



香港興業有限公司 Hong Kong Resort Company Limited

# Proposed Debris Resisting Barriers at Area N1 North, Discovery Bay, Lantau Island

Project Profile

June 2005

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## 1. BASIC INFORMATION

### 1.1 Project Title

Proposed Debris Resisting Barriers at Area N1 North, Discovery Bay, Lantau Island.

### 1.2 Purpose and Nature of the Project

The Discovery Bay Outline Zoning Plan No. S/I-DB/3 has reserved several sites for residential development (zoned as R(C) 2 Areas A and B) within D.D. 352 Lot 385 RP & Ext, Area N1 North in Discovery Bay. Site Formation Plans have been submitted to the Buildings Department (BD) for the residential sites and was approved on 12th June 2003.

As a result of the BD submission, the Geotechnical Engineering Office (GEO) of Civil Engineering and Development Department (CEDD) has requested that structures on the hillslopes to be provided to capture possible loose debris and safeguard the residential developments in the event of a landslip, although unlikely. A comprehensive consultation exercise has been conducted with GEO and Drainage Services Department (DSD) and a debris-resisting barrier option has been accepted by GEO and DSD to achieve the safety requirements.

HKR has submitted a Section 16 Application under the Town Planning Ordinance (TPO) for the construction of two debris-resisting barriers (hereafter referred to as the Barriers) and their associated site formation works and has been approved with conditions by the Town Planning Board (TPB) on 14th January 2005. A condition of the approval is to obtain an Environmental Permit (EP) for the construction and operation of the Barriers under the Environmental Impact Assessment Ordinance (EIAO).

According to the Discovery Bay Outline Zoning Plan (OZP) No. S/I-DB/4, the sites upon which the two Barriers are to be constructed lie partially within a "Conservation Area" ("CA") zone. According to the EIAO, the construction and operation of the Barriers is classified as a Designated Project under the EIAO.

This Project Profile (PP) includes an assessment of the potential environmental impacts associated with the construction and operation of the two Barriers. The assessment has been based on information provided by the Project Proponent and the Civil Engineering Designer.

A Landscape and Visual Impact Assessment (LVIA) that includes the landscape master plan and visual mitigation measures has also been undertaken as part of the Section 16 approval process and is attached to this submission.

### 1.3 Name of Project Proponent

#### **Hong Kong Resort Company Limited**

23/F., China Merchants Tower

Shun Tak Centre

168-200 Connaught Road Central

Hong Kong

Tel: 2238-1188 Fax: 2987-6809

#### **1.4 Location and Scale of Project**

The proposed Barriers are located at D.D. 352 Lot 385 RP & Ext, Area N1 North in Discovery Bay (Appendix 1, Figure 1.1). The total area of the two Barriers is approximately 2,600 m<sup>2</sup>. Due to safety requirements and topographic constraints, the structures fall beyond the boundary of the Discovery Bay residential development and hence encroach into the adjacent hillslopes of the "Conservation Area" ("CA") zone.

The proposed Barriers are located upstream directly north of the current roundabout at the junction of Discovery Bay Tunnel and Discovery Bay Road on the hillslopes. The slopes were previously covered in shrub and woodland but the vegetation has been destroyed by a hill fire at the end of 2004.

#### **1.5 Environmental Impact Assessment Ordinance Status**

The Barriers are located in the "CA" zone of the current Discovery Bay OZP No. S/I-DB/4 (approved on 1st February 2005). The Barriers location in relation to the OZP "CA" zone boundary is shown in Appendix 1, Figure 1.2.

This PP covers one classification of a Designated Project under the EIAO, Schedule 2, Part I, Q – Miscellaneous, Q.1.

#### **1.6 Name and Telephone Number of Contact Person**

The Project Manager for HKR for this project is:

Mr. Wilson Cheung                      Telephone: 2238-1188

### **2. OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME**

#### **2.1 Implementation and Planning of the Proposed Project**

HKR has appointed Atkins China Limited (Atkins) as their Civil Consultant for the preparation of the detailed design of the Barriers and DLS HK Limited is the Quantity Surveyor responsible for the preparation of the above mentioned contract documents. Urbis Limited is responsible for the associated Planning Application for the proposed Barriers construction and operation, and also for the preparation and implementation of a Landscape Master Plan and Visual Mitigation Measures as required for the Section 16 Planning Approval conditions.

#### **2.2 Site Selection**

The proposed Barriers are required as safety measures for the future residential development of Discovery Bay North. Various options were presented and this option was the design that was accepted by GEO and DSD. The Barriers have been positioned at strategic locations where the structures can most effectively collect the upstream debris and for optimal performance and safety and have been located at rock outcrops to minimise the extent of slope cutting works.

#### **2.3 Project Time Table**

The target commencement date for the construction of the Barriers is July 2005. The construction of the two Barriers is expected to be completed by July 2006.

## 2.4 Interactions with Broader Programme or Other Projects

The site formation works for the future Discovery Bay North Residential Development in Area N1 are located immediately south of the Barriers and it is anticipated that there will be concurrent construction works from these activities with the proposed project. This has been reviewed in the following PP.

Further, there are construction works currently being undertaken at the Discovery Bay Siena Three site which are expected to be completed by September 2006. As such, there will be a short overlap of construction activities with these works.

There are no major interactions with other projects.

## 3. MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

### 3.1 Existing and Planned Sensitive Receivers and Sensitive Parts of the Natural Environment that might be affected by the Proposed Project

#### 3.1.1 Noise

The closest existing noise sensitive receiver (NSRs) is Peaceful Mansion of Discovery Bay Siena Two, located approximately 240 m south of the debris-resisting barrier "A" and approximately 290 m southwest of the debris-resisting barrier "F". The relevant location is indicated on Appendix 1, Figure 3.1.

The residential development Discovery Bay Siena Three is a planned NSR currently under construction and is not planned to be occupied during the construction phase of the two Barriers and will not be affected by the proposed works. The expected occupation date is September 2006.

With reference to Discovery Bay OZP No. S/I-DB/4, there are no other planned NSRs located near the works site and there are no planning applications under the Town Planning Ordinance in the vicinity of the works site that would become NSRs during the project construction.

#### 3.1.2 Air Quality

The Air Sensitive Receivers (ASRs) are the same as the NSRs discussed above.

#### 3.1.3 Water Quality

There is a small network of natural ephemeral watercourses associated with the natural slopes of the "CA" zone close to the site. These are located in gullies and are largely dependent on rainfall for flow. It is expected that the debris would flow along two natural streams where the two Barriers will be provided to catch the potential debris flow. These streams ultimately discharges into the Southern Water Control Zone.

The site is over 500 m away from the coast and the project will not directly affect the coastal water; however, indirect impacts from earth moving activities during construction will need to be considered.

#### 3.1.4 Ecology

The proposed Barriers are located within a "CA" zone as described in the current OZP. However, this area has been disturbed by a significant hill fire recently and as of early March 2005, no remaining vegetation has been found on the slope.

### 3.1.5 Landscape and Visual

Details of the visually sensitive receivers (VSRs) are provided in the LVIA (Appendix 3).

### 3.1.6 Historical and Cultural

There are no declared monuments or historical structures within or in close proximity to the works site and no historical or cultural impacts are anticipated.

## 3.2 Elements of Surrounding Environment Which Might Affect the Project

### 3.2.1 Major Elements

There are no major elements of the surrounding environment that might affect the project area.

## 4. POSSIBLE IMPACTS ON THE ENVIRONMENT

### 4.1 Summary of Potential Environmental Impacts

The construction and operational impacts associated with the proposed Barriers are summarised in Table 4.1 and are described in further detail in the following Sections.

**Table 4.1 Potential Sources of Environmental Impacts**

Potential Impact	Cons.*	Ops.*
• Gaseous emissions	✓	x
• Dust	✓	x
• Odour	x	x
• Noise	✓	x
• Night-time operations	x	x
• Significant traffic generation	x	x
• Liquid effluents, discharges, or contaminated runoff	✓	x
• Generation of waste or by-products	x	x
• Manufacturing, storage, use, handling, transport, or disposal of Dangerous Goods, hazardous materials or wastes	x	x
• Risk of accidents which result in pollution or hazard	x	x
• Disposal of spoil material, including potentially contaminated materials	✓	x
• Disruption of water movement or bottom sediment	x	x
• Unsightly visual appearance	✓	✓
• Ecological impacts: - Terrestrial	x	x
- Marine	x	x
- Fisheries	x	x
• Cultural heritage	x	x

Notes: ✓ = Potential to result in adverse impacts, x = Not expected to result in adverse impacts

\*: Cons. = Construction phase Ops. = Operation phase

## 4.2 Process Involved, including Process Flow Diagrams, Site Plans, Storage Requirements, and Information on Emissions and Discharges

### 4.2.1 Debris-resisting Barriers Construction

The two debris-resisting barriers are located upstream directly north of the current roundabout which takes buses to Tung Chung. The two Barriers comprise:

- concrete side walls, from 4.7m to 12.7m high;
- a flat concrete base, 25m x 23m;
- a small guiding inlet channel;
- connection to a small outlet cascade channel;
- access stairways; and
- mitigation measures such as planter boxes.

The Barriers are situated on natural slopes that have an average slope angle of about 30° to 40°. To provide sufficient space for the construction of the Barriers and minimise disturbance to the natural slopes, the platforms are formed by both slope cutting at the back of the Barriers and concrete filling works at the front of the Barriers. Temporary cut slopes of angle 70° are proposed at the back of Barriers to limit the extent of temporary cutting required. Planters of 1.4 m x 1.75 m high are proposed to be constructed in front of the Barrier walls to ameliorate the visual impact of the structure.

## 4.3 Environmental Impacts During Construction Phase

### 4.3.1 Gaseous Emissions and Dust

There is the potential for fugitive dust emissions to be generated at the sites from the construction activities. However, this is expected to be very minimal due to the limited site area and the small quantity of earth and rock to be excavated or moved. Furthermore, dust control measures stipulated in the Air Pollution Control (Construction Dust) Regulation are required to be implemented during the construction.

Exhaust emissions (SO<sub>2</sub> and NO<sub>x</sub>) from diesel powered construction plant will be minimal due to the small number of plant at the site.

As such, adverse impacts on air quality will not result from the construction activities.

### 4.3.2 Odour

No odour impacts will result from the construction activities.

### 4.3.3 Noise

Peaceful Mansion (NSR 1) is the closest existing NSR and will be the most affected NSR with regard to noise generated from the Barriers' construction and has been selected for the assessment. The key noise sources will be Powered Mechanical Equipment (PME) used during site clearance, slope cutting with soil nailing, mass concrete filling (for the platform), formworks and concreting (for the Barrier walls). The anticipated equipment required for each activity (as advised by the design engineer) and its sound power level are provided in Table 4.2. Quiet plant has been assumed for the generators.

The Technical Memorandum for the Environmental Impact Assessment Ordinance (EIAO-TM) stipulates a noise standard of  $L_{eq(30 \text{ minutes})}$  75 dB(A) for all domestic premises for daytime (0700 to 1900 hours on any days not being a Sunday or public holiday) construction activities. Thus, noise generated from the construction activities is required to comply with this noise standard. It is not anticipated that there will be evening or night-time (1900 to 0700 hours) construction activities at the works site. However, should there be any construction activities involving use of PME or Prescribed Construction Work (PCW) during these restricted hours, the Contractor shall be responsible for applying to EPD for a Construction Noise Permit (CNP) under the Noise Control Ordinance, Cap. 400 (NCO).

**Table 4.2 Construction Equipment for a Debris-resisting Barrier**

Construction Activity - for one debris-resisting barrier	Equipment	GW-TM Code	Number of Plant	Sound Power Level, dB(A)
Site clearance	Excavator / loader	CNP081	1	112
	Lorry	CNP141	1	112
Slope cutting - excavation	Excavator / loader	CNP081	1	112
	Lorry	CNP141	1	112
Slope cutting - rock breaking	Breaker, excavator mounted (pneumatic)	CNP027	1	122
Slope cutting - soil nails	Air compressor > 30m <sup>3</sup> / min	CNP003	1	104
	Breaker, hand-held, mass>35kg	CNP026	1	114
Platform forming - mass concrete fill	Concrete lorry mixer	CNP044	1	109
	Concrete pump	CNP047	1	109
	Poker, vibratory, hand-held	CNP170	1	113
	Generator, silenced (75dB(A) at 7m)	CNP102	1	100
Formworks	Saw, circular, wood	CNP201	1	108
	Drill, hand-held (electric)	CNP065	1	98
Concreting	Concrete lorry mixer	CNP044	1	109
	Concrete pump	CNP047	1	109
	Poker, vibratory, hand-held	CNP170	2	113
	Generator, silenced (75dB(A) at 7m)	CNP102	1	100
Haul road activity	Lorry (for worst case)	CNP141	2 veh/hr	112

GW-TM = Technical Memorandum on Noise from Construction Work Other than Percussive Piling.

The predicted noise levels due to construction activities have been calculated in accordance with the methodology prescribed in the Technical Memorandum on Noise from Construction Work Other than Percussive Piling (GW-TM) under the NCO. Generally, a notional source position has been assumed for construction works for each Barrier. For the worst-case scenario, it is assumed that both Barriers will be constructed concurrently. Works boundary is shown in Appendix 1 Figure 4.1. Noise from haul road activity has been calculated based on the methodology recommended in the British Standard BS 5228 Part I, Noise Control on Construction and Open Site. For the worst-case scenario, the centre of the haul road is assumed to be midway between the receiving point and the works boundary of the nearest Barrier.

Full operation of all plant has been assumed for the assessment but it is expected that this will rarely be the situation.

There will be concurrent construction activities due to the site formation works at Discovery Bay Area N1 North and the construction works at the Discovery Bay Siena Three site. As such, cumulative construction noise is anticipated.

Since the other construction activities are not classified as Designated Projects, the noise generated by these construction activities will follow the daytime (0700-1900 hours) noise standards as recommended in the ProPECC Note PN 2/93 "Noise from Construction Activities – Non-statutory Controls". Accordingly, the daytime construction noise level at Peaceful Mansion due to the construction activities other than the Barriers construction is expected to comply with the recommended noise standard, i.e., 75 dB(A).

Based on an expected worst case scenario where the noise levels from other construction activities at Peaceful Mansion are at maximum compliance level (75 dB(A)), the cumulative construction noise levels have been calculated and are summarised in Table 4.3 and the details of the calculations are provided in Appendix 2.

**Table 4.3 Construction Noise Levels Predicted at Peaceful Mansion**

Construction Activity – construction of two Barriers	CNL due to construction of the Barriers	Noise level due to <u>Other</u> Construction Activities	Cumulative Construction Noise Level
Site clearance	<b>65 dB(A)</b>	75 dB(A)	75 dB(A)
Slope cutting - excavation	<b>65 dB(A)</b>	75 dB(A)	75 dB(A)
Slope cutting - rock breaking	<b>72 dB(A)</b>	75 dB(A)	<u>77 dB(A)</u>
Slope cutting - soil nails	<b>65 dB(A)</b>	75 dB(A)	75 dB(A)
Platform forming - mass concrete fill	<b>66 dB(A)</b>	75 dB(A)	75 dB(A)
Formworks	<b>59 dB(A)</b>	75 dB(A)	75 dB(A)
Concreting	<b>66 dB(A)</b>	75 dB(A)	75 dB(A)

CNL = Corrected Noise Level

For the worst-case scenario, noise levels due to the construction of the two Barriers only will comply with the 75 dB(A) daytime noise standard. However, other concurrent construction activities will result in a cumulative construction noise level of 77 dB(A) during the rock breaking activity, which would exceed the noise standard. In order to avoid exceedance due the cumulative noise impacts, careful scheduling of works will be required. Since the same Contractor will be employed for the construction of the two Barriers and the adjacent site formation works, the Contractor shall design their works schedule such that the breakers operation during the rock breaking period will be staggered and does not overlap the PME operation within the adjacent site formation works. Another potential cumulative noise source is the works at Siena Three. Based on the Client information, the structural frames of all buildings at Siena Three have been completed and the outstanding works are only internal finishing and external landscape works which are not expected to cause significant noise impact. Nonetheless, the Contractor shall also liaise with the Siena Three Contractor with respect to their works programme such that the rock breaking activity will not overlap their PME activities, if any. These requirements shall be specified in the construction tender document.

With the implementation of this measure, construction noise levels are expected to achieve the noise criterion an adverse construction noise impacts are not anticipated.

#### 4.3.4 Night-time Operations

There will be no evening or night-time operations.

#### 4.3.5 Traffic Generation

There will be only minor trips generated during the construction phase by construction worker movements and arrival and removal of equipment and materials. As such, adverse impacts from traffic generation are not anticipated.

#### 4.3.6 Effluents, Discharges and Run Off

During the construction phase, there is the potential for adverse impacts to occur due to sediment loaded site run-off and potential wash-outs, especially during the rainy season. Measures will be undertaken to avoid untreated site discharges or runoff from inadvertently entering into the inshore waters of the Southern Water Control Zone, such as the implementation of temporary site drainage and the site discharges will be required to achieve the discharge limits.

Further, the Contractors will be required to provide chemical toilets on-site. Measures will be taken to control any run-off from the site in accordance with the ProPECC Note PN 1/94 "Construction Site Drainage". No kitchen or canteen will be provided on site and there will be no marine activities associated with the project.

Based on the above, no impacts on water quality are anticipated.

#### 4.3.7 Waste

Only a small amount of the non-inert portion of construction and demolition (C&D) material such as timber formworks, packaging for plant / equipment / materials, general refuse will be generated during construction of the Barriers. Disposal of the non-inert portion of C&D materials will be managed through the trip-ticket system following the guideline stipulated by the Works Bureau Technical Circular No. 31/2004 "Trip Ticket System for Disposal of Construction & Demolition Materials".

Only very small quantities of chemical waste will be generated along with municipal waste from construction workers. Correct handling, storage and disposal of these waste streams will be undertaken and adverse impacts on the environment are not anticipated.

#### 4.3.8 Manufacture, Storage, Use, Handling, Transport, or Disposal of Dangerous Goods, Hazardous Materials or Wastes

Dangerous goods are not anticipated to be used during the construction process and all chemical wastes produced in the construction process will be handled in accordance with the Waste Disposal (Chemical Waste) Regulations, and therefore, impacts are not anticipated.

#### 4.3.9 Risk of Accidents Resulting in Pollution or Hazard

No pollution or hazard generating accidents are expected to result from the construction of the Barriers.

#### 4.3.10 Disposal of Spoil or Contaminated Material

Only a small amount (300 m<sup>3</sup>) of excavated spoil material (soil and broken rocks) will be excavated during construction of the Barriers. Since the excavated material will be uncontaminated and inert, it is anticipated that all excavated soil will be reused for backfilling at the site, and excess will be used at the site formation works at Area N1 North, Discovery Bay. Small quantity of the excavated rocks will be managed through the trip-ticket system following the guideline stipulated by the Works Bureau Technical Circular No. 31/2004 "Trip Ticket System for Disposal of Construction & Demolition Materials".

#### 4.3.11 Disruption of Water Movement or Bottom Sediment

The project will not result in any impact on water movement or bottom sediment.

#### 4.3.12 Landscape and Visual

Details of the landscape and visual impacts during the construction phase are provided in the LVIA (Appendix 3).

#### 4.3.13 Ecology

During the construction phase of the project a small amount of land-take would occur which would result in the direct loss of an area of 2,600 m<sup>2</sup> of natural slope. The site is located on a natural slope with an average slope angle of 30° to 40°. The area is presently devoid of habitat due to a relatively recent hill fire. In general, the type of habitat that these slopes support is a generally sparse shrub which are considered to be very limited with regard to supporting ecological resources and would be classified as low value habitat. As such, ecological impacts from the direct removal of an area of 2,600 m<sup>2</sup> would not result in a significant ecological impact.

#### 4.3.14 Cultural Heritage

No historical or cultural impacts are anticipated during construction.

### 4.4 Environmental Impacts During Operational Phase

The Barriers are proposed as a safety measures for future residents and will improve safety and reduce hazards during operation.

The only potential for adverse environmental impacts may be due to landscape and visual impacts during the operational phase. No other potential adverse impacts are expected from the operation of the Barriers.

#### 4.4.1 Landscape and Visual

Details of the landscape and visual impacts during the operational phase are provided in the LVIA (Appendix 3).

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

### 5.1 Measures to Minimise Environmental Impacts

#### 5.1.1 Air Quality

The following air quality measures will be implemented during construction of the project.

- The Contractor must comply with the control measures stipulated in the Air Pollution Control (Construction Dust) Regulation and implement all the required mitigation measures. In accordance with the requirements of the Regulation, sufficient dust control measures shall be implemented by the Contractor to ensure full protection of nearby Air Sensitive Receivers.
- Construction plant shall also be regularly maintained and kept in good working order to minimise gaseous and particulate emissions.

### 5.1.2 Noise

There will be no exceedance in construction noise due to the construction activities for the two Barriers on their own. However, exceedance due to the cumulative noise impacts could result from the concurrent construction activities at the other construction sites in the vicinity such as the site formation works at Area N1 North, Discovery Bay and the construction works at Discovery Bay Siena Three. Since the same Contractor will be employed for the construction of the two Barriers and the adjacent site formation works, the Contractor shall design their works schedule such that the breakers operation during the rock breaking period will be staggered and does not overlap the PME operation within the adjacent site formation works. The Contractor shall also liaise with the Siena Three Contractor with respect to their works programme such that the rock breaking activity will not overlap their PME activities. These shall be specified in the construction tender document.

### 5.1.3 Water Quality

The Contractor shall fully comply with the Water Pollution Control Ordinance and during construction works, the best practice site drainage measures as described in the ProPECC Note PN 1/94 "Construction Site Drainage" shall be implemented at both work sites. During construction all excavated soil / broken rocks materials will be properly covered and contained to ensure that sediment loaded surface runoff does not result from these materials.

Chemical toilets will be provided and will be regularly emptied and serviced by a licensed operator.

### 5.1.4 Waste

Excavated spoil materials and other wastes will be segregated, re-used or recycled as far as possible. Spoil material (e.g., soil and broken rocks) will be retained for backfilling at the sites. The excess will be re-used on the site formation works at Area N1 North, Discovery Bay. Disposal of the inert portion of spoil material (broken rock) will be managed through the trip-ticket system following the guideline stipulated by the Works Bureau Technical Circular No. 31/2004 "Trip Ticket System for Disposal of Construction & Demolition Materials".

Any chemical wastes from plant maintenance will be handled, stored and disposed of in accordance with the requirements of the Waste Disposal (Chemical Waste) Regulations.

### 5.1.5 Landscape and Visual

The landscape and visual mitigation measures are provided in the LVIA (Appendix 3 refers).

## 5.2 Comment on the Possible Severity, Distribution and Duration of Environmental Effects

The duration of the works will be approximately 12 months and will only affect a localised area in the vicinity of the two works sites. With the implementation of the recommended mitigation measures, no adverse residual environmental impacts will result during the construction or operation of the proposed Barriers.

## 5.3 Comment on any Further Implications

None.

#### **5.4 Use of Previous Approved EIA**

None applicable.

#### **6. CONCLUSION**

Based on the findings of this Project Profile, the environmental impacts resulting from the construction of the two Barriers are considered to be minor. With the application of the recommended mitigation measures, no adverse residual environmental impacts are anticipated.

Since the impact of the debris-resisting barriers is not expected to be adverse and the mitigation measures proposed meet the requirements of the Technical Memorandum on Environmental Impact Assessment Process, HKR intends to directly apply for an Environmental Permit under Section 5(11) of the EIAO. In particular, there are unlikely to be any adverse impacts to the "Conservation Area", which is the part of the project that is considered to be a Designated Project.