modelling results showed that for ASRs closed to existing main roads, the contribution from the traffic was much higher. For ASRs away from existing main roads, the contribution from the traffic was much less. The air quality impact to the ASRs mainly came from the North Lantau Highway rather than the new roads. As regards the near-field dispersion model, it was not possible to separate the impact of vehicular emissions due to the new projects from the overall traffic emissions because the traffic using the new roads would mix with those of existing roads.

30. Some Members considered that though the contribution of air emissions from the projects was not significant, it would be important to consider the cumulative impacts of a number of projects on the air quality of a certain area. For example, the level of NO_2 and RSP in Sha Lo Wan were very close to the limits which implied that the safety margin was dropping and thus more actions should be done to reduce the adverse impact. The project proponent recognized that there were some levels of impact arising from the projects adding onto the total emissions. Nonetheless, the EIA concluded that the impact arising from the projects was in compliance with the prevailing AQOs. Even applying the proposed AQOs without the initiatives, the impact in general complied with the standards except few exceedances in annual NO_2. Every effort would be made to minimize the air quality impact arising from the projects.

31. On the exceedances of air quality parameters by using the prevailing AQOs, the project proponent explained that the prediction was based on the assessment year 2031 which was the worst-case scenario for highways project as required under the TM. All parameters in the operation phase were in full compliance with the AQOs and thus there would not be any exceedance. In the construction phase, the only predicted exceedance was the annual Total Suspended Particulates (TSP) in Tuen Mun during the construction phase of TMCLKL which was about 104 to 106 $\mu g/m^3$ as against the standard of 80 $\mu g/m^3$. It was important to note that the TSP contribution due to the TMCLKL project was only up to 2.9% (3 $\mu g/m^3$) of the overall impact. Moreover, the data, which had been taken as a 5-year average between 2003 and 2007 from EPD's monitoring site in Yuen Long, was used in the calculation of the EIA report. It should however be noticed that the background level was in fact dropping over these years. Latest monitoring data showed that the TSP level had dropped in 2008 when compared with 2007. TSP was related to construction activities and thus the exceedance in Tuen Mun was only transient. As a mitigation measure, more frequent watering of 8 to 12 times per day was proposed to ensure impact arising from the TMCLKL project was nullified as much as possible.

32. On the approach in handling the small level of exceedance in annual TSP which was mainly due to high background level, EPD advised that it was not uncommon that there were some levels of exceedance, i.e. residual environmental impacts, predicted by EIA studies in previous EIA reports. According to the TM, the residual environmental impacts had to be considered against various factors, including effects on public health, magnitude of the impact, geographical extent of

the impact, duration and frequency, likely size of community affected, degree to which the adverse environmental impacts were reversible or irreversible, ecological context, disruption to sites of cultural heritage, international and regional importance as well as likelihood and degree of uncertainty. As far as TSP was concerned, it was not a parameter for health impact and thus not a public health concern. The geographical extent focused on the construction site in a localized area and the impact was temporary. Against these considerations, the residual impact was considered acceptable in accordance with the TM.

33. On the assessment of TSP in Sha Lo Wan, the project proponent explained that TSP was mainly associated with dust dispersion arising from construction activities such as excavation and movement of construction lorries. There was no plan to cut the Sha Lo Wan headland. Major construction activities would be concreting and marine works. It was anticipated that the dust impact would be very low. The assessment for TSP mainly focused on areas of Tung Chung and Airport Island near the construction sites. For these ASRs, the TSP level was in compliance with the AQOs.

34. On the interpretation of Table 5.14B in section 5.6.17 of the EIA report on HKLR regarding "Predicted maximum daily concentrations on NO_2 and RSP", some Members noted that the forecast concentration of NO_2 and RSP was even lower than the existing mean 5-year monitoring results, which seemed to imply that the air quality would be improved after the construction of HKLR. The project proponent clarified that the improvement was not related to the construction and operation of HKLR. The prediction included the regional as well as local initiatives. The overall predicted improvement of air quality in Tung Chung was mainly due to the anticipated implementation of various emission reduction measures by the two governments in the region. Based on the monitoring records of NO_2 and RSP in Tung Chung, it was observed that the NO_2 level had been dropping since 2004 and the RSP level had been dropping since 2006 due to regional efforts in improving the background air quality. Some Members considered that a better presentation of the result could be adopted as it might cause some confusion in interpretation.

35. On the effectiveness of watering as a mitigation measure to reduce TSP emissions as indicated in section 5.5.5 of the EIA report on HKLR, the project proponent explained that the predicted TSP concentrations under the unmitigated scenario shown in Table 5-7 included both the background concentration and local

concentration. The proposed mitigation measure of watering would effectively help reduce the dust emission arising from the projects. The mitigation measure would not affect the background concentration which was taken as a 5-year average of annual TSP.

36. On the assessment of ozone (O_3) which was not covered in the EIA report, the project proponent highlighted that O_3 was not a pollutant directly emitted from vehicular emission and it had not been included in the EIA for assessment with the AQOs. This approach was consistent with other EIA reports for highway infrastructure projects. The major parameters for road emissions were NO_2 and RSP. Extensive researches revealed that O_3 was a regional problem and that in Hong Kong was a regional O_3 episode with significant transport of O_3 from the PRD into Hong Kong. The formation of O_3 involved a complex interaction between a large number of chemical substances such as nitrogen oxides (NO_x) and volatile organic compound (VOC) when meteorological conditions, such as sunlight and temperature, favoured such reaction. Vehicular emission did not generate O_3 directly but emitted NO_x and VOC together. The predicted O_3 level had already been assessed in the modelling of air quality and the effect of O_3 in generation of NO_2 had in fact been taken into consideration in the assessment. NO_x coming out from the road projects would react with O_3 quickly to become NO_2. Thus, NO_2 was considered to be the key parameter for road project assessment. As regards VOC, it came from many sources. About 42% of VOC emission in Hong Kong came from VOC containing products while emission from all motor vehicles constituted only about 9%. Out of this 9%, about less than 1% of the total VOC emission in Hong Kong came from the North Lantau traffic. In terms of regional influence, PRD contributed 91% of VOC emission while Hong Kong shared 9% only.

37. On the design capacity of HKLR, the project proponent explained that HKLR was a dual 3-lane configuration with a daily traffic capacity of about 100,000 vehicle/day. The predicted daily two-way vehicles in 2016 were 9,000 to 14,000 vehicle/day and would increase to about 35,000 to 40,000 vehicle/day in 2031. The anticipated traffic mix would be about 50% share of passenger vehicles in 2016.

38. On "dual-licence" vehicles using the HZMB coming to Hong Kong, the project proponent explained that there was currently a quota system restricting the number of cross-boundary vehicles. The Government was actively considering the implementation of an ad-hoc quota system for the general public to meet

short-term needs. Relevant government departments would closely monitor the increase in traffic flow and its impacts on the environment, security and road network.

Alternative alignments

Middle section of the Hong Kong Link Road

39. On the viability of Option C with a tunnel running through the Lantau hillside in lieu of a viaduct structure along Airport Channel under Option A (the preferred option), the project proponent explained that in the selection of alignment, a number of factors were taken into consideration and cost was not the primary concern. In terms of air quality impact, there was not much difference between Option C and Option A as the travelling distance was similar. Under Option C, the natural hillside and coastline at the two portal areas would be adversely affected. The eastern portal of the tunnel would be very close to San Tau Sites of Special Scientific Interest (SSSI) and Hau Hok Wan horseshoe crab breeding site, thus causing impact on the ecology. It would encroach upon a recently enacted country park. Moreover, the energy consumption of the 3.5 km tunnel for 24-hour lighting and ventilation would be much higher than a viaduct. This would generate much more greenhouse gas and thus causing more pollution. In balancing the significant environmental impacts on the country park and landscape with the insignificant improvement in probably the noise impact, Option C was considered not a preferred option.

40. Some Members considered that it was difficult to accept the rationale that the amount of air emissions of the tunnel under Option C was similar to the viaduct under Option A. The project proponent indicated that the difference in the length of the two options was only a few hundred metres.

41. Some Members recalled that the tunnel option was one of the preferred options being considered back in 2005. The project proponent clarified that the tunnel option proposed in 2005 was not the Option C presented in the EIA report. As the proposal of constructing HKBCF was not in place back in 2005, the tunnel option proposed in 2005 was a tunnel running through Wong Nai Uk Shan at the southern part of Tung Chung as a by-pass with a different alignment connecting the HKLR with the existing North Lantau Highway. This option was no longer feasible due to the need to have a separate BCF within Hong Kong waters.

42. Some Members considered that the viaduct along Sha Lo Wan under Option A was visually intrusive to the villagers. There were already quite a number of overhead structures in the area. The tunnel under Option C would only run underneath the country park. With more aesthetic design of the portals and ventilation shafts, it might be considered as a viable option. The project proponent explained that the viaduct under Option A would quickly land on the Airport Island after spanning over Sha Lo Wan. With the Airport as the background, there would not be significant visual impact on this section of road. Under Option C, there would also be visual impacts due to extensive cuttings at the Lantau hillside and damages to the natural coastlines near Sham Wat and San Tau. The western portal would cause visual impact in the western waters and the eastern portal would cause visual impact to sensitive receivers around the eastern portion. Moreover, two big ventilation shafts for exhaust of traffic emissions would have to be constructed inside the country park, which would also be a visual intrusion on the naturalness of the country park.

43. Some Members considered that the boundary of the country park could be changed if there were compelling reasons to do so. With aesthetic design and modern technology, the two ventilation shafts could be camouflaged at a corner of the country park. Mitigation measures could be considered to minimize the impacts on the nearby horseshoe crabs site. The project proponent explained that serious consideration had been given to Option C. On balance, Option A was considered the preferred option from the environmental point of view.

44. On the encroachment upon country park under Option C, AFCD advised that the tunnel option would have significant impact in view of the encroachment upon country park and the proximity of the eastern portal to the San Tau SSSI which was also a horseshoe crab nursery site. The eastern portal would encroach upon the Lantau North (Extension) Country Park which was only designated as a country park in late 2008. Constructing a tunnel underneath the country park would also constitute as an encroachment upon country park. Any proposal to encroach upon country park would require the support of the Country and Marine Parks Board. Experience in previous projects showed that great resistance and objections would be expected. Moreover, ventilation shafts would have to be built within the country park. AFCD, as the authority of the Country Parks Ordinance, considered that Option C was not a preferred option from the ecological point of view.

45. On the possibility of moving the eastern portal of Option C outside the boundary of the country park, the project proponent explained that it would adversely affect the San Tau SSSI and the horseshoe crab nursery site there. Regarding the possibility of having the tunnel underneath the country park to continue running beneath the Airport Channel to the Airport Island without daylighting the tunnel in East Lantau, this option of building an underwater tunnel across the Airport Channel had been seriously considered. It had to be noted that HZMB was a dual 3-lane road. Currently, there was no practicable technology on tunnel boring construction, including Tunnel Boring Machine, which could bore through underwater hard strata for such a big tunnel in such area with complex geology. If immersed tubes were to be used for the underwater tunnel, there were restriction in the width and depth of the Airport Channel to allow the transportation of immersed units into the water. Thus, it was not a technically feasible option.

46. On precedent cases involving encroachment upon country park, AFCD advised that the precedent cases were different from the current project as the previous cases had provided strong reasons to justify that there were no other viable alternatives. From the environmental point of view, encroachment upon country park should be avoided as far as practicable. For the current project, Option A was a viable alignment with merits over Option C. EPD advised that the issue of alternatives had been considered in depth in the judgment of the EIA Appeal Board for "Sheung Shui to Lok Ma Chau Spur Line". The judgment pointed out that the possible alternatives to be investigated in an EIA process also hinged upon further strategic and policy decisions outside the scope of an engineering project. Furthermore, in assessing whether an alternative was "practical and reasonable", matters to be weighed included "adverse impacts, engineering constraints, extra-time involved, additional cost and even government policy". Given that environmental impacts were not the sole determining factor, the EIA process should not be used for determining alignments but for evaluating whether the proposed alignment would fully comply with the statutory requirements and standards under the EIAO.

47. On the landing point of the viaduct at the headland of San Shek Wan under Option A, the project proponent explained that there would not be physical landing on Lantau Island as the viaduct structure would only span over the headland. There would not be any encroachment into the country park under Option A.

48. On the concern of residents in Sha Lo Wan from the perspective of "Fung Shui", the project proponent indicated that there were views expressing "Fung Shui" concerns about a tunnel running through the back of the village under Option C. As regards Option A, the columns of the viaduct should not be too close as they would look like a line of teeth. Thus, the project proponent had tried to widen the span between columns to over 100 m to minimize the impacts.

49. Some Members noted that there were views from the Tai O Rural Committee expressing concerns about the noise, air quality and visual impacts of the viaduct on residents in San Shek Wan and Sha Lo Wan. While the noise level after mitigation would be within the standard, the disturbance of noise on the tranquil environment would have to be considered. The project proponent explained that the findings of the EIA showed that the contribution of noise and air quality impacts from the project was insignificant. For the assessment of air quality impact at Sha Lo Wan in 2031, the contribution of NO_2 from total traffic emissions was only 41 $\mu g/m^3$ while that from the other sources, such as PRD, the Airport and power stations, was 205 $\mu g/m^3$. For the noise impact, the viaduct structure would run at a level much higher than the village houses and the vehicle parapet would serve as a screen for the noise. The predicted road traffic noise level at the nearest sensitive receivers at Sha Lo Wan was 68 dB(A) which was lower than the criteria of 70 dB(A). The ambient noise level of the area was currently highly affected by other regional noise sources.

Tuen Mun-Chek Lap Kok Link

50. On the need of constructing TMCLKL in view of the existing road network from the Airport to the urban area, the project proponent explained that the Airport was connected to the outside only by the North Lantau Highway at the moment. The heavy rainfall in 2008 caused serious flooding to the North Lantau Highway and thus blocked the road traffic to the Airport and Tung Chung. Land transportation had to rely on the airport railway line. There was an urgent need to construct an alternative road to the Airport and Tung Chung. Moreover, the proposed TMCLKL, together with the Tuen Mun Western Bypass, would provide a close loop of highway network connecting HZMB with northwest New Territories and Shenzhen.

Landscape and visual impacts

51. On the possibility of leaning the viaduct under Option A towards the Airport Island in order to minimize the visual impact on residents of Sha Lo Wan, the project proponent explained that by leaning the viaduct towards the Airport Island, it would have to observe the airport height restriction as the southwest tip of the Airport Island was a critical aviation touch down zone. However, the height restriction would impose difficulty on the construction of the viaduct as sufficient headroom had to be provided for the vessels and fire rescue boats to move along the Airport Channel. The viaduct could not also lean too close to the Government Flying Service site in view of its operational needs. Once the viaduct passed through these two restrictive areas, it would land on the Airport Island.

52. On the space between the headland of San Shek Wan and the viaduct structure. The project proponent indicated that there would be about 8 m clearance. Tree survey had been conducted to ascertain that the trees on the headland would not grow to such a height. AFCD confirmed that the types of trees would unlikely grow to such a height. The EIA report also covered an assessment on the shading effect of the viaduct and concluded that it would not affect the vegetation underneath.

Hydrodynamic impact

53. On the hydrodynamic impact of constructing the viaduct in the Airport Channel, the project proponent explained that there would only be 13 pairs of columns for HKLR in the water and only three pairs of them would be in the area of main water flow. Most of the columns would be land-based along the existing seawall at the south perimeter of the Airport Island. Hydrodynamic study confirmed that there would be insignificant impact on Tung Chung Bay while the changes in hydrodynamic patterns in the Airport Channel would not cause unacceptable ecological impacts. The changes in the sedimentation and erosion patterns in the Airport Channel were also predicted to be insignificant and all water parameters in the Airport Channel would comply with the Water Quality Objectives.

54. Regarding the hydrodynamic impact of the West Chek Lap Kok (WCLK) option of the HKBCF as shown in Figure 2.4 of the Executive Summary, the project proponent explained that the main water flow was along the Lingdingyang which was adjacent to the Hong Kong and Guangdong boundary.

The HZMB Main Bridge was about 30 km long with a 23 km sea viaduct. A set of columns would be constructed every 70 m. There would be a large number of columns along the viaduct from Zhuhai/Macao to Hong Kong which would impose hydrodynamic impacts to the Pearl River Estuary. In the HZMB Feasibility Study conducted by the Mainland consultants, a series of expert meetings had been held to study the potential impacts. The findings of the hydrodynamic models showed that it was necessary to control the Total Water Resistance Ratio to within 10%. Without the construction of the HKBCF under the WCLK option, the Total Water Resistance Ratio was already close to 10%. With the construction of HKBCF in the WCLK which was near the main water flow, the Total Water Resistance Ratio would be increased to about 13%. Thus, the WCLK option for HKBCF caused a great concern to the Mainland experts in view of the hydrodynamic impact and flooding effect to the Pearl River Estuary.

Waste management

55. On the generation of construction and demolition (C&D) materials, the project proponent explained that to minimize the generation of C&D materials from excavation, only the seawall foundation would adopt a fully dredged excavation to provide a firm foundation for the seawall. The marine mud in the inner reclamation area would not be excavated.

56. On the disposal of domestic waste from the large number of site staff as it was noted that the disposal of lunch boxes by site staff during the construction of the Airport had caused concern, the project proponent assured Members that stringent requirements on site management and practices would be imposed. As the construction sites were close to Tung Chung and the Airport, the reliance of lunch boxes might be less.

Cumulative impacts

57. On the availability of the EIA report of the Main Bridge conducted by the Mainland, the project proponent indicated that the EIA report was part of the Feasibility Study Report of the Main Bridge which had been submitted to the State Council for consideration. The information could not be released for pubic inspection at this stage. The Executive Summary of the EIA report was available. Upon Members' request, the project proponent provided the Executive Summary for Members' reference after the meeting.

58. On the assessment of cumulative impacts in view of the large number of major infrastructure projects in the pipeline, the project proponent explained that for projects with sufficient information, such as the Sludge Treatment Facilities, Lantau Logistics Park, Tung Chung East and West Future Development, the impacts had been taken into account in the EIA study for the three HZMB related projects. For projects without sufficient data available at the time of the EIA study, such as the proposed third runway and Integrated Waste Treatment Facilities, the EIA studies of these projects would have to take into account the impacts brought about by the three HZMB related projects in their assessment of the cumulative impacts. This approach was in line with the requirements under the TM.

Conclusion

59. After discussion, Members agreed to request the project proponent to provide supplementary information to clarify some concerns and facilitate Members' consideration. The meeting also proposed some conditions should the EIA reports be endorsed.