PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

Agreement No. CE 10/2015 (CE)

EXECUTIVE SUMMARY

MARCH 2019

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

Civil Engineering And Development Department

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Executive Summary

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Contents

Abbreviations and Acronyms

"2006 Spa and Resort Study"	Consultancy Study on the Development of New Tourism Infrastructure – Spa and Resort Facilities (Completed by Tourism Commission)
"3S"	Tri-cable Detachable Gondola
"AAHK"	The Airport Authority of Hong Kong
"ADWF"	Average Dry Weather Flow
"AFCD"	Agriculture, Fisheries and Conservation Department
"AHR"	Airport Height Restriction
"AIA"	Archaeological Impact Assessment
"AMO"	Antiquities and Monuments Office
"Arup"	Ove Arup and Partners Hong Kong Limited
"Assignment A"	Preliminary Feasibility Study of Cable Car System from Ngong Ping to Tai O
"Assignment B"	Preliminary Feasibility Study of Spa and Resort Development at Cheung Sha and Soko Islands
"Assignment C"	Study of Complementary Effect between Development A and Development B
"ASR"	Air Sensitive Receivers
"BDG"	Bi-cable Detachable Gondola
"BH"	Building Height
"Blueprint"	Sustainable Lantau Blueprint
"BOT"	Build-Operate-Transfer
"CA"	Conservation Area
"CAD"	Civil Aviation Department
"CAPEX"	Capital Expenditure
"CC"	Construction Cost
"CCTV"	Closed-circuit Television
"CD"	Channelised
"CDF"	Channelised Debris Flow
"CEDD"	Civil Engineering and Development Department
"CLP"	China Light and Power Company Limited
"C&D materials"	Construction & Demolition Materials
"CP"	Concept Plan
"CPA"	Coastal Protection Area
"CSFWSR"	Cheung Sha Fresh Water Service Reservoir
"CZ"	Consultation Zone

"Development A"	The Construction and Operation of Cable Car System Linking Ngong Ping To Tai O at Study Area A, as well as Other Tourism-Related Developments Identified in this Assignment to Create Synergy with the Proposed Cable Car System
"Development B"	the development of spa and resort facilities at Study Areas B1 and B2 as well as other Value Enhancing Clustering Facilities / developments identified in this Assignment
"DF"	Debris Flow
"DSD"	Drainage Services Department
"DP"	Designated Project
"EBITDA"	Earnings before Interest, Tax, Depreciation and Amortisation
"EIA"	Environmental Impact Assessment
"EIAO"	Environmental Impact Assessment Ordinance
"EMSD"	Electrical and Mechanical Services Department
"EPD"	Environmental Protection Department
"F&B"	Food and Beverage
"FSP"	Fine Suspended Particulates Government Flying Service
"FEHD"	Food And Environmental Hygiene Department
"GB"	Green Belt
"GFS"	Government Flying Service
"G/IC"	Government, Institution or Community
"GI"	Ground Investigation
"GFS"	Government Flying Services
"HAD"	Home Affairs Department
"HDD"	Horizontal Directional Drilling
"HKBAA"	Hong Kong Business Aviation Apron
"HKIA"	Hong Kong International Airport
"HKPSG"	Hong Kong Planning Standards and Guidelines
"HKSAR"	Hong Kong Special Administrative Region
"HyD"	Highways Department
"HZMB"	Hong Kong-Zhuhai-Macao Bridge
"IRR"	Internal Rate of Return
"LanDAC"	Lantau Development Advisory Committee
"LCSD"	Leisure and Cultural Services Department
"LCRPs"	Lantau Closed Road Permits

"LP"	Landing Point
"LR"	Landscape Resource
"LT"	Landing Terminus (of the Cable Car System)
"MDD"	Mean Daily Demand
"MDG"	Mono-cable Detachable Gondola
"MTRCL"	MTR Corporation Limited
"MP"	Marine Park
"NP360"	Ngong Ping 360
"NPV"	Net Present Value
"NSR"	Noise Sensitive Receivers
"NTHS"	Natural Terrain Hazard Study
"O&M"	Operation and Maintenance
"OH"	Open Hillslope
"OPEX"	Operating Expenditure
"OU"	Other Specified Uses
"OZP"	Outline Zoning Plan
"pa"	Per annum
"PDAs"	Potential Development Areas
"PE"	Public Engagement
"PHI"	Potential Hazardous Installation
"pphpd"	passengers per hour per direction
"PRD"	Pearl River Delta
"PTI"	Public Transport Interchange
"RC"	Recurrent Cost
"REC"	Recreation
"SAI"	Sites of Archaeological Interest
"SR"	Service Reservoir
"SPS"	Sewage Pumping Station
"SSSI"	Site of Special Scientific Interest
"STP"	Sewage Treatment Plant
"STW"	Sewage Treatment Works
"TD"	Transport Department
"TOWTW"	Tai O Water Treatment Works
"TDG"	Tricable Detachable Gondolas
"the/ this Report/ Paper"	Executive Summary

"the Study/ this Study"	Preliminary Feasibility Study of Cable Car System from Ngong Ping to Tai O, and Spa and Resort Development at Cheung Sha and Soko Islands – Feasibility Study
"TPDM"	Transport Planning and Design Manual
"TMCLK Link"	Tuen Mun-Chek Lap Kok Link
"VSR"	Visual Sensitive Receivers
"WACC"	Weighted Average Cost of Capital
"WP"	Working Paper (of the Study)
"WSD"	Water Supplies Department
"WTW"	Water Treatment Works

1 Introduction

1.1 The Study

1.1.1.1 Civil Engineering and Development Department (CEDD) of the HKSAR Government commissioned Ove Arup and Partners Hong Kong Limited (Arup) on 17 July 2015 to undertake the Preliminary Feasibility Study of Cable Car System from Ngong Ping to Tai O, and Spa and Resort Development at Cheung Sha and Soko Islands – Feasibility Study (the Study/ this Study). This Study will recommend an option of the proposed Cable Car extending from Ngong Ping village to Tai O (Development A/ Assignment A), as well as an option for proposed spa and resort development and its Value Enhancing Clustering Facilities in Cheung Sha and Soko Islands (Development B/ Assignment B). A study on the synergy between Development A and B (Assignment C) will also be carried out.

1.1.1.2 Specifically, the Study will:

- establish a baseline profile for the Study Areas and to identify key issues, constraints and opportunities to be tackled in the Study;
- propose development options for the Cable Car System (Development A); and spa and resort facilities (including Value Enhancing Clustering Facilities) in Cheung Sha and Soko Islands (Development B);
- assess the broad technical feasibility of proposed options in Development A and B, including preliminary environmental appraisal, land requirement study etc.
- assess the financial viability and prepare preliminary costing information in implementing Development A and B;
- review the preliminary feasibility of proposed coastal cycle track in South Lantau;
- assess the synergy of Development A and B in terms of financial implications, transport/ traffic arrangement and procurement strategy; and
- review feedbacks from stakeholders consultation; and
- examine and review different implementation options and recommend the most appropriate programme for Development A and B.

1.2 Study Areas

1.2.1.1 The Study Areas A, B1 and B2 are defined in **Figure 1.1** to **1.4.**

1.2.1.2 **Study Area A** refers to the Study Area for Development A/ Assignment A **(Figure 1.2 refers)**. To the north, it covers the mountainous area of Cheung Shan; to the east the Ngong Ping Tsuen and Tian Tan Buddha Statue; to the south the mountainous areas of Luk Wu and Kwun Yum Shan; to the west the Tai O fishing village. Although a proposed alignment for the Cable Car System is marked on the Study Area A, the alignment is indicative only and this Study is to explore different options taken into account various planning and engineering considerations.

1.2.1.3 **Study Area B1** refers to the Cheung Sha area for Development B/ Assignment B **(Figure 1.3 refers)**. It is located to the immediately south of the boundary of the Lantau South Country Park. It covers the entire waterfront area from Pui O to the east and Shui Hau to the west. A site to the west of Cheung Sha Ha Tsuen was previously proposed for a 100-room spa and resort facility in the 2006 Spa and Resort Study. A

coastal cycle track running from west to east ("X-Y") is also preliminary identified to be further explored in this Study.

1.2.1.4 **Study Area B2** refers to the Soko Islands for Development B/ Assignment B **(Figure 1.4 refers)**. Soko Islands are formed by a group of islands, with two larger islands of Siu A Chau and Tai A Chau. The marine areas surrounding Soko Islands was earmarked for a proposed Marine Park that is currently under study. A spa and resort facility was previously proposed on the platform area of Tai A Chau. Together with Study Area B1, this Study is to review the scale and technical feasibility of these proposed spa and resort developments, plus other Value Enhancing Clustering Facilities taken into account the changing planning circumstances and market positioning in the wider context of Lantau and in synergy with Development A/ Assignment A.

1.3 Purpose of this Report

1.3.1.1 This Executive Summary is intended to present a consolidated summary of the findings, proposals, recommendations and conclusions of the whole Study, taken into account comments received from Government departments, stakeholders and other parties during the study process.

1.3.1.2 The main process of the Study is summarised as follows:

- Identification of Key Issues, Constraints and Opportunities;
- Formulation of Preferred Options for Cable Car System in Study Area A and for Spa & Resort Development in Study Area B1 & B2;
- Formulation of Recommended Option for Proposed Coastal Cycle Track in South Lantau;
- Exploration of Synergistic Effects between the Proposed Cable Car System and Spa & Resort Developments;
- Review of Feedback from Stakeholder Consultation; and
- Formulation of Implementation Strategy and Programme.

2 Assignment A - Formulation of Preferred Option for Proposed Cable Car System from Ngong Ping to Tai O

2.1 Summary of Key Issues, Constraints and Opportunities

Choice of Cable Car System and Alignment

2.1.1.1 Different alignments would have different implications on cost effectiveness, therefore identification of a cost-effective cable car alignment and minimization of cable towers are necessary. In considering the access to the cable towers for both construction and maintenance, identification of road access/ emergency vehicular access will be needed. Since the terrain between Ngong Ping and Tai O is very steep and mostly inaccessible by vehicle, therefore, transportation of construction materials also need to be carefully considered. To ensure the cable car system is available throughout the operating year, the cable car system should take into account the wind issues. The interface issue also needs to be addressed for linkage with the existing Ngong Ping 360 (NP360) system.

2.1.1.2 The types, size and capacity of the cable car system is proposed taking into account the visitor forecasts and patronage estimates as well as cost effectiveness. The tailor-made cabin design and iconic terminal design also provide opportunities for design innovation and user experience enhancement. In addition, a rescue trail is provided underneath the cableway for the existing NP360, similar offerings should also be considered in the proposed cable car system to increase chance for public to hike along this trail within Study Area A.

Considering the Receiving Capacity of Tai O

2.1.1.3 With Tai O being a place with rich local cultural characteristics, the proposed cable car extension should not attempt to modernize its current social and cultural profile, instead supporting facilities and mitigations should be provided to the local community for any negative impacts associated with higher visitor volumes. Apart from providing suitable tourism/residential segregation to minimise disturbance to the daily living of the locals, it is also of paramount importance to exploring the tourism opportunities. Opportunities should be explored to enhance the environment for the approximate 3,000 population living and working in Tai O. The revitalization of Tai O will provide good opportunity and the impetus to promote cultural heritage and history in the form of heritage tourism, amongst other attractions.

Interface with Existing Development

2.1.1.4 Design of cable car system and its terminal should respect the precious rural and cultural assets of the Study Area A, including existing clusters of residential, village settlements and religious institutions. Moreover, the cable car system should avoid encroachment to identified burial grounds, graves and shrines which will pose additional constraints to future design flexibilities of the system.

Geotechnical and Site Formation

2.1.1.5 Study Area A largely comprises steep mountainous terrain and is subjected to various Landslide Hazard and Risk Levels, hazard mitigation works recommended when necessary to mitigate the identified natural terrain hazards. The potential for integration of any of facilities with rock caverns will be explored based on the facility locational and layout requirements determined by the study as well as the broad suitability of those areas for rock cavern development.

Lack of Infrastructure

2.1.1.6 The limited drainage system, capacity issue of sewage treatment works, water demand arising from the proposed development need to be reviewed.

Environmental and Ecological Concern

2.1.1.7 Impacts to natural assets and particularly ecologically sensitive areas such as country parks, those zoned under "Conservation Area" and "Site of Special Scientific Interest" under the Outline Zoning Plan (OZP) should be avoided and minimised as far as practicable. Mitigation measures should be identified for any interface issues between proposal and these areas. Most of the areas within Study Area A are with high ecological and landscape value as it mainly comprises natural and undisturbed uplands within the Lantau South and North Country Park. Design of the cable car system and its towers should consider the compatibility of development with ecological resources and natural setting, landscape and visual identity sensitivity, preserve high value landscape and protect the visual integrity of ridgelines and peaks.

2.1.1.8 Due to the location and the topography, visitors will require motorised transport to access Tai O to better utilise capacity of other green transport modes. There are also opportunities for cultural heritage promotion and education in Tai O for tourists brought by cable car are evident.

Public Acceptability

2.1.1.9 The development shall take into account whether there are known/anticipated public objections. For example, the public views on Lantau development proposals in LanDAC. There is concern on the suitability/ routing of cable car extension from Ngong Ping to Tai O and expressing their concerns on Tai O's capacity to receive more visitors arising from further tourism development like Cable Car development.

2.2 Formulation of Preliminary Options for the Proposed Cable Car System

2.2.1 Market Positioning Analysis and Preliminary Development Concept

2.2.1.1 To understand market perceptions and attractiveness of an extended Cable Car offer, which connects the existing facilities at the Ngong Ping with Tai O, this Study conducted the market positioning analysis which takes consideration in main market segment for NP360, market research consultations and comparator case studies in Asia. Our analysis is summarised as follows:

Strengths

- NP360's penetration of short haul and long haul markets are now the most dominant in the past 5 years and these groups tend to have longer vacation trips to HK and according to visitor surveys, a significant proportion visits NP360. It is considered that these markets have good potential for an extended cable car offer.
- Whilst the market penetration of the Mainland market is relatively low, the large size and potential growth of this market presents possible growth opportunities for NP360.
- Initial discussions with tour operators indicate that there is broad interest in an extended cable car offer.

Weaknesses

- Ridership is driven in part by the quality and attractiveness of the final destination. Tai O is currently valued for its authenticity and increasing the number of tourists may diminish this characteristic. Moreover, the capacity of Tai O to receive additional tourists in a manner that does not impact visitor experience, is a concern in the market.

Broad Development Theme - Culture and Heritage

2.2.1.2 **Tai O** – Apart from the attractions with local characteristics, Tai O is suggested to offer active contemplative practice (e.g. Wushu retreat, Tai Chi centre), a culinary heritage centre, experiential village life attractions, guesthouses (Minsu), and places for outdoor activities (e.g. open air repertory theatre for enjoying sunset/scenic view).

2.2.1.3 **Ngong Ping** – Ngong Ping, Luk Wu, Keung Shan, Tei Tong Tsai and Ling Wui Shan are the five biggest Buddha Monasteries in Lantau. In order to strike the balance between development and conservation and respect the natural and religious setting in this area, ecological and cultural tourism are suggested which include to retain the existing temple tours, and provide limited religious activities hence to shape the area into a zen conservation zone.

Preliminary Development Concept

2.2.1.4 Study Area A primarily consists of mountainous terrain with rich ecological resources. Permit is required for vehicles entering into majority of Study Area A to minimise disturbance to the natural setting, while the bus journey from Ngong Ping to Tai O also rides on the narrow and winding roads. The proposed cable car system could therefore not only serve as a "tourism attraction/destination" itself, with its breath-taking scenic panoramic views over the Country Parks, the South China Sea and Tai O, but also increase providing an alternative tourism spotlight in Tai O.

2.2.2 Assumptions of the Proposed Cable Car system

2.2.2.1 Potential passenger demand for the proposed cable car system was developed for the design years of 2041, 2046 and 2051. Such patronage forecasts were estimated by considering: (i) existing bus passenger demand and boarding/alighting patterns for routes serving Tai O from Ngong Ping, Tung Chung, and Mui Wo; (ii) potential diversion of Tai O bus passengers to use the cable car system after its opening; (iii) potential induced demand generated by the cable car extension and its associated tourist facilities and/or attractions; and (iv) growth trends of Hong Kong residents and visitors/tourists from present to the respective design years.

2.2.2.2 Three assessment scenarios ("**high**", "**medium**" and "**low**") has been established taking into account the corresponding riders diverted from the bus services from Tung Chung and Mui Wo to Tai O would add to the baseline patronage forecasts for the NP360 (Tung Chung – Ngong Ping segment). Likewise, the induced visitor demand due to the cable car system itself and its associated tourist facilities would also add to the baseline NP360 patronage forecasts. The financial analysis adopted medium scenario traffic patronage forecast for all three proposed alignments.

2.2.2.3 It needs to be remarked that the patronage forecasts have been based largely on the trend analysis of population and visitor growths which are subject to many unforeseeable externality factors. Moreover, visitor preference constantly changes in response to prevailing trends and interaction with other competing and/or complementary facilities.

2.2.3 Three Alignments Options of the Proposed Cable Car System

2.2.3.1 The three **Alignments 3a, 3b and 5a** are formulated and will be discussed in this section and for technical assessment purpose. Two of the alignments (3a & 3b) are along a straight line from Ngong Ping to Tai O, and the third (5a) have one turning point. Preliminary locations and sizes of the stations and towers of the three alignment options are shown in **Figure 2.1**.

2.2.3.2 **Alignment 3a** follows a straight line from *Potential Site 1* at Ngong Ping and landing at *Potential Site 6* at Tai O. Although it is the shortest route, the elevation profile of the terrain requires a greater number of intermediate towers along the alignment. Please refer to **Figure 2.2** for the Section of Alignment 3a.

2.2.3.3 **Alignment 3b** starts from *Potential Site 2* at Ngong Ping and landing at *Potential Site 6* at Tai O. The elevation profile of the terrain requires a greater number of intermediate towers along the alignment. The route over sails village houses on its entrance into Tai O. Please refer to **Figure 2.3** for the Section of Alignment 3b.

2.2.3.4 **Alignment 5a** contains a change in direction and therefore a turning point will be required. The turning point might also provide an alternative location for the garage and maintenance facility if access can be resolved. Compared with Alignment 3a and 3b, the number of intermediate cable towers required will be greater for alignment 5a due to the longer length of the route. The landing point at Tai O is Potential Site 5. The route over sails a wetland area on its entrance into Tai O. If MDG system is adopted, it will likely require a tower to be located in this wetland area. The alignment route is closest to existing roads which will make access for both construction and maintenance easier. Yet, interface issues nearby sites should be considered. Please refer to **Figure 2.4** for the Section of Alignment 5a.

Table 2.2.1 Key parameters of the three preliminary alignments

Aerial Ropeway System	Alignment 3a		Alignment 3b		Alignment 5a	
	MDG	BDG/3S	MDG	BDG/3S	MDG	BDG/3S
Length(m)(on plan)	3,450	3,450	3,600	3,600	4,080	4,080
Station No.	2	2	2	2	2	2
Towers No.	16	6	17	6	19	11
Tower Height						
15m	1	1	2	1	4	3
30m	12	2	12	2	7	3
50m	3	3	3	3	8	5
Turning Station No.	0	0	0	0	1	1
Landing Point						
Ngong Ping Terminus	Potential Site 1		Potential Site 2		Potential Site 1	
Tai O Terminus	Potential Site 6		Potential Site 6		Potential Site 5	

Proposed Landing Points

2.2.3.5 Four potential sites for landing point are carried out from assessment, Potential Sites 1 and 2 in Ngong Ping fall within areas zoned "Green Belt" ("GB") and "Government, Institution or Community" ("G/IC") on the approved Ngong Ping Outline Zoning Plan No. S/I-NP/6 respectively; while Potential Sites 5 and 6 in Tai O fall within areas zoned "Recreation" ("REC") on the approved Tai O Town Centre Outline Zoning Plan No. S/I-TOTC/2 and "GB" on the approved Tai O Fringe

Outline Zoning Plan No. S/I-TOF/2 respectively. Please refer to **Figure 2.5** to **Figure 2.6** for the locations of the Potential Sites.

2.2.3.6 **Potential Site 1 (Ngong Ping)** is located at the northwest to the existing Ngong Ping Station. No access road connecting to the potential site and which requires a new access road to provide evacuation and fire access for the future development.

2.2.3.7 **Potential Site 2 (Ngong Ping)** is located at the Ngong Ping PTI and close to the Ngong Ping Village. No new road and site formation works is required to be built. However, the construction of a cable car terminus might lead to permanent loss of the PTI or co-location of the station that could be considered. Besides, over sailing of the sewage treatment works (STW) become nearly inevitable regarding its location.

2.2.3.8 **Potential Site 5 (Tai O)** is located south of Tai O Lung Tin Estate, to the immediate east of the Yim Tin Playground, which is also southeast of the existing Tai O PTI. Existing footpaths would provide linkage to Tai O Lung Tin Estate. There is an existing road leading from the auxiliary coach parking area to the east of the PTI.

2.2.3.9 **Potential Site 6 (Tai O)** is located on the hillside south of Tai O San Tsuen, and requires a new access road as well as pedestrian facilities to link into Tai O Road and ultimately Tai O Lung Tin Estate. A new footpath would be required to lead from this site to Tai O.

Aerial Ropeway System

2.2.3.10 A number of different types of system have been developed around the world. The three most common and preferred by suppliers in the aerial ropeway industry are **monocable detachable gondolas (MDG)**, **bicable detachable gondolas (BDG)** and **tricable detachable gondolas (TDG/3S)** systems. The characteristics of each system are listed in **Table 2.2.2.**

Table 2.2.2 Key Characteristics and specifications of each system

	MDG	BDG	TDG/ 3S
Number of cables	1	2	3
Maximum speed	22kph	25kph	29kph
Maximum capacity	4000pphpd	4000pphpd	>6000pphpd
Maximum operational wind speed	70kph	70kph	>100kph
Maximum tower span	300m	1500m	1500m
Typical cabin size	10-15 people	15-20 people	35 people
Cost of capital works (relative)	Low	Medium	High
Note: pphd – passengers per hour per direction			

2.2.3.11 In general, as the number of cables increases (MDG to 3S), the technical capability of a system increases along with the capital costs. Compared to a MDG system, a 3S system is more resistant to wind loading, can travel faster, has a greater capacity and requires fewer towers. Advancements in rope technology have increased the carrying capacities of MDG systems such that are similar to BDG systems. As a result, BDG systems have become less popular in recent years.

2.2.3.12 The operation and maintenance requirements of such aerial ropeways are driven by both the complexity of the system and the number of units that require servicing. A TDG/3S system is more complex than a MDG system, and will have more complex operation and maintenance requirements. An MDG system will have far more cabins and towers than either a BDG or TDG/3S system and so the cleaning requirements

will be greater. On the other hand, the time and costs for annual cable inspections for the BDG and TDG/3S systems will greater.

2.3 Summary of Broad Assessments

2.3.1.1 Broad assessments in this section summarize the feasibility of the three proposed cable car options (Alignments 3a, 3b and 5a) and the choice of aerial ropeway system (MDG and BDG/3S), including geotechnical review, site formation assessment, traffic and transport impact, drainage and sewerage impact assessment, environmental appraisal, land requirement and financial assessment.

2.3.2 Geotechnical Review

2.3.2.1 A broad assessment has been conducted regarding major geological constraints among the proposed Alignment Options 3a, 3b and 5a in terms of the number of proposed facilities potentially affected by faults/photolineaments and natural terrain hazards. Overall, the MDG system is more likely to be affected by the presence of faults/photolineaments and natural terrain hazards as a result of the higher number of facilities required by this system.

2.3.2.2 **Faults/photolineaments** – Alignments 3a, 3b and 5a of the MDG system have the highest number of facilities affected by faults/photolineaments. For the landing point, potential site 6 also has a potential to be affected by boulder/rock fall hazards where 20-50% boulder field coverage is present.

2.3.2.3 **Natural terrain catchments** – In respect of the natural terrain catchments associated with the potential sites and turning point, alignment 5a has the largest catchment area that may be subjected to higher potential of natural terrain hazards.

2.3.2.4 **Landslides** – MDG system has higher number of facilities being affected by past landslides. Alignment 5a appears to be mostly affected by natural terrain hazards in both systems, as revealed by their highest number of facilities affected by landslides.

2.3.2.5 **Boulder field** – MDG system has higher number of proposed towers located within areas with boulder field coverage of 50% or above. The proposed turning point of Alignment 5a is also likely to be affected by rock/boulder fall hazards. Potential site 1 has a potential to be affected by boulder/rock fall hazards given their close proximity to an area with over 75% boulder field coverage.

2.3.3 Site Formation Assessment

Natural Terrain Hazard Mitigation Works

2.3.3.1 A preliminary, high level review of the design requirements for the Natural Terrain Hazard Study (NTHS) catchments according to the criteria presented in the guidelines in GEO Report No. 138 is presented in **Table 2.3.1**.

Table 2.3.1 Summary of Level of Hazard Mitigation Works for the NTHS catchments overlooking the turning point within Study Area A in accordance with GEO Report No. 138

NTHS Catchment No.	Facility affected	Cable Car System	Hazard Type	Protection Level	Justifications
1	Turning Point of Alignment 5a	BDG/3S and MDG	DF/CDF	2	The facility affected belongs to Group 1 and the Hazard Type is CDF

2.3.3.2 Analytical Design for Level 2 Catchment: Catchment 1 requires an analytical design approach to be adopted for the mitigation of the CDF and DF hazards identified. As the areas affected by CDF and DF hazards are relatively well-defined and will impact on facilities located at or close to the mouth of drainage lines, the mitigation measures provided will generally comprise one or more of the following measures:

(a) Debris Containment Structure at or close to the mouth of the drainage line to trap and retain the debris before it can impact upon the affected facilities;

(b) Debris Diversion and Straining Structures to control the flow of channelised debris and ensure it is deflected or diverted around potentially affected facilities and discharged at a safe location;

(c) Check Dams/Flexible Barriers along the alignment of the drainage channel in order to progressively retain and inhibit the flow of debris. The build-up of debris (both fluvially and landslide derived) over time also means that the barriers reduce the gradient of the drainage line, thus further reducing debris run-out potential.

2.3.3.3 The preliminary hazard mitigation works within the NTHS Catchments should be further reviewed during the later Investigation, Design and Construction stage of the project based on detailed Natural Terrain Hazard Assessment, supplemented by project site-specific GI and field mapping.

Approach and Methodology of the Proposed Site Formation Works

2.3.3.4 In general, the proposed landing point and cable car towers will be founded on pile foundations where deep rockhead level is anticipated and founded on raft where the rockhead level is shallow. The selection of the use of shallow and pile foundation options will be considered depending on the pattern of loading and ground conditions. Where total and differential settlements may be a concern for shallow foundations, localised removal of estuarine deposit of very soft clay and alluvium of very loose silty sand near Tai O Terminus and backfilling with general fill materials may be required for site formation or shallow foundation.

2.3.3.5 The potential presence of faulting may impose constraints on the selection of foundation types and cause possible difficulties during foundation construction, especially if deep foundation is adopted. Due consideration on the selection of appropriate foundation type shall be required in later stages of the Study upon availability of more GI information and when the layout of the development has been preliminarily developed.

2.3.3.6 Pile cap construction at steeply inclined terrain will require massive volume of soil to be excavated and backfilled, hence disposal of excavated materials and sourcing of suitable backfilling material could be an issue. Inclined pile caps are recommended in such cases to reduce the volume of excavation.

2.3.4 Traffic and Transport Impact Assessment

Traffic / Transport Implications of the Cable Car Extension

2.3.4.1 After opening of the proposed cable car system, as a major tourist attraction and an experiential transport, varying proportions of bus passengers on existing bus services operating from Ngong Ping, Tung Chung and Mui Wo to Tai O will be diverted to the proposed cable car system. It is very likely that bus passengers diverted from Tung Chung to Tai O would also ride on NP360 and extended Cable Car.

2.3.4.2 The induced visitors should not result in an increase in bus passengers on the existing bus services (Ngong Ping and Tung Chung), as visitors induced from Tung Chung to Tai O would very likely use Ngong Ping 360 and extended Cable Car. There may however be an increase in bus passengers from Mui Wo to Ngong Ping, but this should represent a relatively small proportion.

2.3.4.3 All in all, even with the induced visitor demand to Tai O taken into account, there would still be an overall decline in demand for bus travel to Tai O. This decline in bus travel demand may not necessitate a reduction in the number of services however, it shows that there will likely be minimal potential for an increase in traffic accessing Tai O. This is made even more apparent considering the closed road nature of the south Lantau road network, as external vehicles are unable to access the proposed cable car. It is therefore concluded that there will be no adverse traffic impacts on the existing road network given that traffic is more likely to decrease as a result of the cable car establishment, rather than increase.

Implications on the Tai O Bus Terminus

2.3.4.4 Given the likely net reduction in bus passengers to Tai O due to the cable car extension, it is concluded that existing facilities[1] would be sufficient to handle future bus demand. It is assumed that the potential diversion of Tai O bus passengers to use the proposed Cable Car System after its opening, a reduction in bus passengers to Tai O is anticipated. Therefore, no further enhancements are proposed to the Tai O Bus Terminal (other than those in design under CEDD).

Implications on the Ngong Ping Bus Terminus

2.3.4.5 Assuming implementation of a cable car extension to Tai O, bus passenger demand is expected to drop between Ngong Ping - Tai O as previously discussed. However, Tung Chung - Ngong Ping as well as Mui Wo - Ngong Ping services could see an increase in induced demand and thus higher bus demand and required frequency given natural growth and additional induced visitors to Ngong Ping. Taking these routes into consideration, net growth in bus passengers is considered to be negligible on a daily and hourly basis, and thus no increase in bus trips (in terms of service frequency) would be required. Therefore, it is concluded that existing PTI facilities would be able to cater to the future trips and demand without significant expansion.

Potential Pedestrian Linkages between Tai O and Cable Car

2.3.4.6 At Tai O, it is proposed to provide additional signage that could help to distribute passengers more evenly to other areas of Tai O. At present, visitors congregate near the main entrance to the village and use the same pathways to enter/exit the village just north of the existing Tai O Bus Terminus. By distributing visitors to the eastern part of the village, which would better capture visitors coming from the Tai O Cable Car Station, the village could better accommodate the expected growth in visitors – while retaining its rural and rustic feel. It is not recommended to widen pathways within Tai O itself, which would impact residents and small businesses and harm its cultural heritage. Appropriate sidewalk improvements would be needed along Tai O Road as well as other roads linking to the eastern part of Tai O to handle these visitors.

[1] Assuming enhancements of Tai O Bus Terminus as part of the "Improvement Works at Tai O" Project led by CEDD

2.3.5 Drainage and Sewerage Impact Assessment

Broad Drainage Impact Assessment

Drainage at Ngong Ping

2.3.5.1 The Preferred Development of Potential Sites 1 are currently unpaved area to paved area. The potential site would increase the surface runoff peak flow in the receiving drainage channel due to an increase in the percentage of paved surfaces. Suitable drainage mitigation measures will need to be formulated in the detailed design stage of the study.

2.3.5.2 It was also noted that the Preferred Development of Potential Site 2 is currently paved area and there is no change to the existing drainage characteristics for the proposed development.

2.3.5.3 The capacity of the existing downstream drainage system is preliminarily found to be adequate to cater for the increase in peak runoff due to Potential Sites 1 or 2 respectively, which new storm drains are required to drain out to the existing outfall. Similarly, new storm drains are required to drain out to the existing drainage system, which is an existing manhole identified adjacent to the Potential Site 2.

Drainage at Tai O

2.3.5.4 There are two floodwater pumping stations in Tai O town centre area. They are located at the western and northern corners and named as Tai O No. 3 and No. 4 floodwater pumping stations. Emergency bypass has been provided for the floodwater pumping stations. The potential sites have no direct impact to the existing floodwater pumping stations. The proposed sites are offset from Tai O town centre area and no connection with the floodwater pumping station.

2.3.5.5 The capacity of the existing drainage system was preliminarily estimated to be adequate to cater for the increase in peak runoff due to Potential Sites 5 and 6 respectively. Existing manholes have been identified to be the potential connection.

Broad Sewerage Impact Assessment

Sewerage at Ngong Ping

2.3.5.6 A new DN250 sewers are proposed to connect with the existing sewerage system at the manholes for both the Potential Sites 1 and 2. The flow will discharge further downstream to the existing DN500 sewer and Ngong Ping Sewage Treatment Works.

Sewerage at Tai O

2.3.5.7 The proposed development at Potential Sites 5 and 6 with similar approach, where are proposed to connect with the nearest point of existing sewerage system. The estimated sewage flow generated from the Potentials Sites 5 and 6 will discharge downstream to the existing Tai O No. l SPS and Tai O Imhoff Tank for treatment. It is understood that there will be planned upgrading of the existing Tai O Imhoff Tank. The increase in sewage flow (i.e. 60 m3/day Average Dry Weather Flow (ADWF)) generated from these 3 potential sites are insignificant when compared to the treatment capacity of the upgraded treatment plant (i.e. 2,750 m3/day), which will be about 2.1% increase.

2.3.6 Water Supply and Utilities Impact Assessment

Water Supply at Ngong Ping and Tai O

2.3.6.1 The preliminary water demands and proposed size of fresh and salt water main for the Study Area A have been estimated based on indicative development parameters.

2.3.6.2 The estimated mean daily demand (MDD) and peak water demand for fresh and salt water are based on predicted 4,019 visitors and predicted intake for the cable car system daily in year 2051. The estimated MDD for fresh water will be 60 m^3/day with peak water demand for fresh water is 0.002 m3/s (peaking factor of 3)[2]. The estimated salt water will be 30 m^3/day with peak water demand for salt water is 0.001 m3/s (peaking factor of 2).

2.3.6.3 It is also noted that there is no salt water supply in both Ngong Ping and Tai O and therefore fresh water will also be used to meeting the flushing water demand.

Electricity Supply at Ngong Ping and Tai O

2.3.6.4 Both locations of Tai O and Ngong Ping have sufficient capacity for the cable car's estimated 1MW electricity demand. It was confirmed with China Light and Power Company Limited (CLP) that the estimated 1MVA power supply to the proposed cable car system is not significant and no upgrading works is required.

Gas Supply at Ngong Ping and Tai O

2.3.6.5 There are no known existing gas mains within Study Area A[3]. No new installation will be proposed of new supply, which is costly and time-consuming solely for the development.

Telephone Service Systems

2.3.6.6 Record plans were received from telephone system company[4] and further liaison is required in next stage of the project.

2.3.7 Preliminary Environmental Appraisal

Ecology

2.3.7.1 The number of towers required for a MDG system is two or three greater than the BDG system, which would result in a larger area of habitat loss and a higher level of construction phase disturbance. Both potential landing sites at Ngong Ping constitute formed or disturbed land situated within or near developed areas, though not all have urban habitats immediately adjacent.

2.3.7.2 The loss of woodland, shrubland and grassland habitat under the footprint of cable car towers would cause a decline in the abundance of flora and fauna occupying these habitats and within the country park boundary, though given the area of lost habitat relative to the total area of each habitat on Lantau as a whole, this would be relatively small. Mitigation measures such as habitat compensation and/or enhancement for the habitat loss are implemented, though it would take decades to reach the same level of maturity in regard to secondary woodland.

[2] WSD's Departmental Instruction No. 1309 (DI1309).
[3] With reference to the letter from The Hong Kong and China Gas Company Limited
[4] With reference to the letter from Hong Kong Telecommunication Limited

Air Quality & Noise [5]

2.3.7.3 No insurmountable construction dust and noise impact were anticipated from all three options. For operational phase noise impact, the potential fixed noise could be controlled to acceptable levels with proper design or specification of maximum allowable noise level. Hence, operational phase noise impact is not a key consideration for selecting the preferred option.

Water Quality

2.3.7.4 The construction activities will be carried out at the locations of the proposed cable car stations and towers rather than the entire work site. For the operation phase, with the implementation of appropriate mitigation measures, adverse water impacts are not anticipated. Hence, construction and operational phase water quality impact is not a key consideration for selecting the preferred option.

Hazard to life

2.3.7.5 During construction phase, construction workers would increase the population in 400m affected area of Tai O Water Treatment Works (TOWTW). Since the construction locations for Alignments 3a and 3b have a lower mPD than the TOWTW, dropped load impact is not anticipated. For the construction activities of Alignment 5a, the construction locations are instead at a higher mPD than TOWTW and dropped load impact may be anticipated.

2.3.7.6 During operational phase, tourists using the cable car system would increase the population within the 400m area of TOWTW. For Alignments 3a and 3b, hazard to life issues may be expected due to insufficient separation distances, about 90m, from Potential Site 6. Hazard to life issue for Alignment 5a is however considered to be minimal as chlorine gas is denser than air and the additional population (where the alignment fall within the 400m area of TOWTW) from the proposed development would be located at a higher mPD than TOWTW. It is recommended that the proposed developments should be taken at places outside the affected region of the TOWTW and avoid overlapping the transportation route of the helicopter in order to prevent any hazard to life issues. If proposed development in these areas could not be avoided, a further hazard to life assessment should be conducted in the detail design stage.

Waste and Land Contamination

2.3.7.7 With the implementation of mitigation measures, no adverse impact arisen from waste management issue is anticipated for both construction phase and operational phase. For land contamination, no adverse impact is anticipated as the contaminated soil, if any, would be remediated prior to the construction phase. Therefore, waste management implication and land contamination issue is not a key consideration for selecting the recommended option.

Cultural Heritage

2.3.7.8 The effects on built heritage and intangible heritage of the construction and operation of the cable car would be less in the Alignments 3a and 3b. Some mitigation for archaeology would be required to ascertain the archaeological potential of the headland. The mitigation would consist of archaeological field survey with fieldscan, auger test survey and test pit excavation, followed by rescue excavation or

[5] Dust mitigation measures would be implemented and there will be construction dust assessment during detailed design stage

archaeological watching brief if archaeological deposits were identified in the archaeological field survey. If there is any development in the Study Areas A affecting any Site of Archaeological Interest (SAI) and disturbance to the SAI is unavoidable, a detailed archaeological impact assessment (AIA) shall be conducted in the detail design stage.

Landscape Impact

2.3.7.9 Comparing the three proposed alignments, it is anticipated that the BDG/ 3S system would affect relatively less landscape resources than the MDG system as it occupies a smaller development extent. Alignment 5a is the longest alignment, it comprised with more system towers, including an extra turning station, which is predicted to generate more adverse impacts on the landscape resources than alignment 3a and 3b. Given the above considerations, Alignment 3a and Alignment 3b in BDG/3S system are therefore considered as the preferred scenario from landscape perspective.

Visual Impact

2.3.7.10 For visual aspect, certain degree of potential impacts would be experienced by the identified VSRs due to the level of visibility and the changes of view during construction and operational phases. Both Alignments 3a and 3b in BDG/ TDG system are considered as the preferred scenario from visual perspective.

EIAO Implication

2.3.7.11 The Project involves construction of cable car alignment and towers within Lantau North Country Park hence is classified as a Designated Project (DP) under Item Q.1 under Part I of the Schedule 2 of the EIAO. A detailed EIA will be required under the statutory EIAO procedures to confirm its environmental acceptability in detail design stage. The scope of the EIA study assessment would be determined in the pending EIA study brief to be issued under the statutory EIAO process.

2.3.8 Land Requirement Assessment

2.3.8.1 The principles of minimum land resumption and avoidance of encroachment on the existing structures and key land features as far as practicable have been followed when considering the alignment options of the proposed Cable Car System. That said, subject to the detailed design, some following features would be inevitably affected under different alignment options:

- **Private Land Lots / Holdings Affected** – Alignment 5a would affect 2 nos. of private lot of total 1,035 sqm under both MDG and BDG/3S system.
- **Government Facilities Affected** – no Government facility is affected by the proposed Alignment 3a and 5a. Alignment 3b under MDG system would affect 1 no. of 20,764 sqm permanent Government Land Allocation.
- **Tenanted/Licensed Government Land Affected** – no Government land subject to short term tenancy is affected by all three alignments, however, three alignments would encroach on 1 no. of Government land from 1,251 – 2,127 sqm license for both MDG and BDG/3S systems.
- ***Village Environs Affected*** – a portion of village environs of Leung Uk Tsuen of 1,369-1,961 sqm will inevitably affected by the proposed Alignment 3a and 3b (both MDG and BDG/3S systems).

2.3.9 Financial & Economic Assessment

2.3.9.1 This broad financial assessment aims to assess whether the proposed Cable Car System would be financially viable. For the purpose of this broad assessment, financial viability is defined as where satisfactory returns could be generated for potential investors through net project cash flows, once revenues from fares had been used to pay for upfront capital costs, ongoing operating costs, applicable taxes, and the cost of debt finance. The analysis considered two key operator options as below:

- The system would be developed and operated by MTR Corporation Limited (MTRCL), and
- The system would be developed and operated by a Third Party Operator.

2.3.9.2 The financial viability of the proposed Cable Car System would depend on critical factors including the quantum of initial capital costs, operating costs, patronage of the cable car and ticket price point influenced by unpredictable external elements. Financially viability of the Cable Car System would increase its appeal to potential cable car operators. Any new retail spaces associated with the Proposed Cable Car System could also generate incremental revenue for the operator, and improve viability. Exploration on the synergies resulting from linkage to the existing NP360 to minimize any duplication of manpower, capital and operating costs, and may identify opportunity for marginal improvement to financial viability.

2.3.9.3 The financial analysis adopted medium scenario traffic patronage forecast for all three proposed alignments and assumed no financial support from the Government.

Finding and Results

2.3.9.4 **Net Present Value (NPV)**—The results of the broad assessment show that in NPV terms none of the options generate sufficient cash flows to cover capital and operating costs. This is largely due to the high development cost relative to income able to be generated through ticket sales.

2.3.9.5 **Base Case Internal Rate of Return (IRR)**—Base Case IRR for all options are all lower than the Target IRR [6] that represents private sector developers' likely requirement for a project of this nature, and therefore the private sector is unlikely to deliver the project in the absence of financial support. Alignment 5a, which generates the lowest negative NPV, also has the lowest IRR under both operator options. Development of Alignment 5a would therefore require the greatest level of financial support from Government for it to be realised.

2.3.9.6 **Retail Rent Included IRR**—A scenario assuming 6,000m^2 of retail space is developed and associated with the proposed cable car system[7] which is fully leased (i.e. 100% occupancy) on day one of operations. However, even at the highest achieved IRR, the proposed cable car system would generate return which is still far below required by private sector, so the development of Assignment A would still be unlikely to go forward without financial support.

[6] Preliminary research of return requirements for long term infrastructure investors suggests that for projects such as this, IRRs in the range 12-14% would be expected by the private sector to be considered as financially attractive.

[7] This includes retail/commercial areas at each of the two Landing Points in Tai O and Ngong Ping (each with about 1,000 m^2 GFA) as well as a retail/commercial area (about 4,000m^2 GFA) at the Proposed Information and Experience Centre at Lung Shing Street in Tai O.

2.3.9.7 It is concluded in this broad financial assessment that none of the proposed cable car options appear to generate the returns that are likely to be required by the private sector and therefore are unlikely to be realised in the absence of financial support from Government.

2.4 Formulation of Preferred Option for Cable Car System from Ngong Ping to Tai O

2.4.1 Evaluation Framework

2.4.1.1 The evaluation methodology has been undertaken as a qualitative assessment of the relative merits and shortcomings of the three options and appraised against a set of evaluation criteria in **Table 2.4.1** below.

Table 2.4.1. – Evaluation of the Cable Car Alignments

Criteria	Evaluation
Engineering Preferred: Alignment 3a	**Alignments**: Alignment 3a is the only alignment that has all three of the following: does not sail over any built structure, does not require a turning station and is the shortest alignment. **System**: The respective alignments do not have a clear advantage over one another in terms of capacity, cabin size and garaging. Yet, Alignment 3a has the least amount of tower and would therefore has an edge over the other two alignments.
Environmental Impact Preferred: Alignment 3a	**Ecological & Cultural Heritage Impacts**: The area underneath Alignments 3a and 3b is well within Lantau North Country Park, while Alignment 5a lies closer to the edge of country park. Alignments 3a and 3b would land in Tai O at a location that has limited ecological concern and direct impact is considered to be of low significance; and both are located away from the religious landscape at Ngong Ping and Luk Wu/ Lower Keung Shan and there are no expected impacts on heritage at the area. The landing area with terminus at Tai O is proposed on eutaxite headland to the southeast of Tai O fishing village which may be of archaeological interest and contain graves.[8] **Landscape and Visual Compatibility**: Alignment 3a is the shortest alignment, which would cause less adverse impacts on the landscape resources than the other two alignments. Having the least amount of protruding system towers, its visual impact is also be less than the other two alignments. **Environmental Impacts**: No insurmountable construction dust, noise and water quality impacts from all three options is anticipated with the

[8] If there is any development in the Study Areas A affecting any SAI and disturbance to the SAI is unavoidable, a detailed archaeological impact assessment (AIA) shall be conducted to assess the archaeological impact arising from the proposed works. If necessary, a qualified archaeologist shall apply for a licence under the Antiquities and Monuments Ordinance (Cap. 53) to conduct an archaeological investigation to obtain field data to facilitate the impact assessment. A proposal for the AIA shall be submitted to AMO for agreement prior to applying for a licence. Subject to the findings of the AIA, appropriate mitigation measures shall be proposed and implemented by the project proponent in prior agreement with AMO.

Criteria	Evaluation
	implementation of dust and noise control and good site practice measures. Hazard to life may be a concern for Alignments 3a and 3b as they fall within the 400m area of TOWTW.
Connectivity and Infrastructure No alignment has a clear advantage	**Access and connectivity:** Alignment 5a is connected to an existing road but may generate additional traffic impacts on the road and existing Tai O terminus. **Existing infrastructure:** All three alignments perform similarly in this regard. Alignment 3b would however result in major infrastructure works as it would displace part of the existing PTI. **Pedestrian access:** Alignments 3a and 5a allow the shortest and most direct transfer from NP360; but the station in Tai O of both Alignments 3a and 3b is further away from Tai O Town Centre than that of Alignment 5a.
Land Use Compatibility Preferred: Alignment 3a	**Land Use:** All three alignments would require rezoning, but Alignment 3b would require the re-provision of the existing PTI; whereas Alignment 5a would affect the planned 2-storey campsite/ holiday camp facilities stated under the "REC" zone of Tai O Town Centre OZP. **Contextual Compatibility:** The Ngong Ping station of both Alignments 3a and 5a would be built next to the existing NP360 Station which could be considered as a contextual compatibility. **Public Acceptability:** Alignment 5a may cause privacy concern for residents of Lung Tin Estate and may induce opposition because of the loss of "REC" zone.
Cost-Effectiveness and Lands Issue Preferred: Alignment 3a	**Land Availability:** Both Alignments 3a and 3b (BDG) require the least amount of land uptake and no land resumption cost would be incurred because of affecting private lots. **Financial and Economic Consideration:** Alignment 3a (BDG) has the best financial outcomes for MTRCL or a third-party operator.

2.4.2 Preferred Option for the Proposed Cable Car System

Preferred Cable Car Alignment – Alignment 3a and BDG system

2.4.2.1 Based on the above evaluation, Alignment 3a, which follows a straight line from Potential Site 1 at Ngong Ping and Potential Site 6 at Tai O, under BDG system is the shortest alignment with less amount of cable towers (**Figure 2.7**). This would cause less adverse impacts on the landscape resources, visual amenity and environmental impacts than the other two options (i.e. Alignment 3b and 5a) and it appears to be the optimized option with the best financial outcomes. It also involves the least over-sailing issue in comparing with the other two.

Design of Cable Car Terminus

2.4.2.2 As a general design principle, the cable car terminals will need to consider the surrounding landscape as an active ingredient of the design and should aim to minimize disturbance to the landscape and improve their integration so as to limit

adverse impacts on the vegetated surroundings. The arrangement of the terminals should aim to cater for those arriving on foot by providing an outdoor entrance space within which users can stop and rest before entering the cable cars with a unique experience. The entrance plaza should provide a momentary respite before continuing to visit the local tourist destinations and to create a welcoming destination.

Potential Site 1 – Ngong Ping Terminus

2.4.2.3 With Potential Site located elevated above the surrounding areas and the requirement to incorporate garaging for the cable cars into one of the building's levels in addition to one floor for boarding and auxiliary facilities, the terminus will reach a height of about 16m. However, the height could be further reduced if the building can be partially "buried" into the slightly raised ground, feasibility for which can be determined in a detailed study. In terms of pedestrian connectivity, with the proximity of Potential Site 1 to the existing NP360 cable car station, a new pedestrian route traversing the 10-15m uphill slope, with a length of about 120m will need to be provided. In addition, a new public toilet is also proposed to cater for the additional passenger/visitors flow. Figure **2.8a-c** refers.

Potential Site 6 – Tai O Terminus

2.4.2.4 The building height will be approximately 15-20m taking into consideration the 8m height of the boarding area and about 6m height for the auxiliary facilities below and given that the auxiliary facility level will be partially "buried" in the ground, the building will exceed the current ground level by about 5-6m from the west. The relatively higher elevation of Potential Site 6 will require the widening and upgrading of an existing pedestrian route that leads uphill from the Tai O village cluster (from approx. 3mPD to 58mPD), to be supported by a 120m long pedestrian link comprising an escalator corridor, staircase and inclined lift for disabled. A new public toilet is also proposed to cater for the additional passenger/visitors flow. **Figure 2.9a-d** refers.

Preliminary Cable Car System Design Requirement

2.4.2.5 The basic functional requirements for cable car system is summarised in Table **2.4.2**.

Table 2.4.2 – Preliminary Design of Cable Car System

Technical Specifications	**Engineering Requirements**
Operating Wind Speed	The operating wind speed threshold needs to be higher than that of the NP360 system to avoid stranding passengers at Tai O and/or creating a bottleneck at Ngong Ping.
System Reliability	To avoid operating reliability issues, it makes sense to establish a level of system reliability required. Ideally, the evaluation of comparative supplier bids should be based on agreed warranties for component reliability and operating expenditure targets.

Technical Specifications	**Engineering Requirements**
System Capacity	Balancing of the system loads can be achieved by limiting the capacity of the new system, ticket pricing strategies and/or provision of alternative return transport modes from Tai O.
Cabin Size	The selection of cabin type points strongly to using a BDG/3S type system and impacts the tower spacing and route selection. The initial system would therefore require garaging space for up to 20 cabins to achieve the maximum 2,300pphpd capacity.
Garaging	The proposed garaging arrangement is to provide one facility within the footprint of the stations to minimise the impact at both the Tai O and Ngong Ping terminals.
Drive Power and Back-Up Systems	Mains power will be provided via sub-station based in Tai O. Independent back-up pinion drive systems mounted on the bull wheel run ideally might also be considered at each station for additional redundancy.
Tower Details	Simple tubular towers are proposed. The choice of a BDG or 3S system drives the tower design to fewer but significantly larger towers.
Initial Operation Plan	The current plan must be to attempt to keep the both options, i.e. operating as a fully independent system with a fully independent operator or operating the system alongside the NP360 either with MTRC operating staff or an independent operator operating through the MTRC ticketing systems, open by allowing compatible ticketing systems to be used if required.
Operation and Maintenance Strategy	Because of the proximity to the NP360 it is likely the operating and maintenance strategies will be similar. It is however sensible to assume the system operation and maintenance (O&M) structure is designed for independent ownership but with the potential for operating and maintenance compatibility with the NP360 and MTRC.
Service Pattern	Operating hours for the new system should follow those of the existing NP360. *Routine Maintenance:* The amount of cleaning required is dependent on the number of cabins – having a reduced number of cabins will reduce this. Maintenance costs will depending on the sheaves wear. *Periodic maintenance:* The increased use of cable cars for urban and tourist transportation systems has placed greater pressures on specialist maintenance teams as prolonged shutdowns are for these types of system are not desirable.

Technical Specifications	**Engineering Requirements**
Depot and Operation Control Centre Requirements	On board CCTV in all cabins is proposed for incident recording with sufficient capacity for 24 hours storage.
Garage Requirement	*Tai O Garage:* It is intended the garaging at this location would be the main servicing and maintenance garage. *Ngong Ping Garage:* The Ngong-Ping garage will predominantly be for storage and cabin cleaning.
Preliminary Proposal for Rescue and Emergency Services	The design of aerial systems is based on ensuring the risk to life is minimized at all times and single point of failures cannot occur. It is however essential that a rescue and emergency plan is in place to get the passengers safely back on the ground should it be necessary, though it is an extreme and statistically rare scenario. The evacuation method will depend on the cabins' proximity to the ground and the accessibility of the alignment to local roads. Only after exhausting attempts to move the cabins using the independent control systems, back-up motors and/or emergency power will aerial evacuation procedures will be instigated. According to the Code of Practice issued by Electrical and Mechanical Services Department (EMSD), rescue operations should be able to be completed within reasonable hours. The rescue time will be related to the number of cabins which need rescuing. The greater the number of cabins on the line, e.g. in an MDG system, the greater the rescue time. Key to providing a safe evacuation route is an obvious and easy passage once passengers are on the ground to an area accessible to road transport. We anticipate a similar type of path to that used along the alignment of the NP360 will be needed and potentially double up as a trail for hikers.
Method of Construction	Construction materials for the cable car are expected to be transported to the construction sites by a combination of overland and air transport – this will be similar to construction method for NP360. The termini of the cable car, in Tai O and Ngong Ping, are easily accessible via road and therefore, the majority of the required construction material can be transported to the sites by goods vehicles. Construction of the cable car pylons will occur at distinct locations along the preferred alignment. It is expected that all large construction components will be transported to the pylon sites via helicopter. Other pylon construction materials can

Technical Specifications	Engineering Requirements
	be transported overland by horse or donkey using the proposed safety trail that will travel along the cable car alignment.[9]

2.4.3 Conclusion

This section has formulated and compared the three Cable Car Alignment options with respect to their engineering, transportation, environmental and ecological considerations, land use planning, and financial performance. The assessment have suggested a competitive edge of Alignment 3a (with Potential Site 1 & Potential 6) over the other two options and, thus, it is selected as the preferred option from technical perspective for the proposed Cable Car System. However, after taking into account the financial viability and public concerns from the feedbacks of stakeholder consultation (to be discussed in Section 6), the implementation of the cable car from Ngong Ping to Tai O is not recommended to be worth proceeding as it does not sound in terms of financial viability and also has not well received from the public.

[9] The feasibility for proposed transportation of construction materials by horse or donkey shall be further investigated in detailed design stage.

3 Assignment B – Formulation of Preferred Options for Spa and Resort Developments in South Lantau and Soko Islands

3.1 Summary of Key Issues, Constraints and Opportunities

Interface with Existing and Planned Development

3.1.1.1 For Study Area B1, proposed spa and resort will bring the holistic development for vibrant and diverse activities along the entire coastline, while interface with existing facilities and uses, e.g. recognized villages, residential development, beaches, helipads should be considered. For Study Area B2, the interface issues with the proposed South Lantau Marine Park (MP) which have implications on construction and type of activities need to be considered. Yet, remoteness of Soko Islands provide opportunities for exclusive type of spa and resort development, "first-of-its-kind" in HK.

Connectivity

3.1.1.2 Designation of South Lantau roads as closed roads artificially reduces vehicle use of the network. It is anticipated that most visitors will require motorised transport to access Study Area B1 due to the topography, additional bus, ferry or water-borne transport facilities would need be considered. Study Area B2 is isolated without existing public transport services, the initiation costs for transport facilities operation and upgrading will be needed. The rough wave climate as well as the busy navigation and flight paths may constrain the accessibility. It is noted that there are already pier facilities on the two larger islands: Siu A Chau and Tai A Chau, and a helipad in place on Tai A Chau. The feasibility of using these existing facilities could be considered.

Lack of Infrastructure

3.1.1.3 There is no existing sewerage system at both Study Area B1 and B2. The key consideration will mainly investigate the potential on-site sewage facility or treatment works to support the future developments.

3.1.1.4 The existing key water supply infrastructure serving the Study Area B1 is the existing Cheung Sha Fresh Water Service Reservoir with limited capacity to support new development according to WSD. There is no water supply in Study Area B2. Additional facilities need to be explored to support the future developments.

Environmental and Ecological Concern

3.1.1.5 Lantau South Country Park borders the northern edge of Study Area B1, and indirect impacts should be avoided. Freshwater wetlands in Pui O and Shui Hau, the sandflat/ mudflat at Shui Hau, the Tong Fuk and Pui O Ecologically Important Streams (EIS) and any other streams of moderate or high ecological value should be regarded as sites to avoid. Direct impact to the proposed MP in Study Area B2 should also be avoided. The proposed developments at Cheung Sha and Soko Islands will or may adversely affect SAI directly or through associated works which need to be taken into consideration. The Low-level Radioactive Waste Storage Facility at Siu A Chau is one of the development constraints hazard to life.

3.1.1.6 The biodiversity and landscape features in South Lantau will be appealing to both local and international visitors. There exists opportunities for encouraging research

and education on biodiversity and green tourism. Yet, the use of important ecological resources for tourism purpose should be carefully considered in view of the potential adverse impact that could be brought upon these resources.

Public Acceptability

3.1.1.7 The development shall take into account whether there are known/anticipated public objections. For example, whether the development cluster would affect users to existing facilities, or in close proximity to existing rural villages, where some interface/ nuisances and hence local objections may be expected. The Soko Islands are now without inhabitants, local concerns will possibly be limited. Yet, there might be concerns from public if the entire Island will be close for private spa and resort development.

3.2 Formulation of Preliminary Options for Spa and Resort Developments

3.2.1 Market Positioning Analysis and Preliminary Development Concept

Market Positioning

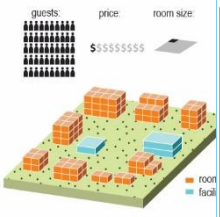
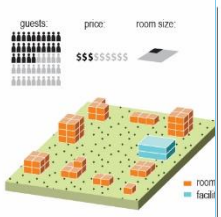
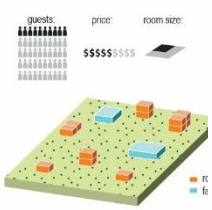
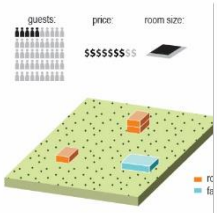
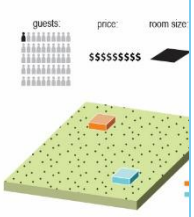
3.2.1.1 From the positioning within Asia, Hong Kong is not traditionally considered a resort and spa destination but has a strong reputation as a quality and luxurious tourist destination established through the number and quality of High Tariff A hotels (5 star). From the positioning within Hong Kong, the wellness industry is well established catering to all income groups. A new spa and resort tourism product in Hong Kong is likely to be successful if it creates a strong identity with effective market positioning, branding, resort design and programming and becomes a destination.

3.2.1.2 South Lantau and Soko Islands provide an opportunity to leverage off the visitor interest in 'authentic' experiences and should build on the natural character, culture, heritage and setting of their respective locations.

Assumptions of the Proposed Spa and Resort Developments

3.2.1.3 Based on the benchmarking of spa and resort facilities from international case studies. summarized in **Tables 3.2.1** below draws up the broad assumptions for determining the scale of spa and resort developments in South Lantau and Soko Islands in this Study.

Table 3.2.1 Summary of Benchmarking and Broad Assumptions for Different Types of Spa and Resort Developments adopted in the Study Area

	Type A	Type B	Type C	Type D	Type E
					
Reference Case Studies					
	Singapore Resort & Spa Sentosa; Misibis Bay; Amiana	Chiva Som; Fusion Maya; Yalong Bay; Discovery Shores	The Nam Hai; An Lam Ninh Van Bay	Soneva Kiri; Song Saa; Aanpulo; Ariara Island	Freegate Island; Laucala; North Island
Average room tariff per night (HKD)[10]	$1,500-$2,500	$2,500-$4,000	$4,000-$6,000	$6,000-$15,000	$25,000-$35,000
Description	Medium-size resorts around 4 star	Boutique type offerings and villa products	Larger resorts in green settings with emphasis on villas	Remote luxury destinations	Large remote, private luxury islands
Size of Resort	5-10ha	1-10ha	30-50ha	3-100ha	200-1,200ha
No. of units in Resort	<200	<80	<100	<40	<25
No. of units per ha	30	15	5	2	0.1
Average Units Size	Rooms and some villas 65sqm	Rooms and some villas 90sqm	Large rooms and some villas 180sqm	Large rooms and some villas 500sqm	Large private villas 650sqm
Average No. of Guest per Units	2.8	2.8	3.0	3.5	4.0
Average Staff to Guest Ratio[11]	0.5:1	1:1	1.5:1	2.0:1	3.0:1
Average Facilities to Units Ratio[12]	1.6:1	1.6:1	1.5:1	1.4:1	1.4:1

[10] From hotel websites and marketing materials (2015)

[11] According to desktop research, for winning service of popular and high-end resort development, typically a staff-to-guest ratio of at least 1.5 to 1 (Source: http://www.travelandleisure.com/articles/worlds-best-service). From this, we have assumed a factor of 1.5 to 1 for Type C or above resort type for the purpose of this Study.

[12] We have adopted a facilities to units ratio of about 1.6:1 for our experience for typical hotels. The total GFA of the spa/resort is calculated 1.6x the assumed room GFA. On this basis, we have assumed 1.6:1 for Type A and Type B resorts in this Study as they could be relatively similar in operation and configuration to typical hotels. We understand that the more luxurious the spa and resort, the more provision of personalized facilities within the spa and resort itself, and thus assuming gradually lower facilities to units ratio for Type C or above resort types.

3.2.2 Preliminary Options for Spa and Resort Developments in South Lantau (Study Area B1)

3.2.2.1 Based on the above broad assumptions (**Table 3.2.1** refers), a total of three preliminary options for spa and resort developments are proposed on South Lantau, namely Leisure Clusters Option, Scenic Diffusion Option and Spectacular Coast Option. The planning intention and development parameters are summarized below:

Table 3.2.2 Planning intention and development parameters for Options 1-3 adopted in the Study Area B1

	Option 1 (Leisure Clusters)	Option 2 (Scenic Diffusion)	Option 3 (Spectacular Coast)
Planning intention	Intended to capitalize on the bay area of Study Area B1 with a diverse programmatic mix without disrupting the existing spatial and visual relationships of the existing development, thus minimize alteration of the area's character. Each leisure cluster will adopt a specific mix of uses that will dictate the type and extent of new development and its location relative to the existing settlements. In this Option, to support the mass of resort guests and employees, a new pier is proposed near Cheung Sha to connect this new destination in South Lantau.	Intended to insert discrete new spa and resort developments without interfering either with existing settlements or the high-value natural setting. New spa and resorts developments clusters are to be diffused within the scenic setting outside existing settlements to create autonomous and exclusive destinations	Envisions the Bay's coastline dotted with diversely mixed clusters of activities that will transform the entire area into a recreational destination via adopting an approach of single and spectacular series of linked and interdependent spa and resorts and nodes. Each cluster is themed to a different rhythm of relaxation and activity that capitalize on surroundings.
Development of Cluster	Development is concentrated in four Clusters, A, C, E and G	Only Cluster B, D and F will be developed	Development is concentrated in four Clusters, A, D, E and G
Number of Resort Units	1,017	184	565
Number of resort guests	2,847	538	1,597
Number of Employees	1,425	710	1,037
Type of resort	All units proposed to be Type A resort	Type B and C resorts are proposed	Mixed types including Type A and C are proposed
Reference	**Figure 3.1** to **3.2** refers	**Figure 3.3** to **3.4** refers	**Figure 3.5** to **3.6** refers

3.2.2.2 It is understood that individual resorts will often provide a number of programmes open to the public that will include restaurants, retail, spa, pool area etc., given their spatial segregation and controlled access, these will not be able to maximize the visitors' experience. As such, some potential development areas within development clusters have been identified for providing Value Enhancing Clustering Facilities based on synergy/enhancement of existing facilities.

3.2.3 Preliminary Options for Spa and Resort Developments in Soko Islands (Study Area B2)

3.2.3.1 A total of three preliminary options for spa and resort developments are proposed on the Soko Islands, with proposed developments mainly on Tai A Chau.

Table 3.2.3 Planning intention and development parameters for Options 1-3 adopted in the Study Area B2

	Option 1 (Scenic Getaway)	Option 2 (Island Experience)	Option 3 (Soko Adventure)
Planning intention	Intended to fully capitalize on the remoteness of the Soko Islands to create a highly exclusive, and private island development that can compete with world's finest resorts such as Freegate Island, Laucala, North Island etc.	Intended to add diversity to the exclusive spa and resort developments in Option 1 to accommodate a wider income range to increase the potential visitors that could experience staying on the Soko Islands. As compared to Option 1, the platform area will be utilized to provide additional 10 resort units with Type D resort.	intended to create a destination for exploration/ adventure of the Soko Islands shared by resort guests and the wider public. Envisioned as exclusive yet slightly larger in scale resort with development concentrated on the central platform and adjacent man-made slopes while the remaining island stays free from any development other than low impact recreational facilities such as hiking trails and lookout points for the guests to explore.
Number of Resort Units	12	22	40
Number of resort guests	48	83	140
Number of Employees	144	214	280
Type of resort	Type E	Types D and E	Type D

	Option 1 (Scenic Getaway)	Option 2 (Island Experience)	Option 3 (Soko Adventure)
Reference	**Figure 3.7** refers	**Figure 3.8** refers	**Figure 3.9** refers

3.3 Summary of Broad Assessments

3.3.1.1 Broad assessments conducted for the proposed spa/resort options in Study Area B1 and B2 have been summarized in this section. This includes geotechnical, site formation, traffic and transport, drainage and sewerage, environmental, landscape and visual, land requirement and financial assessment.

3.3.2 Geotechnical Review

Summary of Geological / Natural Terrain Constraints for Study Area B1

3.3.2.1 Option 1 has the highest number of Potential Development Areas (PDAs) and their associated NTHS catchments potentially affected by faults/photolineaments. Weaker ground conditions are anticipated in these areas. Option 1 has the largest area of NTHS catchments. Open Hillslope (OH) and Channelised (CD) catchments are found in all of the Options, but topographic depression (TD) catchment is absent from Option 2. Option 2 has the highest number of past landslides recorded and appears to be most affected by landslides. Both Options 1 and 3 has the highest number of PDAs and associated NTHS catchments with high potential to be affected by rock/boulder fall hazards.

Summary of Geological / Natural Terrain Constraints for Study Area B2

3.3.2.2 Both Options 1 and 2 have PDAs and their associated NTHS catchments potentially affected by faults/photolineaments. Weaker geological conditions and deeper rockhead are anticipated in these areas. Option 2 has the largest area of NTHS catchments. OH and CD catchments are found in all of the Options. Option 2 has the highest number of past landslides recorded and appears to be most affected by landslides. Both Options 1 and 2 have the highest number and associated NTHS catchments with high potential to be affected by rock/boulder fall hazards.

3.3.2.3 Despite the above, all proposed PDAs under the options are still considered feasible. For catchments that require further natural terrain hazard assessment, a detailed field study of the natural terrain can be carried out in detail design stage.

Existing Man-Made Features Affected

3.3.2.4 These features are typically situated around existing developments or along roads. The types and numbers of the registered man-made features identified within and straddling across Study Area B1 & B2 are summarized below.

Table 3.3.1 Registered Man-Made Features identified under Assignment B

Registered Man-Made Features	Study Area B1	Study Area B2
	Nos.	
Cut slope	324	24
Fill slope	186	6
Retaining wall	112	2

Registered Man-Made Features	Study Area B1	Study Area B2
	Nos.	
Disturbed terrain	12	0

3.3.2.5 It is anticipated that new man-made features will be required in association with the site formation works in the proposed developments. More detailed review of the potentially affected man-made features shall be carried at the detailed design stage. Any land for necessary mitigation works for the natural terrain landslide hazards and stabilization works, any minor roads or footpaths that would be affected should be identified at detailed design stage and should be minimized or reprovisioned as far as possible to avoid impacts to the local communities and users.

3.3.3 Site Formation and Reclamation Assessment

Natural Terrain Hazard Mitigation Works

3.3.3.1 Preliminary review of the design requirements for the NTHS catchments conducted suggested that respective levels of mitigation works required for each NTHS catchment are deemed necessary. Possible type of prescribed flexible barriers to mitigate OHL hazards are needed within the Level 1 hazard mitigation catchments.

Proposed Extent of Reclamation

3.3.3.2 There is a proposal for public pier in Study Area B1 – Option 1 that might require reclamation subject to detailed design. There is no proposed reclamation work in Study Area B2.

Impacts on Existing Beaches

3.3.3.3 For the cross shore transport in Study Area B1, there is little impact generated on the beach. The proposed pier under Study Area B1 – Option 1 may be affected by the long shore current and thus sediment may be accumulated on the updraft side. This should be considered in detailed design stage. In Study Area B2, there is no proposed marine works and thus no impact will be generated on existing beaches.

3.3.4 Traffic and Transport Impact Assessment

3.3.4.1 Traffic impact assessment was undertaken to estimate implications from the visitor and staff vehicle trips. In-line with the Cable Car assessment, the adopted design years are 2041, 2046 and 2051.

Preliminary Transport Strategy for Study Area B1[13]

3.3.4.2 **Option 1** would result in the most intensive resort development. It is likely that this mass consumption option would be best served by a shuttle service from Tung Chung to Cheung Sha. A public ferry service may also be warranted from this location with a proposed public pier at Sha Tsui, as well as a local water-borne transit around South Lantau. The said local water-borne transit would not require a pier and could land on the beach itself.

3.3.4.3 **Option 2** has the least development and would be more of a high-end, luxurious resort option. Shuttle service for staff and visitors could be supplemented by private

[13] Marine Archaeological Investigation would need to be carried out should considerations for new pier, breakwater and berthing facilities at Cheung Sha and Soko Islands to be taken forwarded.

car transfer service. A cycle and pedestrian path along the coast would also provide additional connectivity. No marine connectivity is proposed.

3.3.4.4 **Option 3** falls somewhere in between the other two options in terms of connectivity. The main connectivity options for Option 3 would include the shuttle as well as the water-borne transit.

Traffic Impact Assessment for Study Area B1

3.3.4.5 The establishment of resort developments in South Lantau will result in additional traffic using Tung Chung Road and South Lantau Road. It is considered that the critical components of a road network are the junctions. Thus, effects were assessed on the following key junctions: (i) South Lantau Road / Tung Chung Road Junction - this is a roundabout and is the key junction that all traffic accessing south Lantau travels through; and (ii) South Lantau Road / Chi Ma Wan Road – this junction currently serves traffic accessing Pui O Beach and Chi Ma Wan Peninsula and is priority controlled.

3.3.4.6 It is concluded that even for the most intensive Option 1 generating the highest volume of traffic and vehicle movements for guests and staff, key junctions would still operate satisfactorily – well under capacity. Therefore, traffic impact from the resort development would be minimal and would not adversely affect performance of the road or junctions in South Lantau.

3.3.4.7 It is estimated a maximum increase of 38 fast ferries and 32 guest yachts travelling along Adamasta Channel per day induced by the proposed developments in Study Area B1 (Option 1 in Study Area B1 with proposed pier at Sha Tsui). The increasing no. of vessels is estimated to be about 15% of the total number of existing traffic per day, i.e. 6 additional fast ferries and 4 additional guest yachts per hour during operation. It is necessary to ensure the risk is controlled to an acceptable level and would not cause adverse effect to the existing marine traffic.

Preliminary Transport Strategy for Study Area B2[14]

3.3.4.8 **Option 1–** Guests will be shuttled through helicopters, with staff through ferries from either the Central Ferry Pier or Tung Chung Ferry Pier. Guests may also use their own yachts to access the site.

3.3.4.9 **Option 2–** The connectivity scheme for Option 2 will be similar to that for Option 1.

3.3.4.10 **Option 3**– This scheme assumes that access is through water-borne transport only, with dedicated staff and guest ferries/boats. Guests may also use their own yachts to access the site.

Traffic Impact Assessment for Study Area B2

3.3.4.11 Depending on the type of resort development and the target clientele, transport to/from the Soko Islands would be via air-based or water-based services. Air-based services for guests would consist of luxurious and highly personalized helicopter services, while yacht or ferry services would provide access as well for guests. Air-based services would primarily be for the guests. Due to relatively long journey times, the ferry would be used for staff and logistics purposes (i.e., carrying supplies to the sites). Mass ferries would also be used to transport guests, but only if the resorts on the Soko Islands include less exclusive and more moderately-priced experiences.

[14] Marine Archaeological Investigation would need to be carried out should considerations for new pier, breakwater and berthing facilities at Cheung Sha and Soko Islands to be taken forwarded.

3.3.4.12 It is anticipated that yacht could be a possible means of transport for potential visitors (Mainly for the more luxurious Option 1 and 2) but need to be berthed outside the boundary of the proposed MP near South Lantau area, in order to reduce the risk of collision with the fast ferries or other marine vessels, the yachts should navigate the vessel route along the Adamasta Channel.

3.3.4.13 Internally, there is no road network on the Soko Islands and therefore, purpose built transport infrastructure will be required to access all areas of the proposed resort development. The terrain is fairly hilly throughout Tai A Chau and Siu A Chau, golf carts could be used to operate on hilly and steeper portions of the island.

3.3.5 Drainage, Sewerage, Water Supplies and Utilities Impact Assessment

Preliminary Infrastructure Strategy for Study Area B1

3.3.5.1 The proposed infrastructure strategy are summarized in the table below.

Table 3.3.2: Proposed Infrastructure Strategy in Study Area B1

	Sewerage	Drainage	Water Supply	Power Supply	Gas Supply
Existing Condition	No existing sewerage infrastructure at Tong Fuk and Pui O. There is an existing infrastructure at Shek Pik i.e. Sha Tsui	Minimal and directly discharge to sea.	With existing record plan	With existing record plan	No existing Record – It seems that there is plenty of existing villages, school and residential areas.
Additional Facilities Required	On-site Sewage Treatment Plant	Not essential	Minimal impact on water supply	Minimal impact on power supply	To be provided within future spa/ resort
Facilities Area (sqm)	Option 1: about 2,500 ~ 3,500 Option 2: about 1,000 ~ 2,000 Option 3: about 1,500~2,500	To be provided within future spa and resort development			

Broad Sewerage Impact Assessment for Study Area B1

3.3.5.2 The planned sewerage works by DSD will include new village and trunk sewers, 6 planned SPSs and 1 STW associated with the submarine outfall at San Shek Wan STW. Yet, no sewage capacity of the new STW had been earmarked for the proposed spa/resort developments, there will be a need to identify provision of new treatment facility arising from the development.

3.3.5.3 Since Study Area B1 is now not served by existing sewerage network, new sewerage network, sewage pumping stations (SPSs) and sewerage treatment works (STW) will be required. The proposed options are as follows:

Table 3.3.3: Proposed Peak Flow and STW capacity Option in Study Area B1

	Option 1	Option 2	Option 3
	Peak Flow (l/s)		
Cluster A	11	-	11
Cluster B	-	21	-
Cluster C	29	-	-
Cluster D	-	39	39
Cluster E	61	-	38

	Option 1	Option 2	Option 3
Cluster F	-	18	-
Cluster G	55	-	26
Proposed new STW	**Minimum capacity of Proposed new STW (ADWF) (m^3/day)**		
	2,252	1,123	1,639

Broad Drainage Impact Assessment for Study Area B1

3.3.5.4 New outlets (from DN450 to DN1800) or upgrading of existing outlet for discharging the increase peak runoff would be required. The existing pipelines discharging to the proposed clusters shall be diverted. New drainage system would solely accommodate for the runoff from the proposed developments.[15]

Broad Water Supply Impact Assessment for Study Area B1

3.3.5.5 The estimated MDD and peak water demand for each of the options are summarized as below.

Table 3.3.4: Estimated MDD and peak water demand Options in Study Area B1

	Option 1	Option 2	Option 3
Freshwater			
MDD for freshwater (m^3/day)	2,252	1,123	1,695
Peak water demand (m^3/s)	0.08	0.04	0.06
Peaking factor	3	3	3
Saltwater			
MDD for saltwater (m^3/day)	1,126	562	848
Peak water demand (m^3/s)	0.03	0.01	0.02
Peaking factor	2	2	2

3.3.5.6 WSD advised that the Cheung Sha Fresh Water Service Reservoir do not have sufficient capacity to cater for additional water supply to the proposed spa/resort developments. A new WTW and SR is therefore required to support the proposed developments within Study Area B1. Alternatively, it may be possible to divert water flow from other provision system (e.g. Silver Mine Bay)[16].

Broad Power Supply Impact Assessment for Study Area B1

3.3.5.7 Reserves for power cables and ESS/transformer room within future spa/resort clusters is mandatory subject to development's electric demand and site location from existing infrastructure. Further liaison with CLP required in detail design stage.

[15] As the proposed development may involve a drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300 m from the nearest boundary of an existing or planned coastal protection area, it may be regarded as a Designated Project under the EIAO. Thus, subject to confirmation at detail design stage, a detailed EIA might be required under the statutory EIAO procedures to confirm its environmental acceptability.

[16] This diversion proposal is required to further liaise with WSD at detailed design stage to ensure the feasibility of new supply pipeworks, which could be costly and time-consuming.

Broad Gas Supply Impact Assessment for Study Area B1

3.3.5.8 There are no existing gas main within vicinity of Study Areas B1. Therefore, development could consider electric power or portable gas supply as substitute to steady gas supply.

Possible Infrastructure Strategies for Study Area B2

3.3.5.9 Given the unique context of Study Area B2 on a remote island, a total of 3 infrastructure options (conventional, environmentally friendly and low-cost) are proposed which could all be applicable to all the 3 spa and resort options proposed on the Soko Islands.

Conventional Option

Diagram 3.3.5.1: Conventional Option

Table 3.3.5: Summary of Conventional Option

	Sewerage	Drainage	Water Supply	Power Supply	Gas Supply
Option	On-site Treatment Plant (Assume ADWF = <1000m^3/day)	Internal drainage System and to be directly discharge adjacent to sea	DN 1800 Common Tunnel + 3 nos of DN300 Tunnels	DN 1800 Common Tunnel + 3 nos of DN300 Tunnels	DN 1800 Common Tunnel + 3 nos of DN300 Tunnels
Footprint (m^2)	~800 to 1,500 (depends on Options)	Minimal	Huge construction pits are required for the common tunnel construction		
Power Supply Required	High	To be provided within future spa/ resort			
Recurrent Cost (RC)	High	Very Low	Low		

	Sewerage	Drainage	Water Supply	Power Supply	Gas Supply
Construction Cost (CC)	Very High (including STP and submarine outfall 1.5km)	Very High			
Total CC+RC	Very High				

Environmental-Friendly Option

Diagram 3.3.5.2: Environmental-Friendly Option

Table 3.3.6: Summary of Environmentally-Friendly Option

	Sewerage	Drainage	Water Supply	Power Supply	Gas Supply
Option	On-site Treatment Plant (Assume ADWF = <1000m^3/day)	Rainwater Collection for harvesting irrigation system and remaining to be directly discharge adjacent to sea	Desalination	Laying of New Power Cable Horizontal Directional Drilling (HDD)and Renewable Energy e.g. Solar Power for support	Replacement by Electricity
Power Supply Required	High	Low	High	High	-
Recurrent Cost (RC)	High	Low	Very high	Assume CLP will take up the RC	-
Construction Cost (CC)	Very High (including STP and submarine outfall 1.5km)	Low	High	Low - High	-
Total CC+RC	High				

Low Cost Option

Diagram 3.3.5.3: Schematics Diagram Low Cost Option

Table 3.3.7: Summary of Low Cost Option

	Sewerage	Drainage	Water Supply	Gas Supply	Power Supply
Option	A small-scale sewage treatment system (such as septic tanks system)	Minimal, to be directly discharge adjacent to sea	Vessel Transportation		Laying of New Power Cable by HDD
Power Supply Required	Needed	-	-	-	Needed
Recurrent Cost (RC)	Low*	Low	High - Very high		Assume CLP will take up the RC
Construction Cost (CC)	Low	Low	-	-	Very high
Total CC+RC	Relatively lower when compared with Environmental Friendly Option and much lower than Conventional Option				

*Waste that is not decomposed by the anaerobic digestion must eventually be removed from the septic tank and subject to the consent by EPD

Broad Sewerage Impact Assessment for Study Area B2

3.3.5.10 There is no existing sewerage network found near all the clusters in Study Area B2. The increased sewage flow will be treated within the Study Area B2 area before discharging. It is recommended that a new STW is to be constructed, it should have a minimum capacity (ADWF) of 228m^3/day for Option 1, 338m3/day for Option 2 and 442m3/day for Option 3. Associated upstream SPSs may also be required to support the proposed development.

Broad Drainage Impact Assessment for Study Area B2

3.3.5.11 No drainage system is identified in Study Area B2 sites. The increase in peak flow requires mitigation to directly discharge adjacent to sea such as drainage channel or internal stormwater pipes. The impact of drainage in the area is considered to be low.

Broad Water Supply Impact Assessment for Study Area B2

3.3.5.12 The estimated MDD and peak water demand for each of the options are summarized as below.

Table 3.3.8: Estimated MDD and peak water demand Option in Study Area B2

	Option 1	Option 2	Option 3
Freshwater			
MDD for freshwater (m^3/day)	228	338	442
Peak water demand (m^3/s)	0.08	0.01	0.02
Peaking factor	3	3	3
Saltwater			
MDD for saltwater (m^3/day)	114	169	221
Peak water demand (m^3/s)	0.03	0.04	0.05
Peaking factor	2	2	2

3.3.5.13 Study Area B2 is basically not served by any existing water supply infrastructure. It is also noted that there is also no salt water supply in this area. As mentioned in above, as a new WTW and SR is proposed in Study Area B1 (South Lantau), it is proposed to connect to support Study Area B2 through tunnelling.

Broad Power Supply Impact Assessment for Study Area B2

3.3.5.14 Reserves for power cables and ESS/transformer room within resort clusters is mandatory subject to development's electric demand and site location from existing infrastructure. Further liaison with CLP should be carried out in detailed design stage.

Broad Gas Supply Impact Assessment for Study Area B2

3.3.5.15 There are no existing gas main within vicinity of Study Areas B2. Therefore, development could consider electric power or portable gas supply as substitute to steady gas supply.

3.3.6 Preliminary Environmental Appraisal

Broad Environmental Appraisal for Study Area B1

3.3.6.1 The key environmental concerns, including ecology, air quality, noise, water quality, hazard to life, waste, land contamination, cultural heritage, and visual and landscape impacts of different development options have been examined and summarized in Table 3.3.9. [17]

[17] If the proposed development may be regarded as a Designated Project under the EIAO, subject to confirmation at detail design stage, a detailed EIA might be required under the statutory EIAO procedures to confirm its environmental acceptability.

Table 3.3.9 Broad Environmental Appraisal for Study Area B1

	Option 1 – Leisure Clusters	**Option 2 – Scenic Diffusion**	**Option 3 – Spectacular Coast**
Ecology	Direct loss of habitat such as secondary woodland and grassland/ shrubland and wetland at Shui Hau and Pui O might occur, although the ecological impact is limited given the habitat quality and their disturbed nature, limited size and the rather low floral and faunal diversity supported. Seasonal wet grassland at Shui Hau and Pui O which has relatively high ecological value may pose constraints on developments. Indirect impact on the seasonally wet grassland, rivers and estuaries of considerable ecological significance adjacent to the proposed development clusters are anticipated. Compared with Options 2 and 3, development clusters under this Option are relatively closer to some areas of ecological importance.	Direct impact in terms of woodland and shrubland loss is predicted although it is not considered to be of ecological significance, due to the small area impacted, and the limited maturity and floristic diversity of the woodland. Sensitive habitats such as mangrove, mudflat, seasonal wetland and natural watercourse are avoided. The overall ecological impact of this option is thus considered low, although indirect impacts on the natural coast and nearby streams should be taken into account.	In the absence of mitigation, major loss of seasonal wetland in Shui Hau and Pui O, which supports moderate to high species diversity and species of conservation importance. Potentially significant indirect impacts on seasonal wetland, streams and estuaries, and potential indirect impacts on coastal marine environment of the southern Lantau coast Provides potential for areas of higher ecological value at Shui Hau and Pui O to undergo managed enhancement if it can be tied to adjacent development.

	Option 1 – Leisure Clusters	**Option 2 – Scenic Diffusion**	**Option 3 – Spectacular Coast**
Air quality[18]	Construction dust impact are anticipated in Cluster C, E and G under this Option. Mitigation measures such as watering, covering stockpile of dusty material etc., are required. For operational phase air quality impact, all clusters could fulfil the 200m buffer distance requirement for chimneys, except for Cluster G. Potential odour impact is anticipated in Cluster C.	Potential construction dust impact is anticipated in Cluster F, while no adverse impact is anticipated in Cluster B and F. For operational phase air quality impact, all the clusters could fulfil the 200m buffer distance requirement for chimneys, no adverse air quality impact from chimney emission is anticipated with the implementation of mitigation measures. No potential odour impact is anticipated as well.	For construction dust impact, potential construction dust impact is anticipated in Cluster E and G, no adverse impact is anticipated in Cluster A and D. For operational phase air quality impact, all the cluster, except Cluster G, could fulfil the 200m buffer distance requirement for chimneys, no adverse air quality impact from chimney emission is anticipated with the implementation of mitigation measures except Cluster G. No potential odour impact is also anticipated.
Noise	Noise impact are anticipated in Cluster C, E and G under this Option. Mitigation measures such as adopting noise barrier, etc., are required.	Potential construction noise impact is anticipated in Cluster D and F, while no adverse impact is anticipated in Cluster B. For operational phase noise impact, proper design and mitigation measures are required for Cluster D and F. No adverse helicopter noise impact is anticipated for all clusters.	For construction noise impact, Cluster D, E and G, potential construction noise impact is anticipated. For Cluster A, no adverse impact is anticipated. For operational phase noise impact, Cluster D, E and G are required to minimize the potential fixed plant noise from the development. No adverse helicopter noise impact is anticipated for Clusters A, D and E. Potential helicopter noise is anticipated in Cluster G.
Water Quality	Certain water quality implications to these sensitive areas are anticipated during both construction and operational phase.	With implementation of mitigation measures, no adverse water quality impact to these sensitive areas is anticipated during both construction and operational phase	Certain water quality implications to sensitive areas are anticipated during both construction and operational phase.
Hazard to Life	Cluster E is located about 340m from the Cheung Sha Water Treatment Work, a hazard to life assessment is required to evaluate the potential impact during detail design stage.	No adverse hazard to life impact is anticipated	Not anticipated due to large separation distance and low quantity of chlorine / LPG storage.
Waste	No adverse impact is anticipated with the implementation of mitigation measures		

[18] Dust mitigation measures would be implemented and there will be construction dust assessment during detailed design stage. Besides, the potential impact from chimney and odour are subject to further assessment during detailed design stage.

	Option 1 – Leisure Clusters	Option 2 – Scenic Diffusion	Option 3 – Spectacular Coast
Land Contamination	No adverse impact is anticipated with the implementation of mitigation measures		
Cultural heritage	Cluster C, E and G will directly affect Tong Fuk, Cheung Sha Ha Tsuen and Pui O SAIs. Additional time will be required for detailed archaeological impact assessment/ excavation work prior to the construction stage.	There are no known heritage resources within Clusters D and F. It is noted that Cluster F is immediately adjacent to Pui O SAI. Resort type development at Cluster B will directly impact on the Tong Fuk Miu Wan SAI, in particular B1.[19]	Cluster E and G will directly affect Cheung Sha Ha Tsuen and Pui O SAIs respectively. Additional time will be required for detailed archaeological impact assessment / excavation work prior to the construction stage.
Landscape	No substantial changes on the existing landscape character after the construction and the development will be compatible with the surrounding.	The extent of the development has been overlapped with those high sensitivity natural resources and landscape character areas. With the implementation of appropriate mitigation measures, adverse impacts on these LRs/ LCAs can be reduced/ addressed	
Visual	Adverse visual impacts would be alleviated gradually and reduced to insignificant/ slight level eventually.	Adverse impact are expected on these VSRs with a closer viewing distance with not much visual blockage. It is considered that the adverse visual impacts would be alleviated gradually and reduced to insignificant/ slight level eventually upon implementation of mitigation measures.	Similar to the evaluation for Option 1, adverse impact are expected on the VSRs. When mitigation measures matured and taken effect, it is considered that the adverse visual impacts would be alleviated gradually and reduced to insignificant/ slight level eventually

3.3.6.2 As the proposed spa and resort development in Study Area B1 may involve reclamation works (including associated dredging works) more than 1 ha in size and a boundary of which is less than 500 m from the nearest boundary of an existing or planned sensitive areas (i.e. bathing beach or coastal protection area), it may be regarded as a Designated Project under the EIAO. Thus, subject to confirmation at detail design stage, a detailed EIA might be required under the statutory EIAO procedures to confirm its environmental acceptability.

Broad Environmental Appraisal for Study Area B2

3.3.6.3 The key environmental concerns, including ecology, air, noise, water, hazard to life, waste, land contamination, cultural heritage, and visual and landscape impacts of different development options have been examined and summarized in **Table 3.3.10**.

Table 3.3.10 Broad Environmental Appraisal for Study Area B2

	Option 1 – Scenic Getaway	Option 2 – Island Experience	Option 3 – Soko Adventure
Ecology	The scattered villas under Option 1 and 2 will not have significant ecological concern.		

[19] A detailed AIA shall be conducted to assess the archaeological impact arising from the proposed works . Marine Archaeological Investigation would be carried out should considerations for new pier, breakwater and berthing facilities at Cheung Sha and Soko Island be taken forward. If necessary, a qualified archaeologist shall apply for a licence under the Antiquities and Monuments Ordinance (Cap. 53) to conduct an archaeological investigation to obtain field data to facilitate the impact assessment. A proposal for the AIA shall be submitted to AMO for agreement prior to applying for a licence. Subject to the findings of the AIA, appropriate mitigation measures shall be proposed and implemented by the project proponent in prior agreement with AMO.

	Option 1 – Scenic Getaway	Option 2 – Island Experience	Option 3 – Soko Adventure
	Of major ecological concern would be the possible indirect impacts on the marine waters, but this is assumed to be the same for all options.		
Air quality[20]	Operational air quality impact is not a key consideration for selecting the preferred option		
Noise	Operational noise impact is not a key consideration for selecting the preferred option		
Water Quality	No adverse water quality issue is anticipated for all three options with the implementation of proposed mitigation measures		
Hazard to Life	No potential hazard to life impact and health impact identified for all three options		
Waste	No adverse waste management implication are anticipated for all three options with the implementation of proposed mitigation measures		
Land contamination	No adverse land contamination issue are anticipated for all three options with the implementation of proposed mitigation measures		
Cultural heritage[21]	The impacts are spread out over the island	For Options 2 and 3, the development impacts on Tai A Chau are concentrated to the platform area	
Landscape	The scale of the physical loss of the affected LRs will not be substantial. No substantial changes are predicted on the existing landscape character after the construction and the development will be compatible with the surrounding. It is considered beneficial impacts on the LRs/ LCAs in the operational stage. The adverse landscape impact on those resources could be addressed/ reduced effectively with the implementation of proper mitigation measures.		
Visual	Certain degree of visual impact would be experienced by the identified VSRs. the adverse visual impacts could be addressed/ reduced effectively for all the design options with implementation of the mitigation measures.		

3.3.6.4 As the proposed spa and resort development in Study Area B2 is surrounded by the proposed MP, it may be regarded as a Designated Project under the EIAO, in particular the construction of STP and infrastructure tunnels connecting Soko Islands from South Lantau (as proposed under some of the infrastructure options above). Thus, subject to confirmation at detail design stage, a detailed EIA might be required under the statutory EIAO procedures to confirm its environmental acceptability.

3.3.7 Land Requirement Assessment

3.3.7.1 The principles of minimum land resumption and avoidance of encroachment on the existing structures and key land features as far as practicable have been followed when considering the preliminary options of the proposed Spa and Resort Developments. That said, subject to the detailed design, some following features would be inevitably affected under different options:

Study Area B1

3.3.7.2 **Total Area** - Largest total area (429,050sqm) is affected is found under Option 1 including 306,253 sqm of private lots, 118,591 sqm Government facilities22 and 4,206sqm of Government Land. Option 2 and 3 affected 45,975 sqm and 205,433 sqm respectively.

[20] Dust mitigation measures would be implemented and there will be construction dust assessment during detailed design stage. Detailed assessment on the potential helicopter emission is required shall the proposal is taken forward in subsequent stage. The potential impact from potential impact from marine and odour are subject to further assessment during detailed design stage.
[21] Preservation in-situ should be considered as a first option for Tai A Chau Site of Archaeological Interest
[22] Including temporary and permanent government land allocations

3.3.7.3 **Graves Affected** – 3 nos Graves affected is found under Option 1, followed by 1 and 2 nos in Option 2 and 3 respectively. They should be avoided as far as possible in detailed design of the spa and resort development.

Study Area B2

3.3.7.4 **Total Area** - Largest total area (13,460sqm) is affected is found under Option 1 and 2, including private lots (6,147sqm) and 1 Government facility (GFS helipad, area 7,313 sqm). Option 3 affected 77 sqm of total area.

3.3.7.5 **Graves Affected** – 1 no of grave affected in Option 3. It should be avoided as far as possible in detailed design of the spa and resort development.

Identification of Re-provisioning Sites

3.3.7.6 Any need and identification of re-provisioning sites would be examined in detailed design stage.

3.3.8 Financial & Economic Assessment

3.3.8.1 The broad financial assessment for Assignments B1 and B2 aimed at assessing whether the proposed Spa and Resort development would be financially viable.

3.3.8.2 The development of spa / resort facilities at both Study Area B1 and B2 will require new public infrastructure provision due to capacity constraints at existing facilities. For this broad assessment, the cost of developing such public infrastructure has not been included, as the private sector would not generally expect to fund its development.

Study Area B1

3.3.8.3 The overall result finds that for Assignment B1, none of the Options or any of the constituent Clusters achieve an IRR level required by private developers (approximately 14%).

3.3.8.4 The low IRRs are a consequence of the high construction cost relative to income generated, largely as a result of (i) the difficult nature of and access to the development sites, and (ii) the relatively small scale of the developments and therefore an inability to leverage economies of scale.

Study Area B2

3.3.8.5 The overall result of the financial analysis shows that for Assignment B2, none of the Options or any of the constituent Clusters achieve the Target IRR of 14% required by private developers.

3.3.8.6 Like for Assignment B1, the low IRRs are a consequence of the high capital cost for development because of the difficult nature of and access to the development sites, plus the low annual returns due to the relatively small scale of the developments.

Summary for Study Area B1 & B2

3.3.8.7 Overall, given the high cost of developing any of the Options and the low returns, it is unlikely that the private sector would deliver these schemes without Government support or higher room prices, which would damage the international competitiveness of the developments.

Broad Cost Estimation for Provision of Public Infrastructures to be borne by the Government

3.3.8.8 The development of spa / resort facilities at both Assignments B1: Cheung Sha and B2: Soko Islands will require significant new public infrastructure provision due to capacity constraints at existing facilities. For this broad financial assessment, the cost of developing these public infrastructure facilities has not been included, as the private sector would not generally be expected to fund development of these types of infrastructure for what would be regarded as a private development. However, they would need to be developed before any private initiatives could take place.

3.3.8.9 From the broad estimation, infrastructure requirements for Assignment B1 include water treatment works, sewerage treatment works, pumping stations and, a public pier.

3.3.8.10 The infrastructure requirements for Assignment B2 are even greater, with limited existing infrastructure connections to Lantau Island there would need to be significant improvements in the provision of infrastructure to the islands.

3.4 Preferred Option for Spa and Resort Developments

3.4.1 Evaluation Framework

3.4.1.1 The Evaluation process for this Section is summarized in the tables below.

Table 3.4.1 – Evaluation of Spa and Resort Options for Study Area B1

Criteria	Option 1- Leisure Clusters	Option 2- Scenic Diffusion	Option 3- Spectacular Coast
Regional Synergies and Tourism Potential			
Strategic Location	High level of synergy (re-positioning of South Lantau as a vibrant tourism destination)	Low level of synergy	High level of synergy
Recreational Potential	Could accommodate a high number of visitors, medium diversity of visitors	Could accommodate a low number of visitors , low diversity of visitors	Could accommodate a moderate number of visitors , high diversity of visitors
Value Enhancing Clustering Facilities	Value Enhancing Clustering Facilities in all clusters	No Value Enhancing Clustering Facilities	Value Enhancing Clustering Facilities in some clusters
Employment Opportunities	High job numbers provision , medium variety in jobs	Low job number provision, low variety in jobs	Medium job number provision, medium variety in jobs
Connectivity and Infrastructure			
Access and connectivity	Vehicular drop-off location within 200m	Vehicular access heavily constrained for some sites	Ranging from drop-off within 200m to heavily constrained vehicular access for some sites
Existing Infrastructure	Adjacent to existing settlements, opportunity to minimize new provisions	Remote location, new provision is likely	Ranging from adjacent to existing settlements to remote locations
Pedestrian Access	Links in with existing pedestrian routes	No integration with existing pedestrian routes apart from hiking trails	Ranging from linking in with existing pedestrian routes to no integration besides hiking trails

Criteria	Option 1- Leisure Clusters	Option 2- Scenic Diffusion	Option 3- Spectacular Coast
Cost effectiveness and Implementation			
Topographic Constraints	No geotechnical constraints, limited site formation works	No geotechnical constraints, extensive site formation works or constraint for developer	No geotechnical constraints, site formation works varies per site.
Land availability	(90% Private Lots) Small privately owned parcels with multiple owners, depends on private initiatives	(0% Private Lots) All Government land, more certainty for intended developments	(52% Private Lots) Both small privately owned parcels and government land
Financial impacts	Unlikely to be attractive to private developer	Unlikely to be attractive to private developer	Unlikely to be attractive to private developer
Land Use Compatibility			
Land Use	Developments within "CPA" and "GB" require rezoning"	Developments within "CPA" and "GB" require rezoning"	Developments within "CPA" and "GB" require rezoning"
Contextual Compatibility	Building height (2-3storeys) & development intensity (<PR0.4) compatible with surroundings	Building height (2 storeys) & development intensity (PR0.14-0.22) compatible with surroundings	Building height (2-3storeys) & development intensity (PR0.14-0.31) compatible with surroundings
Interface with Existing/Planned Uses	No encroachment to site trawling sites, village environs and burial grounds. Some encroachment on gazetted beaches	No encroachment to site trawling sites, village environs, burial grounds and gazetted beaches	No encroachment to site trawling sites, village environs, burial grounds and gazetted beaches
Public Acceptability	Affecting two BBQ sites, Cluster C, E and G in close proximity to existing settlements, affecting beach users	Cluster F in close proximity with 2 existing houses.	Affecting one BBQ site at Lower Cheung Sha
Environmental Impact			
Construction Impact	Cluster C, E & G close to sensitive receivers and mitigation required	Cluster D & F close to sensitive receivers and mitigation required	Cluster D, E & G close to sensitive receivers and mitigation required
Air Quality[23]	Cluster G within 200m from chimneys. Cluster C subject to odour from Ma Po Ping STW, mitigation measures required	No adverse air quality and odour impact	Cluster G within 200m from chimneys. No odour issue anticipated
Noise	Cluster C, E & G close to sensitive receivers and mitigation required. Cluster G subject to helicopter noise	Cluster D & F close to sensitive receivers and mitigation required	Cluster D, E & G close to sensitive receivers and mitigation required. Cluster G subject to helicopter noise
Hazard to Life	Cluster E within 340m from Cheung Sha Water Treatment Works (WTW), detailed assessment required	No anticipated impact	Cluster E within 340m from Cheung Sha Water Treatment Works (WTW), detailed assessment required
Cultural Heritage	Cluster C, E & G within SAIs	No direct impact on Cluster D&F. Cluster B will directly impact on the Tong Fuk Miu Wan SAI	Cluster E & G within SAIs

[23] Dust mitigation measures would be implemented and there will be construction dust assessment during detailed design stage. Besides, the potential impact from chimney and odour are subject to further assessment during detailed design stage.

Criteria	Option 1- Leisure Clusters	Option 2- Scenic Diffusion	Option 3- Spectacular Coast
Ecological	Possible negative ecological impact on seasonal wetland at Shui Hau and Pui O. Certain water quality impact	No significant negative ecological impact. No adverse water quality impact	Possible negative ecological impact on seasonal wetland at Shui Hau and Pui O. Certain water quality impact.
Visual	Compatible massing in proximity of existing built-up areas	Compatible massing in middle of vegetated slope area which are visually prominent	Compatible massing in proximity of existing built-up areas and some in middle of vegetated area which are visually prominent

Table 3.4.2 – Evaluation of Spa and Resort Options for Study Area B2

	Option 1 – Scenic Getaway	Option 2 – Island Experience	Option 3 – Soko Adventure
Regional Synergies and Tourism Potential			
Strategic Location	Low level of synergy	Medium level of synergy	Medium level of synergy
Recreational Potential	Will attract only a niche group of visitors (48), limited diversity of visitors (Type E only)	Will attract low number of visitors (83), higher diversity of visitors (Type D & E)	Will attract only a larger number of visitors (140), limited diversity of visitors (Type D only)
Value Enhancing Clustering Facilities	No Value Enhancing Clustering Facilities	Some Value Enhancing Clustering Facilities on Siu A Chau	Some Value Enhancing Clustering Facilities on Siu A Chau
Employment Opportunities	Estimated number of staff 144, low variety in jobs	Estimated number of staff 214, low variety in jobs	Estimated number of staff 280, low variety in jobs
Connectivity and Infrastructure			
Access and connectivity	Access mainly by helicopter	Access mainly by helicopter and ferry	Access mainly by helicopter and ferry
Existing Infrastructure	Substantial infrastructure provision to the Island. New infrastructure required to central platform and scattered villas	Substantial infrastructure provision to the Island. New infrastructure required to central platform and scattered villas	Substantial infrastructure provision to the Island. New infrastructure required to central platform only
Pedestrian Access	Only the central platform is walkable, access to scattered villas by golf buggies	Only the central platform is walkable, access to scattered villas by golf buggies	All facilities are located at the central platform and thus walkable
Cost effectiveness and Implementation			
Topographic Constraints	Scattered villas and road access might require significant site formation work	Scattered villas and road access might require significant site formation work	Development focus on existing platform
Land availability	Mainly government owned land (6% Private Lots)	Mainly government owned land (6% Private Lots)	Mainly government owned land (0.2% Private Lots)
Financial impacts	Not attractive to private developer	Not attractive to private developer	Not attractive to private developer
Land Use Compatibility			
Land Use	No statutory plan. New OZP required	No statutory plan. New OZP required	No statutory plan. New OZP required
Interface with Existing/Planned Uses	No encroachment to site trawling sites, village environs and burial grounds. Affect existing GFS helipad & police training activities	No encroachment to site trawling sites, village environs and burial grounds. Affect existing GFS helipad & police training activities	No encroachment to site trawling sites, village environs and burial grounds. Affect existing GFS helipad & police training activities

	Option 1 – Scenic Getaway	Option 2 – Island Experience	Option 3 – Soko Adventure
Public Acceptability	May have concerns from public on closing the island from public access by private development	May have concerns from public on closing the island from public access by private development	No anticipated public objection
Environmental Impact			
Construction Impact	No sensitive receivers in close proximity	No sensitive receivers in close proximity	Sensitive receivers in close proximity, mitigation measures required
Air Quality[24]	Limited impact on marine and operational air quality	Limited impact on marine and operational air quality	Limited impact on marine and operational air quality
Noise	Limited noise impact if helipad is being relocated. Possible marine noise impact	Limited noise impact if helipad is being relocated. Possible marine noise impact	Limited noise impact if helipad is being relocated. Possible marine noise impact
Hazard to Life	No anticipated impact	No anticipated impact	No anticipated impact
Cultural Heritage	Within SAI, more impact due to scattered development plots	Within SAI, more impact due to scattered development plots	Within SAI, less impact due to more centralized developments
Ecological	Potential loss of floral species due to scattered development plots. Main concern possible impact to marine waters	Potential loss of floral species due to scattered development plots. Main concern possible impact to marine waters	Less loss of floral species due to more centralized developments. Main concern possible impact to marine waters
Visual	Compatible massing of scattered villas and central platform limited developed	Compatible massing of scattered villas and central platform limited developed	Compatible massing on central platform fully developed
Water Quality	Limited impact on marine waters with provision of proper sewage conveyance and treatment facility with proper discharge location		

3.4.2 Preferred Option for Spa and Resort Development in Study Area B1

3.4.2.1 The three options are evaluated against the evaluation criteria as mentioned above. Comparatively, **Option 3 – Spectacular Coast** presents more merits than the other Options. As the option is not recommended to be proceeded, the suggestions on the preferred option shall be regarded as the potential refinements on the Preferred Option.

3.4.2.2 On the basis of the Preferred Development Option, based on the findings of technical assessments, some of the PDAs in the development clusters were recommended to be refined or postponed to a later stage of development. Please refer to **Figure 3. 10 to 3.13** for the Preferred Development Option. Below a review/description of the PDAs per cluster.

Cluster A – Evaluation

3.4.2.3 Development of Cluster A was originally proposed in Option 3 – Spectacular Coast to provide an ecological park to preserve the seasonal wetland and would make the area more accessible to the public. Instead of having a different operator per PDA it is recommended that a single operator would be provided with incentives for developing eco-lodge type of resort facilities at this location, as well as a commitment for long-term management of the ecological park and education centre. By

[24] Dust mitigation measures would be implemented and there will be construction dust assessment during detailed design stage. Besides, the potential impact from marine and odour (study area B2) are subject to further assessment during detailed design stage.

integrating these two uses, a unique visitor experience could be achieved that is focussed on nature conservation and education.

3.4.2.4 One of the key constraints at Cluster A is the landownership with the PDAs comprising small parcels of private lots. Realization of the intended ecological park and eco-lodge type resort development is highly uncertain as it much depends on private initiatives and willingness to commit.

3.4.2.5 Moreover, as per further analysis from environmental perspective, given the sensitive nature of the area, including the ecologically important stream and extensive seasonally wet grassland, the original proposal for eco-lodge type resort development cum ecological park is recommended to be not further pursued at this stage to keep the area of Shui Hau Bay intact. This also aligns with the latest policy intention to conserve the Shui Hau Area. During the course of the Study, the Government proposes, under the Sustainable Lantau Blueprint[25] promulgated in June 2017 to advocate Conservation in predominant part of Lantau. In particular, the Blueprint suggests conserving the ecologically valuable mudflat and sandflat habitats in Shui Hau. According to the Blueprint, management measures for conservation of Shui Hau could be explored in collaboration with relevant stakeholders and supporting facilities such as information kiosks, signage, benches and shelters, where appropriate, could be proposed in support of public appreciation of the habitats while promoting public awareness on nature conservation.

Cluster D – Preferred Development Layout

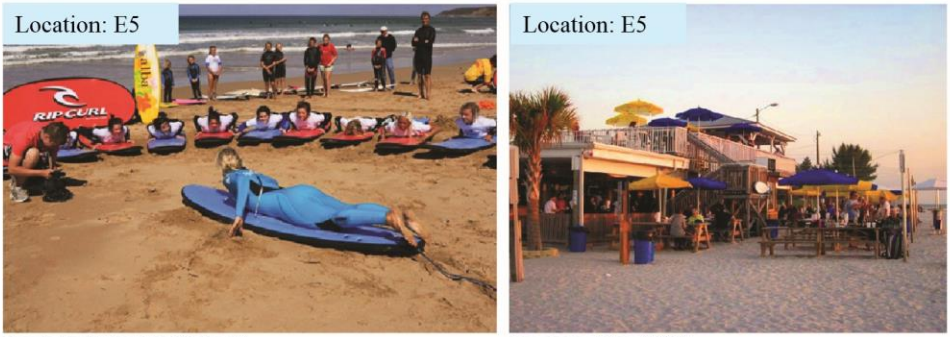
3.4.2.6 Cluster D is recognized as having a high development potential as it could result in a unique experience where a spa and resort development is fully integrated with the hill side while offering spectacular views over the bay. Cluster D is a single PDA on the steep slopes of Cheung Sha comprising Type C Resorts and will provide splendid views over the bay. Resort Type C adopts a unit size of 180sqm and a density of 5 units per ha. With the large area available for Cluster D, it will yield a total of 79 resort units, estimating 237 guests and 356 employees. As these developments are away from existing settlements, no Value Enhancing Clustering Facilities are provided. Access to the development is along the currently closed road along the eastern side of the cluster, internally a central road that follows the existing contour lines provides access to the individual villas.

Cluster E –Preferred Development Layout

3.4.2.7 Under the original Option 3- Spectacular Coast, a total of 3 PDAs are chosen in Cluster E, which are Sites E1, E3 and E10. Site E3, which comprised entirely of Government land is found most preferable for spa and resort development Resort Type A in the Cheung Sha area. Site E5 is completely under Government ownership, the Government could take up early initiatives to develop this site for various kind of facilities to enhance recreational potential of the Lower Cheung Sha Beach. For Site E1, it is recognized with potential for spa and resort development given the direct beach access and unobstructed views towards the sea. Site E1 and Site E10 will not be pursued for further development under the preferred option: Site E1 is constrained in terms of implementation as all the flat area along the beach side are under multiple private lots and it lacks existing beach facilities and synergy with the proposed Resort Type A is limited. Site E10 will affect the existing Shan Shek Wan BBQ site run by AFCD and will require substantial site formation work due to its sloping topography and lack of proximity to bathing beaches.

[25] http://www.lantau.gov.hk/download/full_report.pdf

3.4.2.8 Site E5 is reserved for Value Enhancing Clustering Facilities, some examples in **Diagram 3.4.2.1** below. Site E3 is reserved for Resort Type A development and building configurations try to emphasize the connection to the beach as possible. Cluster E (with spa and resort development on Site E3 only) will yield a total of 84 resort units, estimating 235 guests and 118 employees.



Beach Facilities (Surf School) Beach Facilities (F&B)

Diagram 3.4.2.1 – Possible Value Enhancing Clustering Facilities in Cluster E

Cluster G – Brief evaluation

3.4.2.9 Development of Cluster G at Pui O was originally proposed in Option 3 – Spectacular Coast to provide resorts and a number of Value Enhancing Clustering Facilities envisioned to attract a large number of visitors and provide a vibrant and active environment. With the identification of Pui O as a major tourist/ recreational destination with the attractive recreational facilities, the original development will be focused on Sites G5 for spa and resort development with direct beach access, while Site G3 and G4 are recommended for Value Enhancing Clustering Facilities such as an event plaza, beach facilities and commercial program to enhance the overall recreational attractiveness of the Pui O area. The boundary of Site G5 has been slightly modified taking into account the interface with the proposed cycling track.

3.4.2.10 Similar to Cluster A, one of the key constraints at Cluster G is the landownership with the PDAs comprising small parcels of private lots. Realization of the intended resort and Value Enhancing Clustering Facilities is highly uncertain as it much depends on private initiatives and willingness to commit.

3.4.2.11 Moreover, as per further analysis from environmental perspective, given the sensitive nature of the Pui O marshes with large amount of migrant population of birds recorded, the original proposal for a major recreational cluster in Cluster G is recommended to be not further pursued at this stage to keep the area intact. This also aligns with the latest policy intention to conserve the Pui O Area. During the course of the Study, the Government proposes, under the Sustainable Lantau Blueprint[26] promulgated in June 2017 to advocate Conservation in predominant part of Lantau. In particular, the Blueprint suggests conserving the ecologically valuable wetland in Pui O. According to the Blueprint, measures for conservation of Pui O wetland are being explored.

3.4.2.12 Thus, the preferred spa/resort clusters originally proposed in Pui O should no longer form part of the recommendation in this Study owning to landownership, high uncertainty of private initiatives and willingness to commit and ecological sensitivity nature of the area.

[26] http://www.lantau.gov.hk/download/full_report.pdf

3.4.2.13 In total, the total development area for the Preferred Development Option is 18.9ha, which include 18.5ha for spa and resort developments, and 0.4ha for various type of Value Enhancing Clustering Facilities. The total number of spa and resort units proposed will be approx. 163 rooms, which is expected to bring in about 472 guests and 474 direct employments.

Table 3.4.3 – Summary of Preferred Development Option for Study Area B1

Cluster	PDA	Site Area (ha)	Proposed Use	Units per ha	No. of Units*	Average Unit size (sqm)	Resort Unit GFA (sqm)	Resort Facilities GFA (sqm)	Total GFA (sqm)	PR	No. of Guests	No. of Staff
D	**D1**	**15.7**	Resort Type C	5	**79**	180	14220	7110	21330	0.14	**237**	**356**
E	**E3**	**2.8**	Resort Type A	30	**84**	65	5460	3276	8736	0.31	**235**	**118**
	E5	**0.4**	Value Enhancing Clustering Facilities	(Example: Beach Facilities, Surfing School, F&B etc)								
Total		***18.9***			***163***						***472***	***474***

*Stating the amount of units is preferred over the amount of rooms as some types of accommodations includes multiple bed rooms per unit.

3.4.3 Preferred Option for Spa and Resort Development in Study Area B2

3.4.3.1 The three options are evaluated against the evaluation criteria as mentioned above. Comparatively, **Option 2 – Island Experience** presents more merits than the other Options, in terms of feasibility, synergy, environmental impact and potential uniqueness. As developing Study Area B2 is not recommended to be proceeded, the suggestions on the preferred option shall be regarded as the potential refinements on the Preferred Option.

3.4.3.2 The Preferred Development Option on Tai A Chau is intended to add diversity to the exclusive spa and resort developments to accommodate a wider income range to increase the potential visitors that could enjoy the experience of staying on the Soko Islands. Please refer to **Figure 3.14 to 3.16** for the Preferred Option.

Preferred Development Layout

3.4.3.3 Luxurious Type E resort is envisioned with matching with the high end luxury and level of privacy. In addition to 12 units of Type E resort, this Preferred Development Option is with the variation of additional 10 Type-D resort accommodation concentrated on the central platform. Given the smaller size, less attractiveness of platform site with limited views, these villas are proposed to be developed as Type D Resort which is comparatively more affordable. Communal facilities are located at the central platform, while an unobstructed view towards the sea determines the location of the villas.

3.4.3.4 Under the Preferred Option, Siu A Chau [27] is transformed into a destination exclusively for guests of the resort. The proposed Value Enhancing Clustering Facilities at Siu A Chau are limited and utilise the present assets; hiking trails, a site for rock climbing, a lookout point, etc, in order minimize ecological and visual impact.

3.4.3.5 Please refer to the table below for the details of the Preferred Development Option. In total, the total development area for the Preferred Development Option is about 10.4ha. The total number of spa and resort units proposed will be approx. 22 rooms, which is expected to bring in about 83 guests and 214 direct employments.

Table 3.4.3.1– Summary of Preferred Development Option for Study Area B2

Spa & Resort Type	No. of Units*	Average Unit size (sqm)	Resort Unit GFA (sqm)	Resort Facilit-ies GFA (sqm)	Total GFA (sqm)	Max BH (storeys)	No. of blocks	No. of Guests	No. of Staff
D	10	500	5,000	2,000	7,000	3	8	35	70
E	12	650	7,800	3,120	10,920	2	15	48	144
Total	**22**				**17,920**			**83**	**214**

3.4.4 Conclusion

3.4.4.1 This Study has compared the comparative advantages of the different Spa and Resort options in Study Area B1 (South Lantau) and Study Area B2 (Soko Islands) with respect to their engineering, transportation, environmental and ecological, land use planning point of view. The assessment in these perspectives have suggested a competitive edge of Option 3 – Spectacular Coast for South Lantau with adjustment to some of the development clusters, as well as Option 2 – Island Experience for Soko Islands over the options proposed. Thus, they are selected as the preferred option for proposed spa and resort. From the broad technical assessment conducted as part of the Study, the proposed developments under the preferred options are considered technically feasible and shall not be regarded as the only option that may pre-empt other possible development options for the area. Besides, the Government proposes, under the Sustainable Lantau Blueprint promulgated in June 2017, to conserve the ecologically valuable wetland in Pui O as well as the mudflat and sandflat habitats in Shui Hau. Yet, taking into account the ecological significance of various sites, detailed environmental and ecological impact of the proposals should be subject to further review on their detailed layout if the individual spa/resort sites are to be pursued in the future.

3.4.4.2 It is considered that the preferred spa/resort clusters originally proposed in Shui Hau and Pui O under Study Area B1 should no longer form part of the recommendation in this Study owning to landownership, high uncertainty of private initiatives and willingness to commit and ecological sensitivity nature of the area. With the removal of these two key clusters in our Preferred Development Option, it is considered that the original intention to establish a series of different activities along the coast and create benefits for local residents will no longer able to be achieved.

3.4.4.3 In addition to the latest conservation initiatives, taking into account of the financial viability and public concerns (to be discussed in Section 6), it is considered that the

[27] This preferred option is a conceptual idea suggesting possible type of Value Enhancing Clustering Facilities . Detailed development parameters are not provided at this preliminary study stage. Further study should be conducted for the details of these Value Enhancing Clustering Facilities should the proposed spa/resort development are to be put forward in future.

implementation of spa/resort facilities in both Study Area B1 and B2 might not be worth proceeding under the recommendations of the Study.

4 Assignment C - Exploration of Synergistic Effects for Assignment A and Assignment B

4.1 Direct and Indirect Synergistic Proposals

Direct Synergistic Proposals

4.1.1.1 Direct synergistic proposals consider proposals between development in Assignment A and Assignment B. Examples include discounted fares, shuttle bus services between Development in Assignment A and B and programmes where Development in Assignment A and B share common infrastructure including retail and F&B. For discounted fares, it was found that cable car users are currently not perceived to be highly sensitive to cost. Similarly a zero-emission and eco-friendly shuttle bus service may also have low synergistic effects if it just connects Developments A and B. Synergistic effects will be created between Development A and Development B1, given that these assignments have different offers.

Indirect Synergistic Proposals

4.1.1.2 Indirect synergistic proposals are designed to drive customers from a range of target markets to Lantau Island and as a result improve visitorship to Lantau Island and then in turn increase visitorship to Development in Assignment A and B. The shuttle bus connecting multiple locations on Lantau Island is an example and could be highly effective in improving synergy and driving visitor growth. It was also shown that the development of Lantau Island as a recognised tourism destination is necessary.

4.2 Traffic and Transport Arrangement between Assignment A & B

4.2.1.1 It was considered that guests will largely desire to remain at the Soko Islands to relax, rather than riding on a boat and road vehicle to other tourist/recreational spots on Lantau. As a minimal number of such connecting visitors is envisioned, coupled with considerable constraints posed by the busy sea and air travel route between Soko Islands and Lantau, establishing a transport connection between Assignments A and B2 is not considered to be practical. In addition, it is likely that the majority of travel demand between Assignments A and B1 will be made up of resort guests attracted to the proposed cable car system rather than cable car system users being attracted to use the resorts. This demand can be handled by a zero-emission and eco-friendly shuttle service between Assignments A and B1. The frequency of such a shuttle bus service can be increased or decreased to appropriately meet demand. It is anticipated that the shuttle bus vehicles would be registered to the applicable resorts. Designated shuttles are proposed over simply enhanced public transport since enhanced franchised bus service may be undesirable compared to a private shuttle.

4.3 Financial Implications of Assignment A & B

4.3.1.1 ***Customer Profile:*** The two developments have different target market segments due to the different appeal and facilities they offer. Research found that the majority would still visit other tourist destinations on Lantau and in Hong Kong, especially if Development B provided tour services which allowed their guests to visit attractions such as at Development A more easily, even though a significant percentage of visitors at Development B would likely remain within their resort. Notwithstanding

the specific offering of the hotel and spa facilities, wider impacts to the Hong Kong economy may well be limited.

4.3.1.2 ***Geographical Separation:*** the geographical separation of the two developments would further divide the markets, especially if a shuttle bus scheme as discussed is not provided. The physical separation may deter some visitors from making the trip.

4.3.1.3 ***Risk Profiles:*** Developments A and B have different risk profiles which affect their interrelation. Risks at Development A are mostly technological and also include design risk and patronage risk. Development B does not have the same level of upfront development risks, but developments on the Soko Islands may be more challenging, but yet still easier than Development A, due to the lack of infrastructure in place. The risks to Development B include not only marketing the resort successfully by offering an internationally comparable experience through activities and facilities for visitors such as spa facilities and boat trips, but also around access. It was reckoned that there is limited operational synergy between Developments A and B due to the overall difference of the schemes.

4.3.1.4 From financial perspective, given the differing development and technological risks, operational requirements, and target markets, Developments A and B are unlikely to generate any meaningful financial synergies. It is, therefore, difficult at this stage to formulate a plan for using resources efficiently to achieve lower development costs for both developments and thus it would be difficult to establish a development synergy from a pure financial perspective.

4.3.1.5 Further, given the difference in the nature of the assets– with Development A which could be considered as either a form of transport or a tourism project, and Development B a hotel/resort development – it is likely that the procurement strategy undertaken would differ between the two Developments. This would further limit any possible financial synergies.

4.4 Summary

4.4.1.1 In summary there are limited opportunities to generate significant synergies between Developments A and B, but there may be opportunities to generate indirect synergies with other tourism/ recreational nodes on a Lantau-wide basis as the overall Recreation and Tourism Development Strategy for Lantau is developed and implemented.

5 Recommended Cycle Track in South Lantau

5.1 Summary of Key Issues, Constraints and Opportunities

Broaden the Range of Tourism Facilities in South Lantau

5.1.1.1 As originally designed in the Study Brief, a coastal cycle track in South Lantau is to be explored as Value Enhancing Clustering Facilities that could enhance the appeal and spatial continuity in association with proposed spa and resort developments in Study Area B1 for enjoyment of visitors. Yet, as per discussed in Section 3.4.4 above, since proposed spa/resort is not recommended to be pursued at this stage, given the understanding that a coastal cycle track with a certain extent could also serve as a recreational activity on its own, and these experiences would not be affected whether they are enrolled in the spa and resort facilities or not. Therefore, the recommended cycle track in this section will focus on an alignment in absence of the proposed spa/resort developments in Study Area B1.

Community- and Environmentally-sensitive Connectivity Plan

5.1.1.2 Designation of South Lantau Road as closed roads has reduced vehicle uses and hence is beneficial for the environment and the residents for years. The introduction of a cycle track along the South Lantau, as a means of green transport, would contribute to a sensitive connectivity plan effectively connecting the tourist/recreational spots while keeping community close and environmental nuisance to minimum by lowering vehicles on the road.

Engineering Considerations

5.1.1.3 The key constraints for the establishment of cycle tracks are the amount of space and maximum gradients required to be met by the TPDM. Design of the cycle track need to be carried out in accordance with the latest guidelines of the government, including TPDM and Structural Design Manual for Highways and Railway 2013 Edition ("SDMHR"), summarized in below.

Table 5.1.1: General Requirements of Cross-section Design

Design Features	General Requirements
General	Two-way cycle track with footpath alongside
Cycle track width	4m (reduced to 3.5m for space reason)
Footpath width	2m
Horizontal clearance to street furniture	Min. 500mm
Position of footpath	- Between cycle track & carriageway - Between gazetted beach & cycle track
Level difference between cycle track & footpath	Min. 50mm
Soft landscape and planting facilities for highways structures	SDMHR Clause 15.6.1 to the satisfaction of from Advisory Committee on the Appearance of Bridges and Associated Structure

Table 5.1.2: General Requirements of Alignment Design

Design Features	General Requirements
Gradient	- 3% (max. 5%) - Steeper gradient up to 8% to be approved by TD
Horizontal radius	- At-grade: 5m (min. 2m) - Cycle bridge/ ramp: min. 25m
Sight distance	25m (min. 15m)

Design Features	General Requirements
Signage and road marking	- TPDM Volume 3 Chapter 6 - Plastic bollard to be provided at pedestrian crossing. - Detailed arrangement to be approved by TD

5.2 Recommended Cycle Track Alignment

5.2.1.1 Taking into account the broad technical assessment of the proposed cycle track in South Lantau, including Hong Kong cycle track standards, land constraints, site-specific engineering constraints, connectivity with existing communities, environmental and geotechnical considerations etc, a recommended cycle track alignment with about 11km in length has been formulated and shown in **Table 5.2.1** and **Figure 5.1**.

Table 5.2.1: Recommended Cycle Track Alignment

Cycle Track Alignment Section	Explanation
Shui Hau Wan (West) Section	This section of cycle track along Lantau Road from Shui Hau to starting and termination Point X (as in the Study Brief) near Shek Pik is not recommended due to the steep road gradient.
Shui Hau Wan (East) Section	An alternative starting/termination Points X' and Y' are proposed near the major bus stop at Shui Hau Village. Land resumption at the west of it shall be avoided.
Tong Fuk Miu Wan Section	This recommended section of cycle track is straight forward routing along South Lantau Road.
Tong Fuk Section	The recommended cycle track in Tong Fuk shall route along South Lantau Road.
Upper Cheung Sha Section	The recommended cycle track shall route along South Lantau Road and then ramp down to Upper Cheung Sha Beach. Relocation of LCSD facility on South Lantau Road near Upper Cheung Sha Beach will be necessary subject to detailed design.
Lower Cheung Sha Section	The recommended cycle track shall route along Lower Cheung Sha Beach, ramp up to South Lantau Road and then ramp down to the coast above High Water Mark so as to enhance its coastal recreational values.
Pui O Wan (West) Section	This section shall continue to route along the coast.
Pui O Wan (East) Section	This section shall route along the back of the gazetted Pui O Beach, ending at the alternative terminating/ starting Point Y', i.e. the junction of Chi Ma Wan Road and South Lantau Road near the recommended bicycle parking and rental area.

Starting/Termination Points

5.2.1.2 In order to provide a good public connectivity to the proposed cycle track and enable change of modes of transport, alternative starting and termination Points X' & Y' (as oppose to original starting/termination points X/Y in the Study Brief) are proposed at

Shui Hau Village near the bus stops and at Pui O Beach near the junction of Chi Ma Wan Road and South Lantau Road as indicated in **Figure 5.1**.

Connection with Mountain Bike Trail

5.2.1.3 In view of the different natures between mountain bike trail and leisure cycle track, it is not recommended to connect them together so as to ensure safe cycling by avoiding the potential interface between experienced mountain bike cyclists and leisure cyclists.

Supporting Facilities

Bicycle Parking Facilities & Bicycle Rental Facilities

5.2.1.4 Bicycle parking facilities in the form of racks and bicycle rental facilities shall be designed to minimise land requirements. Subject to detail design, they could be provided near the proposed starting and termination Points X' and Y', Shui Hau Village, major bus stops and beaches so as to enable change of modes of transport and enhance the mutual-recreational values.

Resting areas

5.2.1.5 Resting areas shall be designated at about 1km intervals and at the key destinations such as starting / termination points, bus stops, beaches, public latrines, leisure and amenity facilities, locations where cyclist can take rest, visit places of interest or enjoy scenic views.

Public Toilets

5.2.1.6 It is considered that the existing public toilets along the proposed cycle track are adequate for the cyclists' usage. The identified public toilets are as indicated on **Figure 5.1**.

Emergency Call Points and Access

5.2.1.7 Considering the route of the recommended cycle track, the villages, emergency call points is considered not necessary, subject to detailed design. Emergency access to the proposed cycle track shall be made available at 1km interval for rescue purpose to be determined in detailed design stage. Since the recommended cycle track will mainly routed along South Lantau Road, in close vicinity of South Lantau Road or existing development, emergency access from public road is considered feasible. For cycle track sections away from public road, the cycle track shall be designed as emergency vehicular access.

5.2.2 Conclusion

5.2.2.1 While preliminary technical feasibility on the recommended cycle track alignment has been established under the broad technical assessments, potential environmental impacts should be well considered and mitigated. This suggested that detailed study, investigation and design should be carried out if the proposal is to be proceeded further.

5.2.2.2 It should be noted that the cycle track alignments under this section was formulated based on established technical guidelines of HKSAR Government, in terms of requirements on width of cycle track, footpath, landscape amenities, gradient, horizontal radius, sight distance, signature and road marking etc. Should the recommended cycle track be proceeded to detailed design stage, opportunities should be explored on flexibilities to these technical requirements, based on cycle tracks of

similar nature in other cities/ countries, so to further minimize its impacts from land use, environmental, geotechnical, land requirement and cost perspectives etc.

6 Feedbacks from Stakeholder Consultation

6.1.1.1 The stakeholder consultation presents the comments and opinions received from Marketing Sounding-Out Exercise conducted under this Study and the Public Engagement for Lantau Development regarding the proposed developments.

6.1.1.2 The objective of the Market Sounding-out Exercise was to inform the market positioning and analysis mainly on the demand for spa and resort development in South Lantau. The target stakeholders included both public and private sector organisations, in four main categories, namely Hong Kong public sector tourism bodies, Hong Kong tourism industry groups and operators, international resort and spas and specialised operators in Hong Kong.

6.1.1.3 As for the Public Engagement for Lantau Development, the objective was to gauge public opinions on Lantau Development proposals. As the methodology and foci of the public engagement by LanDAC is designed for the Lantau Development proposals as a whole, only qualitative review has been adopted to support the analysis of the public views on the proposed developments under this Study.

Summary of Findings from Market Sounding Out Exercise

6.1.1.4 Respondents were generally positive towards the extension of the cable car system. However, a number of issues were raised including the importance of providing authentic and unique tourism experiences and concerns about the receiving capacity of visitors for Tai O and potential overcrowding.

6.1.1.5 The exercise found broad interest in resort and spa developments on Lantau and both South Lantau and Soko Islands as potentially desirable destinations. Respondents emphasised that resort development could not compete with more tropical destinations but could provide its own market for staycations or existing visitors to Hong Kong. Luxury was also a potential selling point, but would need to be highly differentiated and an exceptional product. Overall, South Lantau was considered a more viable development than Soko Islands. Hotel developers interviewed focused on many of the practical development aspects such as site size, land price, infrastructure, connectivity, tax incentives and terms, and would require further information on all these aspects before considering any development further.

Summary of Findings from Public Engagement Exercises

6.1.1.6 The proposed extension of the cable car system from Ngong Ping to Tai O was not supported by the public. Major reasons backing the objection include the extension would only serve the tourists, it would destroy natural habitat and landscape, and increase transportation pressure on the local community. Tai O's limited capacity to receive tourists and the potential impact on Tai O's cultural heritage characteristics were other concerns among the objection against the proposed cable car extension.

6.1.1.7 The proposed spa and resort development at South Lantau and Soko Islands also received reservations from the public. There were doubts on the balance with conservation feasibility, and in particular the potential impacts to the marine park in Soko Islands.

6.1.1.8 On the other hand, public proposed to extend the cycle track around Lantau and expand the cycle track network, whereas potential environmental impacts should be well considered and mitigated. This echoes with the proposed cycle track along South Lantau under this Study.

7 Implementation Strategy and Programme

7.1 Implementation Strategy and Programme for Assignment A

7.1.1.1 As concluded in **Section 2.4.3**, although Cable Car Alignment 3a (BDG System) is selected as the preferred option from technical perspective, the proposed cable car system is not recommended to be worth proceeding at this stage as it does not sound in terms of financial viability and also has not well received from the public. Nonetheless, should the preferred cable car alignment is to be put forward in the future, this section is intended to provide an overview of the recommended implementation strategy and programme.

Implementation Strategy

Recommended Implementation Model

7.1.1.2 The most suitable implementation model for Assignment A appears to be a PPP model, employing a concession contract (referred hereafter at the Concession Agreement Model). This may be useful for Assignment A given it is part of a wider tourism strategy, and therefore it is important that the cable car is operated efficiently and effectively so as to attract users and to help promote Hong Kong's tourism sector.

Recommended Operator

7.1.1.3 It is considered that if MTRCL would take on operation of the proposed Cable Car System complementary benefits would be generated through economies of scale on fixed costs such as staffing.

Recommended Development Approach

7.1.1.4 In preparation for the implementation of preferred Cable Car Alignment, the necessary changes to land use will need to be carried out, in particular to the two preferred landing points in Ngong Ping and Tai O, by making references to the existing NP36028. For both Ngong Ping29 and Tai O30 terminals, it is proposed to rezone the site from "GB" to "Other Specified Uses (Cable Car Terminal)". Specific development parameters including building height and allowable non-domestic GFA to cater for the proposed operations and commercial facilities should be determined during the rezoning stage subject to detailed design.

Implementation Programme

7.1.1.5 Based on the Implementation Programme as shown in **Figure 7.1**, it will take about 10 years from the point of preparing the Study Brief for the Investigation Consultancy to the point of the cable car system opening for commercial operation.

Recommended Proposals in Tai O

7.1.1.6 In order to review the potential impacts of the preferred Cable Car System with reference to the relevant studies/ works for Tai O Revitalization with a view to

[28] By making reference to the existing NP360 (From Tung Chung to Ngong Ping), no rezoning has been carried out for the cable car towers and route as most of them fall within boundary of country parks and will be governed by the relevant ordinance. In this Study, similar arrangement is anticipated to the proposed towers of the preferred alignment within country park.
[29] Approved Ngong Ping OZP S/I-NP/6
[30] Approved Tai O Fringe OZP S/I-TOF/2

enhancing the tourism appeal of Tai O while conserving its unique character as a traditional village. The following summarizes the recommended proposals under the cable car project. **Figure 7.2** refers.

- Viewing deck at Tai O Cable Car Station
- New pedestrian route is proposed to connect Tai O Cable Car Station
- Information and Experience Centre at Lung Shing Street in Tai O
- Innovative modes of construction, management and maintenance responsibility could be identified for New Bridge Connections in Yim Tin and Po Chue Tam
- Modification of Inner Loop Heritage Trail and Outer Loop Heritage Trail in Tai O
- Establish alternative entry/exit points to the village and creating multiple transport access nodes in Tai O

7.2 Implementation Strategy and Programme for Assignment B

7.2.1.1 As concluded in Section 3.4.4, although the preferred spa and resort options for Study Area B1 and B2 are not at all technically infeasible , the proposed developments are not recommended to be worth proceeding at this stage as it does not sound in terms of financial viability and also has not well received from the public. Nonetheless, should the preferred spa and resort developments are to be put forward in the future, this section is intended to provide an overview of the recommended implementation strategy and programme.

7.2.1.2 The optimal delivery model of the proposed spa / resort for both Study Area B1 and Study Area B2 would be through private sector delivery, with the Government potentially providing financial support should it wish to encourage the project in the absence of market forces, and /or developing any public infrastructure required for the spa/ resorts.

Implementation Strategy - Study Area B1

7.2.1.3 The preferred developments in Cheung Sha are expected to yield relatively low financial benefits for the private sector[31]. Thus, if the Government wishes to encourage these projects in the absence of market appetite by the private sector, some form of financial support would be necessary.

7.2.1.4 **Cluster D**: The proposed spa and resort uses which are regarded as "Hotel" use are not currently included in either Column 1 or 2 of the "GB" zone[32] and appropriate rezoning from "GB" to a specialized "OU" zone, e.g. "OU(Spa and Resort Development)" will be required. Re-open the entire/ part of the old Tung Chung Road could be explored to provide access to Cluster D in detailed design stage.

7.2.1.5 **Cluster E**: None of the proposed spa and resort uses such as "Hotel" use or Value Enhancing Clustering Facilities are included in either Column 1 or 2 of the "Coastal Protection Area" ("CPA") zone while refreshment kiosks within "CPA" zone also require planning permission from the TPB. Appropriate rezoning will therefore be needed such as "OU(Spa and Resort Development)" for the spa/resort clusters and

[31] It should be noted that given there is a lack of strong rationale to resume private land for spa and resort development as "public purpose", future development is not recommended to proceed by means of land resumption.

[32] Approved South Lantau Coast OZP No. S/SLC/21

"Commercial" for Value Enhancing Clustering Facilities that allow "'Shop and Services' and 'Eating Place' uses to enhance vibrancy of Cheung Sha waterfront.

Implementation Programme - Study Area B1

7.2.1.6 The Implementation Programme covers the time periods needed for site investigation, land acquisition for sites that require resumption and the statutory approval period. It also outlines the time requirements for administrative and consultative procedures as well as design and construction. Figure **7.3** refers.

7.2.1.7 **Clusters D & E**: Land for development of these clusters are under Government ownership, as such the implementation schedule will not require any land resumption to be undertaken.

Implementation Strategy - Study Area B2

7.2.1.8 There are currently no statutory town plans covering Study Area B2. Thus, appropriate planning control should also be made to the land areas of the Soko Islands to guide development by the private sector.

7.2.1.9 To avoid bringing the entire extent of the Soko Islands under private ownership with a comprehensive development plan, it is recommended that discrete areas identified as suitable for specific types of uses (e.g. villa accommodation or communal facilities) are specifically zoned. Therefore, the central platform will be zoned as a specialized OU zone e.g. "OU(Spa & Resort Development)" with communal uses placed into Column 2 of the future OU zone, which will require the future operator to submit a master layout plan for approval by TPB. The dispersed areas on slopes on Tai A Chau is proposed to be zoned similarly but with "Hotel" use in Column 2 of the future OU zone with suitable restrictions to guide the future developer to minimize site formation and introduce innovative architectural design that respects the existing context. Remaining part of Tai A Chau should be designated as "GB" to define limits of development areas as well as to provide passive recreational outlets, with a general presumption against development.

Implementation Programme - Study Area B2

7.2.1.10 The recommended development areas for Study Area B2 are dispersed throughout Soko Islands. The implementation programme therefore does not account for the process of land acquisition by the private developer/ operator.

7.2.1.11 The proposed development will include some works on piers and landing steps at the waterfront. Gazettal of these works may be required under the Foreshore and Seabed (Reclamations) Ordinance. The programme takes into account the necessary processes required by Government to provide the recommended development with essential infrastructure including power, water and sewerage and includes incorporation of the necessary statutory procedures. Adequate allowance would be made for detailed geotechnical assessment, ground investigation and topographical survey works required for slope stability assessment and design of slope works and hazard mitigation measures in detailed design.

7.2.1.12 Overall, the programme for Assignment B includes an implied timeframe for the design and construction of the spa resort by the private developer. Based on the Implementation Programme as shown in **Figure 7.4**, it will take about 11 years from the point of preparing the Study Brief for the Investigation Consultancy to the point of the spa resort opening for commercial operation.

7.3 Implementation Strategy and Programme for Cycle Track in South Lantau

7.3.1.1 As concluded in Section 5.2.2, taking into account public comments received and the broad technical feasibility established in this Study, the recommended cycle track alignment proposed under this Study may worth proceeding to detailed study for implementation. Accordingly, this section is to provide an overview of the recommended implementation strategy and programme.

Implementation Strategy and Programme for Recommended Cycle Track in South Lantau

Implementation Strategy

Recommended Development Approach

7.3.1.2 The proposed cycle track has been defined as serving a "public purpose". As such, responsibility for the cycle track's implementation will rest with the relevant Government bureaux/ departments. However, implementation will need to account for the private ownership of the land identified as necessary for cycle track's route construction in detailed design stage. Further liaison with relevant Government departments to further minimize interface with existing facilities such as gazette beaches should also be made during detailed design.

7.3.1.3 The Roads (Works, Use and Compensation) Ordinance requires all road works, except those of a minor nature, shall be gazetted so as to give the public the opportunity to comment or object to such proposals. This Ordinance also provides the mechanism to resume private land for road works. Upon authorization of the proposed works to the provisions of the Roads (Works, Use and Compensation) Ordinance, the roads will be incorporated as appropriate into the respective statutory town plans.

Implementation Agents

7.3.1.4 Relevant Government departments could act as agents for construction, management and maintenance, suggested as below subject to detailed study:

Table 7.3.1 - Proposed management and maintenance

Item	Description	Maintenance Agent	Management Agent	Remarks
1.1	Road (Road surfacing, road marking, traffic signs, pedestrian railings etc.)	HyD	TD	-
1.2	Road (Street cleaning)	FEHD	FEHD	ETWB TCW No. 6/2015 - Appendix B - Note (ii)
1.3	Bridge	HyD	TD	-
1.4	Retaining structure	HyD	TD	-
1.5	Registered slope	HyD	TD	-
1.6	Road lighting	HyD/ Lighting	HyD/ Lighting	ETWB TCW No. 6/2015 - Appendix B - Note (iv)
1.7	Traffic bollards	HyD	TD	-
1.8	Exclusive road drainage system including gully pits/sumps, gully connection pipes and carrier drains	HyD	HyD	ETWB TCW No. 14/2004 - Appendix A
1.9	Non-exclusive road drain	DSD	DSD	ETWB TCW No. 14/2004 - Appendix A

Item	Description	Maintenance Agent	Management Agent	Remarks
2.0	Bicycle parking facilities (within the proposed spa/ resort development, if any)	That of the proposed spa/ resort development	That of the proposed spa/ resort development	-
2.1	Bicycle parking facilities (within government lands)	HyD	TD	-
2.2	Bicycle rental facilities (within government lands)	Private operator	Private operator	-
2.3	Resting facilities (within government lands)	HAD	HAD	-
2.4	Transplanted and compensatory trees/ vegetation	TBC[3]	TBC[3]	DEVB TC (W) No. 6/2015

Notes:

1. The following Abbreviations are adopted:

HyD	Highways Department
TD	Transport Department
FEHD	Food And Environmental Hygiene Department
DSD	Drainage Services Department

2. TD is responsible for the traffic management of public roads and footbridge maintained by Highways Department.

3. TBC denotes "to be confirmed". The maintenance and management parties of the transplanted and compensatory trees/ vegetation shall be determined and agreed with the associated parties after formulation of the tree survey report and tree preservation proposal in the detailed design stage. The determination shall comply with DEVB TC (W) No. 6/2015.

Implementation Programme

7.3.1.5 Given that substantial portions of the cycle track route are under private ownership, land resumption will be required and has been incorporated into the programme.

7.3.1.6 Based on the Implementation Programme shown in **Figure 7.5**, it is estimated that it will take about 8.5 years from the point of preparing the Study Brief for the Investigation Consultancy to the point of the cycle track being fully operational.

8 Conclusion and Way Forward

8.1.1.1 Taking into the considerations including the key issues, site constraints and opportunities, the preliminary options for the Proposed Cable Car System from Ngong Ping to Tai O (Assignment A), the Proposed Spa and Resort Developments in South Lantau and Soko Islands (Assignment B) and the Proposed Cycle Track in South Lantau are formulated under this Study. The Preferred Options are recommended based on the comparative evaluation of the broad technical assessments:

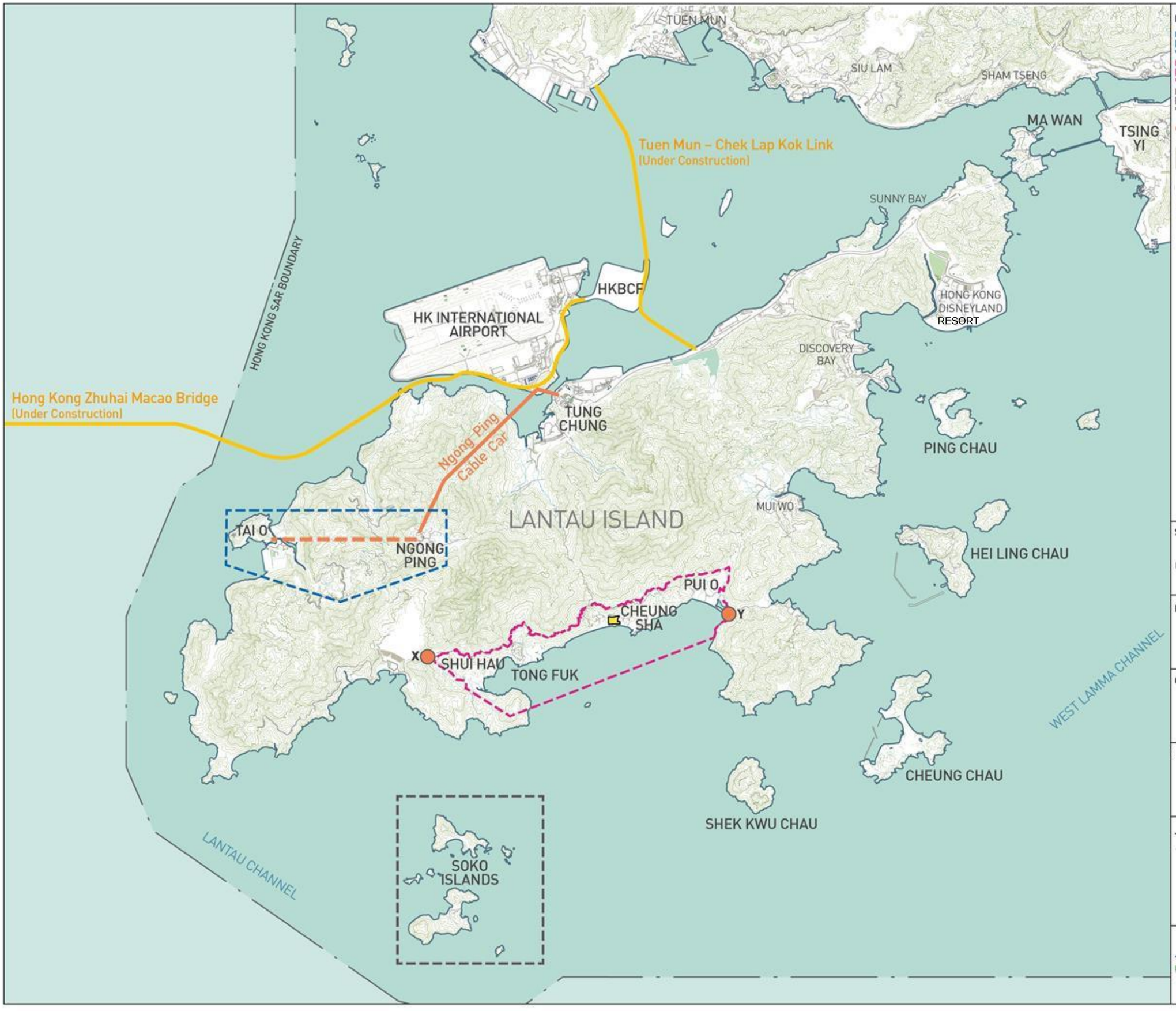
- **Preferred Option for Cable Car System (Assignment A) –** Cable Car Alignment 3a (BDG System) is selected as the preferred option from technical perspective. Although the Proposed Cable Car System is not at all technically infeasible, the proposed cable car system is not recommended to be worth proceeding at this stage as it does not sound in terms of financial viability and also has not well received from the public.

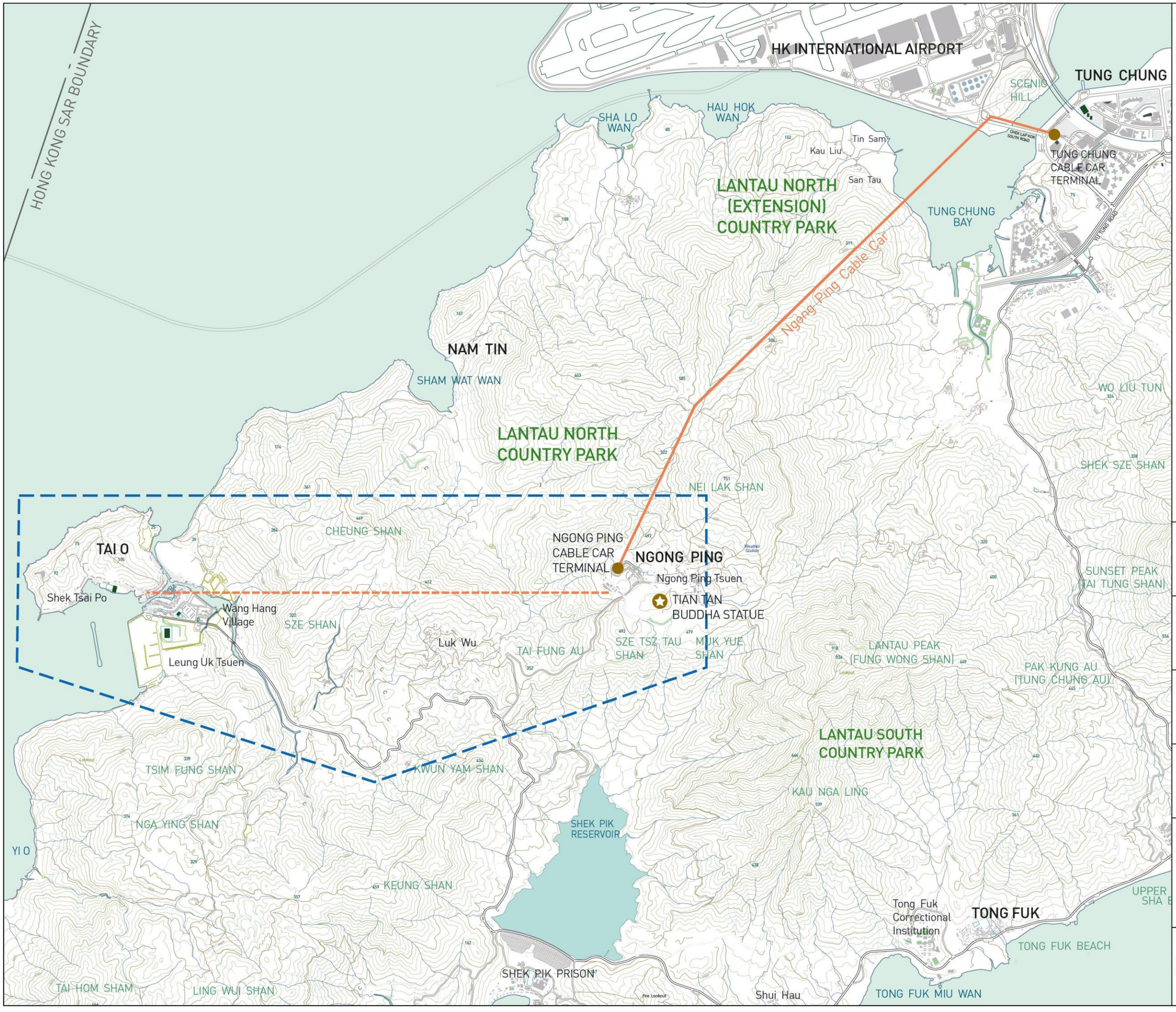
- **Preferred Options for Spa and Resort Development (Assignment B) –** Option 3 – Spectacular Coast for South Lantau with adjustment to some of the development clusters, as well as refined Option 2 – Island Experience for Soko Islands are selected over the options proposed. From the broad technical assessment conducted as part of the Study, the proposed developments under the preferred options are considered technically feasible, yet shall not be regarded as the only option that may pre-empt other possible development options for the area. Yet, taking into account the ecological significance of various sites, detailed environmental and ecological impact of the proposals should be subject to further review during the detailed design stage if the preferred options are to pursued in the future. Nonetheless, taking into account of the financial viability and public concerns, the preferred options under Assignment B (Spa and Resort) might not be worth proceeding at this stage under the recommendations of the Study.

- **Recommended Cycle Track in South Lantau –** Taking into account of HK cycle track standards and broad technical assessments, a recommended cycle track alignment along South Lantau coast has been formulated as a recreational activity on its own. While preliminary technical feasibility on the recommended cycle track alignment has been established under the broad technical assessments, further detailed study, investigation and design should be carried out, in particular on the environmental and cost aspects, together with the necessary statutory procedures, including but not limited to the EIA, if the cycle track proposal is to be proceeded further. The current alignment recommended should not pre-empt other options in connecting South Lantau in the future, if found necessary.

- **Synergistic Effects between Assignment A & B (Assignment C)–** Concluded that limited synergy could be achieved between the two developments from perspective of tourist appeal, transport arrangement, financial and procurement perspectives.

Figures


TUEN MUN
SIU LAM
SHAM TSENG
MA WAN
TSING YI
Tuen Mun – Chek Lap Kok Link
(Under Construction)
SUNNY BAY
HONG KONG SAR BOUNDARY
HKBCF
HK INTERNATIONAL AIRPORT
HONG KONG DISNEYLAND RESORT
DISCOVERY BAY
Hong Kong Zhuhai Macao Bridge
(Under Construction)
TUNG CHUNG
Ngong Ping Cable Car
PING CHAU
LANTAU ISLAND
MUI WO
TAI O
NGONG PING
HEI LING CHAU
PUI O
CHEUNG SHA
Y
X
SHUI HAU
TONG FUK
WEST LAMMA CHANNEL
CHEUNG CHAU
SHEK KWU CHAU
LANTAU CHANNEL
SOKO ISLANDS
LEGEND
STUDY AREA A
STUDY AREA B1
STUDY AREA B2
THE PROPOSED CABLE CAR SYSTEM (THE ALIGNMENT IS INDICATIVE ONLY)
AREA FOR PROPOSED SPA AND RESORT FACILITIES
(Under 2006 Spa and Resort Study)
STARTING AND TERMINAL POINTS OF PROPOSED CYCLE TRACK (X & Y)
Scale and Orientation
0m 1km
N
Drawn
WLL
Date
Feb 2018
Checked
WLL
Approved
WLL
Figure No.
1.1
Drawing Title
Study Areas A, B1 and B2
Job Title
Agreement No. CE 10/2015 (CE)
PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY
CEDD 土木工程拓展署 Civil Engineering and Development Department
ARUP



LEGEND

- STUDY AREA A
- THE PROPOSED CABLE CAR SYSTEM (THE ALIGNMENT IS INDICATIVE ONLY)

Scale and Orientation

N

0m 500m 1km

Drawn	Date
WLL	Feb 2018

Checked	Approved
WLL	WLL

Figure No. 1.2

Drawing Title Study Area A – Ngong Ping and Tai O

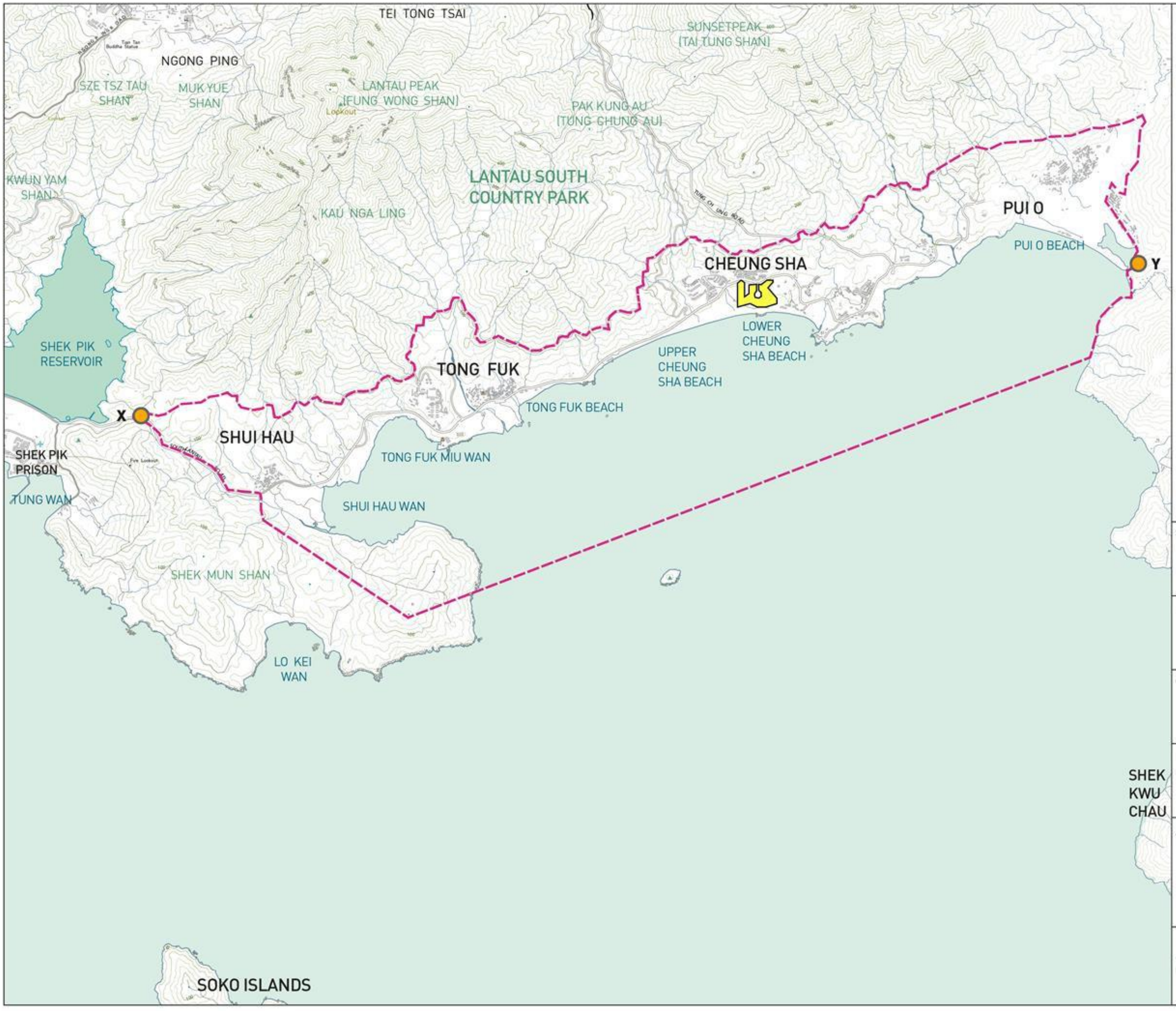
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP


TEI TONG TSAI
SUNSETPEAK
(TAI TUNG SHAN)
NGONG PING
SZE TSZ TAU
SHAN
MUK YUE
SHAN
LANTAU PEAK
(FUNG WONG SHAN)
PAK KUNG AU
(TUNG CHUNG AU)
KWUN YAM
SHAN
LANTAU SOUTH
COUNTRY PARK
KAU NGA LING
PUI O
PUI O BEACH
CHEUNG SHA
Y
SHEK PIK
RESERVOIR
TONG FUK
LOWER
CHEUNG
SHA BEACH
UPPER
CHEUNG
SHA BEACH
TONG FUK BEACH
X
SHUI HAU
SHEK PIK
PRISON
TONG FUK MIU WAN
TUNG WAN
SHUI HAU WAN
SHEK MUN SHAN
LO KEI
WAN
SHEK
KWU
CHAU
SOKO ISLANDS
LEGEND
STUDY AREA B1
AREA FOR PROPOSED
SPA AND RESORT FACILITIES
(Under 2006 Spa and Resort Study)
STARTING AND TERMINAL POINT OF
PROPOSED CYCLE TRACK (X & Y)
Scale and Orientation
N
0m
500m
1km
Drawn
NL
Date
Feb 2018
Checked
NL
Approved
NL
Figure No.
1.3
Drawing Title
Study Area B1 –
Cheung Sha
Job Title
Agreement No. CE 10/2015 (CE)
PRELIMINARY FEASIBILITY STUDY OF
CABLE CAR SYSTEM FROM NGONG PING TO
TAI O, AND SPA AND RESORT DEVELOPMENT
AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY
CEDD
土木工程拓展署
Civil Engineering and
Development Department
ARUP

LEGEND

STUDY AREA B2

Scale and Orientation

0m 500m 1km

N

Drawn	Date
NL	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
1.4	**Study Area B2 – Soko Islands**

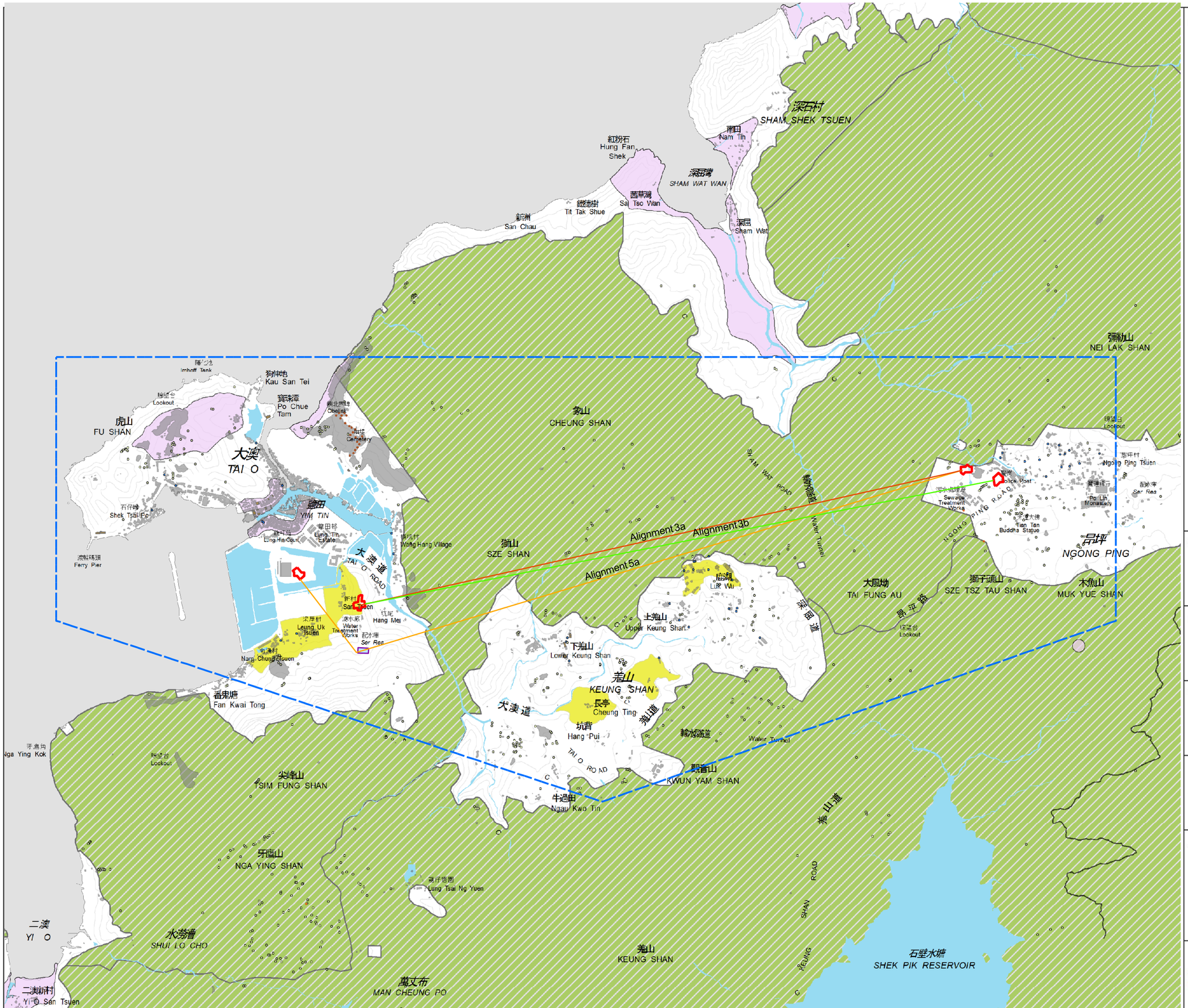
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



LEGEND

- Study AreaA

Possible Cable Car Alignments

- Alignment 3a
- Alignment 3b
- Alignment 5a
- Proposed Cable Car Terminus
- Proposed Turning Point
- Cemetery
- Small Burial Urn
- Small Grave
- Small Shrine
- Water Bodies
- Village Environs
- Sites of Archaeological Interest
- Declared Monuments
- Graded Historic Buildings
- Country Park
- Building

Scale and Orientation

0 0.25 0.5 KM

Drawn	Date
WLL	Feb 2018
Checked	**Approved**
WLL	WLL

Figure No. 2.1

Drawing Title Preliminary Cable Car Alignments

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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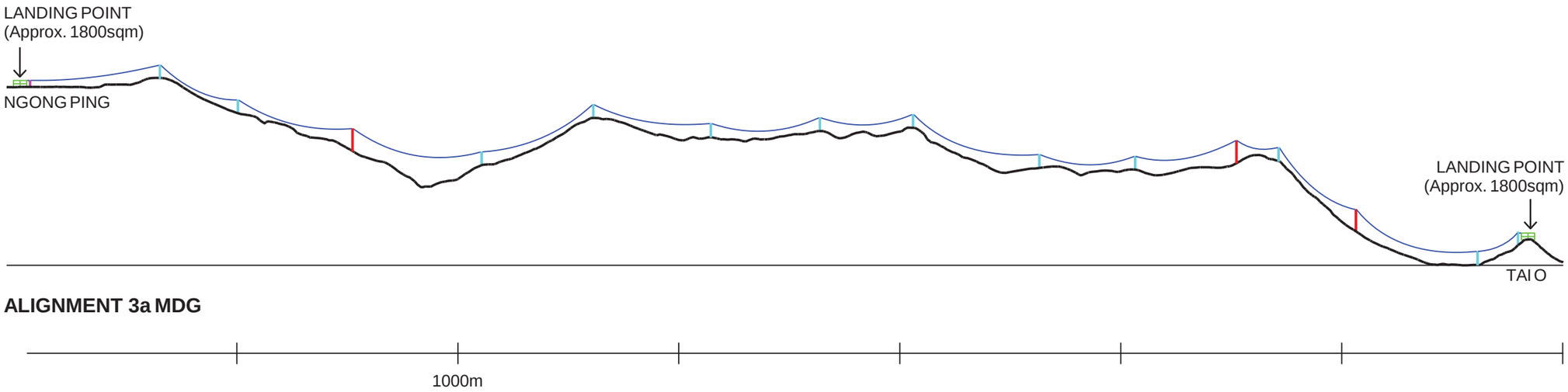
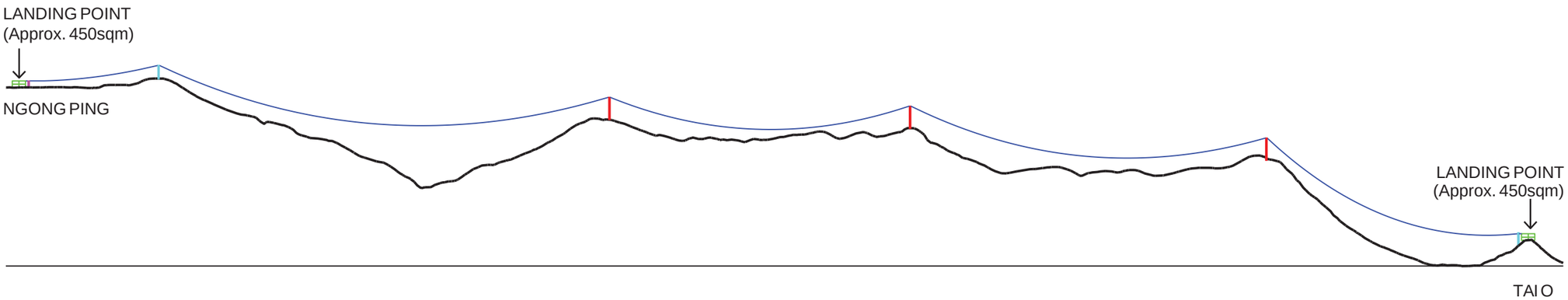


ALIGNMENT 3a MDG



ALIGNMENT 3a BDG/3S

LEGEND

- 15m Cable Tower
- 30m Cable Tower
- 50m Cable Tower

Scale and Orientation

Not to Scale

Drawn	Date
RH	Feb 2018
Checked	**Approved**
CY	KL

Figure No. 2.2

Drawing Title

Study Area A
Section of Alignment 3a

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

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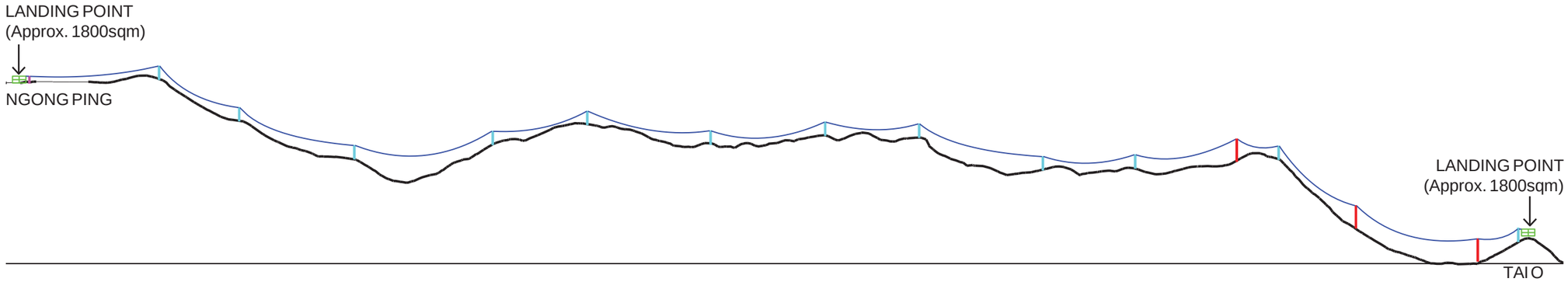
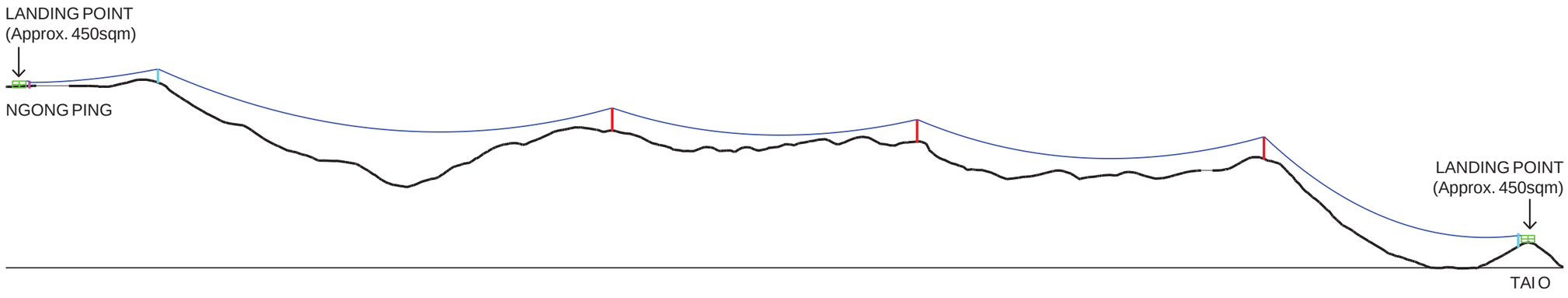


ALIGNMENT 3b MDG



ALIGNMENT 3b BDG/3S

LEGEND

- 15m Cable Tower
- 30m Cable Tower
- 50m Cable Tower

Scale and Orientation

Not to Scale

Drawn	Date
RH	Feb 2018
Checked	**Approved**
CY	KL

Figure No. 2.3

Drawing Title
Study Area A
Section of Alignment 3b

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

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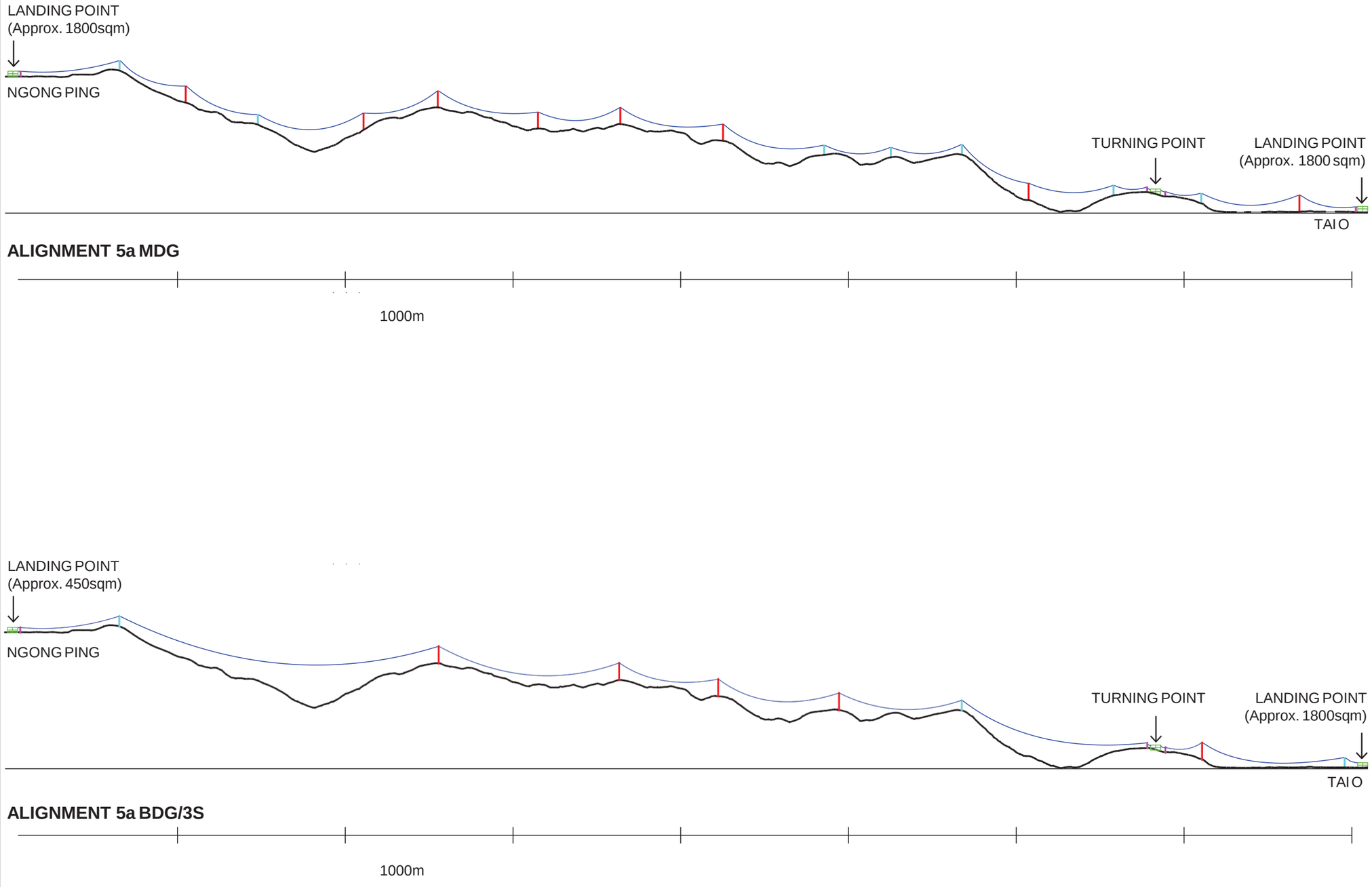

LEGEND

- 15m Cable Tower
- 30m Cable Tower
- 50m Cable Tower

Scale and Orientation

Not to Scale

Drawn	Date
RH	Feb 2018
Checked	**Approved**
CY	KL

Figure No.	Drawing Title
2.4	**Study Area A** **Section of Alignment 5a**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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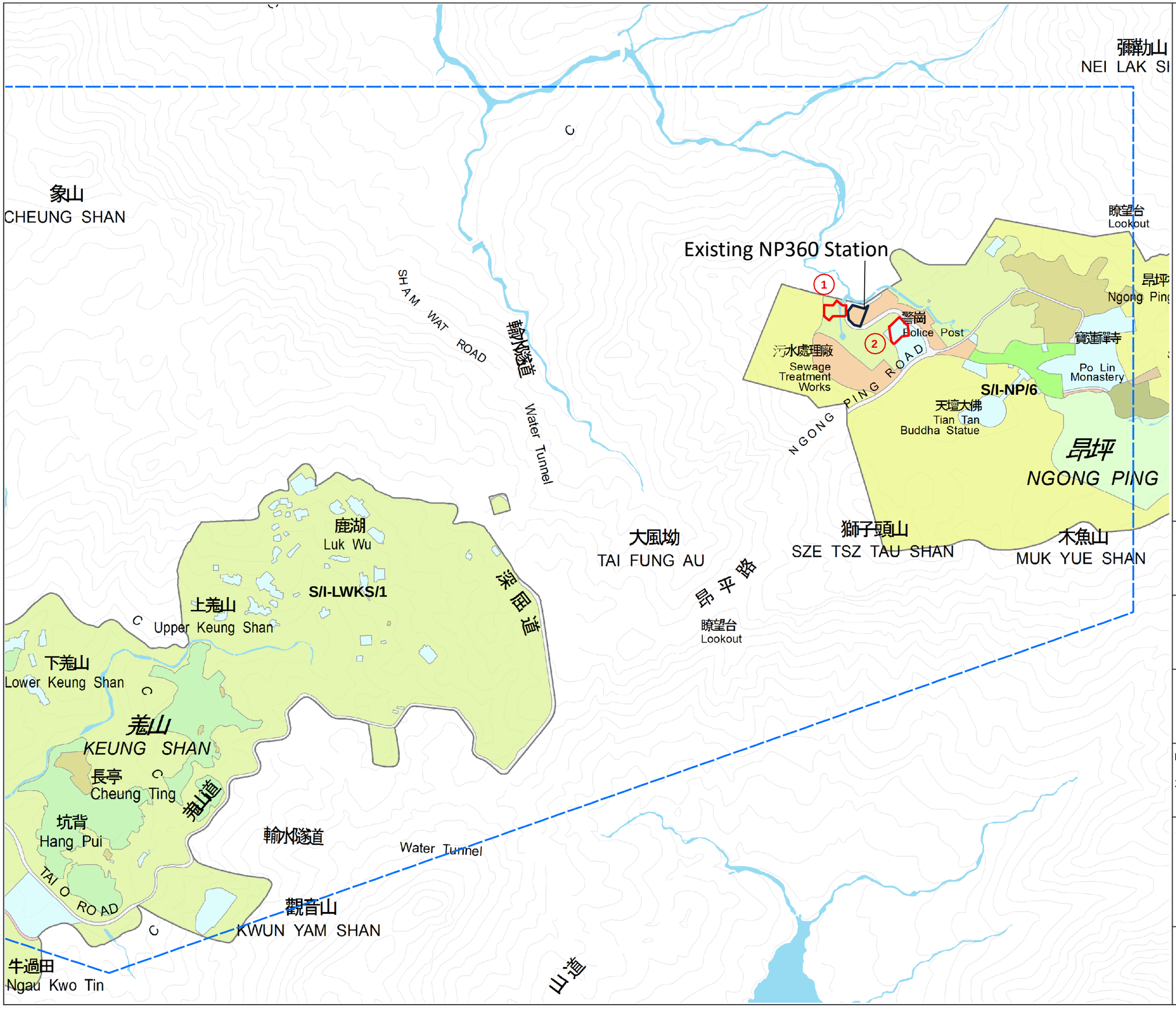
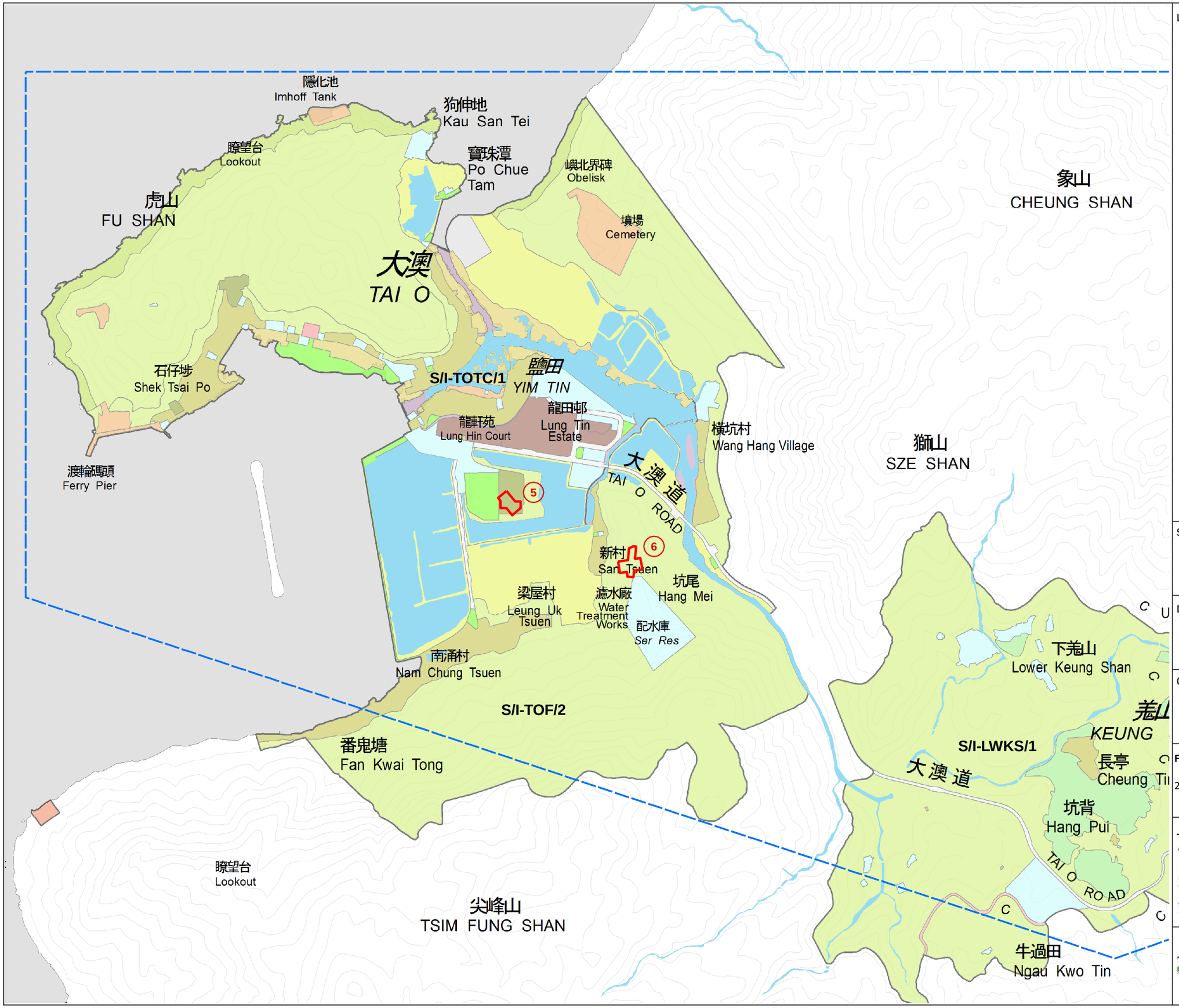

LEGEND
Study Area A
Proposed Cable Car Terminus
Water Bodies
Zoning
AGR
CA
CP
G/IC
GB
MRDJ
O
OU
R(C)
REC
SSSI
V
Outline Zoning Plan (OZP)
彌勒山
NEI LAK SI
象山
CHEUNG SHAN
Existing NP360 Station
1
2
瞭望台
Lookout
警崗
Police Post
污水處理廠
Sewage Treatment Works
寶蓮禪寺
Po Lin Monastery
S/I-NP/6
天壇大佛
Tian Tan Buddha Statue
昂坪
NGONG PING
SHAM WAT ROAD
輸水隧道
Water Tunnel
NGONG PING ROAD
鹿湖
Luk Wu
S/I-LWKS/1
上羌山
Upper Keung Shan
下羌山
Lower Keung Shan
羌山
KEUNG SHAN
長亭
Cheung Ting
坑背
Hang Pui
TAI O ROAD
觀音山
KWUN YAM SHAN
牛過田
Ngau Kwo Tin
大風坳
TAI FUNG AU
昂平路
獅子頭山
SZE TSZ TAU SHAN
木魚山
MUK YUE SHAN
Scale and Orientation
0 0.1 0.2 KM
Drawn
LJ
Date
Feb 2018
Checked
WLL
Approved
WLL
Figure No.
2.5
Drawing Title
Study Area A
Potential Sites and Existing Land Use at Ngong Ping
Job Title
Agreement No. CE 10/2015 (CE)
PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY
CEDD 土木工程拓展署 Civil Engineering and Development Department
ARUP



LEGEND

- Study Area A
- Proposed Cable Car Terminus
- Water Bodies

Zoning

- AGR
- C
- CA
- CP
- CPA
- G/IC
- GB
- MRDJ
- O
- OU
- R(A)
- R(C)
- R(D)
- REC
- U
- V
- Development Permission Area (DPA)
- Outline Zoning Plan (OZP)

Scale and Orientation

0 0.1 0.2 KM

Drawn	Date
WLL	Feb 2018
Checked	**Approved**
WLL	WLL

Figure No. 2.6

Drawing Title Study Area A Potential Sites and Existing Land Use at Tai O

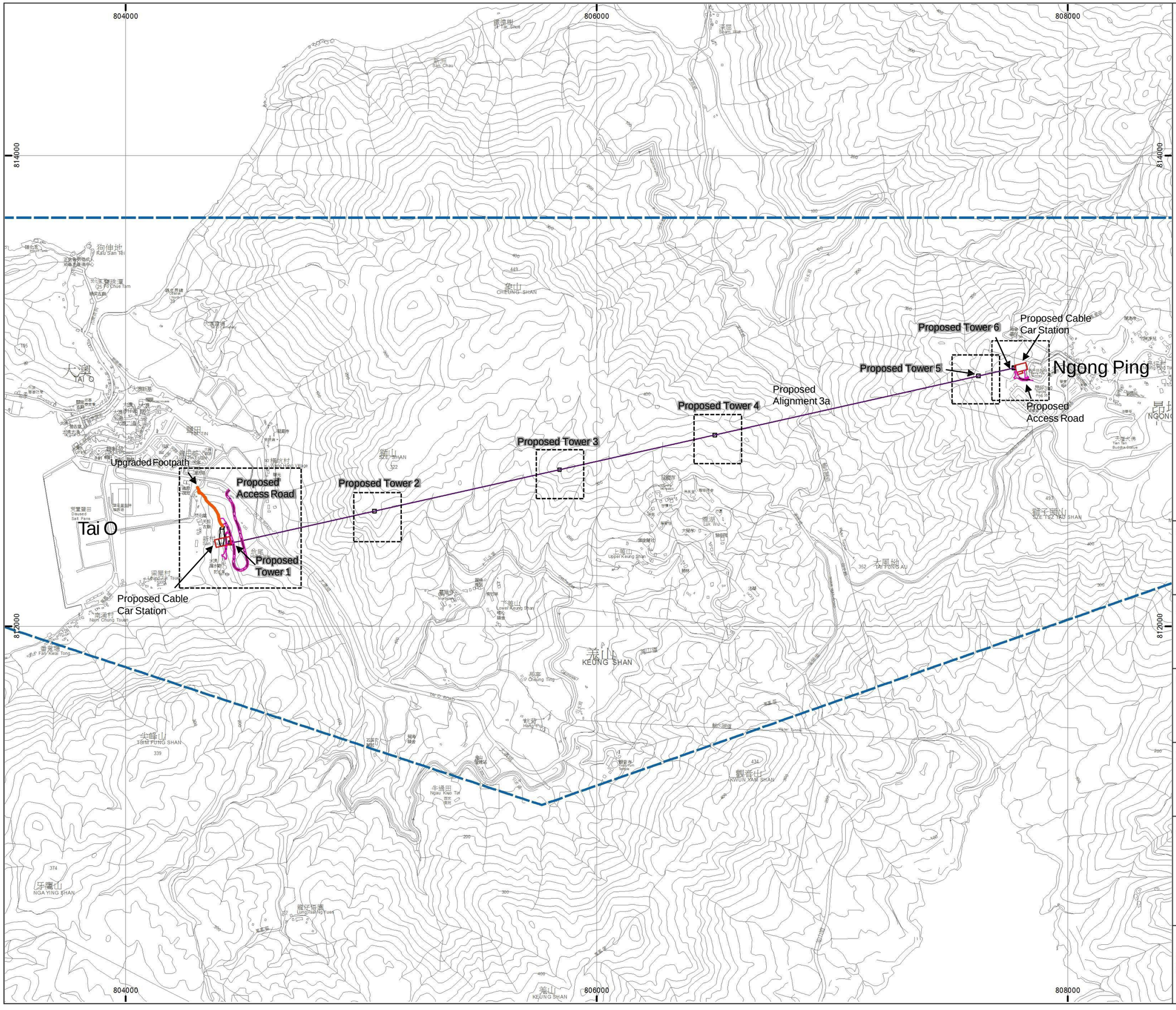
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



LEGEND

- Study Area A
- Proposed Alignment 3a
- Proposed Towers
- Proposed Cable Car Station
- Proposed Access Road
- Proposed Upgraded Footpath

Scale and Orientation

0m 200m 400m

N

Drawn	Date
WLL	Feb 2018
Checked	**Approved**
WLL	WLL

Figure No. 2.7

Drawing Title **Preferred Alignment 3a**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

LEGEND

Scale and Orientation

1:1000 (A3)

Drawn	Date
CR	Feb 2018

Checked	Approved
WLL	WLL

Figure No.	Drawing Title
2.8a	Ngong Ping Terminus Site Plan

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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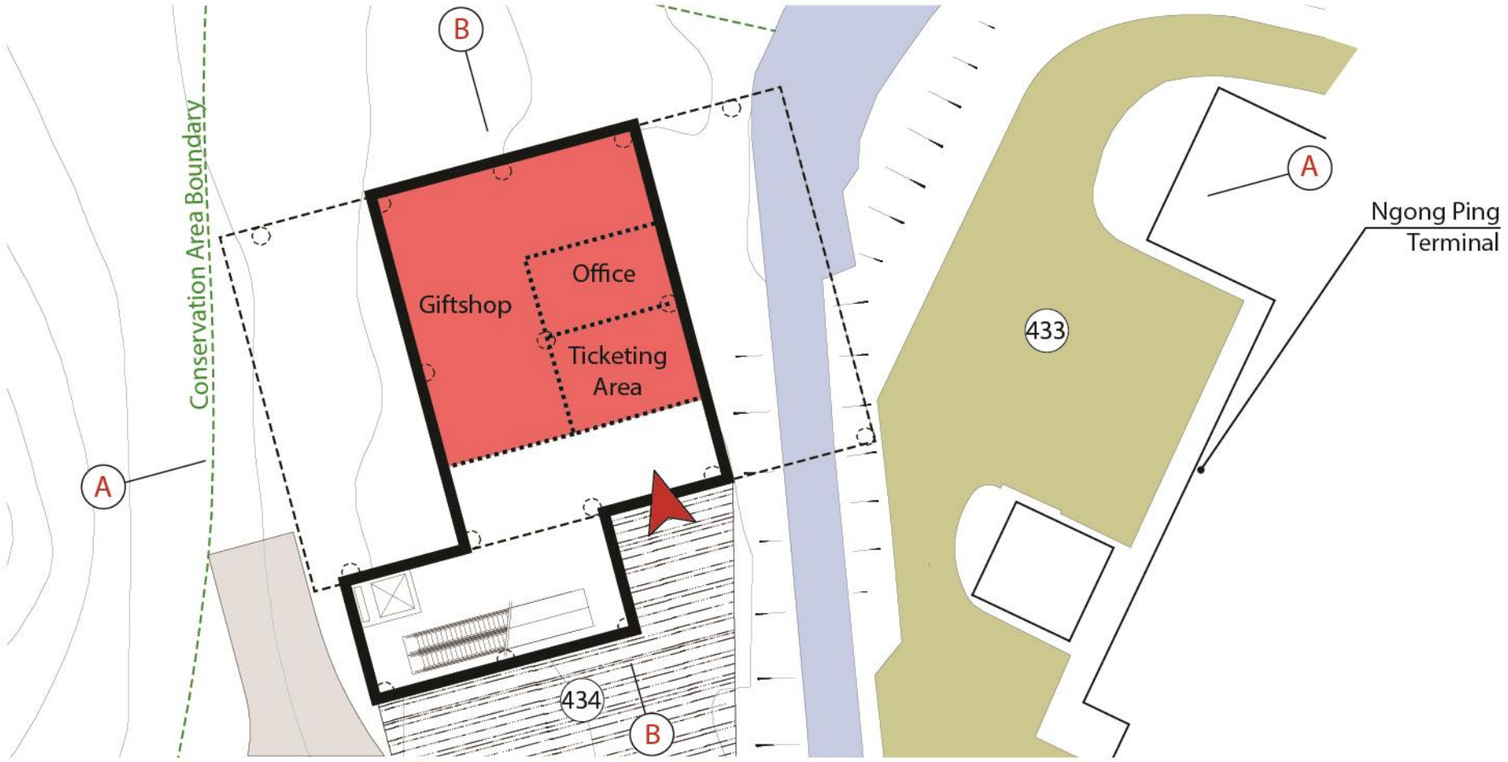
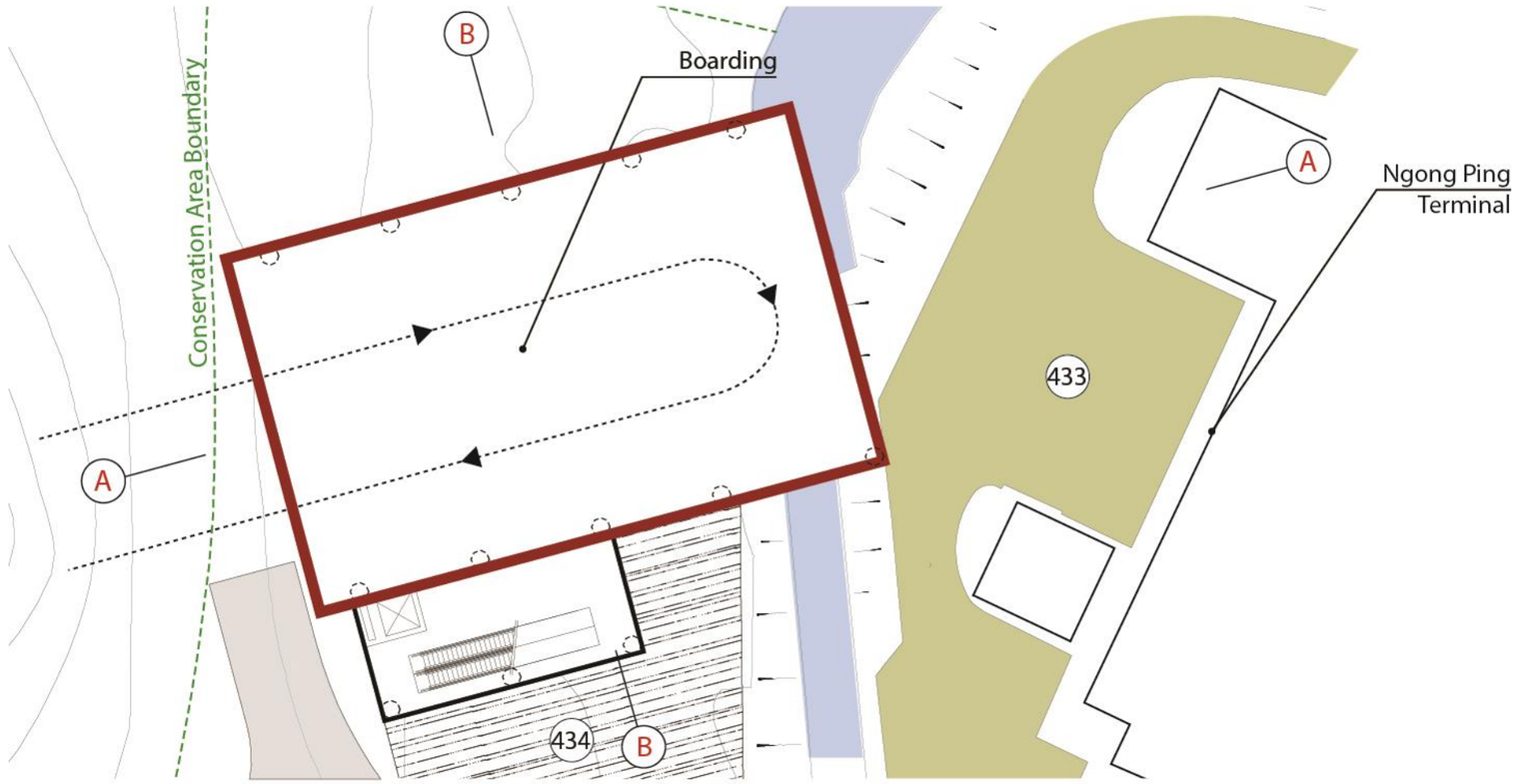


Entrance Level



Boarding Level

LEGEND

Scale and Orientation

1:500 (A3)

Drawn	Date
CR	Feb 2018

Checked	Approved
WLL	WLL

Figure No.	Drawing Title
2.8b	**Ngong Ping Terminus Plans**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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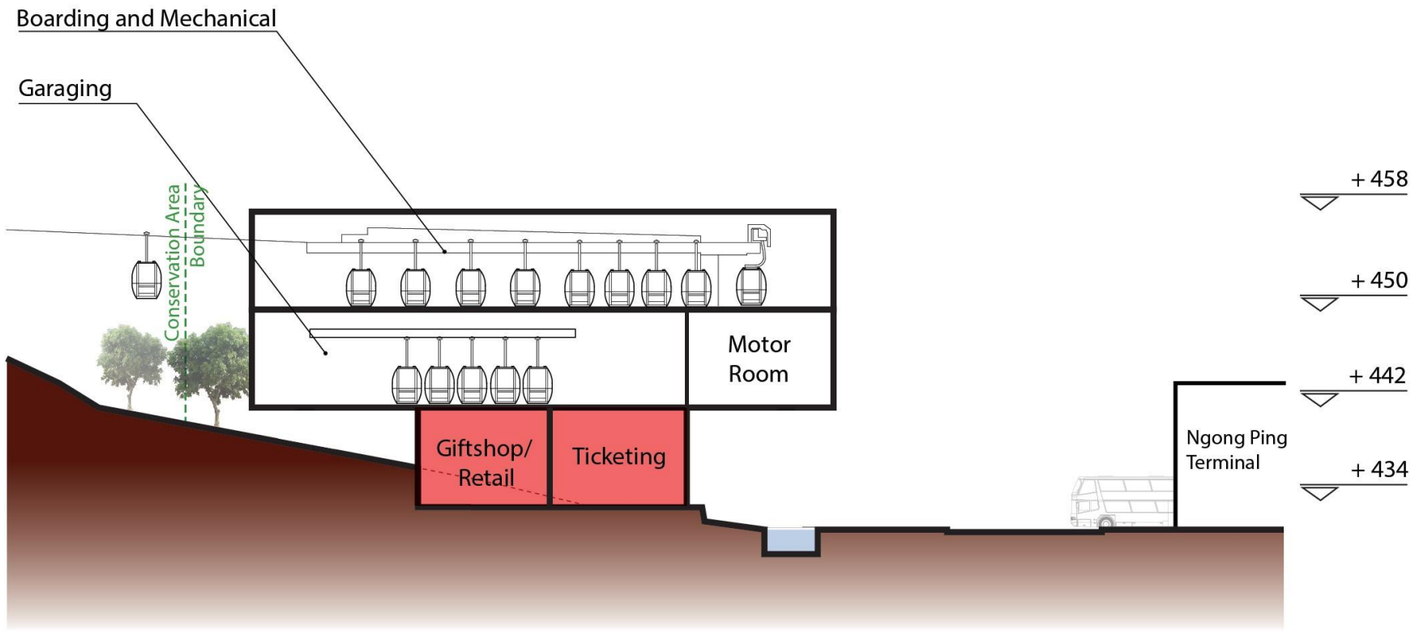
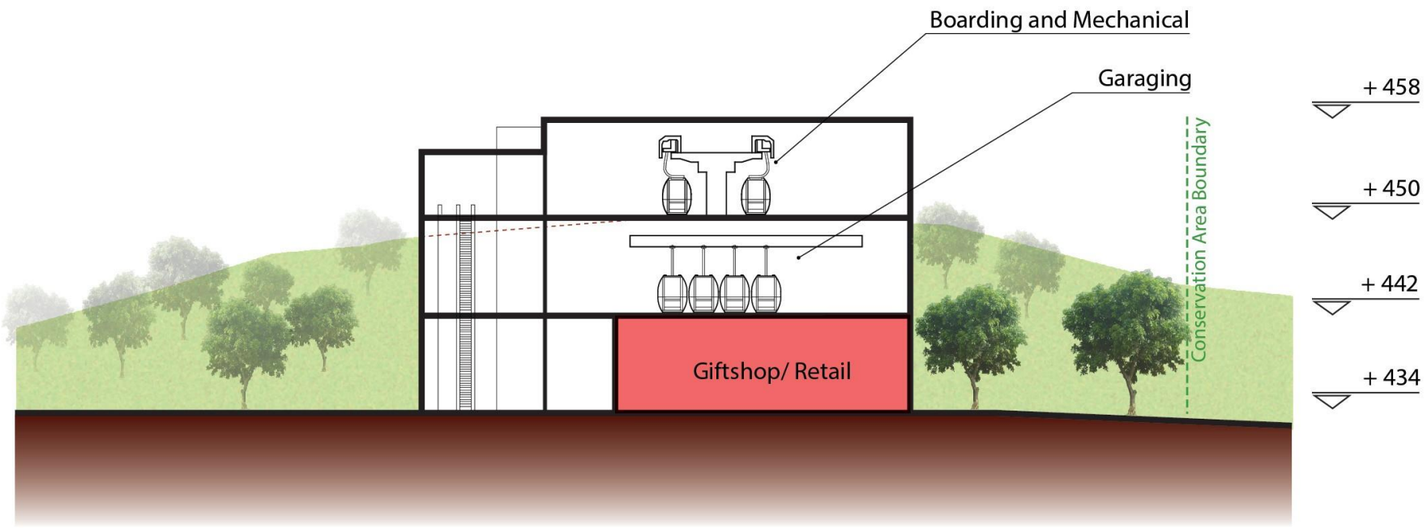


Section A-A



Section B-B

LEGEND

Scale and Orientation

1:500 (A3)

Drawn	Date
CR	Feb 2018

Checked	Approved
WLL	WLL

Figure No.	Drawing Title
2.8c	Ngong Ping Terminus Sections

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

LEGEND

Scale and Orientation

Drawn	Date
CR	Feb 2018
Checked	**Approved**
WLL	WLL

Figure No.	**Drawing Title**
2.9a	**Tai O Terminus Site Plan**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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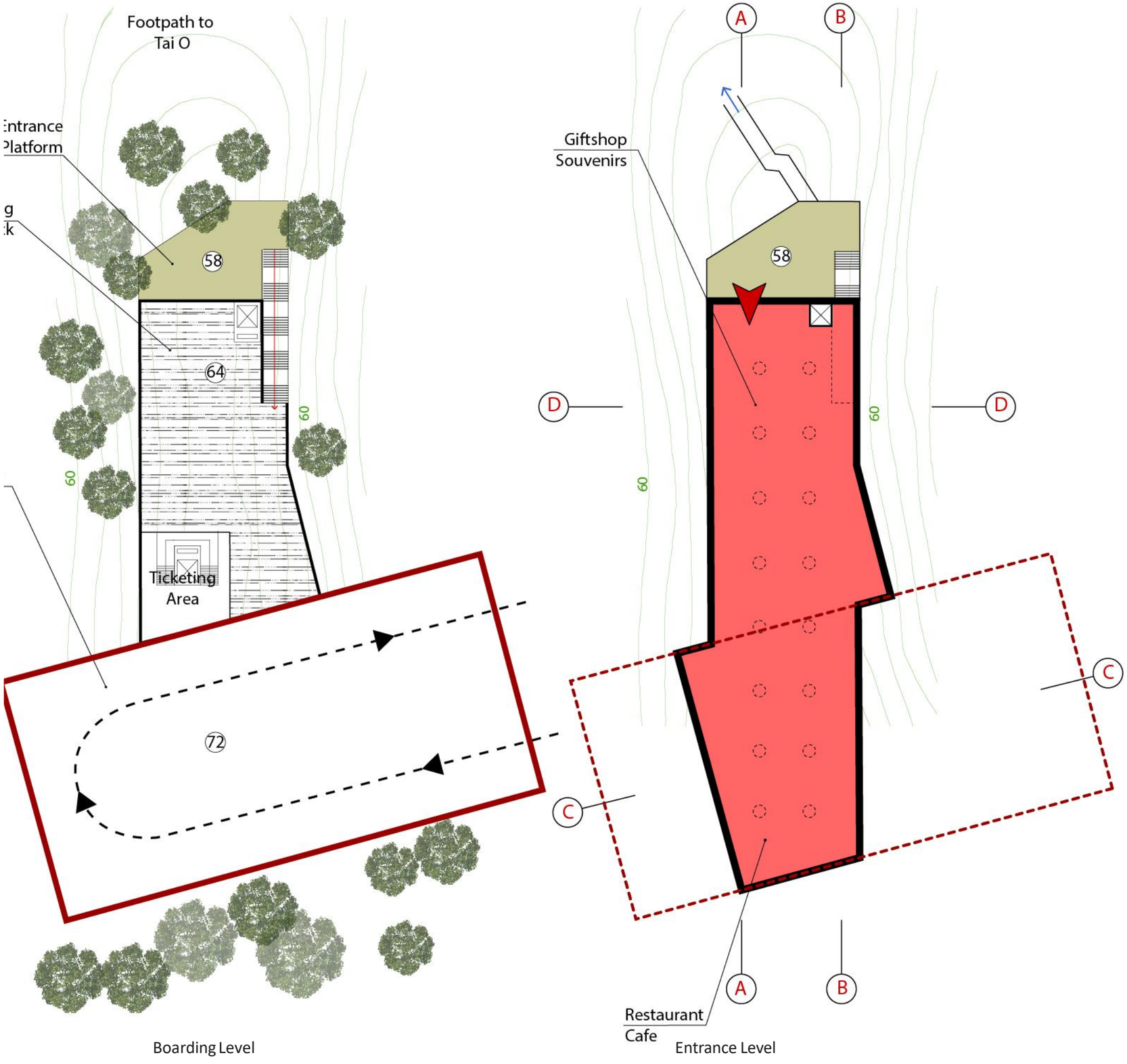

LEGEND

Scale and Orientation

1:500 (A3)

Drawn	Date
CR	Feb 2018

Checked	Approved
WLL	WLL

Figure No.	Drawing Title
2.9b	**Tai O Terminus Plans**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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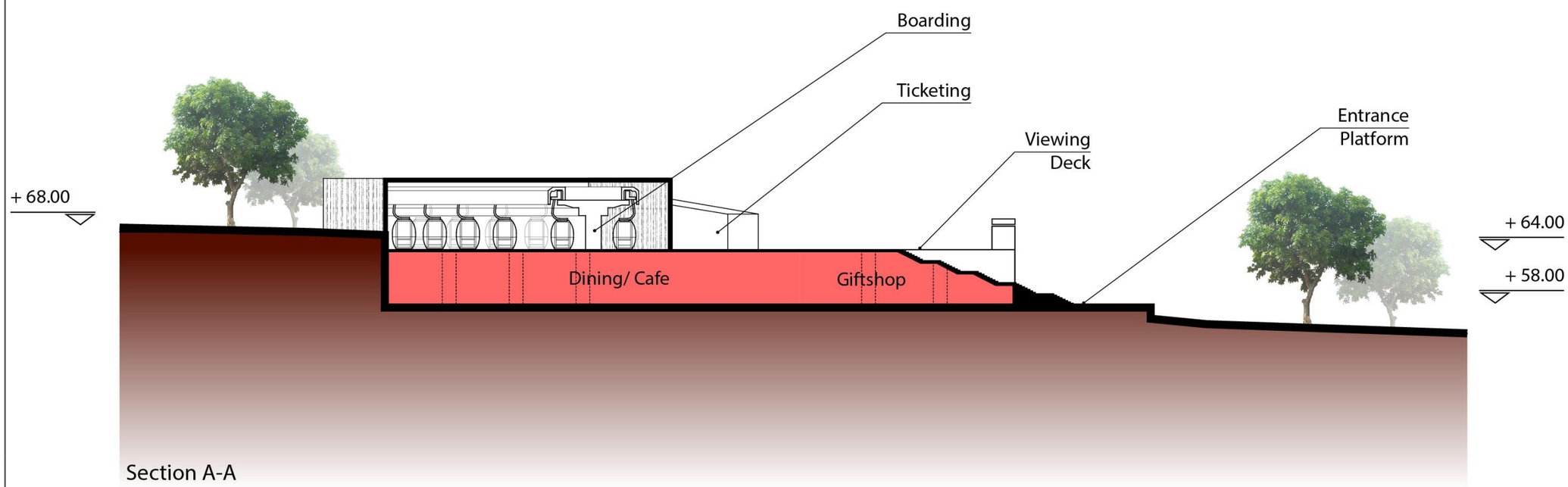

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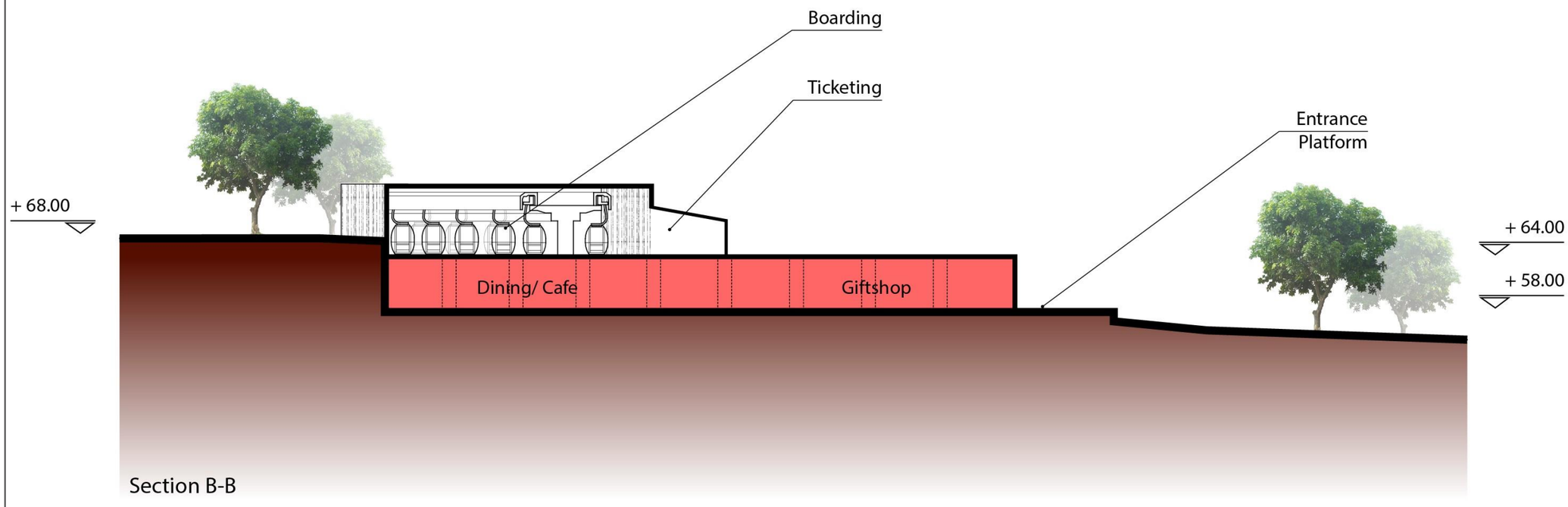

Section B-B

LEGEND

Scale and Orientation

1:500 (A3)

Drawn	Date
CR	Feb 2018

Checked	Approved
WLL	WLL

Figure No.

2.9c

Drawing Title

Tai O Terminus Sections

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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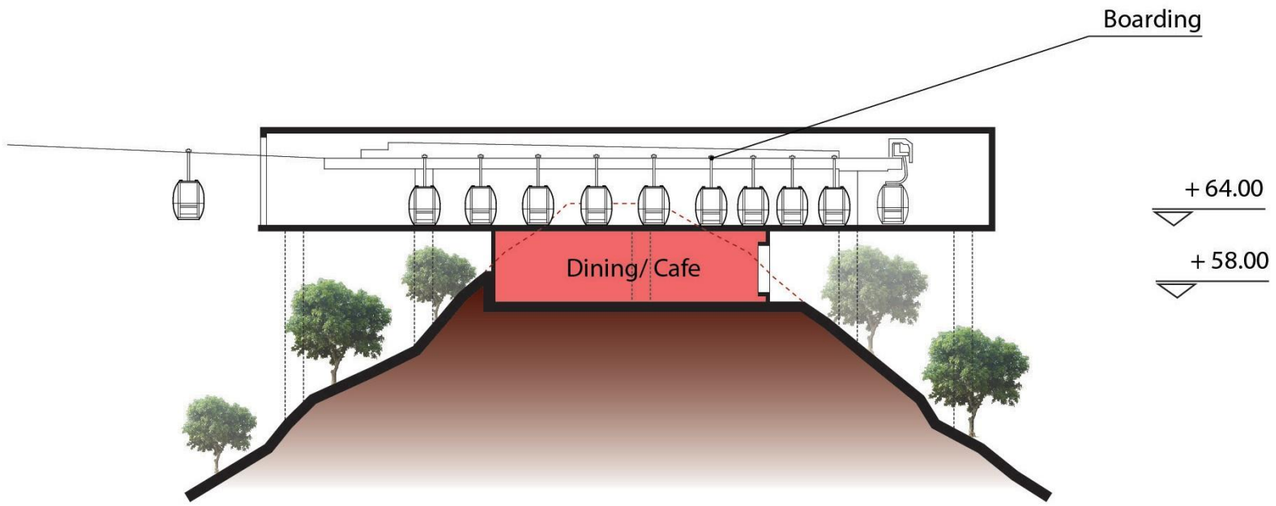

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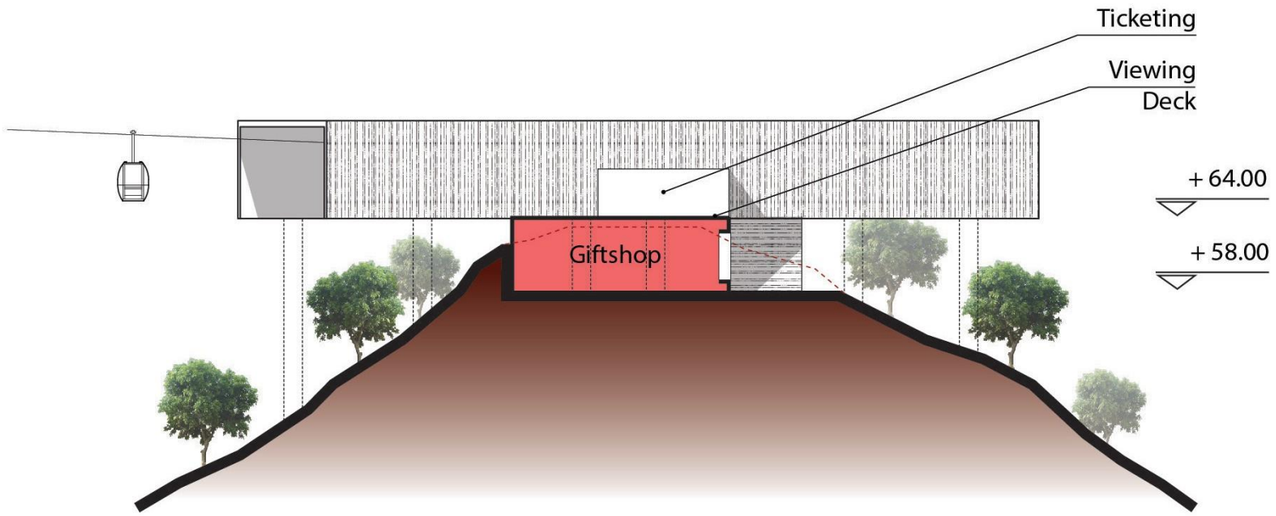

Section D-D

LEGEND

Scale and Orientation

1:500 (A3)

Drawn	Date
CR	Feb 2018

Checked	Approved
WLL	WLL

Figure No.	Drawing Title
2.9d	**Tai O Terminus Sections**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

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Option 1 – Leisure Clusters

LANTAU SOUTH COUNTRY PARK

869 SUNSET PEAK

934 LANTAU PEAK

GATHER/PLAY

RECREATION/ RELAXATION

PUI O

RELAXATION

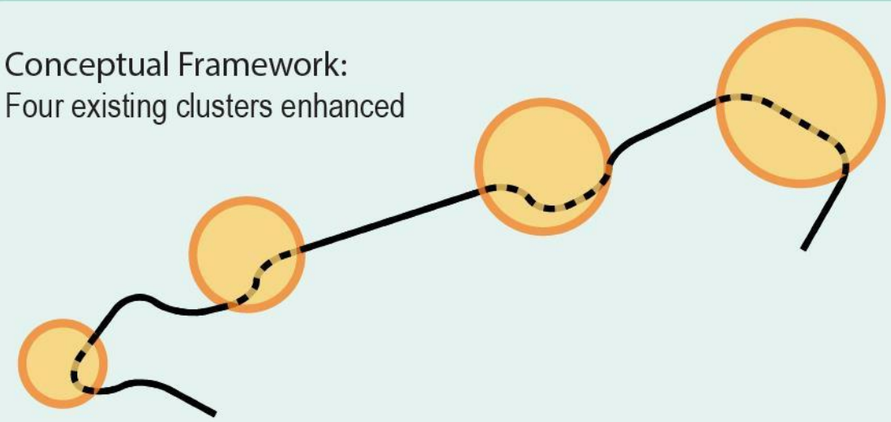
CHEUNG SHA

RELAXATION/ ECO-RECREATION

TONG FUK

SHUI HAU

Conceptual Framework:
Four existing clusters enhanced



LEGEND

- Study Area B1
- Existing Development
- Potential Development Area
- Development Cluster
- Green Corridor
- Destination
- Proposed Public Pier

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.1	**Study Area B1 Option 1 - Spatial Development Strategy**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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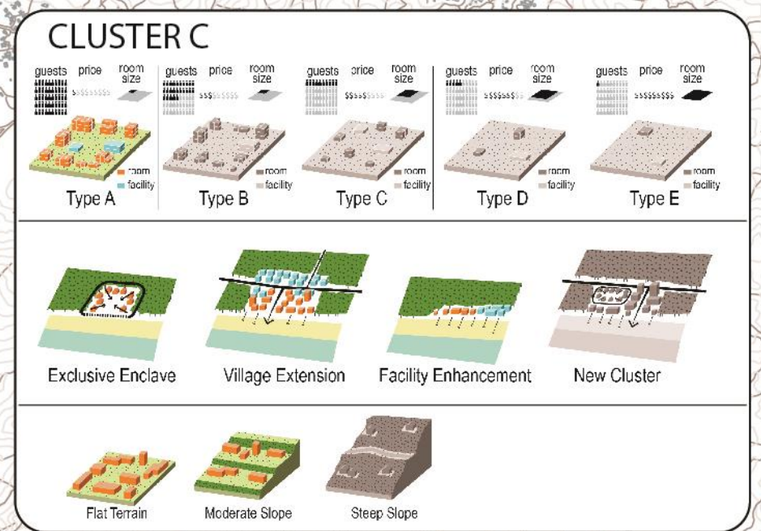
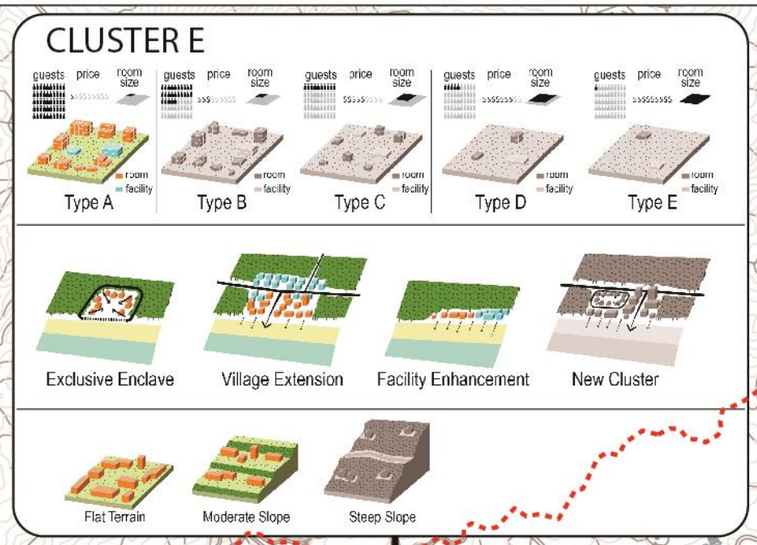
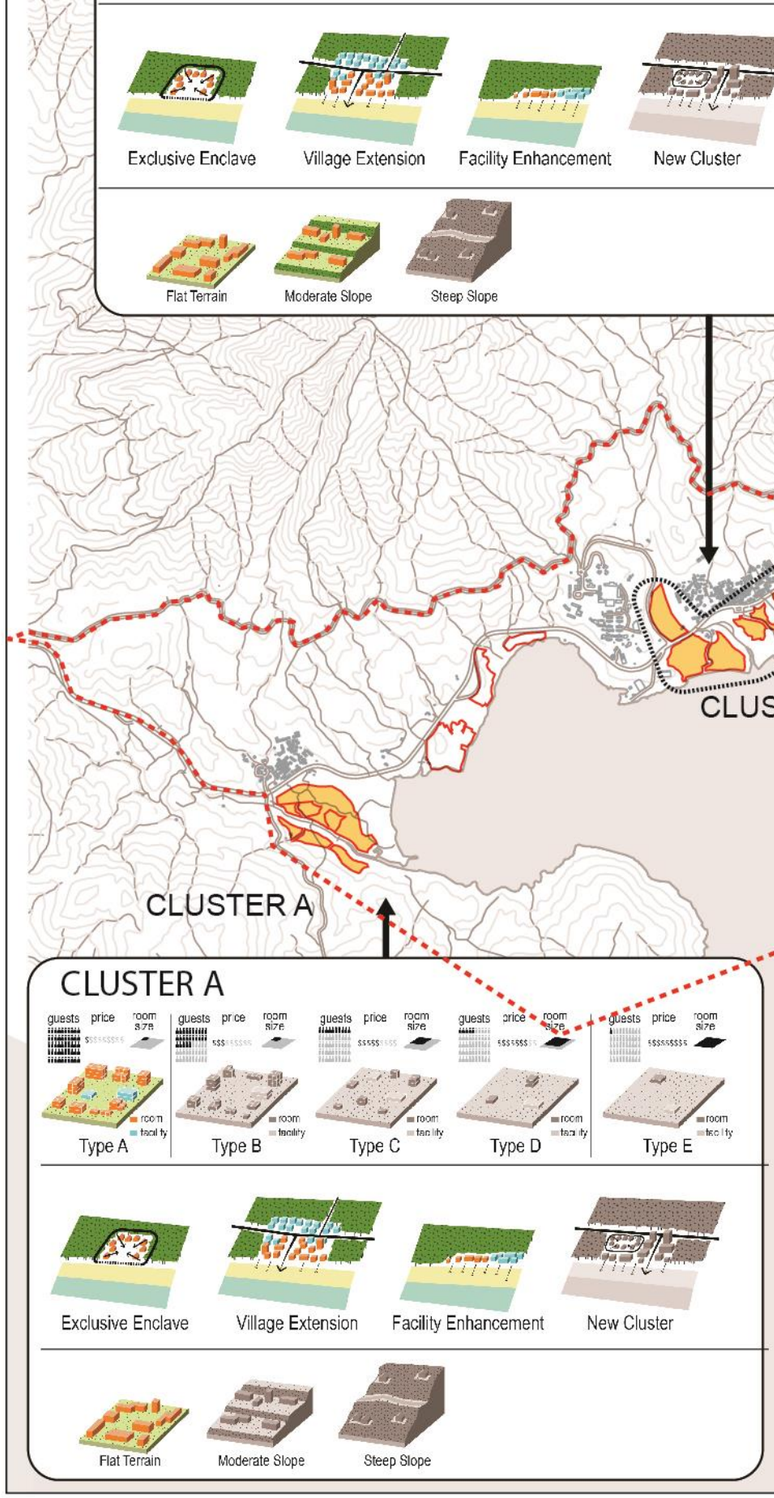
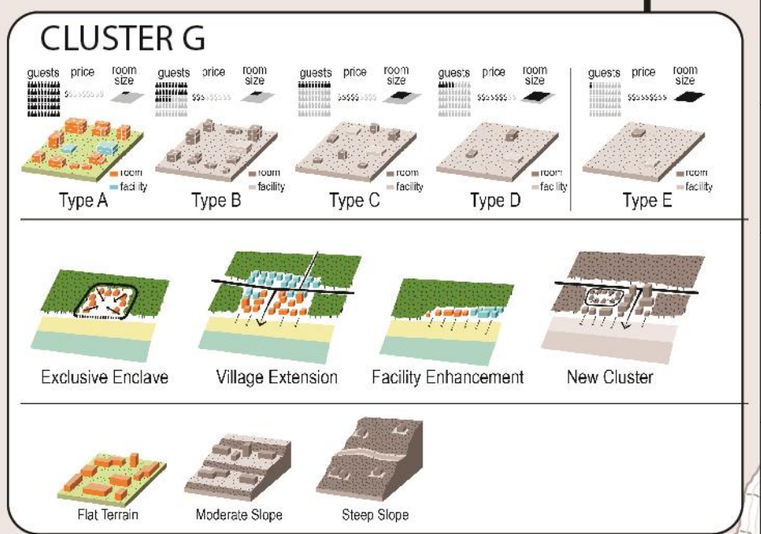
Option 1: Leisure Clusters









CLUSTER C

CLUSTER E

CLUSTER G

CLUSTER A

LEGEND

- Study Area B1
- Potential Development Area
- Development Cluster
- Not Developed under this option

Scale and Orientation

0 200 400 600 800 1000m

N

1:25,000 @ A3

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No. 3.2

Drawing Title: **Study Area B1 Option 1 –Development Extent**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

Option 2 – Scenic Diffusion

LANTAU SOUTH COUNTRY PARK

869 SUNSET PEAK

934 LANTAU PEAK

PLAY

ENCLAVE

ENCLAVE

PLAY

EAT

PUI O

CHEUNG SHA

ENCLAVE

RELAX

ENCLAVE

TONG FUK

ECO

SHUI HAU

LEGEND

- Study Area B1
- Existing Development
- Potential Development Area
- Development Cluster
- Green Corridor
- Destination

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No. 3.3

Drawing Title: **Study Area B1 Option 2 - Spatial Development Strategy**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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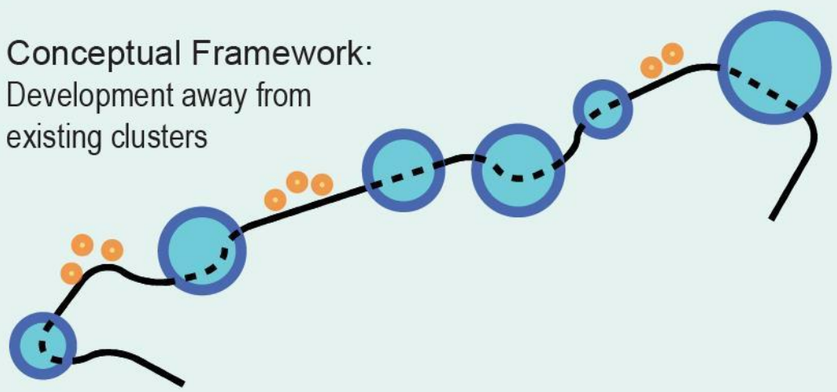
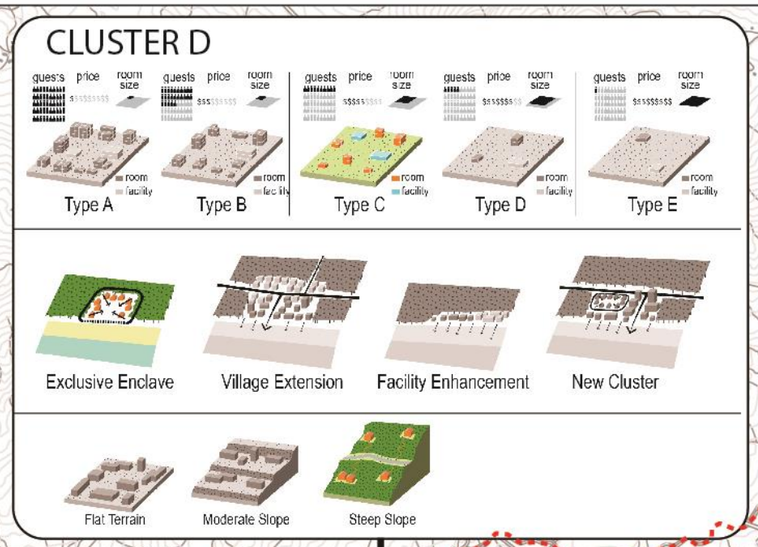
Conceptual Framework:
Development away from existing clusters



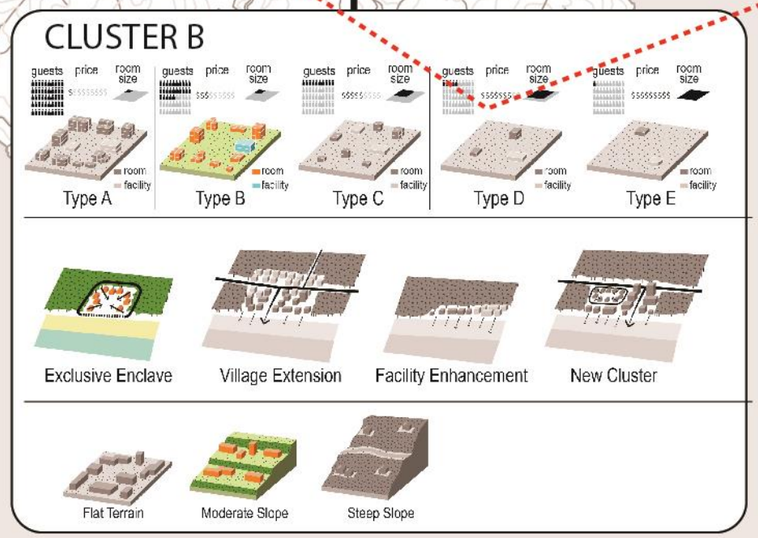
Option 2 – Scenic Diffusion

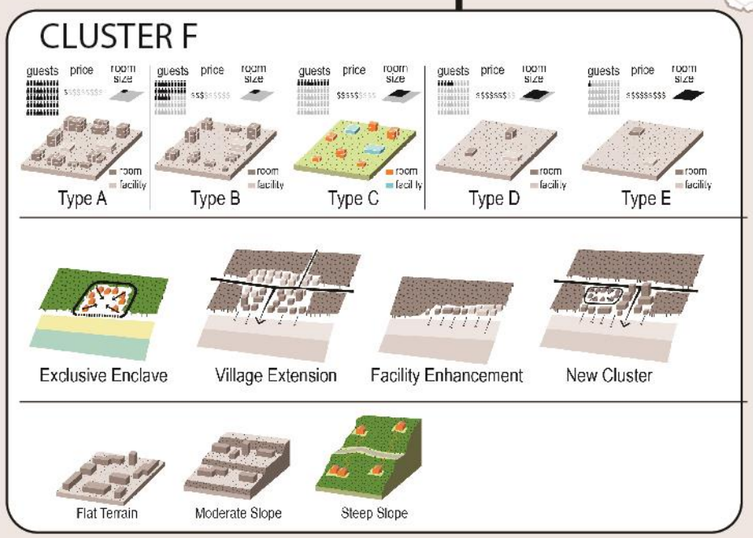


CLUSTER F

CLUSTER D

CLUSTER B





LEGEND

- Study Area B1
- Potential Development Area
- Development Cluster
- Not Developed under this option

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No. 3.4

Drawing Title: **Study Area B1 Option 2–Development Extent**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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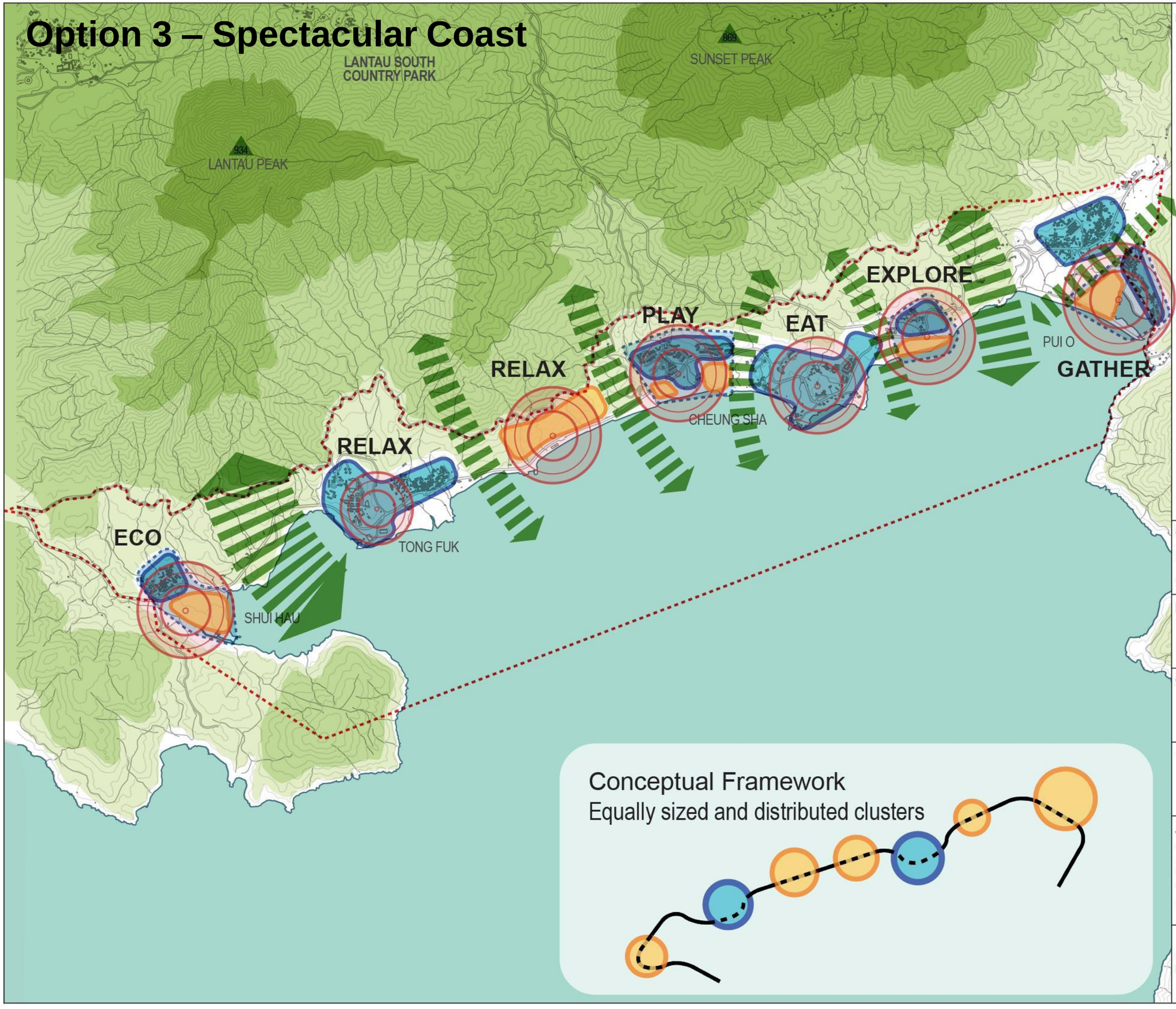
Option 3 – Spectacular Coast



LEGEND

- Study Area B1
- Existing Development
- Potential Development Area
- Development Cluster
- Green Corridor
- Destination

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.5	**Study Area B1 Option 3- Spatial Development Strategy**

Job Title

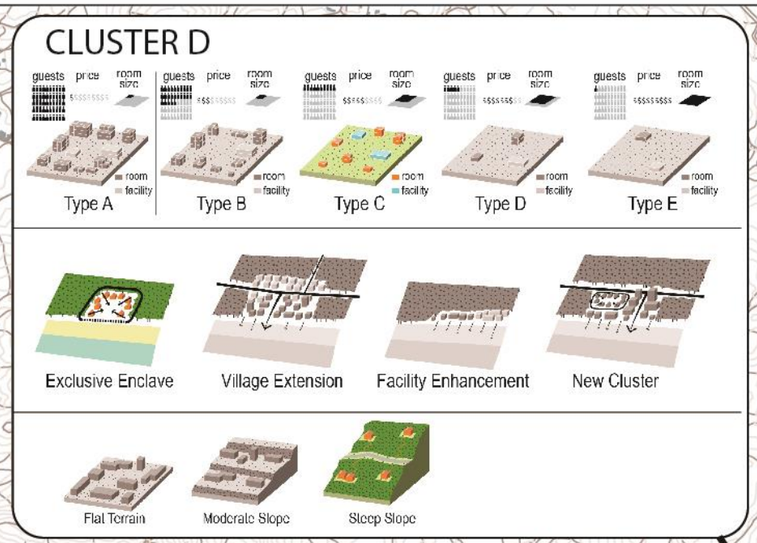
Agreement No. CE 10/2015 (CE)

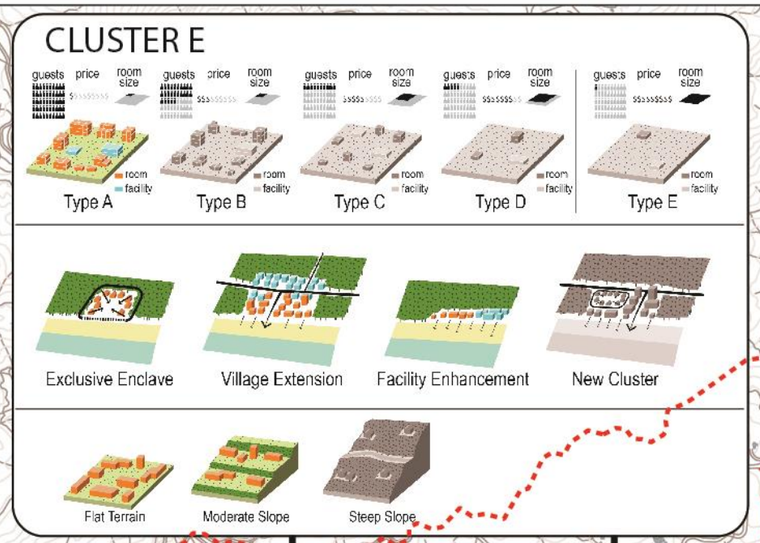
PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

Option 3 – Spectacular Coast



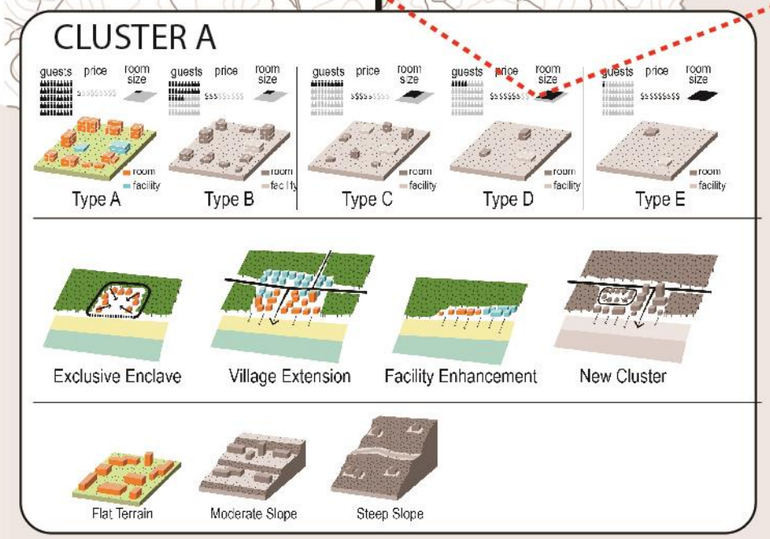


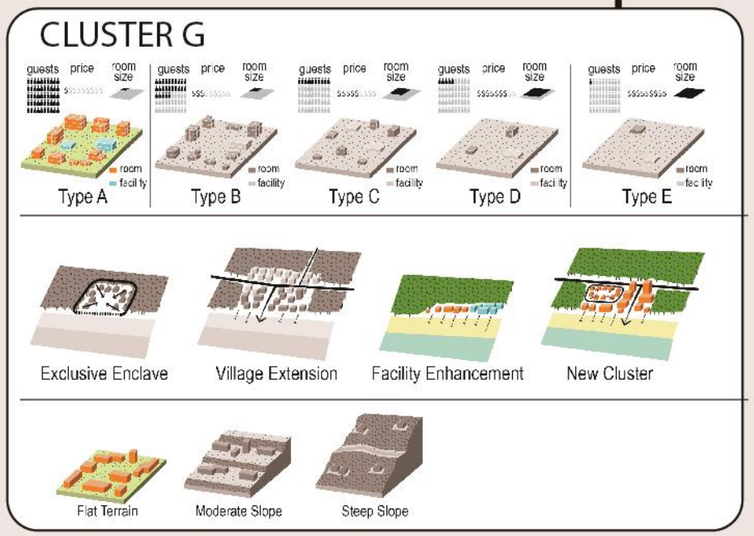
CLUSTER G

CLUSTER D

CLUSTER E

CLUSTER A





LEGEND

- Study Area B1
- Potential Development Area
- Development Cluster
- Not Developed under this option

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.6	**Study Area B1 Option 3–Development Extent**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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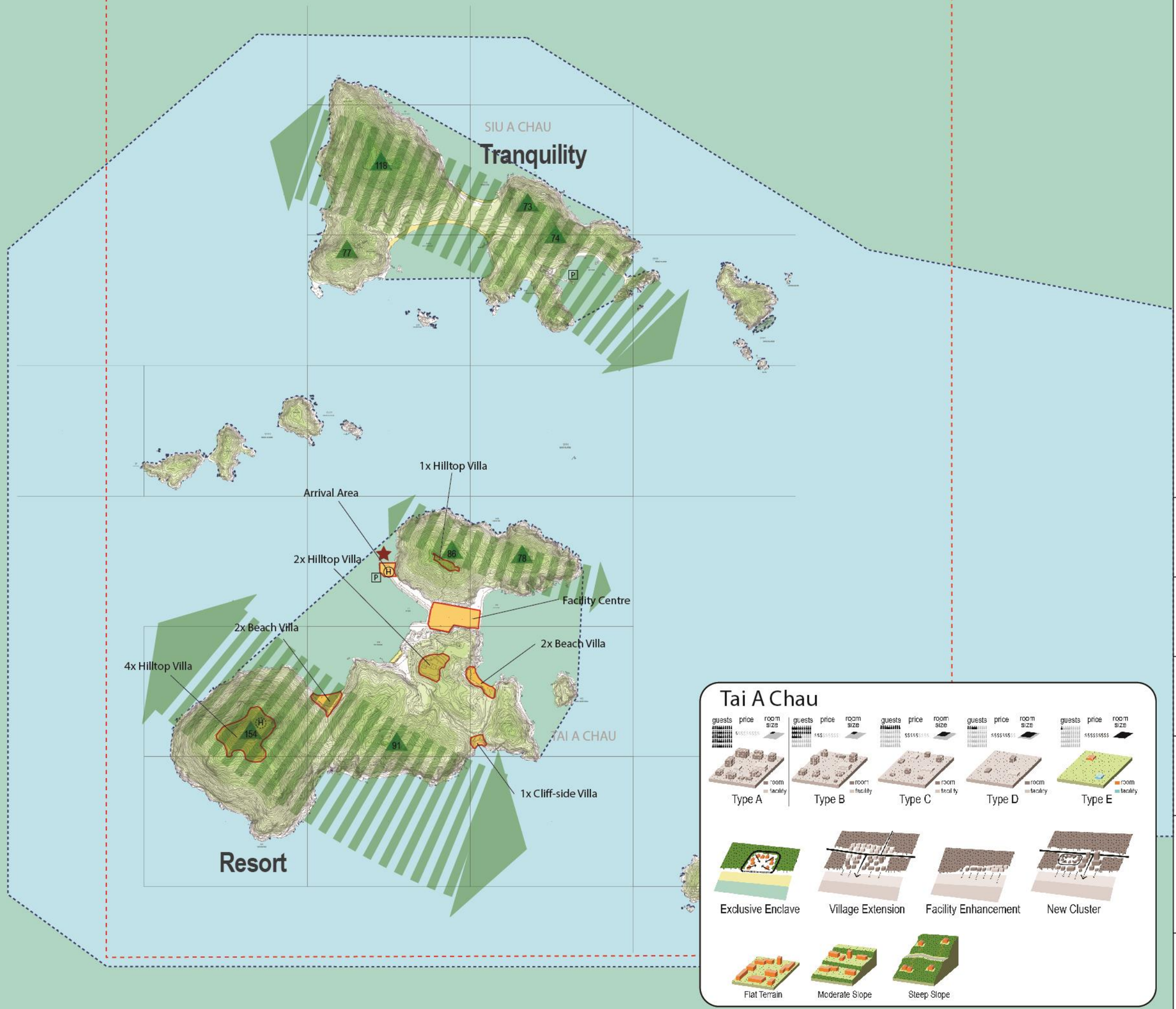
Option 1 – Scenic Getaway



LEGEND

- Study Boundary
- Proposed Marine Park
- Beach
- Green Corridor
- (H) Existing Helipad
- (H) Proposed Helipad
- [P] Existing Pier
- Potential Development Area
- Berthing Area

Scale and Orientation

N

0 100 200 300 400 500m

1:17,500 @ A3

Drawn	Date
JH	Apr 2018

Checked	Approved
NL	NL

Figure No.	Drawing Title
3.7	**Study Area B2 Option 1–Development Extent**

Job Title

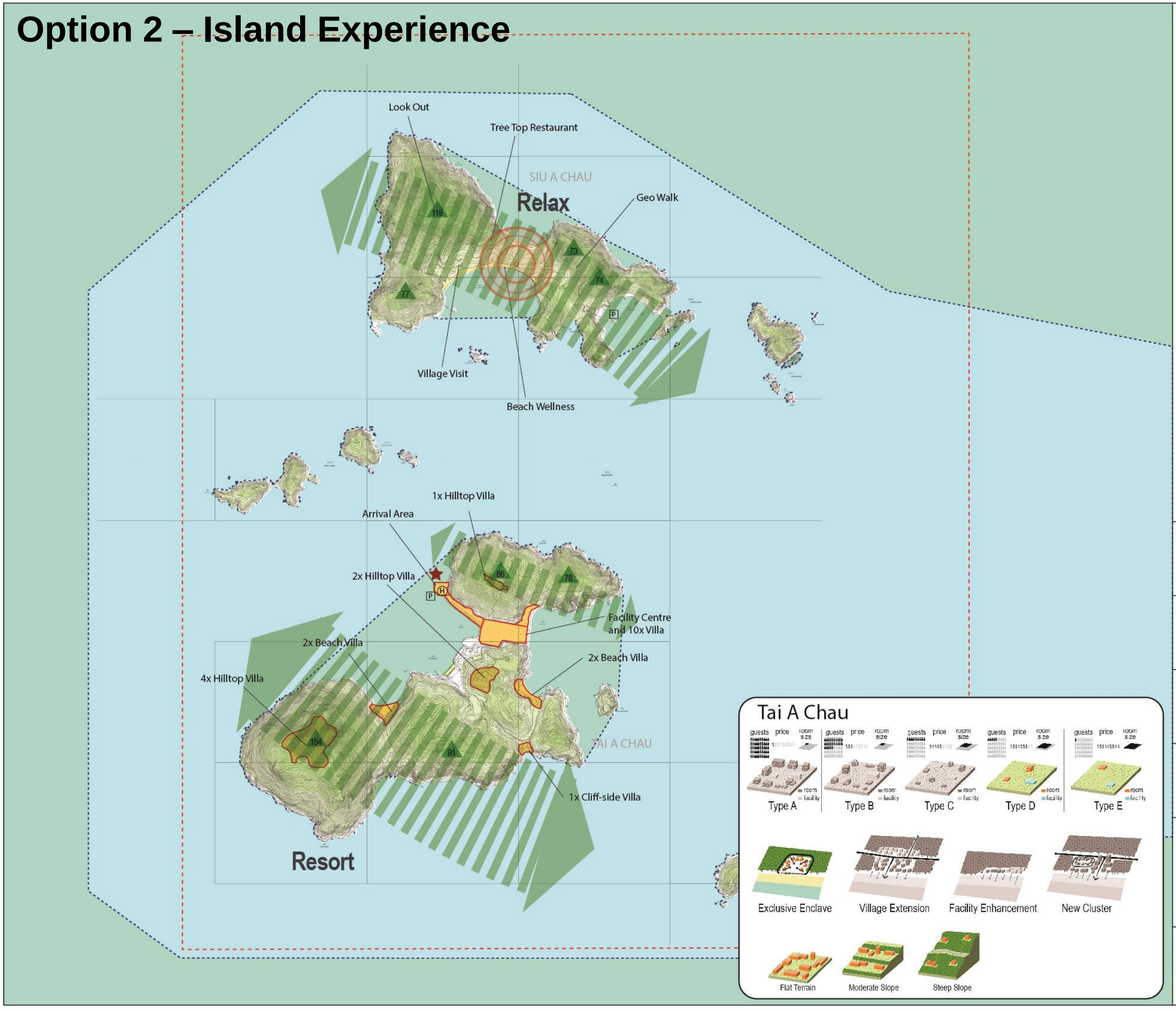
Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP

Option 2 – Island Experience



LEGEND

- Study Boundary
- Proposed Marine Park
- Beach
- Green Corridor
- (H) Existing Helipad
- [P] Existing Pier
- Potential Development Area
- Berthing Area
- Destination

Scale and Orientation

0 100 200 300 400 500m

1:17,500 @ A3

N

Drawn	Date
JH	Apr 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.8	**Study Area B2 Option 2–Development Extent**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

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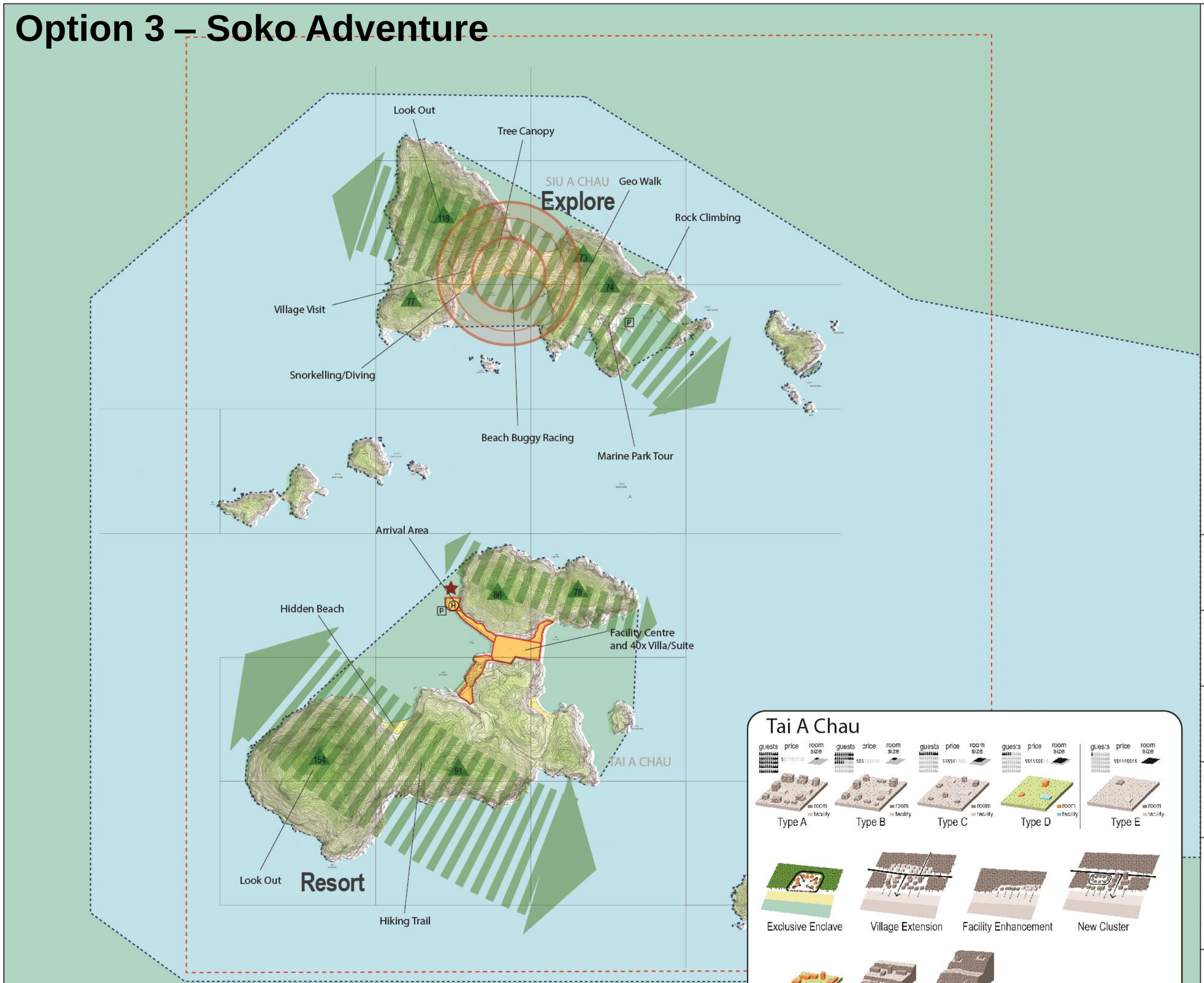
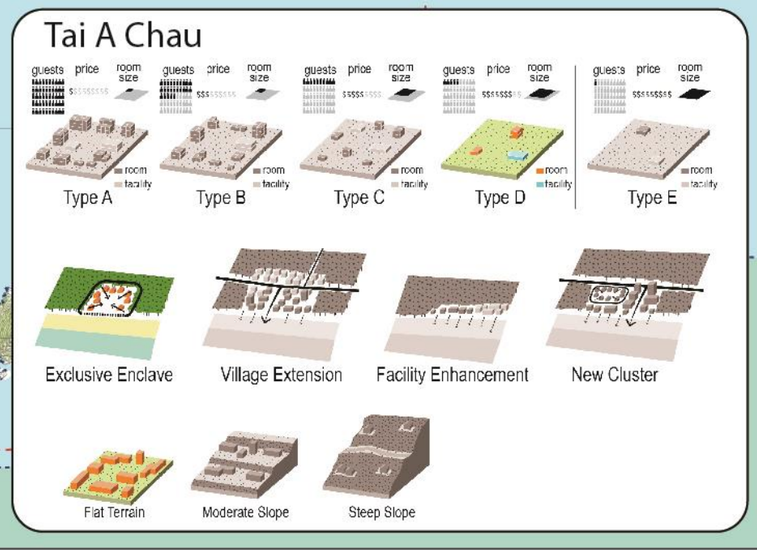
ARUP

Option 3 – Soko Adventure





LEGEND

- Study Boundary
- Proposed Marine Park
- Beach
- Green Corridor
- Existing Helipad
- Existing Pier
- Potential Development Area
- Berthing Area
- Destination

Scale and Orientation

0 100 200 300 400 500m

1:17,500 @ A3

N

Drawn	Date
JH	Apr 2018

Checked	Approved
NL	NL

Figure No. 3.9

Drawing Title: **Study Area B2 Option 3–Development Extent**

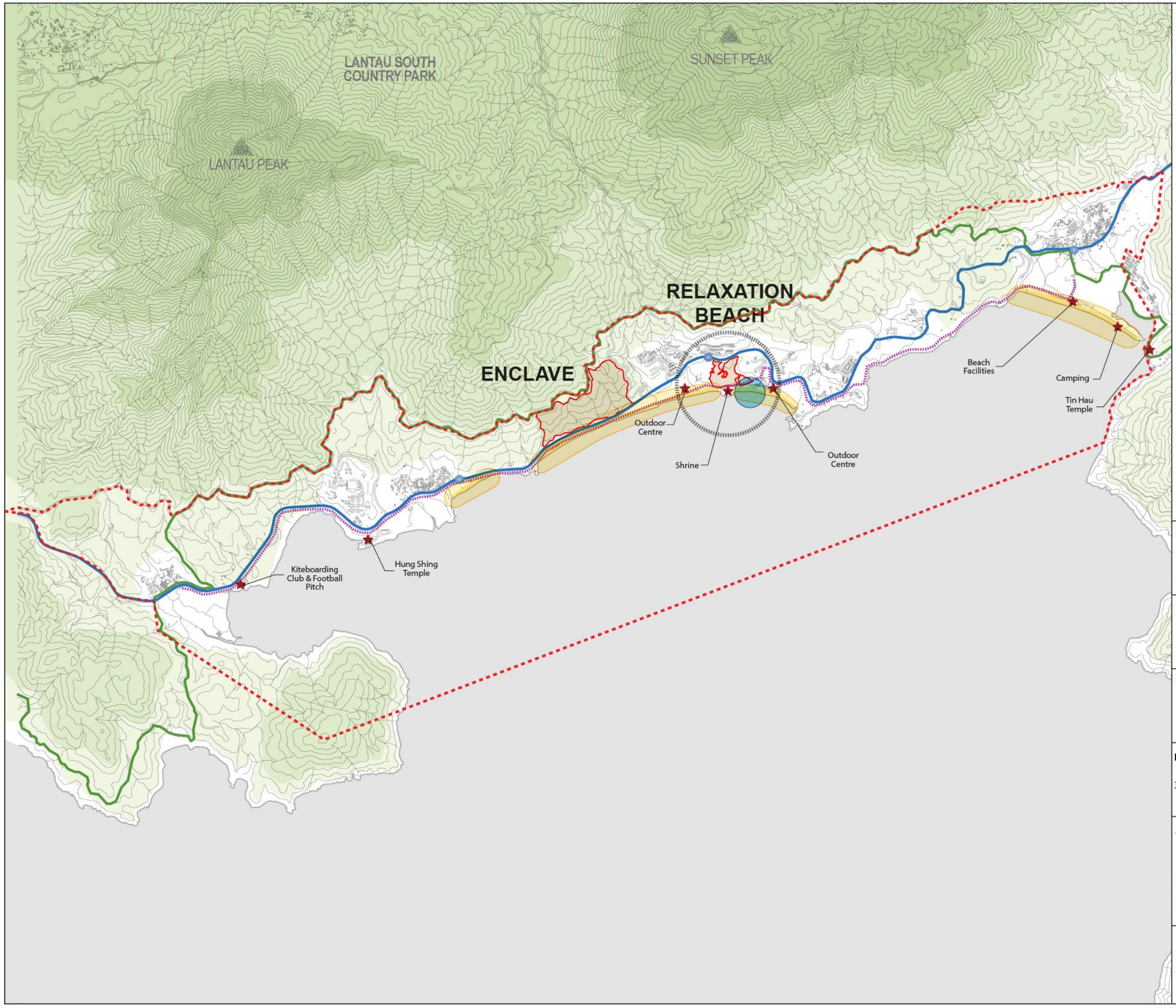
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



LEGEND

- Study Area
- Development Site
- Attraction Cluster

PROPOSED ATTRACTIONS

- Watersports

EXISTING ATTRACTIONS

- Place of Interest
- Beach

CONNECTIVITY

- Existing Road (Shuttle Bus Service)
- Existing Hiking path
- Proposed Cycling Track

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	July 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.10	Preferred Development Framework Option Development

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF
CABLE CAR SYSTEM FROM NGONG PING TO
TAI O, AND SPA AND RESORT DEVELOPMENT
AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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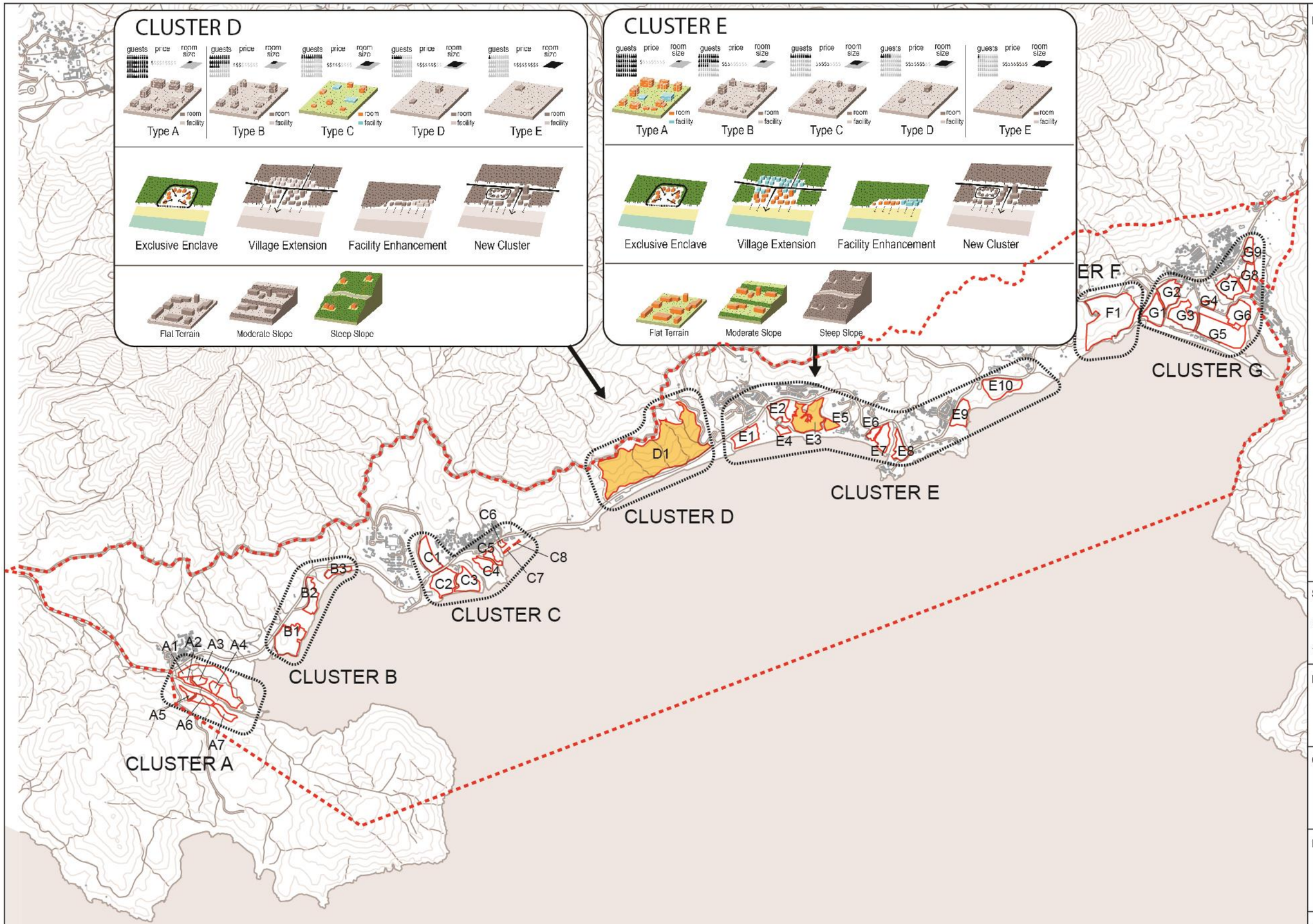


LEGEND

- Study Area - B1
- Potential Development Area
- Development Cluster

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	July 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.11	**Preferred Development Option Development Areas**

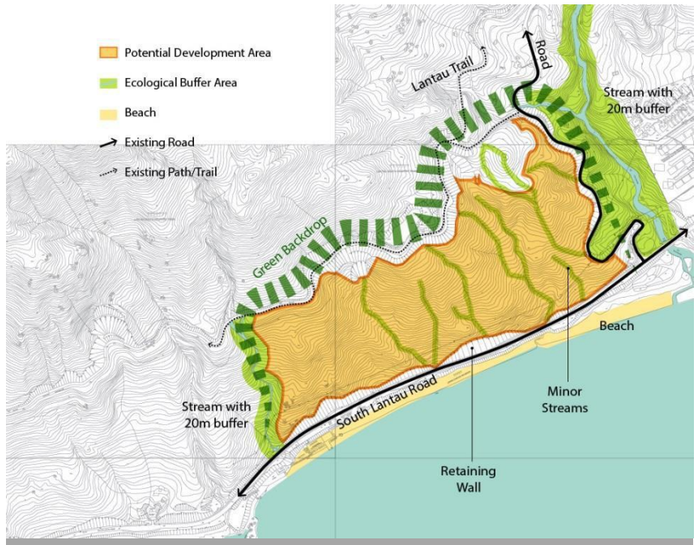
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



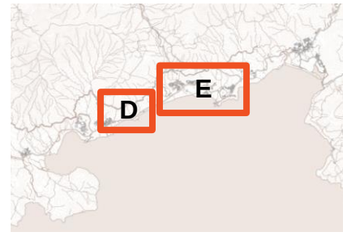
Cluster D - Cheung Sha Hillside

Resort Type C

Cluster E - Cheung Sha

Resort Type A

LEGEND



Cluster location

Scale and Orientation

N

Drawn	Date
JH	July 2018
Checked	**Approved**
NL	NL

Figure No.
3.12

Drawing Title
Preferred Development Option Spatial Configuration

Job Title
Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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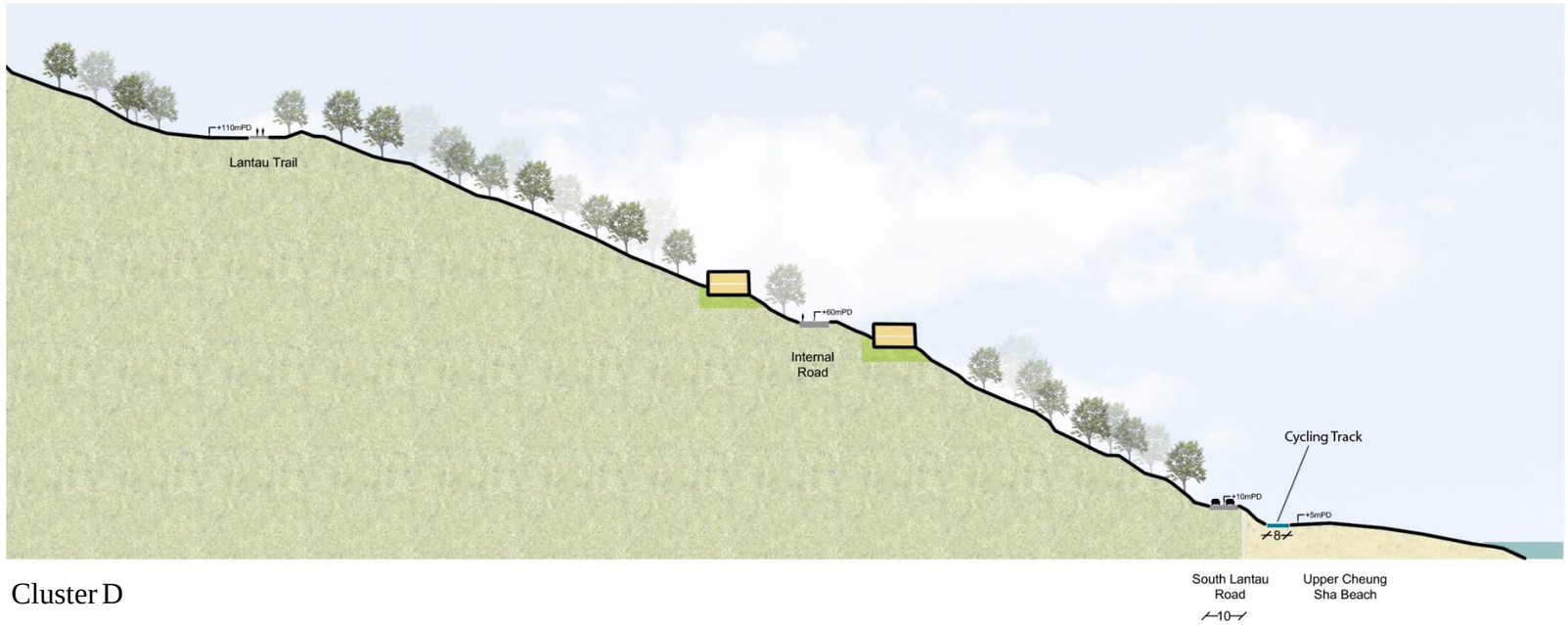
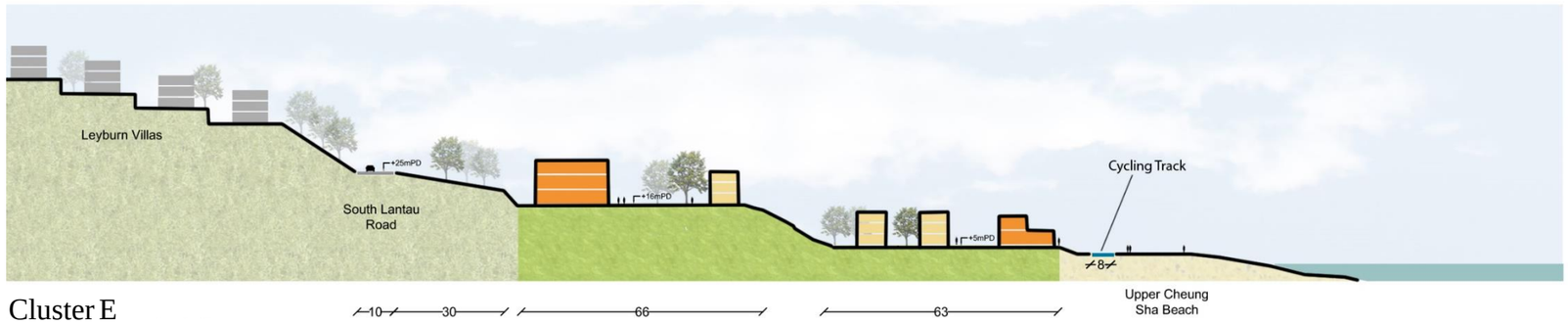
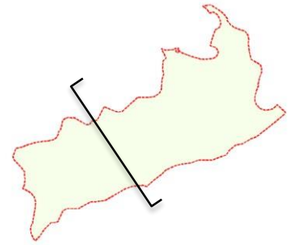


Cluster D

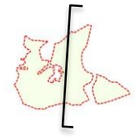


Cluster E

LEGEND



Cluster D



Cluster E

Scale and Orientation

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.13	**Preferred Development Option Indicative Sections**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF
CABLE CAR SYSTEM FROM NGONG PING TO
TAI O, AND SPA AND RESORT DEVELOPMENT
AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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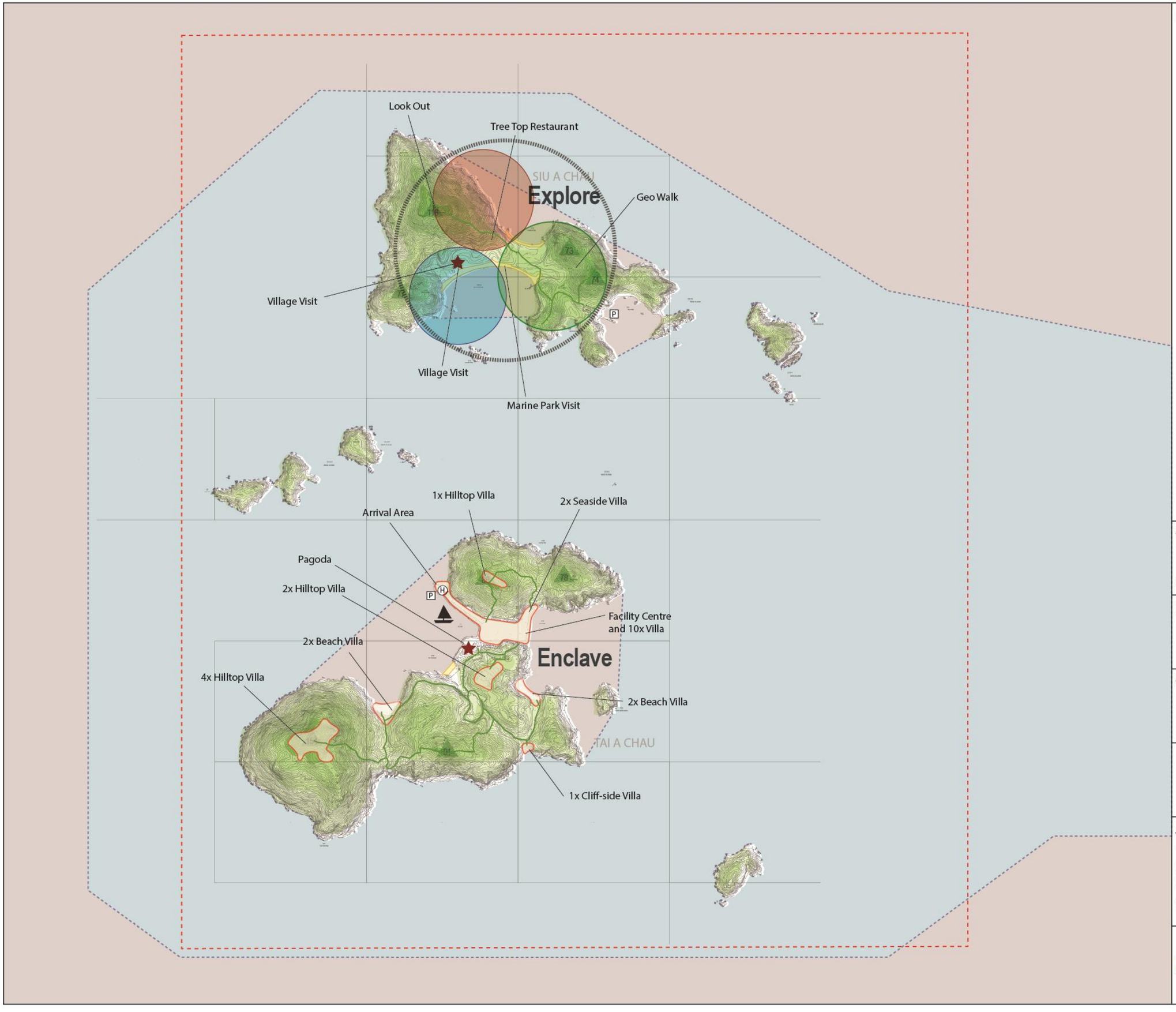


LEGEND

- Study Area
- Development Site
- Attraction Cluster
- Proposed Marine Park

PROPOSED ATTRACTIONS

- Watersports
- Outdoor Recreation
- Eco-Tourism

EXISTING ATTRACTIONS

- Place of Interest
- Beach

CONNECTIVITY

- Existing Hiking path
- Existing Helipad
- Existing Pier
- Berthing Area

Scale and Orientation

N

0 100 200 300 400 500m

1:17,500 @ A3

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
3.14	**Preferred Development Option Development Framework –SA B2**

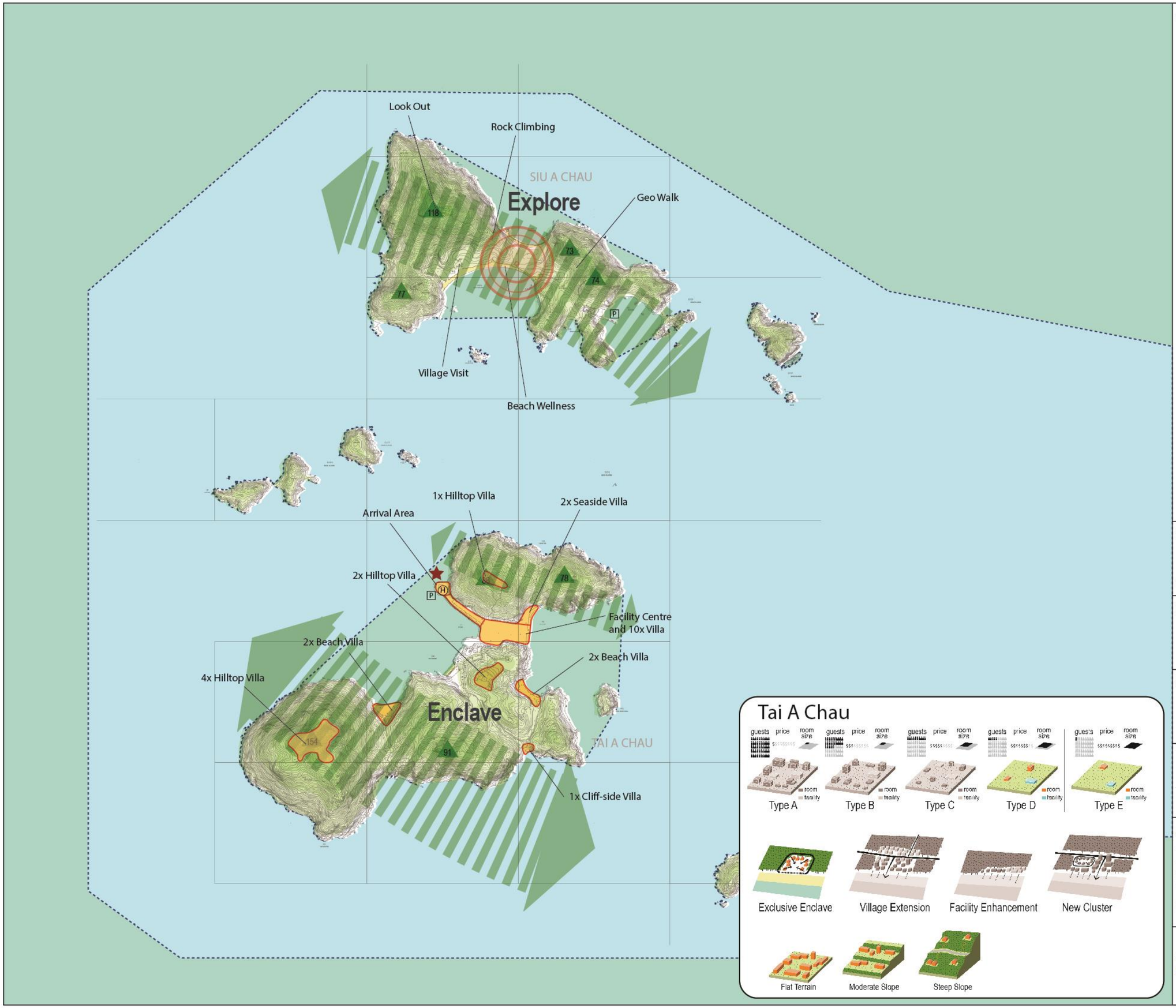
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



LEGEND

- Study Boundary
- Proposed Marine Park
- Beach
- Green Corridor
- Existing Helipad
- Existing Pier
- Potential Development Area
- Berthing Area
- Destination

Scale and Orientation

N

0 100 200 300 400 500m

1:17,500 @ A3

Drawn	Date
JH	Feb 2018

Checked	Approved
NL	NL

Figure No. 3.15

Drawing Title: **Preferred Development Option Development Extent**

Job Title

Agreement No. CE 10/2015 (CE)

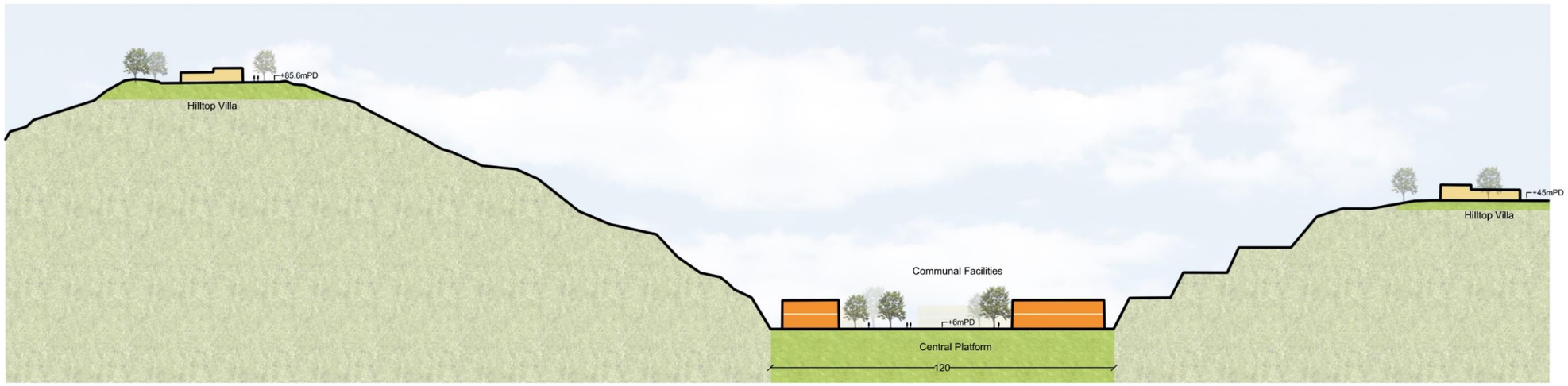
PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

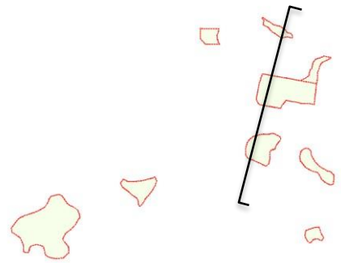
ARUP

Tai A Chau

Study Area B2



LEGEND



Soko Islands

Scale and Orientation

N

Drawn	Date
JH	Feb 2018

Checked	Approved
NL	NL

Figure No.	Drawing Title
3.16	**Preferred Development Option Indicative Sections**

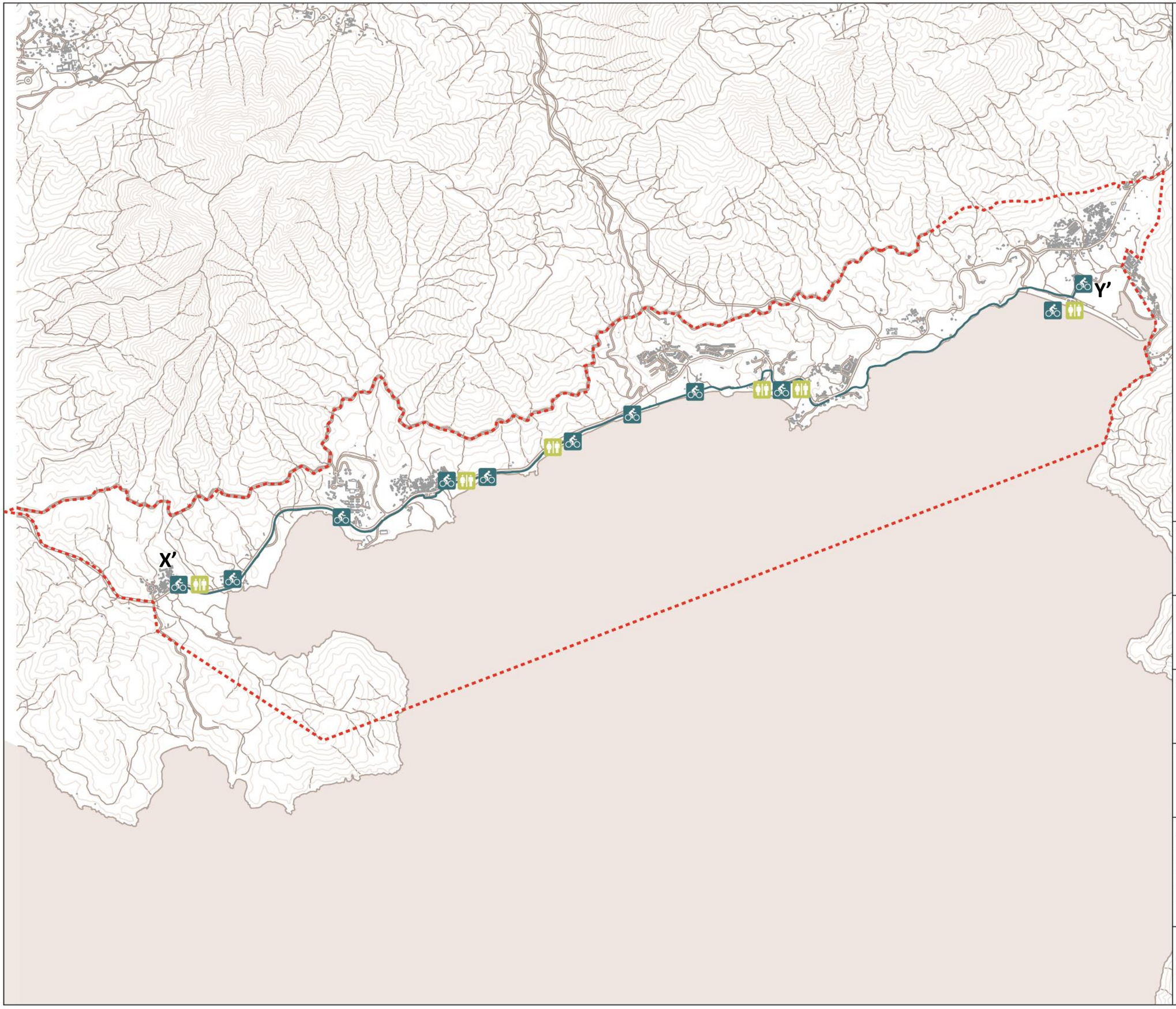
Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF
CABLE CAR SYSTEM FROM NGONG PING TO
TAI O, AND SPA AND RESORT DEVELOPMENT
AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



LEGEND

- Study Area - B1
- Recommended cycling track X'Y'
- Proposed bicycle parking and rental area
- Existing toilet

Scale and Orientation

0 200 400 600 800 1000m

1:25,000 @ A3

N

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
5.1	**Preferred Development Option Cycling Track and associated facilities**

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

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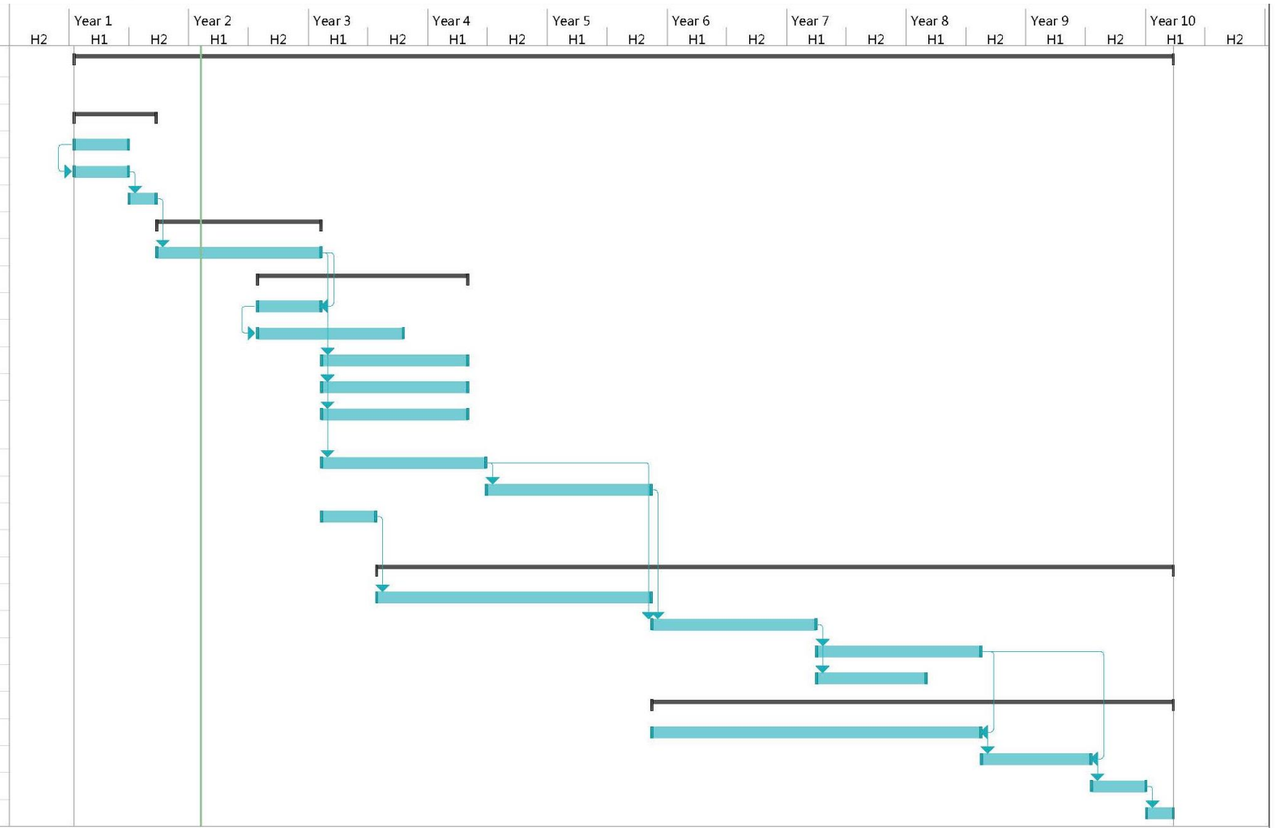
Assignment A: Implementation Programme

ID	Task Name	Duration
1	**Assignment A**	**2400 days**
2	***By Government***	
3	**Procurement of Investigation Consultancy**	**180 days**
4	Prepare Consultancy Brief	6 mons
5	Financial Approval for Investigation Study	6 mons
6	Tender Consultancy	3 mons
7	**Investigation Consultancy (including EIA under EIAO)**	**360 days**
8	Technical Assessment and Preliminary Design	18 mons
9	**Statutory Procedures**	**460 days**
10	EIAO Process (7 months)	7 mons
11	Country Parks Ordinance Process (CAP 208)	16 mons
12	Aerial Ropeways (Safety) Ordinance (CAP 211)	16 mons
13	Town Planning Ordinance Process (CAP 131)	16 mons
14	Roads (Works, Use and Compensation) Ordinance Process (CAP 370)	16 mons
15	**Preparation of Land Documents by LandsD**	18 mons
16	**Land Clearance / Acquisition**	18 mons
17	**Procurement of Franchisee (with System Supplier Contractor**	6 mons
18	***By Franchisee***	
19	**Design and Construction**	**1740 days**
20	Detailed Design, GI and Tendering of Civil Works	30 mons
21	Site Formation and Enabling Works	18 mons
22	Construction of Terminal Buildings	18 mons
23	Construction Towers Foundations	12 mons
24	Cable Car System	**1140 days**
25	Cable Car System Design, Manufacturing and Delivery	36 mons
26	Installation	12 mons
27	Testing and Commissioning	6 mons
28	Trial Operation	3 mons



Project: Cable Car
Date: Wed 07/02/18

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

LEGEND

Scale and Orientation

Drawn	Date
WLL	Feb 2018

Checked	Approved
WLL	WLL

Figure No.
7.1

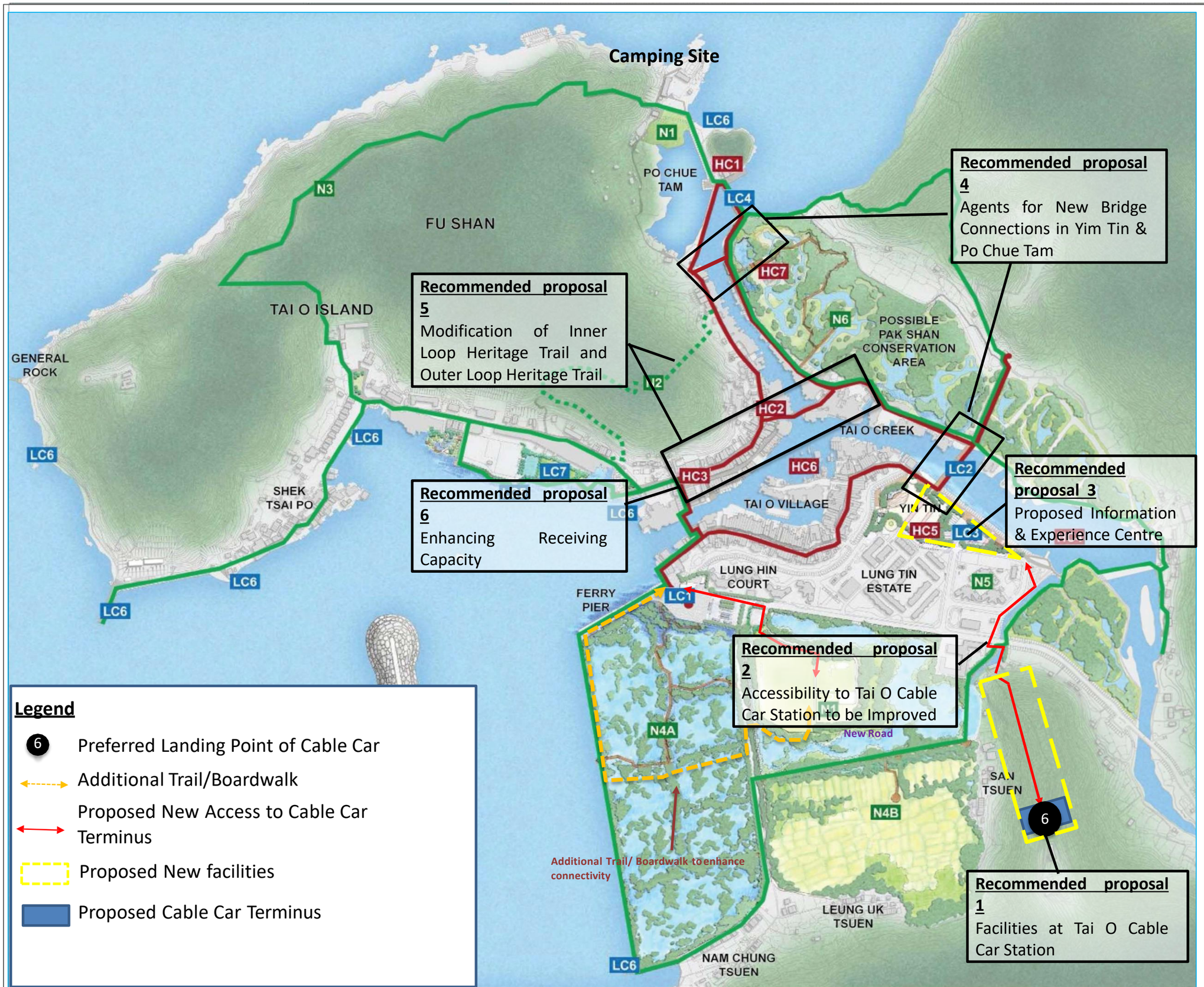
Drawing Title
Implementation Programme for Study Area A

Job Title
Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS
- FEASIBILITY STUDY

CEDD 土木工程拓展署 Civil Engineering and Development Department

ARUP



Source: Tai O Concept Plan

Scale and Orientation

0m 1km

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Drawn	Date
NL	Feb 2018
Checked	**Approved**
NL	NL

Figure No.	Drawing Title
7.2	New Facilities at Tai O

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

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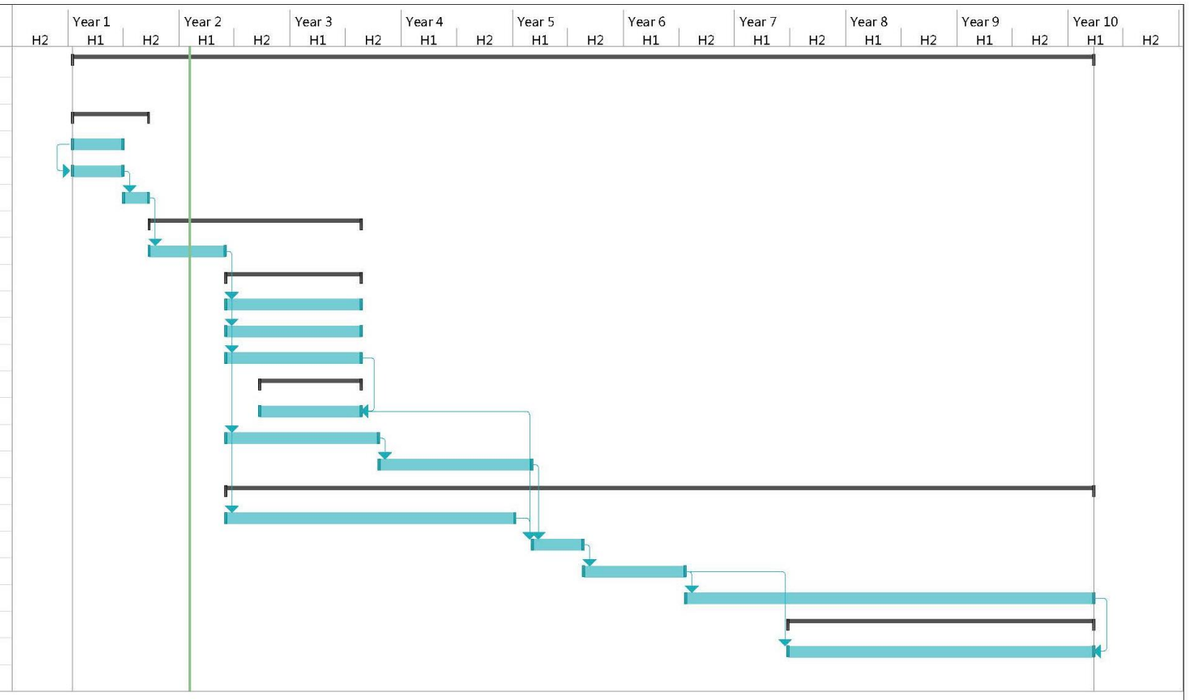
Study Area B1: Implementation Programme

ID	Task Name	Duration
1	**Assignment B1 (Cheung Sha - Clusters D and E)**	**2400 days**
2	***By Government***	
3	**Procurement of Investigation, Design and Construction Consultancy**	**180 days**
4	Prepare Consultancy Brief	6 mons
5	Financial Approval of I,D&C Consultancy	6 mons
6	Tender Consultancy	3 mons
7	**Investigation (including EIA under EIAO)**	**500 days**
8	Technical Assessments	9 mons
9	**Statutory Procedures**	**320 days**
10	Town Planning Ordinance Process (CAP 131)	16 mons
11	Roads (Works, Use and Compensation) Ordinance Process (CAP 370	16 mons
12	Water Pollution Control (Sewerage) Ordinance (Cap. 358)	16 mons
13	**Financial Approval for Works**	**240 days**
14	Prepare TFS, Direct Cat B Items in PWP	12 mons
15	**Preparation of Land Document by LandsD**	18 mons
16	**Land Clearance**	18 mons
17	**Design and Construction**	**2040 days**
18	Detailed Design, GI and Tendering	34 mons
19	Contamination Survey & Decontamination Works	6 mons
20	Site Formation Works	12 mons
21	Essential Infrastructure Works	48 mons
22	***By Developer***	**720 days**
23	Spa Resort Developments	36 mons
24		



Project: Spa Resort
Date: Wed 07/02/18

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

LEGEND

Scale and Orientation

Drawn	Date
NL	Feb 2018

Checked	Approved
NL	NL

Figure No.
7.3

Drawing Title
Implementation Programme for Study Area B1

Job Title
Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

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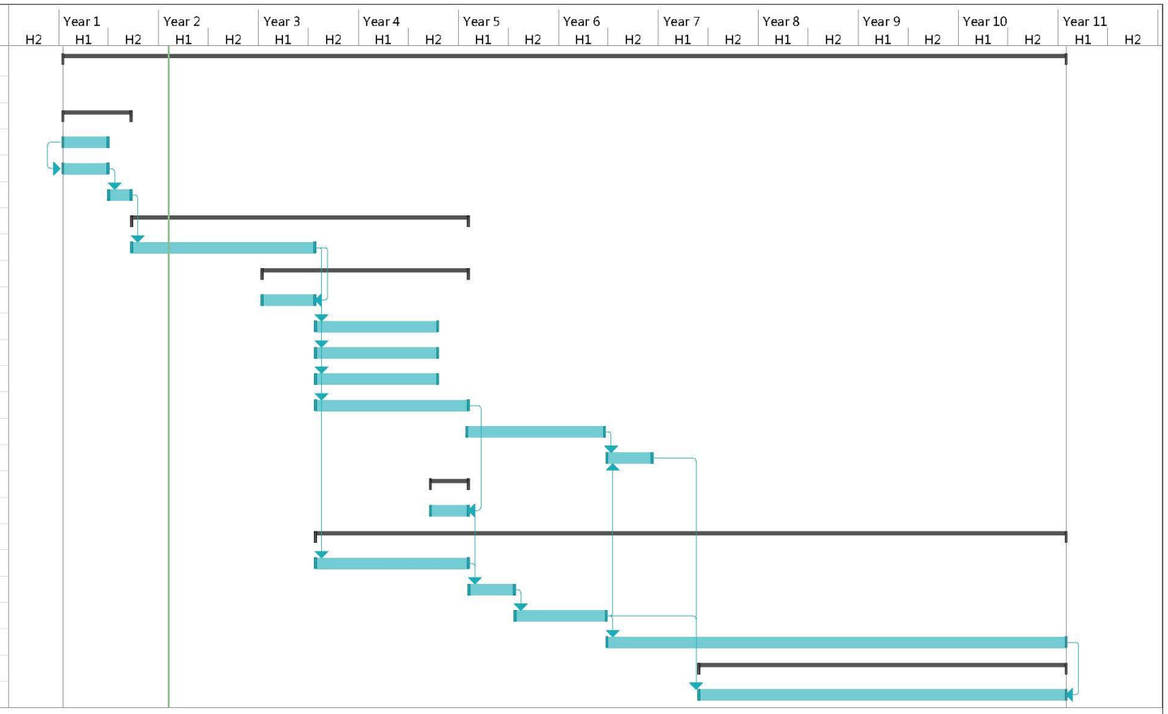
Study Area B2: Implementation Programme

ID	Task Name	Duration
1	**Assignment B2 (Soko Island)**	**2620 days**
2	***By Government***	
3	**Procurement of Investigation, Design and Construction Consultancy**	**180 days**
4	Prepare Consultancy Brief	6 mons
5	Financial Approval of I,D&C Consultancy	6 mons
6	Tender Consultancy	3 mons
7	**Investigation (including EIA under EIAO)**	**880 days**
8	Technical Assessments and Preliminary Design	24 mons
9	**Statutory Procedures**	**540 days**
10	EIAO Process	7 mons
11	Town Planning Ordinance Process (CAP 131)	16 mons
12	Roads (Works, Use and Compensation) Ordinance Process (CAP 370	16 mons
13	Water Pollution Control (Sewerage) Ordinance (Cap. 358)	16 mons
14	Foreshore and Seabed (Reclamations) Ordinance (Cap 127)	20 mons
15	**Preparation of Land Documents by LandsD**	18 mons
16	**Land Clearance**	6 mons
17	**Financial Approval for Works**	**100 days**
18	Prepare TFS, Direct Cat B Items in PWP	5 mons
19	**Design and Construction**	**1960 days**
20	Detailed Design, GI and Tendering	20 mons
21	Contamination Survey & Decontamination Works	6 mons
22	Site Formation Works	12 mons
23	Essential Infrastructure Works	60 mons
24	***By Developer***	**960 days**
25	Spa Resort Developments	48 mons



Project: Spa Resort
Date: Wed 07/02/18

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone

LEGEND

Scale and Orientation

Drawn	Date
JH	Feb 2018
Checked	**Approved**
NL	CR

Figure No.	Drawing Title
7.4	Implementation Programme for Study Area B2

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

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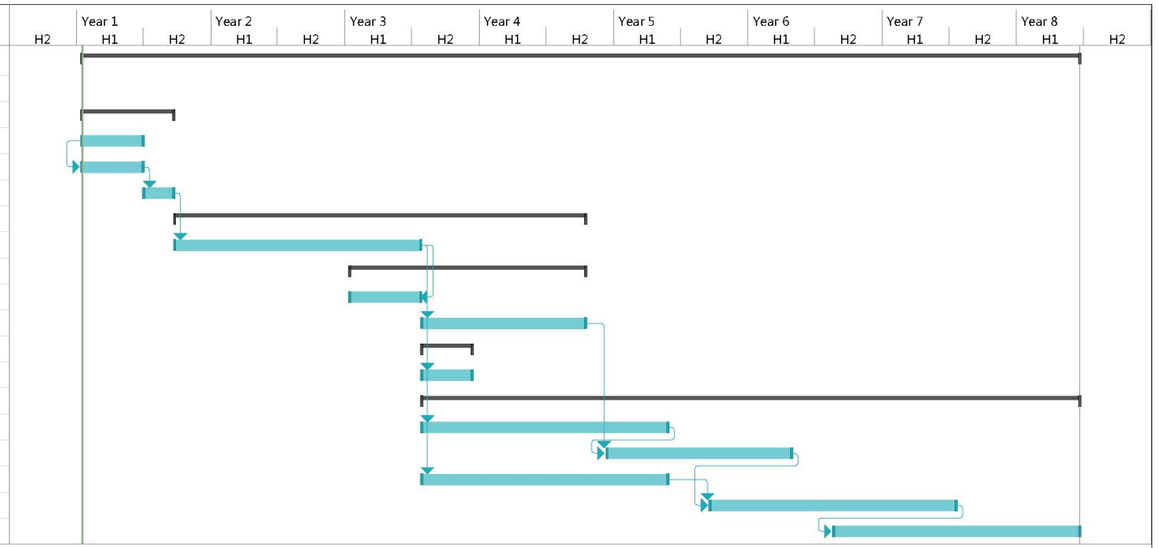
Cycle Track in South Lantau: Implementation Programme

ID	Task Name	Duration
1	**Assignment B2 (Cycle Track)**	**1940 days**
2	***By Government***	
3	**Procurement of Investigation, Design and Construction Consultancy**	**180 days**
4	Prepare Consultancy Brief	6 mons
5	Financial Approval for I,D&C Consultancy	6 mons
6	Tender Consultancy	3 mons
7	**Investigation Stage (including EIA under EIAO)**	**800 days**
8	Technical Assessments and Preliminary Design	24 mons
9	**Statutory Procedures**	**460 days**
10	EIAO Process	7 mons
11	Roads (Works, Use and Compensation) Ordinance Process (CAP 370	16 mons
12	**Financial Approval for Works**	**100 days**
13	Prepare TFS, Direct Cat B Items in PWP	5 mons
14	**Design and Construction Stage**	**1280 days**
15	Submit CAF to LandsD & LandsD Processing	24 mons
16	Land Clearance & Resumption	18 mons
17	Detailed Design, GI and Tendering	24 mons
18	Slope and Site Formation Works	24 mons
19	Cycle Track Construction	24 mons



Project: Spa Resort
Date: Tue 17/01/17

Task	Project Summary	Manual Task	Start-only	Deadline
Split	Inactive Task	Duration-only	Finish-only	Progress
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress
Summary	Inactive Summary	Manual Summary	External Milestone	

LEGEND

Scale and Orientation

Drawn	Date
JH	Feb 2018

Checked	Approved
NL	NL

Figure No. 7.5

Drawing Title Implementation Programme for Cycle Track in South Lantau

Job Title

Agreement No. CE 10/2015 (CE)

PRELIMINARY FEASIBILITY STUDY OF CABLE CAR SYSTEM FROM NGONG PING TO TAI O, AND SPA AND RESORT DEVELOPMENT AT CHEUNG SHA AND SOKO ISLANDS - FEASIBILITY STUDY

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