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Ms. Wong Sean Yee, Anissa, JP
Director of Environmental Protection
Environmental Protection Department
46/F, Revenue Tower,
5 Gloucester Road,
Wan Chai, Hong Kong
(email: eiaocomment@epd.gov.hk)

By Email ONLY

Dear Ms Wong,

Re: Project Profile of the Baroque on Lamma (ESB-229/2011)

WWF is writing to express our grave concerns on the captioned. The proposed project will cause various adverse impacts to the marine and terrestial environment of Lamma Island, particularly Tung O Wan and its nearby ecologically important areas, affecting species of conservation concerns such as finless porpoise, green turtles and Romer's tree frogs. WWF opines that the information as outlined in the Project Profile is inadequate, failing to identify and address a number of potential impacts to be resulted from this project. WWF considers a project of such scale will apparently incur significant impacts to the environment and would like to express our serious concerns in a number of areas, as follows:

1. Potential impacts to the marine environment

1.1 Finless Porpoise

Inadequate information to evaluate habitat importance

The finless porpoise (*Neophocaena phocaenoides*), listed as "Vulnerable" in the IUCN Red List of Threatened Species[1]and CITES Appendix I (i.e. highest protection)[2], is one of the two resident cetaceans inhibiting Hong Kong waters. It is estimated that more than 150 finless porpoises inhabit mainly in the southern and southwestern part of Hong Kong waters[3] during the dry seasons (December to May).

[1] IUCN Red List http://www.iucnredlist.org/apps/redlist/search Accessed on 16 March 2011.
[2] CITES-listed species database. http://www.cites.org/eng/resources/species.html Accessed on 16 March 2011.
[3] AFCD data. http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_fin/con_mar_fin_fin/con_mar_fin_fin_dis_where.html. Accessed on 16 March 2011.

Although the latest AFCD marine mammal monitoring report (2009-2010)[4] revealed that only one porpoise sighting was made near Tung O Wan from eight surveys conducted between April 2009 and March 2010, the calculated SPSE and DPSE values suggested that Tung O Wan was one of the intense porpoise usage locations. In view of this, the report recommended that "*The density estimates of these grids could be seriously biased with the low amount of survey effort, and a longer study period with larger sample size of porpoise sightings and survey effort per grid would be needed to outline important porpoise habitats in Hong Kong*". In addition, "*No porpoise was seen in Lamma waters during those months, but this was somewhat related to the lack of survey effort there in summer and autumn months*". As such, before assessing the ecological value of the habitat for the finless porpoise at Tung O Wan, ***the project proponent should conduct a comprehensive baseline porpoise survey specifically at the location of Project Site and its surrounding waters for at least one year, so as to collect adequate information on the distribution and abundance of porpoise at the said area in various seasons.***

Habitat loss

The marina (plans to accommodate 500 yachts), which includes a yacht club, a watersports centre and a sailing academy, will be built at the Project Site. These facilities will bring in a huge number of vessels and boats visiting and mooring inside and outside the marina area, resulting in the escalation of marine traffic in Tung O Wan and its surrounding waters. The increased levels of vessel movement and the underwater noise will cause disturbance to the porpoise. The induced avoidance from the obstacles may lead to porpoise's behavioural change as well as preferred habitat displacement. The rise in the number of boat (e.g. boats moving in and out of the marina) may also increase the risk of porpoise being killed or injured by vessel collisions.

WWF foresees that a large proportion of water areas outside the marina will be used for conducting different water activities (e.g. sailing, windsurfing, yachting training). The porpoise may choose to avoid using such an area of busy traffic, comprising more than the stated 50 ha (both directly and indirectly affected area) in total. Apart from assessing the impact within the marina area, the project proponent should also estimate the extent of water areas where water activities will be taken place outside the marina, and assess the potential impacts and disturbance to the porpoise to be caused by this extra amount of water activities. ***The project proponent should quantify the habitat loss for the species and the risk of vessel collisions at both the construction and operation phases of the project to species of***

[4] AFCD. 2010. Monitoring of Marine Mammals in Hong Kong Waters – Data Collection (2009-10).

conservation interest, including but not limited to finless porpoises and green turtles, and demonstrate the project will not cause degradation to the ecological functions (e.g. as migratory path or foraging ground) of the area of waters. The project proponent should explain how the impacts from direct and indirect habitat loss be addressed.

Increase in underwater noise pollution

Marine mammals rely on echolocation, which is similar to sonar, for hunting, communication and navigation. The construction of marina may bring in an additional amount of yachts, vessels and other watersports boats into the water areas at southern Lamma. The underwater noise pollution from the increased marine traffic will cause acoustic disturbance to the porpoise, which may result in behavioural alternation due to increased stress and subsequent displacement from important habitat. ***In order to assess the extent of impacts which may cause to the porpoise from the increased underwater noise, WWF opines that a baseline underwater acoustic study should be conducted.***

Mitigation measures and residual impacts

It is important to investigate if the measures can effectively mitigate the impacts to ensure there is no residual impacts, or to keep it at a very low level. WWF has concerns on the effectiveness of some potential mitigation measures, which are listed as follows.

- During the construction and operation phase, briefing can be given to all vessel operators and watersports users on the guidelines for safe vessel operations on the presence of cetaceans (e.g. vessel speed restriction). However, WWF is seriously doubtful that if the skippers can accurately spot the porpoise occurring near the vessels. Unlike the Chinese white dolphin, which is pink and light in colour, the finless porpoise is in dark grey and relatively more difficult to observe. Also, the finless porpoises usually occur in small group (three individuals or less) which are less easy to spot. In addition, under windy and rough sea conditions, or weather conditions of poor visibility, it is unlikely for boat operators to spot the porpoise and slow down the yachts/ sailing boats. As such, the collision risk of the vessels to the dolphins remains relatively high.
- Although speed restriction can be applied so as to reduce the chance of vessel collision to the porpoise, it is sometimes difficult to control the sailing speed of the windsurfers and sailing boats (can go up to >20 – 40 knots), whereas the speed is subject to the wind force and weather condition. The project proponent should provide clear guidelines on how to restrict the speed of vessels using the water areas, as well as define an area/ route where the vessel speed restriction shall be implemented.

WWF opines that the suggested baseline surveys shall be conducted to assess the adverse impacts on finless porpoise in the EIA with proper mitigation measures (e.g. more stringent restriction on the speed of vessels during porpoise peak season and immediate designation of a marine park in South Lamma as a porpoise protection site.)

1.2 Green Turtle

The location of the proposed development is close to Sham Wan, the only remaining regular nesting beach for the protected green turtle (*Chelonia mydas*) in Hong Kong. Access to the Sham Wan beach is seasonally restricted under the Wild Animals Protection Ordinance (Chapter 170). Green turtle is classified as an endangered species according to the IUCN Red List of Threatened Species and its population is of significant global concern. Worldwide, the number of green turtles has shown a decline, with habitat degradation being one of the main threats.

There have been regular records of nesting turtles in Sham Wan and this beach therefore represents the most important nesting site in Hong Kong for this endangered species[5]. However the proposed project will pose significant threat to this species, as well as to their use of the Sham Wan beach for nesting.

Light pollution

Scientific studies have revealed that the presence of light on or adjacent to green turtle's nesting sites can seriously alter the behaviour of nesting turtles. Artificial lighting can also cause disorientation of the turtle, which can be fatal to emerging juvenile turtles as they may be attracted to light sources on the landward side, instead of moving to the sea[6]. Although the project development will not be physically located on the Sham Wan beach, any potential increase in artificial lighting at night associated with the development, including but not limited to the construction activities, residential area, resort area, marina, boats and vessels, will potentially affect the green turtles' return to Sham Wan. ***Given Sham Wan is the only regular nesting beach for the green turtle in Hong Kong, WWF considers the site is non-replaceable and any potential impacts from light pollution associated with the development should be totally avoided and fully mitigated.***

Increased marine traffic

As discussed in the earlier section for the porpoise, the increased marine traffic (from yachts and other watersports activities) will also cause disturbance to the turtles. Speed restriction

[5] AFCD. http://www.afcd.gov.hk/english/publications/publications_con/files/hkbonewsletter4.pdf

can be a measure to mitigate the impacts of increased marine traffic to the turtle. However, according to an overseas study on the vessel collision risk for the green turtle[7], turtles would find it extremely difficult to avoid being struck by vessels if the boat speed exceeded 4 km h^{-1} (~2 knots). The faster was the boat speed, the shorter was the detection distance for the green turtles, allowing the turtles insufficient reaction time to avoid and swim away from the approaching boats. The study results therefore suggests a potential increase in collision rate if the boat speed exceeds an acceptable limit.

The marine traffic in south Lamma waters is regarded as busy (i.e. cargo and fishing vessels) and has already been posing threats to the marine mammals and turtles using the water areas. The marine traffic is expected to be much heavier after the construction of marina, hence increasing the chance of this vulnerable marine species being hit. The project proponent shall investigate and quantify the baseline marine traffic movement at Tung O Wan and predict the impacts from the increased traffic to be brought by the marina (e.g. yacht movement, watersports activities and race events) to the turtles and porpoise. There is high risk for the green turtles to abandon the Sham Wan nesting site if the disturbance levels from human activities increase.

1.3 Subtidal Coral Communities

Inadequate survey effort

Corals, the marine sensitive receiver, are vulnerable to various environmental stresses caused from deterioration of water quality, such as elevation of suspended solids in water column. Increased sediment loads on corals will reduce the amount of available light and increase the sedimentation rates, posing adverse effects to the feeding and the growth rates of corals, whereas bleaching, partial and total mortality may be resulted. In view of this, impacts to corals should be carefully assessed.

WWF considers that, in order to identify all existing coral communities (both hard corals, octocorals and black corals) which could be affected by the work, ***the project proponent should conduct an extensive dive survey in the entire Project Site, but not only limited to the shallow areas of the natural shoreline*** (i.e. the octocorals can grow at the depth of 15-30m in Hong Kong). This piece of information will be important for the latter thorough assessment of impacts caused by the proposed work of marina construction and is essential

[6] IUCN. http://www.redlist.org/apps/redlist/details/4615/0

[7] Hazel J, Lawler IR, Marsh H, Robson S (2007) Vessel speed increases collision risk for the green turtle *Chelonia mydas*. Endangered Species Research 3: 105-113

for determining the necessity of additional mitigation measures, i.e. post-construction coral monitoring surveys.

Change in hydrodynamic regime

Octocorals are heterotrophic suspension feeders, they usually feed on small organic food particles in the water column. However, since their nematocysts are small and weak, they cannot actively capture their prey but would depend on water current to bring in their food. Food particles transported to the coral colonies will then be trapped and captured by the tentacles and pinnules of the individual polyps. The intensity and speed of water current may thus affect their feeding rate. The water movement is one of the main factors directly affecting the growth and distribution of octocorals.

A 1.2 km long breakwater proposed to be built for the marina is likely to cause changes in the hydrodynamic regime in the nearly enclosed water areas. The decreased current flow rate will affect the food transport rate to the polyps, lower down the food encounter and intake rate, hence affecting the growth rate and health condition of the corals. ***The project proponent shall investigate the impact of the change of current speed to the octocorals (if any) inhabiting inside and near the vicinity of the Project area. On top of this, water modeling shall be conducted so as to investigate if the change in hydrodynamic regime will affect the health condition of corals in the Project Site.***

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1.4 Fisheries Impact

Additional studies are required to provide the most up-to-date data on fisheries resources

WWF has concerns on the reliance on the fisheries impact study findings which were primarily based on the Port Surveys results. There are strong ecological reasons to suspect that the methodology used for Port Surveys can hardly produce findings that highly relevant to current conditions of the Project Site. We have previously expressed our serious concerns on the over reliance on Port Survey data.

Port Surveys are grossly inadequate for identifying and quantifying fisheries resources and important fisheries areas in Hong Kong. The nature of the Surveys (through fishers' interviews) and frequency of conducting (i.e. every few years) cast serious doubts on the quality and accuracy of the fisheries information. Since the Surveys relied almost entirely on reported catches from fishers, the high sampling errors and systematic bias may largely affect the accuracy of the estimates. In addition, the interview data is not ground-truthed by actual fishing surveys. As the size of fish stocks often vary massively from year to year due to naturally large variations in recruitment, the every-several-year Port Surveys should not be expected to reflect

the state of current fisheries resources with any accuracy several years after completion, not withstanding the inherent weaknesses of an interview based methodology..

Using data of such dubious quality could likely lead to the under-estimation of the potential impacts from the work to the fisheries (both resources and fishermen livelihood) in the Project area. The impact on the fisheries, in particular, the fish eggs and larvae, if not being assessed carefully, will cause detrimental impact to the fish stocks, as well as the prey availability to the marine cetaceans, alternating their distribution, abundance and feeding behaviour.

WWF urges EPD to require the project proponent to conduct a comprehensive fishing surveys to fill the knowledge gap of the fisheries resources and provide up-to-date fisheries stocks information in the Project area before assessing the severity of the impacts.

1.5 Water Quality

The discharge of sewage/greywater, as well as the surface runoffs from the development site, will cause adverse impact to the water quality in Tung O Wan area. The marina and related recreational facilities will also bring in a large number of vessels visiting and mooring both inside and outside the marina area. Although the marina may impose management control on vessels using the marina area to forbid any discharge from vessels into the seas, WWF questions the effectiveness in implementation, as the sewage and greywater discharged from vessels or recreational boats using the water area outside the marina (but in the close vicinity) may not follow the “no-sea-discharge” regulation. The discharge from a large number of boats and vessels will cause changes in water quality such as increasing in the suspended solid concentration, decreasing dissolved oxygen, increasing in *E. coli* concentration and increasing in nutrient level. Such changes will greatly affect the health and growth conditions of the sensitive marine species (e.g. corals, fish eggs and larvae) inhabited in the area, as well as the nearby fish culture zone and artificial reefs. The project proponent shall also investigate and quantify all the potential impacts which will be caused from the sewage/greywater discharge by the vessels outside the marina. ***Effective mitigation measures should be proposed to address the potential increase in water pollution loadings associated with the project and its associated operation against the baseline water quality conditions of the area under the “without project scenario”.***

2. Potential impacts to the terrestrial environment

2.1 Loss of Habitats within Conservation Area and Coastal Protection Area

According to Figure 2.2, parts of the land section covers the "Conservation Area" ("CA") and "Coastal Protection Area" ("CPA") on the approved Lamma Island Outline Zoning Plan (No. S/T-LI/9). With reference to the site layouts and proposed use which incorporates a total of 900 units of residence[8], we view that the proposed development will result in a tremendous loss of CA and CPA areas and incur landscape and ecological impacts to the exiting wildlife habitats (e.g. shrubland and secondary woodland). As such, ***we consider that the project proponent should conduct detailed baseline survey to confirm the ecological value of the affected areas*** in order to prevent those ecological sensitive areas from adverse impacts to be caused by construction and operation of the proposed development.

2.2 "Conservation Corridor" in the Northern Site

Since the proposed Conservation Corridor in the Northern Area, which mainly consists of secondary woodland, is largely surrounded by the residential buildings, we consider that wildlife inhibiting in the woodland area will be adversely affected by the significant human disturbance (e.g. noise and glare) during construction and operation phases. As such, ***we are highly dubious about the effectiveness of the corridor in terms of mitigating the adverse impacts due to the proposed development and maintaining/enhancing its ecological values and connectivity with the surrounding habitats.***

While the project proponent suggests the purpose of the proposed "Conservation Corridor" (the Corridor) is for conservation and preserving the existing trees, it is stated in Section 2.2.1 that there will be sections of access roads serving the residential area within the Corridor. Given a large proporton of the Corridor is covered by woodland area, we worry that the construction of access roads and other associated works, as well as the future users of the project site, will incur adverse ecological and landscape impacts to the wildlife inhibating in the secondary woodland within the Corridor.

2.3 Access road connecting the Southern Site and the Northern Site

It is stated in Section 2.2.1 that a wide road (7 -12 m) will be constructed in order to connect the Southern Site and the Northern Site. According to our site visit on 18 May 2011, it is anticipated that the proposed connecting road will encorach some tall shrubland near Tung O and woodland areas at Yung Shue Ha. In addition, the streams at Yung She Ha (Figure 1) will also be potentially affected by the proposed road alignments[9]. ***We consider that road construction works should be avoided and/or minimised as habitat loss and human disturbance to the wildlife will be inevitable due to the construction and operation of the***

[8] See Section 2.2.1 of the Project Profile

road, rendering adverse ecological impacts to the undisturbed area. Moreover, the project proponent should explicitly identify and address any adverse impacts on the wildlife due to the construction and operation of the proposed access road.

2.4 Potential impacts on Romer's tree frog

Lamma is one of the four islands in the world with the natural occurrence of Romer's tree frogs (*Liuixalus romeri*), an endemic species to Hong Kong, while the project site will encroach on the southern part of Lamma where the Romer's tree frogs are recorded[10]. As such, we view that the proposed development may cause adverse impact to the habitats of Romer's tree frog, a species protected under the Wild Animals Protection Ordinance (Chapter 170) and classified as an endangered species of global conservation importance according to the IUCN Red List of Threatened Species. Since Romer's tree frog is a species of conservation importance, we hold a strong view that the project proponent should conduct detailed baseline ecological surveys for the Romer's tree frogs. In order to prevent this species from adverse impacts of the proposed development, ***a long term conservation plan with clear and measurable objectives for this species should be formulated to ensure the ecological integrity of the Romer's tree frog habitats are protected from the impacts of development, and that potential future human disturbance is minimised***.

2.5 Potential Impact on the Plant of Conservation Interest

According to our site visit on 18 May 2011, Hong Kong Pavetta (*Pavetta hongkongensis*) (Figure 2), a protected plant species under the Forests and Countryside Ordinance Cap. 96, was recorded at the edge of the tall shrubland adjacent to the hiking trail between Yung Shue Ha and Mo Tat Old Village. Since this plant species of conservation interest is found within the Project Site, adverse impacts on the plant species due to the construction works are anticipated. As such, the project proponent should conduct detailed baseline ecological surveys to confirm the existence of the species and other plant species of conservation concern, as well as to explicitly evaluate the impacts on the plant species due to the construction. ***The project proponent should avoid incurring adverse impacts to the plant species of conservation concern by conducting a detailed study*** (e.g. feasibility of the adoption of appropriate design). If adverse impacts are unavoidable, the project proponent should provide a detailed transplantation proposal which includes the information on transplanting methodology and recipient site, so as to ensure that the potential impacts on the plant species of conservation interest can be fully mitigated by the proposed transplantation.

[9] See Figure 1.1 Location of the Project

2.6 Increased human activities and disturbance

Given ecologically sensitive areas including secondary woodland and natural streams are found within and adjacent to the Project Site, direct disturbance to the natural habitats and wildlife due to increased human activities during construction and operation of the Project is anticipated. We are of grave concern that night time lighting, visual and noise disturbance in both construction and operation phases will incur adverse ecological impacts to wildlife, in particular the nocturnal species (e.g. Asian Barred Owlet *Glaucidium cuculoides*[10]). Since the number of units (900 units) to be constructed is not small, ***we are highly dubious that the level of light, as well as visual and noise disturbance generated by such a large-scaled development can be fully addressed even if a reasonable amount of mitigation measures matching such a scale is implemented***[11].

2.7 Habitat fragmentation

While the design of the proposed development aims to avoid the potential impacts on the woodland areas and designate the woodland areas as Conservation Corridor[12], a large area of grassland/shrubland which surrounds those habitats will be lost for the proposed residential blocks[13]. We consider that the proposed development will likely undermine the ecological linkage of the ecologically sensitive areas (e.g. secondary woodland) to the surrounding habitats and thus lead to habitat fragmentation and isolation. In view of the large scale of the development proposed and the known existence of the species of conservation interest, we view that the project proponent should carefully assess the impacts on the wildlife due to habitat fragmentation and isolation. Although tree or shrub planting is proposed as a mitigation measure, such planting may be easily damaged and the vegetation thickness may vary among seasons. Therefore, ***we consider that the project proponent should be requested to formulate a detailed habitat management plan to monitor and ensure the effectiveness of the mitigation measures***.

3. Conclusion

WWF urges the Director to request sufficient information from the Project Proponent in response to the concerns listed above for the preparation of the Study Brief. We consider that the EIA should not be approved unless all environmental concerns as identified above have been fully addressed.

[10] The calling of this species is heard near the hiking trail between Yung She Ha and Mo Tat Old Village during our site visit on 18 May 2011
[11] See Section 3.7.1 of the Project Profile
[12] See Section 3.7.1 of the Project Profile
[13] See Section 2.2.1 of the Project Profile

Thank you for your attention and consideration of the comments.

Yours sincerely,

Dr. Alan Leung
Conservation Manager-Terrestrial
WWF-Hong Kong

Figure 1 A natural stream at Yung Shue Ha (Photo taken on 18 May 2011)

Figure 2 Hong Kong Pavetta (*Pavetta hongkongensis*) at the edge of the tall shrubland between Yung Shue Ha and Mo Tat Old Village (Photo taken on 18 May 2011)