MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU – SHENZHEN – HONG KONG EXPRESS RAIL LINK

(No. EP-349/2009/B)

Baseline Ground-borne Noise Monitoring Report

- Addendum Pages

Verified by: 

Position: Independent Environmental Checker

Date: 1 August 2011

MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU – SHENZHEN – HONG KONG EXPRESS RAIL LINK

(No. EP-349/2009/B)

Final Report for Ecological Habitat Management Plan (EHMP) (Version 2) – Addendum Page (Part 2)

Verified by: _____

Position: Independent Environmental Checker

Date: 4/8/11

MTR Corporation Limited

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Date: - 2 AUG 2011

AECOM

MTR Corporation Limited

Consultancy Agreement No. C8012

Ecological Habitat Management Plan and Baseline Bird Survey for Environmental Impact Assessment

Final Report for Ecological Habitat Management Plan (EHMP)

May 2010

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Version:	2	Date: 3 May 2010

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1 INTRODUCTION

1.1 Background

1.1.1 The Guangzhou-Shenzhen-Hong Kong Express Rail Link (XRL, hereinafter refers to as "the Project") is a high-speed railway that will link three major regional metropolises of the Pearl River Delta. The XRL will also connect to China's national high-speed rail network. The XRL will link Hong Kong to mainland China through this railway system and provide unprecedented connectivity. This network is currently under construction in mainland and construction of the XRL will ensue shortly in Hong Kong.

1.1.2 The XRL in Hong Kong will consist of a subterranean railway (approximately 26 km) that will run from the West Kowloon Terminus to Futian, Shenzhen (**DRAWING No. NOL_ERL_300_C_XRL_ENS_M50_001D, NOL_ERL_300_C_XRL_ENS_M50_002D,** and **DRAWING NO. NOL_ERL_300_C_XRL_ENS_M50_003C**). In addition to the below ground portions of the alignment, several above ground facilities will also be constructed. Some of these facilities, the Shek Kong Stabling Sidings (SSS) and Emergency Rescue Siding (ERS) are located in the low lying northwest New Territories.

1.1.3 Construction of the SSS/ERS requires alteration of nearly 1.5 km of the Shek Kong Stream. The Shek Kong Stream is a semi-natural waterway that drains the Kam Tin sub-catchment and flows into the Kam Tin River. The area of stream habitat affected by the construction of the SSS/ERS is approximately 2.32 ha. As recommended by the XRL Environmental Impact Assessment (EIA) Report (MTRC, 2009a), mitigation stream habitats in form of open channel should be provided within the project scheme boundary. Ecologically friendly design should be incorporated in the channel section (about 2.42 ha) to provide wet area for avifauna species similar to those recorded from existing watercourse (See **DRAWING NO. FIGURE 3_Rev G**).

1.1.4 In accordance with the requirement stipulated in the Environmental Permit No. EP-349/2009, an Ecological Habitat Management Plan (EHMP) agreed by the Director of Agriculture, Fisheries and Conservation shall be submitted to the Director of Environmental Protection at least one month before the commencement of construction at the SSS/ERS works area of the Project. The EHMP should contain the details of implementation schedule and construction programme of the mitigation stream habitat to be provided in-situ within the works area of the SSS/ERS.

1.1.5 MTR Corporation Limited (MTR) commissioned AECOM Asia to prepare the EHMP in collaboration with Ove Arup & Partners Hong Kong Limited (OAP) and Urbis Limited in accordance with the Environmental Permit requirement for submission to and approval by the government authorities (hereafter refers to as "the Assignment").

1.1.6 AECOM Asia were responsible for the ecological input to the EHMP, while OAP and Urbis Limited were responsible, respectively, for the engineering and landscape design of the river habitat and stream widening works.

1.2 Objectives of this Report

1.2.1 As recommended in the EIA Report of this Project, the principal objective of the wetland design is to provide wet area for avifauna species similar to those recorded from the existing watercourse ("target species") through provision of mitigation stream habitats in order to minimise the unavoidable loss of watercourse. The mitigation stream habitats are expected to promote utilization by the target species which are considered to be of conservation interest. To meet these criteria, the EHMP shall include management objectives, target species for habitats to be created, habitat management/maintenance requirements, monitoring programme, construction programme, and implementation schedule. The EHMP will form the basis for the detailed design of the constructed wetlands.

1.3 Structure of the Report

1.3.1 This EHMP is organized into the following sections:

(a) Section 2: outlines the key physical, engineering, and biotic design considerations of the mitigation stream habitat.

(b) Section 3: identifies the key components and ecological function of the mitigation stream habitat.

(c) Section 4: identifies the target species and their habitat requirements;

(d) Section 5: define construction programme and implementation schedule of the mitigation stream habitat

(e) Section 6: develops maintenance and management strategies

(f) Section 7: outlines monitoring requirement for the mitigation stream habitats.

2 GENERAL DESIGN CONSIDERATION

2.1 Overview

2.1.1 In this section, the main aims of the mitigation stream habitat programme are introduced, and the key design considerations needed to meet these aims are outlined.

2.2 Description of Ecological Baseline Condition

2.2.1 One of the objectives of this Assignment was to provide suitable resources for avifauna currently supported by habitats that will be lost to the SSS/ERS construction. The key ecological characteristics of the existing habitats and associated wildlife are described below.

Habitat

2.2.2 The Shek Kong Stream is a fairly large (third order stream), semi-natural watercourse in the low lands of the northwest New Territories (NWNT). The Stream drains part of the Kam Tin sub-catchment and ultimately flows into the Kam Tin River Nullah and Deep Bay. This is one of the few remaining large streams in the area; many others have been channelized or reprovisioned as part of the regional drainage network (MTRC, 2009a). Representative photograph taken along the Shek Kong Stream is shown in **Appendix 2.1 Rev A**.

2.2.3 The section of watercourses potentially affected by the Project is situated at the lowland reach of the Shek Kong Stream. The stream is relatively large with its substrate consisted of boulders and pebbles. The stream has natural riffle / pool formation, and its riverbanks had been variously modified with some sections lined with concrete. Riparian vegetation of this stream is limited, with commonly recorded species including *Bidens alba, Pueraria lobata var. Montana, Mikania micrantha, Leucaena leucocephala, Melia azedarach, Ricinus communis,* and *Lantana camara*. Water quality of this stream appeared to be very poor with litters extensively present.

2.2.4 The stream runs through a patchwork of agricultural lands, village housing, and open storage lots. Water quality of the Shek Kong Stream has suffered from run-off from adjacent village developments, pig and poultry farms, agricultural lands, domestic sewage discharge, and illegal dumping. The water in the stream is malodorous and nutrient enriched. Limited water quality data exist.

2.2.5 The ecological value of the existing Shek Kong Stream habitat was identified as low to moderate in the EIA Report supporting only a few locally common ardeid species of conservation interest. The watercourse together with other habitats such as agricultural areas, drainage channels, and woodland were considered as integral parts in the ecosystem of the Shek Kong area (MTRC, 2009a).

Wildlife

2.2.6 The watercourses are of typically low water quality, with domestic effluent and pollution. The freshwater species encountered in these waters are typified as pollution tolerant species (e.g. Chironomidae, *Tilapia* spp., and Oligochaeta) and some locally common birds (e.g. Magpie Robin, Wagtails, and Green Sandpiper).

2.2.7 The proposed mitigation stream habitat was found to support only two ardeid species and one dragonfly species of conservation interest, namely Little Egret (*Egretta garzetta*), Chinese Pond Heron (*Ardeola bacchus*), Scarlet Basker (*Urothemis signata signata*) (MTRC, 2009a). These species have regionally declining populations and are of conservation interest (Fellowes et al, 2002), though they are locally common in Hong Kong.

2.2.8 The loss of stream habitats will be mitigated by constructing enhanced stream habitats attractive to these waterbirds and dragonfly as well as to other wetland dependent wildlife, such as invertebrates and amphibians.

2.3 Target Species

2.3.1 The purpose of the mitigation stream habitat is to provide replacement habitat for target species – the avifauna and dragonfly species similar to those recorded from the existing watercourse. However, as each species utilising the area has slightly different requirements, it would be an unrealistic goal to try and create wetlands to accommodate the needs of all the species. Therefore, wetland design will focus on creating habitats suitable for a group of key target species identified in the EIA Report, these species include the Chinese Pond Heron (*Ardeola bacchus*), the Little Egret (*Egretta garzetta*), and the Scarlet Basker (*Urothemis signata signata*). It is anticipated that if suitable stream habitats can be created for the target species, other species with similar requirements will colonise the area. Their habitat requirements are discussed further in **Section 4**.

2.4 Description of the Proposed Mitigation Stream Habitat

2.4.1 The design of the created habitats is dependent on four factors:

(g) Key features of existing habitats – Habitats will be designed to replace, and where possible enhance the ecological value of existing habitats at the site.

(h) Habitat requirements of target species – Habitat design will be guided by the known habitat requirements of target species.

(i) Site constraints – The size and shape of the project area will determine the exact nature of the habitats to be created.

(j) Engineering constraints – The hydraulic performance of the stream habitat will be taken in account during the development of in-stream features.

2.4.2 With reference to the criteria listed in **Section 2.4.1**, seven distinct habitats are to be included in the mitigation stream habitat:

Open Water

2.4.3 The mitigation stream habitat will be integral with the existing Shek Kong Stream. The maximum depth of water will as now be along the centre of the stream course. The 1 in 200 years maximum operational water depths will be approximately 0.93 m depending upon the storm events with shallower water depths in dry season. The average depth along stream would be 0.34 m at 1 in 2 years and 0.43 m at 1 in 50 years.

Open Stream Floodplain

2.4.4 At the water margins along the stream gentle side slopes and a wider bed of natural substrate will increase the area of shallow water available for wading birds. Where feasible, the lower bank slopes of 1 in 5 where new channels are formed will provide vegetated and non-vegetated habitats. The stream is widened to form a flat section of stream bed materials. This will be exposed to a variable extent during low flow conditions and will providing an open and lightly-vegetated habitat.

Short Grass

2.4.5 Such areas will be hydro-seeded and/or planted with low grasses near the edge of the stream. The grasses will be cut on a regular basis to maintain vegetation height at a suitably low level (not more than 0.2m) and to prevent the colonisation of unwanted exotics.

Tall Grass / Shrubs

2.4.6 Such areas will be hydro-seeded and/or planted with tall grass/low shrubs. The grasses should be cut on a regular basis to maintain vegetation height at a suitably low level (not more than about 2m) and to prevent the colonisation of invasive exotic species.

Reedbeds

2.4.7 At the upper reach of the mitigation stream habitat where bank is narrower and steeper as limited by site boundary, reedbed will be planted along the lower stream bank. Emergent vegetation will characterise the middle section of the stream with marginal vegetation at the edges giving way to terrestrial species on the upper banks and terrace areas beyond. Typical species will include *Phragmites* spp.

Bamboo Clumps

2.4.8 Previous studies revealed that local ardeid species nest on bamboo. Although no egretry or breeding activities were observed within the site boundary, bamboo clumps will be provided sparsely along the upland terrestrial area of the stream habitat to enhance the habitat quality.

Trees / Tall Shrubs

2.4.9 Tall trees will be planted along the periphery with shrubs along the gentle slopes. Woodland areas will largely be located along the boundary of the habitat to form a buffer; these areas will be planted with native trees and shrubs.

2.5 Adjacent Habitats

2.5.1 The habitat types will be linked to reduce the edge to area ratio, thereby minimising edge effects, and allow fauna to disperse freely across the habitats.

2.5.2 Additionally, the mitigation stream habitats will be ecologically linked with the upper reach of the Shek Kong Stream and a proposed receptor site for the trees affected under the Project.

2.6 Sustainability

2.6.1 The mitigation stream habitat will be provided in-situ by the MTRC within the project boundary of the SSS/ERS after the completion of construction activities. The long-term maintenance requirements of the mitigation stream habitats would be minimized by designing it to be as self-sustaining as possible, similar to the maintenance regime for the existing watercourse.

2.7 Special Requirements and Limitations on Habitat Design

2.7.1 The mitigation principles and key channel features recommended in the EIA Report guided the development of EHMP and in turn the design and construction of the mitigation stream habitat. The EHMP also incorporates the relevant guidelines from the Drainage Services Department (DSD), Environmental Protection Department (EPD), Civil Engineering and Development Department (CEDD), Agriculture, Fisheries and Conservation Department (AFCD), and other government relevant bodies. The key purposes of the reconstructed lotic habitat are to provide useable habitat for identified key species and to function within engineer defined hydrological parameters. The section below briefly discusses constraints and special requirements of the mitigation stream habitat.

Engineering

2.7.2 The mitigation stream habitat is to be formed by excavating new stream channels adjacent to the existing stream bed. In locations where this is not possible due to insufficient land area available, such as between the two existing bridge crossings within the proposed mitigation stream habitat boundary, the existing stream bed and banks will be maintained and integrated with the new stream channels.

2.7.3 The crossings over the existing stream are a footbridge and a 1,200 mm diameter raw water main pipe bridge that will remain undisturbed by the stream habitat works.

2.7.4 The banks of the new stream channels will be excavated at a stable slope. The slopes will be as gentle as possible, but it is constrained by the width of the stream.

2.7.5 Vegetated earth bank will be provided along the stream to enhance habitat heterogeneity, however, sections near water inlet will be armoured to prevent bank erosion and scour.

Hydrology and Drainage

2.7.6 The Shek Kong Stream is presently flowing through the future SSS/ERS area. The SSS/ERS site falls within Drainage Basin 9 of Yuen Long, Kam Tin, Ngau Tam Mei and Tin Shui Wai Drainage Master Plan Study (DMP). In line with the design principle of the DMP the peripheral drains - a box culvert along the eastern edge of the SSS/ERS is designed to take a 200 year storm (**DRAWING NO. FIGURE 8 Rev B**). Lesser storm will be carried by the widened existing channel and box culvert along the western edge of the SSS/ERS. Such flood protection measure would require stream diversion (D**RAWING NO. FIGURE 3 Rev G)**.

2.7.7 The existing stream has a catchment area of about 2.54 sq. km of which about half comprises village areas (**DRAWING NO. FIGURE 7 Rev B**). The village areas are not sewered and in them the predominant non residential land uses are container and vehicle storage, vehicle scrap yards, vehicle maintenance and agriculture.

2.7.8 In the upper part of the catchment the stream has a perennial ground water flow but by the time it crosses Kam Tin Road the flow becomes grossly polluted and water quality remains poor throughout its length.

2.7.9 The whole of the Shek Kong Stream base flow will be diverted to the mitigation stream habitat. During rainfall events the flow diverted to the habitat will increase but the majority of storm flows will be conveyed down the east culvert to discharge to the Kam Tin main drainage channel (**DRAWING No. 823B/T/SSS/OAP/C14/211 Rev A1, DRAWING No. 823B/T/SSS/OAP/C14/224 Rev A1** and **DRAWING No. 823B/T/SSS/OAP/C14/225 Rev A1**).

2.7.10 Diversion of flow is made possible by constructing a low weir (**DRAWING NO. 823B/T/SSS/OAP/C14/430 Rev A1** and **823B/T/SSS/OAP/C14/431 Rev A1**) across the intake of the east culvert and allowing flow to by-pass the culvert through pipes of up to 900 mm diameter between the existing stream and the habitat. Up to 6cu.m/s of flow will be diverted to the habitat during peak flow conditions.

2.7.11 The maximum water depth in the stream habitat during such conditions is expected to be about 1 m to 1.3 m. The discharge from the habitat downstream is uncontrolled so that free flow conditions are maintained at all times even during dry weather.

2.7.12 In dry weather the flow in the habitat will be similar to the base flow in the existing stream. However, during a prolonged dry spell ground water levels may sink to below the stream bed level. This happens on many ephemeral streams in Hong Kong during long periods without rain and in these circumstances the flow downstream may cease. Given the new hydrology of the scheme (with excess water being piped east of the site during times of flood) the stream habitat's water flow would be more consistent and controlled than before. Periods of high flow are also expected to be relatively infrequent.

Water Quality

2.7.13 The Shek Kong Stream has a base flow that is heavily polluted and the pollution is extensive covering an area as far upstream as the Lam Kam Road roundabout with Route Twisk. There is therefore a risk that these low flows will form odourous stagnant pools in the bed of the natural stream and this will create a nuisance. It will therefore be important to design the stream invert in the habitat area in such a way that minimises the formation of stagnant pools and ensures a continuous flow downstream (MTRC, 2009b).

3 MITIGATION STREAM HABITATS

3.1 Overview

3.1.1 The general principles for the stream habitats design outlined in the EIA Report will be adopted as far as practicable. The following ecologically friendly key channel design features would be incorporated into the proposed mitigation stream habitat to enhance the ecological value of the channel:

(k) The stream section and the banks would be widened to create additional wetland area (shallow water) for wildlife use particularly wetland dependent avifauna (**DRAWING NO. 823B/T/SSS/OAP/A58/163 Rev B** shows the typical sections of the river restoration area.);

(l) Channel beds would be constructed using natural materials such as small cobbles and boulders to provide a more diverse habitat for aquatic community. To closely re-create existing conditions, materials collected from the existing watercourse during the construction phase would be used to line the newly constructed channels, if possible. Where possible, the existing substrate of the watercourse would be retained, and the base width of the watercourse would be widened to create more wet area for wildlife use;

(m) Channel banks would be trapezoidal in shape and provide interface connecting aquatic and terrestrial habitats for wildlife. Such function can be provided through provision of vegetated channel embankment;

(n) To enhance habitat suitability for birds that are normally associated with stream bed habitats, gentle bank slopes and areas of shallow water depth would be provided, both of which would encourage wading birds such as herons and egrets. Where the width of the channel allows, the lower portion of the 1 in 2 slope will be flattened to 1 in 5 to 1 in 10 and with the middle of the stream remaining largely unchanged;

(o) The water depth of the channels would be varied, where practicable, to re-create the pool-riffle sequence found in existing watercourse; and

(p) Subject to seasonal conditions, water flow would be maintained along the mitigation stream habitat throughout the year.

3.2 Description of Habitats to be Provided in Mitigation Stream Habitats

3.2.1 A variety of habitat forms will be provided along the mitigation stream habitat to enhance the habitat heterogeneity and hence the ecological value for target species. Typically, short grasses, and herbs grow along stream margins. Some emergent vegetation grows in shallow, slower stretches of streams. These plants are important for providing shelter and food resources to a range of animals. Shorter grasses have the benefits of being easy to maintain for drainage maintenance and will not reduce stream velocities as much as taller vegetation during bank full discharges. A mix of short plants will be planted in the low areas adjacent to the stream. This will not only improve the habitat, but also serve to stabilize soils and prevent the establishment of exotic vegetation during construction of the habitat.

3.2.2 Higher along the bank taller riparian vegetation will be planted (grasses and shrubs) to provide perches for birds, shade, and shelter. These plants will also increase the naturalness of the widened stream habitat and increase the heterogeneity of the system. Taller vegetation, planted along base of the banks within planting bays can also help settle suspended solids during high stream flow. Finally, at the top of banks, small trees and taller shrubs will be planted to provide roosting sites, leaf litter to the stream, and habitat diversity for the stream.

3.2.3 The characteristics of each of the proposed habitat under the mitigation stream habitats are discussed in **Table 3.1**. A representative plant list is provided below. This is a preliminary

list and will be further refined taking into account the horticultural consideration and availability from nurseries. The lateral zonation of the stream habitat is provided in **DRAWING No. 823B/T/SSS/OAP/A58/060 Rev C** to **DRAWING No. 823B/T/SSS/OAP/A58/063 Rev B1.** And the proposed planting plans are shown in **DRAWING No. 823B/T/SSS/OAP/A58/112 Rev B to DRAWING No. 823B/T/SSS/OAP/A58/118 Rev C** and detailed specification are discussed in **Contract 823B – Particular Specification: Appendix AN**.

Table 3.1 Characteristics of the Mitigation Stream Habitats

Lateral Zonation	Habitat Type	General Description	Purpose	Example of Plant Species
Stream Channel	Open Water (1)	The mitigation stream habitat will be integral with the existing Shek Kong Stream at its upper reach. The maximum depth of water will as now be along the centre of the widened stream course. Maximum operational water depths will be approximately 0.93 m in the wet season depending upon the storm event. Water depths will be shallower in dry season (0.2 m depth or below). The average depth along stream would be 0.34 m at 1 in 2 years and 0.43 m at 1 in 50 years. Emergent and marginal vegetation will be provided sparsely along the edge of open water. Vegetation coverage will be low (<10% of the open water area).	Provide foraging opportunities for targeted wading birds such as Little Egret and Chinese Pond Heron, and habitat for freshwater marcoinvertebrate such as Chironomids, Oligochaeta, Odonates (e.g. Scarlet Basker), and fishes. Connect to and provide water supply to the marginal habitats (e.g. open/vegetated stream bank)	-
Floodplain (Stream Bank)	Open Stream Bank (2)	Area of open stream bank at the water margins along the stream with gentle side slopes (1 in 5 to 1 in 10). Slope bank habitat will be seasonally inundated up to approximately 1 m to 1.3 m. Vegetation coverage will be less than 10%.	Support a wider bed of natural substrate with larger and unobstructed open area of shallow water edge. Provide foraging opportunities for targeted wading birds such as Little Egret and Chinese Pond Heron, and habitat for Chironomids, Oligochaeta, Odonates, and amphibians.	*Acorus gramineus* *Acorus tatarinowii* *Bacopa monnieri* *Drymaria diandra* *Equisetum debile* *Kyllinga brevifolia* *Ludwigia adscendens* *Nephrolepis hirsutula* *Cleistocalyx operculatus* *Ficus microcarpa* *Pennisetum alopecurodies*
	Herbs (3)	Such areas will be hydro-seeded and / or	Support emergent and marginal	*Blechnum orientale*

Lateral Zonation	Habitat Type	General Description	Purpose	Example of Plant Species
		planted with herbs / sedges / grasses along the edge of the stream channel. The vegetation will be cut on a regular basis to maintain vegetation height at a suitably low level (not more than 0.2 m) with coverage of about 80%. Since the banks slope is within the range of hydrologic floodplain, the slope bank habitat will be seasonally inundated up to approximately 1 m to 1.3 m.	sedges and herbs that grow in shallow water and saturated ground. Provide foraging opportunities for target ardeid species, and habitat for Chironomids, Oligochaeta, Odonates (e.g. Scarlet Basker), and amphibians.	*Drymaria diandra* *Equisetum debile* *Ficus hispida* *Kyllinga brevifolia* *Miscanthus sinensis* *Nephrolepis hirsutula* *Celtis sinensis* *Cleistocalyx operculatus* *Ficus tinctoria* *Ficus variegata* *Litsea glutinosa* *Ficus virens var. sublanceolata* *Glochidion* spp *Aquilaria sinensis* *Liquidambar formosana* *Sapium sebiferum* *Cinnamomum camphora* *Pennisetum alopecurodies* *Phragmites karka*
	Herbs and Shrubs (4)	Upper stream bank will be hydro-seeded and / or planted with about 80% coverage of grasses and low shrubs. The vegetation should be cut on a regular basis to maintain vegetation height at a suitably low level (about 2 m). With the provision of eastern culvert, it is expected the upper bank will only be inundated occasionally.	Provide a transitional habitat between the upland terrestrial area and the seasonal flooded wetland area in the lower bank. Short riparian vegetation planted upper bank maintain a relatively open canopy mimic the existing Shek Kong Stream characteristics. Support terrestrial plantings that provide for amenity screening and habitat. Provide perching opportunities for target ardeid	*Blechnum orientale* *Drymaria diandra* *Kyllinga brevifolia* *Miscanthus sinensis* *Nephrolepis hirsutula* *Bridelia tomentosa* *Celtis sinensis* *Cleistocalyx operculatus* *Ficus microcarpa* *Ficus superba* var. *japonica* *Litsea glutinosa* *Ficus virens var. sublanceolata* *Sterculia lanceolata* *Bischofia javanica*

Lateral Zonation	Habitat Type	General Description	Purpose	Example of Plant Species
			species.	*Glyptostrobus pensilis* *Sapium sebiferum* *Schefflera heptaphylla* *Cinnamomum camphora* *Pennisetum alopecurodies* *Phragmites karka*
	Reedbed (5)	Reed will be planted at the edge of the upper reach of the stream habitat where water flow is relatively slow. Vegetation coverage will be about 80%.	Provide habitats for Odonates (e.g. Scarlet Basker), birds (e.g. Chinese Pond Heron, Warblers), and amphibians.	*Phragmites* spp. *Cleistocalyx operculatus*
Upland Terrestrial Area	Bamboo Clump (6)	Scattered bamboo clumps will be planted near stream embankment along with other tall trees. About 10% of the upland terrestrial area will be planted with bamboo clump. Areas with higher human disturbance (e.g. locations near footpath, bridge, village house, etc) will be avoided.	Provide roosting, perching, and nesting opportunities for target ardeid species.	*Bambusa vulgaris* *Bridelia tomentosa* *Celtis sinensis* *Bischofia javanica* *Cinnamomum camphora*
	Tall Shrub / Tree (7)	Tall trees will be planted along the periphery with shrubs along the gentle slopes covering about 70% of the terrestrial area. Woodland areas will largely be located along the boundary of the habitat to form a buffer; these areas will be planted with native trees and shrubs.	Support terrestrial plantings that provide for amenity screening and habitat. Provide roosting, perching, and nesting opportunities for target ardeid species.	*Bridelia tomentosa* *Celtis sinensis* *Cleistocalyx operculatus* *Ficus hispida* *Ficus microcarpa* *Ficus superba* var. *japonica* *Ficus tinctoria* *Ficus variegata* *Litsea glutinosa* *Ficus virens var. sublanceolata* *Glochidion* spp *Sterculia lanceolata*

Lateral Zonation	Habitat Type	General Description	Purpose	Example of Plant Species
				Aquilaria sinensis *Bischofia javanica* *Glyptostrobus pensilis* *Liquidambar formosana* *Sapium sebiferum* *Schefflera heptaphylla* *Cinnamomum camphora*

Note:
(1) Refer to Drawing No. 823B/T/SSS/OAP/A58/112 Rev B to DRAWING No. 823B/T/SSS/OAP/A58/118 Rev C for detail.

Proposed Layout of the Mitigation Stream Habitats

3.2.4 The mitigation stream habitat has been divided into two zones separated by a foot bridge with concrete piers to be retained in the middle of the river widening area (**DRAWING NO. FIGURE 3_Rev G** refers). The upstream zone encompasses the south-eastern reach of the mitigation area and the stream is characterized by several bends and meanders. This zone has an area of approximately 1.3 ha. The banks are natural in most stretches. The south-western part of the mitigation stream habitat abuts the Shek Kong Barracks, is located further north, and has an area of about 1.1 ha. The existing channel here is narrow and the banks are steep and armoured in some stretches.

3.2.5 The compensatory stream habitat will be fed by water from the stream and runoff from adjacent areas as well as from ground water. As shallow water will form an important element in the habitat some changes to the existing landform are proposed to maximise the habitat opportunities in the areas identified (MTRC, 2009b).

3.2.6 Though Shek Kong Stream is a fairly natural stream, it is not considered of high ecological value. Through reprovisioning of the streambed, banks, and riparian vegetation the mitigation stream habitat may serve to enhance the ecological value of the widened channel section. The goal of this mitigation stream habitat is to replace comparable habitat destroyed during construction and operation of the SSS/ERS (MTRC, 2009a).

3.2.7 With this aim in sight, a holistic approach, including features that replicate other natural watercourses, is required. Sufficient microhabitat for invertebrates and other ardeid prey species, riparian vegetation to shelter feeding birds, open water areas for foraging, and unimpeded stream access for fauna are required for a healthy stream community.

3.2.8 The size of the mitigation stream habitat to be provided will be similar to the area affected by SSS/ERS. This is based on the need for the development to avoid a net loss of habitat. The habitat area is consolidated into a single unit along the Shek Kong Stream to reduce fragmentation, lessen the effects of disturbance and maximise connectivity with existing habitats in the vicinity. The layout of the mitigation stream habitat is designed to maximise the extent to which it is directly adjacent to existing habitats, and at the same time prevent a direct interface between the proposed SSS/ERS development and existing habitats outside the SSS/ERS. The mitigation stream habitat will thus also serve to buffer the existing habitats from potential impacts created by the proposed development. Within the recreated habitat there will be a gradation in vegetation height, with the tallest vegetation along the existing stream course (MTRC, 2009b).

4 TARGET SPECIES

4.1 Overview

4.1.1 The ecological value of the affected stream course was rated as low to moderate and the habitat supported only low floral and faunal diversity. The species recorded were predominantly locally common. The XRL EIA Report (MTRC, 2009a) concluded that potential ecological impact to watercourse habitat resulting from the proposed construction of SSS/ERS would be low to moderate. Three species of bird and dragonfly species of conservation interest associated with the stream habitat would be affected.

4.1.2 It is expected that impacts to the bird and dragonfly species of conservation interest can be mitigated through provision of enhanced habitats during operation phase. The habitat design will focus on creating habitats suitable for a group of key target species identified during the EIA stage. The 2 groups of organisms selected as "target species" are as follows:

(q) Ardeids including Chinese Pond Heron (*Ardeola bacchus*) and Little Egret (*Egretta garzetta*); and

(r) Scarlet Basker (*Urothemis signata signata*).

4.1.3 Apart from the above target species, it is envisaged that the ecologically friendly open channel and mitigation stream habitats would also provide habitats of similar ecological value and function to the wildlife utilising the existing stream course.

4.2 Habitat Requirement of the Target Species

4.2.1 The purpose of the mitigation stream habitat is to provide replacement habitat for target species – the ardeid and dragonfly species similar to those recorded from the existing watercourse.

Ardeids (Little Egret and Chinese Pond Heron)

4.2.2 The Shek Kong and Kam Tin district forms part of a substantial system of wetlands in the North West New Territories, comprised of a number of habitat types including, drainage channels, rivers, recreated wetland, and wet agricultural lands. The region as a whole is utilised by a numbers of ardeids (Herons and Egrets). Ecological surveys carried out for the XRL EIA Report identified 5 species of ardeid to be common in the assessment area: Little Egret (*Egretta garzetta*), Chinese Pond Heron (*Ardeola bacchus*), Cattle Egret (*Bubulcus ibis*), Great Egret (*Casmerodius albus*), and Grey Heron (*Ardea cinerea*). The former two species were recorded foraging along the Shek Kong Stream throughout the survey period and therefore have been selected as target species for the mitigation stream habitats.

4.2.3 Observations in the field have demonstrated that stream and channel are among the preferred feeding grounds for many ardeids. Ardeids generally roost in dense, low vegetation (<0.5m) on bunds and islands, and nest in stands of trees and bamboo. The location and size of egretries is clearly related to the availability of nearby foraging sites (Melville et al., 1994). Over 70% of egretries found in Hong Kong are situated in the North West New Territories, where extensive wetland habitats provide ample feeding resources (Aspinwall & Company, 1997). Their habitat requirements are summaries in **Table 4.1**. It should be noted that no ardeid roosting activities were observed in Shek Kong Stream during the surveys (AECOM, 2009).

Table 4.1 Habitat Requirement of Target Bird Species

Species	Status and Distribution in Hong Kong	Level of Concern [1]	Preferred Foraging Habitat	Preferred Water Depth of Foraging Habitat	Prey	Preferred Nesting and Roosting Habitat

Species	Status and Distribution in Hong Kong	Level of Concern [1]	Preferred Foraging Habitat	Preferred Water Depth of Foraging Habitat	Prey	Preferred Nesting and Roosting Habitat
Little Egret (*Egretta garzetta*)	Resident and winter visitor; Locally common	PRC (RC)	• Shallow water with emergent vegetation (<50 cm) • Stocked fishpond • Drained fishponds • Intertidal mudflat	< 25 cm	Small prey (e.g. fish, shrimp)	Bamboo clump and trees (e.g. *Ficus microcarpa*)
Chinese Pond Heron (*Ardeola bacchus*)	Resident; Locally common	PRC (RC)	• Edge of shallow water areas with sparse or short vegetation (<50 cm) • Emergent vegetation • Muddy Stream Bank mudflat • Reedbed	<15 cm	Prey in shallow water in/on the edge of areas of emergent or pond side vegetation (e.g. small fish, shrimp, invertebrate, amphibians)	Bamboo clump and trees (e.g. *Ficus microcarpa*)

Note:
(1) Fellowes et al. (2002): RC=Regional Concern; PRC=Potential Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.

Dragonfly (Scarlet Basker)

4.2.4 The dragonfly species Scarlet Basker (*Urothemis signata signata*) was recorded in a watercourse within the works area of the SSS / ERS near the Shek Kong Airfield during surveys in EIA stage. The species is locally common throughout Hong Kong but its population is considered as of Local Concern (Fellowes et al. 2002). The species can usually be found in areas containing abandoned fish ponds. They also prefer weedy ponds and sluggish rivers (Wilson, 2004).

5 HABITAT CREATION

5.1 Overview

5.1.1 This section outlines of the design features, techniques, and construction methods incorporated into the mitigation stream habitat. This includes some general guidelines as well as specific suggestions for incorporation into the final detailed design of the reprovisioned watercourse.

5.2 Habitat Creation and Enhancement Works

Land Form

5.2.1 The overall length of the stream habitat is about 600m. The width of the new stream bed varies from about 10m to 45m and the new banks are curvilinear so as to be similar in form to a meandering natural stream channel (**DRAWING NO. 823B/T/SSS/OAP/C22/701 to DRAWING NO. 823B/T/SSS/OAP/C22/703 Rev C**).

5.2.2 The overall depth of the channels varies from about 1.8m to about 3.5m. At its lowest elevation the new stream bed will be at about +14mPD and at its highest elevation about +19.7mPD. This gradient is similar to that of the existing Shek Kong Stream which falls from +19mPD to +15mPD over a length of about 50m (**DRAWING No. 823B/T/SSS/OAP/C22/761 Rev B**).

5.2.3 The new stream bed will have a varying downstream slope or gradient made up of cobbles and boulders infilled with finer gravels and sands (refer to the "Notes on River Habitat" on **DRAWING No. 823B/T/SSS/OAP/C01/601 Rev A** as well as **DRAWING No. 823B/T/SSS/OAP/C22/763 Rev B**). As the gradient of the stream bed is naturally quite steep the base flow will not fill the whole bed width of the channel but will be trained to meander irregularly through the bed. The emphasis will be on creating a naturalistic arrangement. In time, stream flow may re-sort and grade the stream bed and may modify the channel profile and alignment.

5.2.4 The earth banks will be of uniform slope but curvilinear in plan and may contain embedded boulders provided these are stable and do not create turbulences and result in local scour holes that would undermine the slope. At the junction of the bed and banks gentler slopes (e.g. 1:5) planted with herb and low shrub species will soften the transition between stone and planted earth bank. This marginal vegetation will also protect the earth banks from erosion. The gentle bank slopes and shallow water areas will encourage wading birds.

Channel Design

5.2.5 Where practical within the land available the proposed new stream bed channel is wider and the invert deeper than existing (**DRAWING No. 823B/T/SSS/OAP/C22/751 Rev B** to **DRAWING No. 823B/T/SSS/OAP/C22/756 Rev B**). This wider channel form is designed to limit the velocity of flow during times of peak runoff so as to limit further erosion of the natural banks and the proposed earth bank slopes. The deeper invert is designed to ensure that the proposed flow remains in bank during the design rainfall event with a freeboard allowance.

5.2.6 A shallow sinuous channel will meander through the broader channel bed area, connecting shallow pools along the stream. Confining the low flow within a narrower channel will ensure areas of open water in all but the driest periods. The variety in water depth and flow speeds will create a range of microhabitats for wildlife.

5.2.7 The channel bed will be lined with riverine cobbles, boulders, gravels and finer river sands, preferably sourced from the site. In-channel features such as boulders will be carefully considered in relation to their effect on hydraulic flow and subsequent erosion pattern, particularly near banks. In time, the stream bed will adjust to the seasonal flow regime and adopt its own course and profile within the overall cross sectional profiles of the design.

5.2.8 Stream banks will be carefully graded to smooth horizontal profiles to give a naturalistic appearance and gradients suitable for promoting a favourable terrestrial/aquatic habitat interface for target bird species. Where the width of the channel allows the lower portion of the slope will be flattened to 1 in 5. Existing bank slopes will remain untouched as far as possible. Bank edge conditions will be varied and will include rock, grass, shrub and in some cases even tree cover (refer to **DRAWING No. 823B/T/SSS/OAP/A58/060 Rev C** to **DRAWING No. 823B/W/SSS/OAP/A58/063 Rev B1**). Vegetation establishment will play an important role in erosion control and temporary biodegradable geotextiles may be employed prior to and during establishment.

Water Sources

5.2.9 The main external water source of the mitigation stream habitat will be the base flow and rain induced runoff in the Shek Kong Stream. Other sources of surface water come from the narrow catchment area between the Shek Kong Airfield Road Drainage Nullah and the stream habitat. These other sources comprise a dry weather flow that has been observed to flow alongside the nullah access road embankment and rain induced runoff from this catchment (**DRAWING No. 823B/T/SSS/OAP/C14/211 Rev A1, DRAWING No. 823B/T/SSS/OAP/C14/224 Rev A1** and **DRAWING No. 823B/T/SSS/OAP/C14/225 Rev A1**).

Water Control Structures

5.2.10 Upstream inlet pipes and a weir across the east culvert will control the flow entering the stream habitat (**DRAWING NO. 823B/T/SSS/OAP/C14/430 Rev A1** and **DRAWING NO. 823B/T/SSS/OAP/C14/431 Rev A1**). No change to the stream flow volumes should occur as a consequence of the stream re-provision works. There will be no downstream control device as the intention is not to form a pond but to allow water to flow freely downstream with maximum natural aeration but minimum sediment transport.

5.2.11 Low base flows will be conveyed through a 450 mm diameter pipe and enter the habitat near its upstream end. Higher flows will be conveyed through two 900 mm diameter pipes up to a limiting flow of about 6cu.m/s (**DRAWING No. 823B/T/SSS/OAP/C14/211 Rev A1, DRAWING No. 823B/T/SSS/OAP/C14/224 Rev A1** and **DRAWING No. 823B/T/SSS/OAP/C14/225 Rev A1**).

5.2.12 Water control structures (e.g. pipes, drainage outlet) will be designed to integrate into the stream banks and be as visually unobtrusive as possible. Texturing and pigmentation of concrete structures will be considered to blend them with the natural materials and colours of the stream bed.

Soils

5.2.13 The stream bed will consist of boulders, cobbles, gravels and sands as described above. The stream banks by contrast will have a soil covering to support stream bank planting. The existing stream soils will be re-used as far as practicable. Soils for the stream banks will be sourced from the site excavation and stockpiled ready for placement once the stream bank profiling has been completed. Should insufficient soil be available from site excavation, suitable soils will be imported.

5.2.14 Soil composition shall also be examined for suitability for the native plant species selected and may be adjusted through the addition of organic and inorganic soil additives. Soils placed on the banks will be protected from erosion prior to plant establishment by biodegradable geo-textiles. Details are provided in **Contract 823B – Particular Specification: Appendix AN**.

Vegetation Planting

5.2.15 Along the widened stream corridor, vegetation will be planted to encourage recruitment of wildlife, enhance stream function, provide shelter for fauna, and improve aesthetics. Vegetation will be selected based on its ecological function, appropriateness to the habitat,

and role in the altered channel hydrology. Selected planting species will include appropriate species from those existing on site and new species that it is anticipated will enhance the habitat potential. Natural colonisation by favourable species will be encouraged in the long term and accommodated within the management plan.

5.2.16 Though existing vegetation is generally of common species and low value, they will be retained on site during construction as much as possible. Wherever possible, salvaged plants will be restored to the riparian corridor to maintain a biological continuity and community composition similar to the unaltered stream. Undesirable or invasive species (e.g. *Mikania micrantha*) will be removed.

5.2.17 The intended vegetation communities will be established through the planting of aquatic and terrestrial species (refer to **DRAWING No. 823B/T/SSS/OAP/A58/112 Rev B** to **DRAWING No. 823B/T/SSS/OAP/A58/118 Rev C**). Planting species will be native selected for their suitability for location on the stream profile (aquatics, marginals/semi-aquatics, etc.) and for their compatibility with the target bird and insect species. Vegetation and cover will be varied to create a variety of habitats including open water, un-vegetated areas, vegetated slopes of short and long grasses, grass and shrub areas and tree and shrub areas. Wooded areas will be located along the habitat edges to create a buffer. Trees will be planted randomly in groups or individually to replicate the natural character of the original stream habitat.

5.2.18 Initial plantings/hydroseeding will occur as soon as the site is cleared to prevent erosion and establishment of invasive plants. To facilitate successful establishment of wetland vegetations in the newly created stream habitat, planting would preferably be commenced in wet season (e.g. April and May) prior to the onset of the monsoon rains to coincide with the plant growing season. However, larger vegetation might be transplanted during the wet season to secure higher survival rate.

5.2.19 Following planting, care should be taken to prevent the planted vegetations from drying out or being flooded. Initial planting will be managed to prevent invasion of unwanted species. Natural colonisation by favourable species will be encouraged. The contractor should replace vegetation within the widened stream habitat that does not survive over the establishment period.

Access and Security

5.2.20 The footbridge over the existing stream will be maintained to provide access to the north bank of the habitat area from the existing village access road that skirts the boundary of the Shek Kong airfield. The habitat can also be accessed from the footpath to be constructed along the SSS southern access road leading from Kam Sheung Road. Where space allows an access footpath will be constructed along the outside of the boundary fence line.

5.2.21 Where required to restrict access to the habitat area boundary fencing with lockable gates will be installed. The form of fencing provided will be similar to that provided at other wetland habitat areas. For example, the fencing provided to habitat areas alongside West Rail between Kam Sheung Road Station and Yuen Long Station (**DRAWING NO. 823B/T/SSS/OAP/C24/125 Rev B**). This form of fencing is constructed from vertical, horizontal and inclined steel channel sections painted green with stretched horizontal stainless steel wire at 150mm centres.

5.3 Implementation Programme

5.3.1 Core construction of the mitigation stream habitat is expected to be commenced in mid 2014 and targeted for completion by early 2015. The wetland enhancement works of the proposed mitigation stream habitat would be commenced after the completion of key construction activities in the SSS/ERS site. It is expected that from commencement of construction of the habitat to it being operational will take approximately 9 months.

Table 5.1 Tentative Work Programme of Key Activities Relevant to the Mitigation Stream Habitat Construction

Key Activities	Start	Finish	Works Involved
Construction Period			
Possession of SSS/ERS Site	Dec 2010	N/A	• Erection of temporary site hoarding/fencing
Construction of Eastern Culvert (Bypass Channel) and Flow Control Structures	Dec 2010	Oct 2013	• Formation of Eastern Culvert • Construction of upstream inlet pipes and a weir across the Eastern Culvert
Temporary Diversion of Shek Kong Stream (Section to the South of SSS/ERS Site) to Eastern Culvert	Dec 2012	Dec2012	• Temporary divert the stream flow of Shek Kong Stream to Eastern Culvert to allow for construction works in the mitigation stream habitat
Watercourse Training (South of SSS/ERS Site)	Dec 2010	Jul 2014	• Stream diversion to Eastern Culvert • Site formation and removal of existing structures as necessary • Re-contouring the mitigation stream habitat preserving useful habitat species • Installation of water control structure along stream bank • Pipe laying
Habitat Development for Mitigation Stream Habitat	Jul 2014	Mar 2015	• Create in-stream features • Preparation of soil for planting along stream bank • Planting within suitable area of the mitigation stream habitat • Installation of permanent fencing as necessary
Diversion of Shek Kong Stream flow from Eastern Culvert to Mitigation Stream Habitat	Upon completion of mitigation stream habitat	N/A	• Depending on the level of water at the entrance to the Shek Kong Stream upstream of the East Culvert, the flow will be diverted to mitigation stream habitat

6 MANAGEMENT AND MAINTENANCE PLAN

6.1 Responsibility

6.1.1 The creation, enhancement, and maintenance of the mitigation stream habitat would be undertaken by a contractor under the management of the project proponent. The contractor's proposed detailed design and construction method would be assessed and the progress and completion of the works would be checked against the requirements of the design specifications outlined in the EHMP by qualified ecologist(s).

6.1.2 The management and maintenance matrix is yet to be confirmed with the relevant Authorities. The MTR will remain responsible for the management and maintenance of the mitigation stream habitat until other arrangement is confirmed, and will liaise with relevant authorities to identify the long-term management and maintenance matrix for the mitigation stream habitat.

6.2 Programme and Action

Flow Management

6.2.1 The flow that is diverted to the mitigation stream habitat will depend on the level of water at the entrance to the channel upstream of the east culvert. This water level will vary according to the flow from the upstream catchment of the Shek Kong Stream. At very low flows all of the flow in the stream will be diverted to the habitat so that whenever there is a flow of water in the Shek Kong Stream there will be a similar flow through the stream habitat area.

6.2.2 A limit needs to be placed on the flow through the habitat during peak runoff conditions so that erosion of existing and formed earth bank slopes does not occur. This limit is a peak flow of about 6cu.m/s carried mainly by the twin 900mm diameter pipes

Habitat Management

6.2.3 A management team would be appointed by the project proponent or its agent to maintain the physical and/or ecological requirements of the mitigation stream habitat and undertake necessary modifications to the mitigation stream habitat as being required through the proposed monitoring programme as described in **Section 7**.

6.2.4 Appropriately qualified ecologist(s) with relevant experience will be responsible for supervising implementation of the EHMP and for monitoring the mitigation stream habitat. In addition a specialist contractor with solid experience in habitat construction and planting would be appointed to carry out the establishment works and subsequent maintenance until handover.

Vegetation Control

6.2.5 Vegetation will be actively managed during establishment with the goal of promoting habitat variety. This will require an experience ecologist and a specialist contractor to monitor and manage the vegetation appropriately. Grasses will be cut on a regular basis to maintain optimum heights for wildlife and discourage colonisation by unwanted species. Heights will vary for different habitat zones. The need for further maintenance operations will be reviewed based on the findings of post-construction monitoring.

Channel, Structure and Equipment Management

6.2.6 Pipes leading into the stream habitat should be inspected every 3 months to ensure that they remain free of blockage and any blockages are cleared. Desilting should only be carried out when necessary and should be limited to the early and late dry season (October, and February to March) to avoid the peak overwintering season of bird (November to January). The natural stream bed substrate should not be removed from the channel during desilting works. Containment structures such as sand bags barrier should be provided for the active de-silting works area to facilitate a dry or at least confined working area within the channel. Good site practice and appropriate measures as stipulated in ETWB Technical Circular (Works) No.

potential environmental impact cause to the watercourse. Waste material produced during desilting should be disposed of in a timely and appropriate manner. The handling/treatment of sediment materials would be proceeded in accordance with the requirements stipulated in ETWB Technical Circular (Works) No. 34/2002.

6.2.7 After establishment of the habitat vegetation the area should be regularly inspected to check the necessity of vegetation maintenance in order to maintain the right conditions for habitat creation. Regular perimeter inspections every three months are advisable to ensure there has been no illegal entry and that the boundary fence remains in a serviceable condition.

Table 6.1 Management and Maintenance Works required for Mitigation Stream Habitat

Key Activities	Works Involved
Habitat Management	• Regular inspection of stream profile and in-stream feature • Modification of stream profile and in-stream feature as necessary
Vegetation Management	• Regular inspection of plantings for signs of insect or fungal attack and any necessary mitigation measures • Replacement planting (to replace dead/damaged/unsuitable plant) • Supplemental planting (change of plant species, add new plant species) • Removal of exotic plant species • Weeding, thinning, and irrigation of vegetation
Channel, Structure and Equipment Maintenance	• Regular inspection of blockage • Regular inspection and maintenance of channel structure and equipment (e.g. weir, channel bank, culvert, stepped channel, water point, fence, gate, etc.) • Ad-hoc maintenance (e.g. clearance of debris, boulders, de-silting, removal of refuse, dead vegetation, etc.) should be carried out when necessary.

7 MONITORING

7.1 Introduction

7.1.1 Monitoring, evaluation and adaptive management are necessary to check on the success of the design of mitigation stream habitat proposed during planning stage. Suitable adjustment can then be identified to refine the design based on the set targets.

7.2 Monitoring

7.2.1 Monitoring will be conducted during post-construction phase. The data collected will provide a better understanding of the characteristics of the stream habitat.

Post-construction Phase Monitoring

7.2.2 A post-construction phase ecological monitoring of the mitigation stream habitats shall be conducted to check and guide that the mitigation function is achieved. The monitoring will track the progress of habitat establishment through time and under a range of changing environmental conditions such as flooding, channel shift, and erosion. The performance of the habitat will be compared with the pre-construction condition and checked against the goals on a regularly basis.

7.2.3 MTR is committed to conduct the post-construction phase ecological monitoring during the first two year of stream habitat operation. A more detailed plan on monitoring methodology will be submitted to AFCD at least one month before commencement of the first phase monitoring programme. The findings of the first phase post-construction monitoring data will be reviewed in order to check whether the physical (e.g. water level, condition of substrate) and ecological (e.g. vegetation establishment, wildlife use) functions of the stream habitats are achieved. The requirement of monitoring duration, frequency and parameters for further monitoring will then be reviewed and defined with reference to the first phase monitoring data. The requirements of further operation phase ecological monitoring will be reviewed and agreed with the AFCD at least one month before the completion of the first phase post-construction monitoring.

7.2.4 The tentative plan for monitoring parameters, frequency and timing is provided in **Table 7.1**.

Table 7.1 First Phase Post-construction Monitoring of the Mitigation Stream Habitat

Parameters	Monitoring Location	Monitoring Frequency
Habitat		
Percentage cover and size of each habitat type	Within the boundary of mitigation stream habitat	Twice per year: end of wet season (Oct), end of dry season (Mar)
Vegetation		
Percentage of vegetation cover in each habitat type	Within the boundary of mitigation stream habitat	Monthly
Percentage cover of individual dominant plant species within each habitat type along the lateral zonation	Within the boundary of mitigation stream habitat	Monthly
Percentage cover of invasive species with the mitigation stream habitat	Within the boundary of mitigation stream habitat	Monthly

Parameters	Monitoring Location	Monitoring Frequency
Fauna		
Diversity and abundance of bird species	Within the boundary of mitigation stream habitat	Monthly
Diversity and abundance of dragonfly and damselfly species	Within the boundary of mitigation stream habitat	Monthly between April and October
Diversity and abundance of fish species	Stream channel	Twice per year (cover dry and wet seasons)
Diversity and abundance of benthic macro-invertebrate species	Stream channel	Twice per year (cover dry and wet seasons)
Water Quality		
• Temperature • pH • Salinity • Dissolved oxygen • Turbidity	Three water quality monitoring points along the mitigation stream habitat	Bi-monthly
• Suspended solids • Total oxidized nitrogen • Ammoniacal nitrogen • Total phosphorus • Total reactive phosphorus (Orthophosphate) • Oil and grease • Biochemical oxygen demand • *Escherichia coli*	Three water quality monitoring points along the mitigation stream habitat	Twice per year (cover dry and wet seasons)

7.3 Evaluation and Adaptive Management

7.3.1 Evaluations based on the data collected in monitoring works are required to determine whether the effort in habitat re-creation is effective and mitigation targets set during planning stage are met. As the new site data becomes available, any unexpected problems and adjustment in management direction can then be identified. The key processes involve in adaptive management are as follow:

7.3.2 Monitoring of relevant habitat components – The response of different aspects of the wetland habitat and community will be monitored to evaluate the success of remedial strategies

7.3.3 Review of wetland components – Monitoring data collected from the stream habitats will be reviewed to determine why specific indicator objectives are not being achieved

7.3.4 Review of management techniques – Management strategies will be examined to determine the changes needed in order to meet indicator objectives.

7.3.5 Implementation of revised management techniques – Refined management strategies will be implemented.

7.4 Documenting and Reporting

7.4.1 During the first two year of first-phase post-construction period, the findings of monitoring and adaptive management will be recorded in Monthly Monitoring Report. The Report will be prepared and submitted within 10 working days of the end of each reporting month to relevant authority including AFCD. An Annual Report reviewing the functions of the recreated habitat will be prepared and circulated to AFCD at the end of the first year post-construction period. A Final Report will be prepared at the end of the second year and circulated to EPD and AFCD.

7.5 Staffing

7.5.1 The monitoring will be undertaken by qualified ecologist(s) with university degree in ecology or relevant disciplines, and at least 5-years relevant post qualification project experience.

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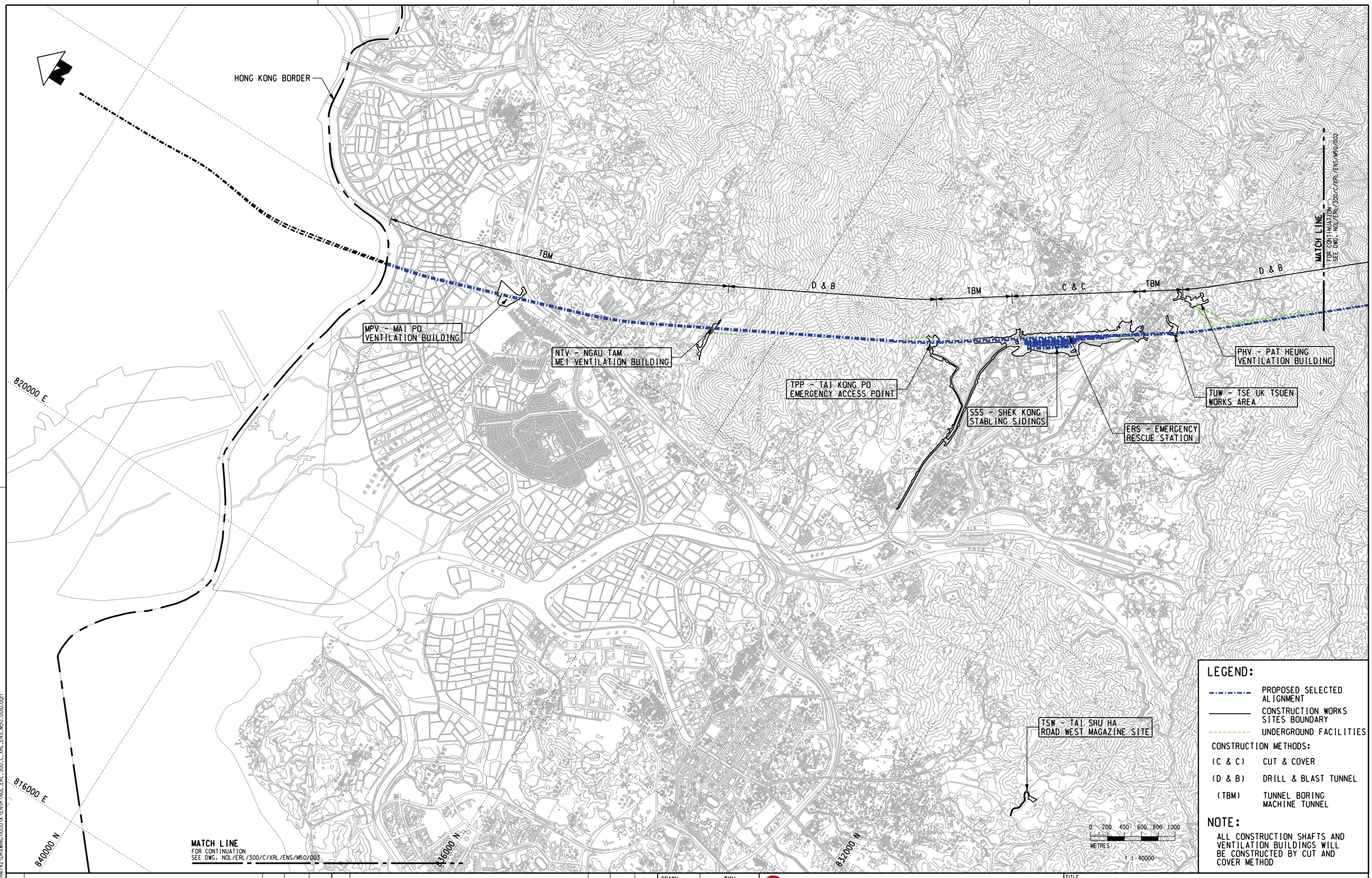
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FIGURES



LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- UNDERGROUND FACILITIES

CONSTRUCTION METHODS:

(C & C)	CUT & COVER
(D & B)	DRILL & BLAST TUNNEL
(TBM)	TUNNEL BORING MACHINE TUNNEL

NOTE:

ALL CONSTRUCTION SHAFTS AND VENTILATION BUILDINGS WILL BE CONSTRUCTED BY CUT AND COVER METHOD

REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	GXH
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CADD REF. NOL_ERL_300_C_XRL_ENS_M50_001D.dgn

TITLE

NOL / ERL-300
ENVIRONMENTAL IMPACT ASSESSMENT
OVERALL VIEW OF ALIGNMENT

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D & B

SMV - SHING MUN VENTILATION BUILDING

SYW - SHEK YAM WORKS AREA

KCV - KWAI CHUNG VENTILATION BUILDING

MLW - MEI LAI ROAD WORKS AREA

LCW - LAI CHI KOK WORKS AREA

RCB - RAMBLER CHANNEL BARGING POINT

TBM

C & C

NCV - NAM CHEONG VENTILATION BUILDING

MKV - MONG KOK WEST VENTILATION BUILDING

NCB - NAM CHEONG BARGING POINT

PTI - PUBLIC TRANSPORT INTERCHANGE

WKT - WEST KOWLOON TERMINUS

WKB - WEST KOWLOON BARGING POINT

TSUEN WAN

RAMBLER

VICTORIA

MATCH LINE
FOR CONTINUATION
SEE DWG NO. NOL/ERL/300/C/XRL/ENS/M50/001

LEGEND:

- PROPOSED SELECTED ALIGNMENT
- CONSTRUCTION WORKS SITES BOUNDARY
- UNDERGROUND FACILITIES

CONSTRUCTION METHODS:

(C & C)	CUT & COVER
(D & B)	DRILL & BLAST TUNNEL
(TBM)	TUNNEL BORING MACHINE TUNNEL

NOTE:

ALL CONSTRUCTION SHAFTS AND VENTILATION BUILDINGS WILL BE CONSTRUCTED BY CUT AND COVER METHOD

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TITLE

NOL / ERL-300
ENVIRONMENTAL IMPACT ASSESSMENT
OVERALL VIEW OF ALIGNMENT

SCALE	FIGURE NO.	REV.
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MATCH LINE
FOR CONTINUATION
SEE DWG. NOL/ERL/300/C/XRL/ENS/M50/001

HONG KONG BORDER

810000 E

820000 E

SKW - SO KWUN WAT
MAGAZINE SITE &
NURSERY AREA

TCB - TSING CHAU TSAI
BARGING POINT

SLB - SIU LAM
BARGING POINT

SLSW - SIU LANG SHUI
NURSERY AREA

LKB - LUNG KWU
SHEUNG TAN
BARGING POINT

830000 N

820000 N

URMSTON ROAD

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LEGEND:
PROPOSED SELECTED ALIGNMENT
CONSTRUCTION WORKS SITES BOUNDARY

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TITLE
NOL / ERL-300
ENVIRONMENTAL IMPACT ASSESSMENT
OVERALL VIEW OF ALIGNMENT

SCALE 1 : 60000 (A3) | FIGURE NO. NOL/ERL/300/C/XRL/ENS/M50/003 | REV. C

GENERAL NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. ALL LEVELS ARE IN METRES ABOVE PRINCIPAL DATUM (m.P.D.).
3. DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWINGS.
4. COORDINATES ARE BASED ON THE HONG KONG METRIC GRID (1980).
5. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT DRAWINGS ISSUED UNDER THE CONTRACT. THE CONTRACTOR SHALL INFORM THE ENGINEER IMMEDIATELY OF ANY DISCREPANCIES FOUND IN THE DRAWINGS.
6. ALL EXISTING STRUCTURAL INFORMATION IS FOR REFERENCE ONLY. THE CONTRACTOR SHALL CARRY OUT HIS OWN INVESTIGATION WORKS TO VERIFY THE ACTUAL LOCATION AND LEVEL OF ALL EXISTING STRUCTURES BEFORE COMMENCING WORK.
7. ALL WORKS SHALL COMPLY WITH THE HONG KONG BUILDING (CONSTRUCTION) REGULATIONS. CODE OF PRACTICE FOR FOUNDATIONS AND RELEVANT PRACTICE NOTES FOR AUTHORIZED PERSONS, REGISTERED STRUCTURAL ENGINEERS, REGISTERED GEOTECHNICAL ENGINEERS AND PRACTICE NOTES FOR REGISTERED CONTRACTORS.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL NECESSARY SLOPE SURFACE PROTECTION WORKS.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TEMPORARY DIVERSION AND REINSTATEMENT OF UTILITIES AND ALL COORDINATION WORKS WITH UTILITY COMPANIES.
10. THE EXACT BOUNDARIES OF THE WORKS SITE AND THE WORKS AREAS AND THE EXACT ALIGNMENT OF HOARDING, SAFETY FENCES AND CHAIN LINK FENCES SHALL BE CONFIRMED BY THE ENGINEER ON SITE.
11. PRIOR TO THE COMMENCEMENT OF EXCAVATION WORKS, THE CONTRACTOR SHALL SUBMIT METHOD STATEMENT OF PRECAUTION AND MITIGATION MEASURES AGAINST POTENTIAL DIFFERENTIAL SETTLEMENTS IN EXISTING WSD WATERMAINS, IN ACCORDANCE WITH GUIDELINES FOR EXCAVATION NEAR WATER MAINS PUBLISHED BY WSD FOR THE APPROVAL OF WSD AND THE ENGINEER.
12. EXISTING DRAINAGE CHANNELS AND CATCHPITS TO BE RETAINED WITHIN THE SITE WORKS AREA SHALL BE PROTECTED BY THE CONTRACTOR AND SHALL BE REPAIRED WHERE NECESSARY AS DIRECTED BY THE ENGINEER ON SITE.
13. THE CONTRACTOR SHALL REPORT TO THE ENGINEER IMMEDIATELY IF THE ACTUAL GROUND WATER TABLE AND GROUND CONDITION REVEALED DURING CONSTRUCTION ARE DIFFERENT FROM THE DESIGN ASSUMPTIONS.
14. THE SURFACE RUNOFF OR EXTRACTED GROUND WATER CONTAMINATED BY SILT AND SUSPENDED SOLIDS SHALL BE COLLECTED BY THE ON-SITE DRAINAGE SYSTEM AND DISCHARGED INTO STORM DRAINS AFTER THE REMOVAL OF SILT IN SILT REMOVAL FACILITIES. THE DISCHARGE LOCATION SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND EXECUTION OF ALL TEMPORARY WORKS. THE CONTRACTOR SHALL ALSO SUBMIT THE PROPOSED TEMPORARY WORKS FOR THE APPROVAL OF THE ENGINEER PRIOR TO THE COMMENCEMENT OF THE WORKS.
16. THE CONTRACTOR SHALL KEEP THE SITE IN A CLEAN AND HYGIENIC CONDITION. ALL SURPLUS MATERIAL AND WASTE OF ANY KIND WHATSOEVER GENERATED BY THE CONTRACTOR OR BY THE WORKS SHALL BE CLEARED AWAY AND REMOVED FROM THE WORKS AREA. THE EXTENT OF WHICH SHALL BE CONFIRMED ON SITE BY THE ENGINEER. ALL SURPLUS MATERIAL AND WASTE SHALL BE DISPOSED IN ACCORDANCE WITH THE CONTRACT.
17. PERMANENT SLOPE AND RETAINING WALL FEATURES SHALL BE REGISTERED IN ACCORDANCE WITH PNAP168 AND THE MAINTENANCE MANUALS SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH PNAP 189.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REINSTATEMENT OF THE EXISTING KERB ALONG THE EXISTING WSD RESERVED ROAD WITHIN THE WORKS AREA AND TO THE ACCEPTANCE OF THE ENGINEER AND THE RELEVANT MAINTENANCE PARTIES.
19. PRIOR TO BACKFILLING OR CONSTRUCTION OF PERMANENT STRUCTURES, THE TOP 1M THICK TOP SOIL UNDERNEATH EXISTING STRUCTURES AND ROADS AND THE TOP 2m THICK TOP SOIL AT OTHER AREAS SHALL BE REMOVED. THE EXACT THICKNESS OF SOIL TO BE REMOVED TO BE DETERMINED BY THE ENGINEER ON SITE. IF THE FINAL EXCAVATION LEVEL IS LOWER THAN THE GROUNDWATER TABLE, GRANULAR BACKFILL SHALL BE USED TO BACKFILL THE AREA UNDER THE GROUNDWATER TABLE AND THE GRANULAR BACKFILL SHALL BE PROPERLY WRAPPED BY AN APPROVED TYPE NON-WOVEN GEOTEXTILE.
20. INSPECTION PITS AT 50m CENTRES SHALL BE EXCAVATED TO DETERMINE THE EXACT THICKNESS OF SOIL TO BE REMOVED. THE CONTRACTOR SHALL SUBMIT THE INSPECTION PITS RECORDS TO THE ENGINEER AND IDENTIFY THE EXTENT OF DEBRIS, SOFT SOIL, BOULDERS, ORGANIC WASTE, CONTAMINATED SOIL, RUBBISH AND ALL OTHER UNSUITABLE MATERIALS IN THE OPINION OF THE ENGINEER FOR THE FORMATION OF THE SOIL EMBANKMENT AND PERMANENT STRUCTURES.
21. THE INDICATED SITE FORMATION LEVELS ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL REFER TO THE RELEVANT ROAD WORKS AND STRUCTURES DRAWINGS TO DETERMINE THE ACTUAL SITE FORMATION LEVELS REQUIRED.
22. A LAYER OF APPROVED WOVEN GEOTEXTILE SHALL BE INSTALLED AT THE BASE OF BACK FILL.

NOTES ON HYDROSEEDING

1. ALL PERMANENT NEWLY FORMED SLOPES SHALL BE COVERED BY EROSION CONTROL MAT HYDROSEEDED UNLESS OTHERWISE SPECIFIED.
2. REQUIREMENTS FOR THE HYDROSEEDING WORKS SHALL BE SPECIFIED AS PER THE LANDSCAPE DRAWINGS AND M & W SPECIFICATION.
3. GREEN COLOUR HYDROSEEDING AND LONG-TERM NON-DEGRADABLE EROSION CONTROL MAT SHALL BE APPLIED TO THE FINISHED SURFACES.
4. EROSION CONTROL MAT SHALL BE AT LEAST 20mm THICK POLYAMIDE TYPE OR EQUIVALENT.

NOTES ON EXCAVATION / TRIMMING

1. EXCAVATION / TRIMMING OF SOIL SLOPES SHALL BE CARRIED OUT IN SUCH A MANNER THAT SOIL IS REMOVED FROM THE SLOPE FACE WITHOUT AFFECTING THE STABILITY AND INTEGRITY OF THE SLOPE. MEASURES SHALL ALSO BE TAKEN TO PREVENT UNCONTROLLED FALLS OF DEBRIS.
2. ALL MATERIAL REMOVED OR EXCAVATED BY TRIMMING INCLUDING LOOSE FRAGMENTS OF SOIL AND ROCK SHALL BE REMOVED FROM THE SLOPE.
3. ALL NECESSARY PRECAUTIONS SHALL BE TAKEN TO PREVENT DAMAGE TO EXISTING DRAINS AND SERVICES ENCOUNTERED IN AND AROUND THE EXCAVATION AREA. WHERE NECESSARY, DRAINS AND SERVICES SHALL BE TEMPORARILY DIVERTED AWAY FROM THE EXCAVATION AREA AND SUBSEQUENTLY REINSTATED FOLLOWING COMPLETION OF THE WORKS.
4. EXCAVATED MATERIAL SHALL BE DISPOSED OF BY THE CONTRACTOR AS STATED IN THE CONTRACT.

NOTES ON FILL SLOPES

1. THE DEPOSITION, COMPACTION, FIELD TESTING AND FINISHING OF FINAL SURFACES SHALL BE CARRIED OUT IN ACCORDANCE WITH M & W SPECIFICATION SECTION 6 AND PARTICULAR SPECIFICATION UNLESS OTHERWISE SPECIFIED BY THE ENGINEER.
2. AREAS OF EXISTING SLOPING GROUND REQUIRING FILL PLACEMENT SHALL BE BENCHED IN ACCORDANCE WITH THE DETAILS STATED IN DRAWING NO. 823B/T/SSS/OAP/C22/101 PRIOR TO THE PLACEMENT OF ANY FILL.
3. THE FILTER BLANKET AND FILLING DETAILS AT THE BASE OF THE FILL SLOPE SHALL BE IN ACCORDANCE WITH DRAWING NO. 8238/T/SSS/OAP/C22/101.
4. EXACT EXTENT OF BENCHING TO BE AS DIRECTED BY THE ENGINEER ON SITE IN ACCORDANCE WITH DRAWING NO. 823B/T/SSS/OAP/C22/101.

NOTES ON SOIL CUT SLOPE FORMATION

1. NEW SOIL CUT SLOPES SHALL BE FORMED AT THE GRADIENTS SHOWN ON THE DRAWINGS. UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. ROUNDING OF THE TOP AND SIDES OF ALL NEWLY FORMED SOIL CUT SLOPES SHALL BE CARRIED OUT IN ACCORDANCE WITH DRAWING NO. 823B/T/SSS/OAP/C22/101.

NOTES ON PLACEMENT AND COMPACTION OF FILL

1. THE TEMPORARY AND PERMANENT FILLING WORKS SHALL BE CONDUCTED IN ACCORDANCE WITH PNAP 55 AND M & W SPECIFICATION SECTION 6.
2. GENERAL FILL SHALL BE PLACED IN HORIZONTAL LAYERS OF NOT MORE THAN 300mm THICKNESS (UNCOMPACTED). EACH LAYER SHALL BE COMPACTED TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY A COMPACTION TEST, GEOSPEC 3 TEST 11.4, OR UNLESS OTHERWISE STATED. THE EXACT TEST LOCATIONS ARE TO BE AGREED AND APPROVED ON SITE BY THE ENGINEER. THE COMPACTION TESTS CARRIED OUT ON SITE SHALL BE VERIFIED AGAINST LABORATORY TESTS, TAKING INTO ACCOUNT THE COMPACTION EQUIPMENT AND MOISTURE CONTENT OF THE SOIL.
3. THE CONTRACTOR SHALL RECORD THE LOCATION AND LEVEL OF THE IN-SITU DENSITY TESTS UNDERTAKEN FOR THE WORKS WHICH SHALL BE PRESENTED TO THE ENGINEER ON SUITABLY DETAILED FORMS FOR VERIFICATION OF THE RESULTS.
4. COMPACTION TESTS AND ANY OTHER TESTS REQUIRED BY THE ENGINEER SHALL BE CARRIED OUT BY AN INDEPENDENT TESTING LABORATORY APPROVED BY HOKLAS.
5. MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS OF THE PROPOSED BACKFILL MATERIAL SHALL BE SUBMITTED TO THE ENGINEER FOR CONSENT AT LEAST 14 DAYS PRIOR TO CARRYING OUT COMPACTION ON SITE.
6. FILL AREAS SHALL BE BUILT UP EVENLY OVER THEIR FULL WIDTH AND BENCHES CUT AND PROVIDED WITH A SUFFICIENT CROSSFALL AT ALL TIMES TO ENABLE SURFACE WATER TO DRAIN READILY TO THE TEMPORARY DRAINAGE SYSTEM.
7. IN-SITU DENSITY DETERMINATION TESTS COMPLYING TO GEOSPEC 3 SHALL BE CARRIED OUT AS DIRECTED BY THE ENGINEER.
8. PRIOR TO THE COMMENCEMENT OF THE FILLING WORKS, THE CONTRACTOR SHALL SUBMIT METHOD STATEMENT OF PROPOSED SEQUENCE OF THE FILLING WORKS AND MITIGATION MEASURES AGAINST POTENTIAL DIFFERENTIAL SETTLEMENTS, FOR THE APPROVAL OF THE ENGINEER.
9. UNLESS OTHERWISE SPECIFIED, PRIOR TO THE COMMENCEMENT OF THE FORMATION OF FILL SLOPES ABOVE EXISTING SLOPES, THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING THE IN-SITU DENSITY AND RELATIVE COMPACTION OF THE EXISTING FILL MATERIAL, TO THE SATISFACTION OF THE ENGINEER. WHERE THE EXISTING SLOPE IS IDENTIFIED TO CONTAIN LOOSE FILL MATERIAL, THE EXISTING SLOPE TO A DEPTH OF 3m OR TO THE EXISTING SLOPE TOE LEVEL, WHICHEVER IS HIGHER, SHALL BE EXCAVATED WITH ADEQUATE TEMPORARY SUPPORT. RECOMPACTION SHALL BE UNDERTAKEN IN ACCORDANCE WITH PNAP55 AND M&W SPECIFICATION SECTION 6. THE EXACT EXTENT OF THE RECOMPACTION OF EXISTING SLOPES SHALL BE AGREED WITH THE ENGINEER ON SITE.

NOTES ON TEMPORARY CUT SLOPES

1. THE CONTRACTOR SHALL SUBMIT DETAILS OF HIS TEMPORARY WORKS DESIGNS TO CARRY OUT THE RECOMPACTION WORKS FOR THE APPROVAL OF THE ENGINEER.
2. ALL TEMPORARY SOIL CUT SLOPES INTENDED TO BE LEFT EXPOSED FOR LESS THAN TWO WEEKS SHALL BE PROTECTED WITH NYLON SHEETS SECURED AGAINST THE WIND.
3. ALL TEMPORARY CUT SLOPES EXPOSED FOR MORE THAN TWO WEEKS SHALL BE PROTECTED BY HARD SURFACING OR OTHER APPROVED MATERIAL.
4. NO STOCKPILING OF ANY MATERIALS SHALL BE UNDERTAKEN IN AREAS WHERE IT MAY CAUSE A LANDSLIDE OR ENDANGER THE PUBLIC OR ADJACENT PROPERTIES.
5. THE VOID BETWEEN THE TEMPORARY EXCAVATION PROFILE AND THE FINAL GROUND LEVEL SHALL BE BACKFILLED AND COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY, UNLESS OTHERWISE STATED.

NOTES ON CONSTRUCTION OF REINFORCED CONCRETE RETAINING WALLS

1. THE PROPOSED RETAINING WALLS ARE DESIGNED IN ACCORDANCE WITH GEOGUIDE 1 : GUIDE TO RETAINING WALL DESIGN, SECOND EDITION, OCTOBER 1993.
2. STEEL REINFORCEMENT SHALL BE GRADE 460 TYPE II DEFORMED HIGH YIELD STEEL BARS TO CS2 : 1995.
3. WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
4. CONCRETE FOR REINFORCED CONCRETE STRUCTURES SHALL BE A GRADE 40D/20 DESIGNED MIX TO THE M&W SPECIFICATION SECTION 11.
5. IN GENERAL, MINIMUM CONCRETE COVER TO OUTERMOST BAR SHALL BE 50mm. FOR CONCRETE CAST AGAINST THE GROUND AND BLINDING, THE MINIMUM CONCRETE COVER SHALL BE 70mm.
6. THE BLINDING LAYER BENEATH ANY R.C. STRUCTURE SHALL BE GRADE 20/20.
7. ALL CONSTRUCTION JOINTS SHALL BE POSITIONED WITH THE APPROVAL OF THE ENGINEER. THE EXACT LOCATION OF THE JOINTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
8. FINISHES TO CONCRETE SURFACES SHALL BE IN ACCORDANCE WITH TABLE 9.4, M&W SPECIFICATION.
9. THE FOUNDING MATERIAL OF RETAINING WALLS SHALL BE INSPECTED BY THE ENGINEER PRIOR TO THE PLACEMENT OF BLINDING CONCRETE. ANY SOFT SPOT SHALL BE REMOVED AND THE VOID BACKFILLED AND COMPACTED TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DIRECTED BY THE ENGINEER.
10. WEEPHOLES SHALL BE INSTALLED WITHIN THE RETAINING WALLS ON A 1.5m(V)x 2.5m(H) GRID UNLESS OTHERWISE STATED.
11. FOLLOWING CASTING OF THE FOOTING, TWO COATS OF BITUMINOUS PAINT SHALL BE APPLIED TO ALL SURFACES OF RETAINING WALLS WHICH WILL BE IN CONTACT WITH SOIL.
12. ALL EXPOSED CORNERS SHALL HAVE A 25mm CHAMFER UNLESS OTHERWISE STATED.
13. THIS NOTE SHALL BE READ IN CONJUNCTION WITH GENERAL NOTES FOR STRUCTURAL WORKS - CONCRETE, DRAWING NO. 823B/T/SSS/OAP/C01/001.
14. RADII AND BENDS IN REINFORCEMENT SHALL BE IN ACCORDANCE WITH THE HONG KONG BUILDING CONSTRUCTION REGULATIONS : 1990 AND BS4486.
15. UNLESS NOTED OTHERWISE ON THE DRAWINGS, ALL CONCRETE SHALL COMPLY WITH PNAP 180 IN RESPECT OF THE MAXIMUM PERMITTED ALKALI CONTENT OF CONCRETE MIXES ($3kg/m^3$) WHEN TESTED AND CALCULATED IN ACCORDANCE WITH PNAP 180.
16. ALL CONCRETE WORKS SHALL BE DESIGNED IN ACCORDANCE HONG KONG CODE OF PRACTICE FOR THE STRUCTURAL USE OF CONCRETE 2004 (SECOND EDITION).
17. A PLATE LOADING TEST SHALL BE CARRIED OUT TO VERIFY THE BEARING CAPACITY OF SOIL FOR THE RETAINING WALL WITH MAXIMUM ALLOWABLE BEARING PRESSURE OVER 100kPa.
18. THE NOS. OF PLATE LOAD TESTS FOR RETAINING WALL SHALL BE REFERRED TO DRAWING NO. 823B/T/SSS/OAP/C22/104.
19. THE PLATE LOAD TEST SHALL BE CARRIED OUT IN ACCORDANCE WITH 8.2, CODE OF PRACTICE FOR FOUNDATIONS. UNLESS OTHERWISE STATED, THE ALLOWABLE SETTLEMENT UNDER ALLOWABLE WORKING LOAD FOR RETAINING WALL SHALL NOT BE GREATER THAN 100mm.

NOTES ON PROTECTION OF EARTHWORKS

1. ALL EARTHWORKS SURFACES SHALL BE GRADED AND SEALED TO ENSURE RUN-OFF AND AVOID PONDING.
2. A METHOD OF WORKING SHALL BE ADOPTED WHEREBY THE MINIMUM AMOUNT OF BARE SOIL IS EXPOSED AT ANY TIME. EARTHWORKS WHICH FORM THE FINAL FACE SHALL BE FOLLOWED UP IMMEDIATELY BY SURFACE PROTECTION WORKS.
3. WHERE TEMPORARY BARE FACES ARE UNAVOIDABLE, THEY SHALL BE PROTECTED WITH SHEETING SECURED AGAINST THE WIND. WHERE SLOPE FACES ARE TO BE TEMPORARILY EXPOSED FOR MORE THAN TWO WEEKS, TEMPORARY HARD SURFACING SHALL BE PROVIDED AND TEMPORARY DRAINS SHALL BE INSTALLED.
4. EARTHWORKS SHALL BE SEALED TO THE SATISFACTION OF THE ENGINEER TO PREVENT INFILTRATION AND EROSION.
5. EXCAVATION WORKS FOR ANY SECTION OF A TRENCH FOR TEMPORARY/PERMANENT DRAINAGE WORKS SHALL NOT COMMENCE UNTIL THE NATURE, LOCATION AND SIZE OF EXISTING UTILITIES THAT MAY BE AFFECTED BY THE EXCAVATION HAVE BEEN ASCERTAINED AND THE SETTING OUT DETAILS HAVE BEEN APPROVED BY THE ENGINEER.
6. THE CONTRACTOR SHALL ALLOW THE ENGINEER TO INSPECT TRENCHES, BEDDING, PIPES, JOINTS, FITTINGS AND VALVES BEFORE DRAINAGE WORKS STARTS. THE CONTRACTOR SHALL INFORM THE ENGINEER AT LEAST 24 HOURS, PRIOR TO COMMENCING TEMPORARY/ PERMANENT DRAINAGE WORKS TO ANY PART OF A SLOPE.
7. THE EXCAVATION ALONG ANY SLOPE TOE SHALL FOLLOW THE REQUIREMENTS STATED IN THE GUIDE TO THE TRENCH EXCAVATIONS (SHORING SUPPORT AND DRAINAGE MEASURES), GEOGUIDE1 GUIDE TO RETAINING WALL DESIGN, GCO PUBLICATION NO. 1/90 REVIEW OF DESIGN METHODS FOR EXCAVATIONS, AND THE GEOTECHNICAL MANUAL FOR SLOPES. ADEQUATE SUPPORT SHALL BE PROVIDED TO THE TRENCH. THE TEMPORARY EXCAVATION DESIGN SHALL BE CERTIFIED BY AN INDEPENDENT CHECKING ENGINEER AND SUBMITTED TO THE ENGINEER FOR APPROVAL.
8. THE TRENCH EXCAVATION SHALL BE SEPARATED IN PHASES, EACH PHASE SHALL INCLUDE SEVERAL SHORT TRENCHES EACH WITH A MAXIMUM LENGTH OF 5m. THE CLEARANCE BETWEEN ANY TRENCH SHALL NOT BE LESS THAN 5m. PRECAUTIONS SHALL BE TAKEN TO PREVENT WATER ENTERING AND ACCUMULATING IN THE TRENCH.
9. PRIOR TO THE COMMENCEMENT OF THE SITE FORMATION WORKS ANY SURFACE WATER FLOWING INTO THE SITE SHALL BE INTERCEPTED AND SAFELY DISCHARGED FROM THE SITE.

PROTECTION AND PRESERVATION OF EXISTING VEGETATION / LANDSCAPE WORKS

1. NO TREE SHALL BE FELLED WITHOUT THE APPROVAL OF THE ENGINEER IN WRITING.
2. ADEQUATE TEMPORARY WORKS SHALL BE PROVIDED TO SUPPORT AND PROTECT TREES SPECIFIED TO BE PROTECTED FROM DAMAGE. THE PROPOSED WORKS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
3. WHERE EXISTING SPRAYED CONCRETE IS TO BE REMOVED CARE SHALL BE TAKEN NOT TO DISTURB TREE ROOTS IMMEDIATELY BELOW THE SLOPE SURFACE.
4. AS AGREED OR DIRECTED BY THE ENGINEER, ALIGNMENT OF HOARDINGS, FENCING, NEW CHANNELS AND MAINTENANCE STAIRWAYS / WALKWAYS SHALL BE ADJUSTED ON SITE TO AVOID DAMAGE TO EXISTING TREES.
5. THE CONTRACTOR SHALL CONFIRM THE LOCATION OF TREES AGAINST AVAILABLE RECORDS AND TAKE PHOTOS OF THE CONDITIONS OF THE EXISTING TREES WITHIN THE WORKS SITE AND WORKS AREA. A REPORT ON THE CONDITION OF THE EXISTING TREES, INCLUDING COLOUR PHOTOS, PLAN OF LOCATIONS AND BRIEF DESCRIPTIONS OF ANY DEFECTS OR DAMAGE OF TREES OBSERVED SHALL BE SUBMITTED TO THE ENGINEER FOR RECORD AT LEAST 2 WEEKS PRIOR TO COMMENCEMENT OF THE WORKS IN PARTICULAR AREA.
6. EXISTING TREES SHALL BE RETAINED AS INSTRUCTED BY THE ENGINEER ON SITE. TREES SHALL BE RETAINED WITH TREE RINGS IN SHOTCRETED AREAS IN ACCORDANCE WITH CEDD STANDARD DRAWING NO. C2104E. THE SURFACE FINISH OF TREE RINGS SHALL BE U2 AND F2.
7. FOR PLANTER HOLES WITH SPECIFIED PLANTS IN SPRAYED CONCRETE COVERED SLOPES REFERENCE SHALL BE MADE TO CEDD STANDARD DRAWING NO. C2507C. PLANTER HOLES SHALL BE AT 2m STAGGERED CENTRES, OR AS SPECIFIED BY THE ENGINEER.
8. ALL EXPOSED SURFACES OF SPRAYED CONCRETE COVER, SKIN WALL, REINFORCED CONCRETE SLABS OR GRILLAGE BEAMS SHALL BE PAINTED WITH 2 COATS OF WATER BASED COLOURED PAINT. THE COLOUR SHALL BE 'ANTIQUE' BS 5252F COLOUR CODE 10B25 OR SIMILAR SUBDUED COLOUR AS SPECIFIED. THE CONTRACTOR SHALL SUBMIT DETAILS OF THE PROPOSED PAINT FOR THE ENGINEER'S APPROVAL AT LEAST 4 WEEKS BEFORE THE COMMENCEMENT OF THE PAINTING WORK.
9. THE LANDSCAPE SOFTWORKS AND ESTABLISHMENT WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH M & W SPECIFICATION AND PARTICULAR SPECIFICATION.

NOTES ON MAINTENANCE STAIRCASE

1. ALL WELDING CONSUMABLES AND THE PROCEDURES USED SHALL COMPLY WITH M&W SPECIFICATION CLAUSE 7.6, 7.21 AND 7.22.
2. THE CORROSION PROTECTION OF STEELWORK SHALL GENERALLY COMPLY WITH M&W SPECIFICATION CLAUSE 7.2.
3. ALL STEEL WORK SHALL COMPLY WITH M&W SPECIFICATION CLAUSE 7.1.
4. THE WIDTH OF THE STAIRWAY SHALL BE 600mm MIN. WITH A HANDRAIL AT EACH SIDE UNLESS OTHERWISE SPECIFIED. FOR DETAILS REFERENCE SHALL BE MADE TO DRAWING NO. 823B/T/SSS/OAP/C22/105.
5. A SINGLE HANDRAIL IS TO BE INSTALLED ON THE DOWNHILL SIDE OF THE STAIRWAY ALONG THE EDGE AND CREST OF THE SLOPE AND ALONG ALL SLOPE BERMS.
6. A MINIMUM LAP LENGTH OF A252 MESH SHALL BE PROVIDED FOR IN THE CONSTRUCTION OF A STAIRWAY.
7. THE METALLIC PARTS (SUCH AS HANDRAILING, STEPS AND LOCKABLE GATE) OF THE MAINTENANCE WALKWAY AND CONCRETE STAIRCASE SHALL BE PAINTED IN ACCORDANCE WITH THE FOLLOWING:

   (i) PRIMER - 1 COAT OF TWO PACK WASH PRIMER, DRY FILM THICKNESS OF 5mm.

   (ii) UNDERCOAT - 2 COATS OF HIGH BULLO MICACEOUS IRON OXIDE EPOXY PAINT;

   (iii) FINISH - 1 COAT OF HIGH BUILD AMINE ADDULT CURE EPOXY PAINT;

   (iv) MINIMUM TOTAL DRY FILM THICKNESS - 180µm.

   THE FINISHING COAT OF THE PAINT SHALL BE 'ANTIQUE' BS5252F COLOUR CODE 10B25 OR AS AGREED BY THE ENGINEER.
8. THE CONCRETE OF THE MAINTENANCE STAIRWAY SHALL BE GRADE 20/20 CAST IN-SITU CONCRETE WITH A MINIMUM COMPRESSIVE CONCRETE CORE STRENGTH EQUIVALENT TO A CUBE STRENGTH OF 20MPa AT 28 DAYS IN ACCORDANCE WITH BS810.
9. THE EXACT ALIGNMENT OF THE PROPOSED STAIRCASE SHALL BE CONFIRMED ON SITE BY THE ENGINEER.
10. A LOCKABLE GATE SHALL BE PROVIDED FOR THE MAINTENANCE STAIRWAY. THE EXACT LOCATION OF THE LOCKABLE GATE SHALL BE CONFIRMED ON SITE BY THE ENGINEER.

NOTES ON RIVER HABITAT

1. THE COMPENSATORY STREAM HABITAT SHALL HAVE A STREAM BED CONSTRUCTED OF NATURAL SUBSTRATES.
2. TO ACHIEVE THIS, THE FILL MATERIAL USED TO FORM THE STREAM BED SHALL COMPRISE:

   a.) CLEAN ROCK INCLUDING ALLUVIAL COBBLES AND BOULDERS OF SIZE 100mm TO 200mm OR LARGER

   b.) NATURALLY OCCURRING WASHED ALLUVIAL SANDS AND GRAVELS
3. THE ROCK AND OTHER FILL MATERIAL USED SHALL BE SOURCED FROM THE SITE EXCAVATIONS TO THE MAXIMUM EXTENT POSSIBLE. FOLLOWING SITE CLEARANCE AND REMOVAL OF GRASS, ORGANIC MATTER AND TOPSOIL WHERE PRESENT, SUITABLE EXCAVATED FILL MATERIALS SHALL BE SCREENED TO SEPARATE THE 100MM SIZE OR LARGER COBBLES AND BOULDERS FROM THE FINER MATERIAL.
4. THESE MATERIALS SHALL BE STOCKPILED SEPARATELY FROM THE GENERAL FILL MATERIAL. AT STREAM BED FORMATION LEVEL, ANY VOIDS IN THE IN-SITU MATERIAL SHALL BE FILLED WITH SMALL COBBLES AND COMPACTED TO FORM A NEARLY LEVEL BUT POROUS SURFACE.
5. IF LARGE EMBEDDED BOULDERS REMAIN PROTRUDING ABOVE THE FORMATION LEVEL, THE ENGINEER SHALL DECIDE ON SITE IF THEY SHALL REMAIN IN PLACE, BE REMOVED OR BE SPLIT DOWN FOR RE-USE AS STREAM BED MATERIAL. WHEN FORMING THE PROPOSED STREAM BED CLOSE TO THE EXISTING STREAM BED, THE EXISTING BED MATERIAL SHALL BE CUT BACK AT A SAFE SLOPE WITHOUT DISTURBING ITS STABILITY.
6. COBBLES AND BOULDERS OF THE SPECIFIED SIZE SHALL THEN BE RANDOMLY PLACED BY HAND IN TWO LAYERS TO FORM THE UNDER LAYER OF THE SPECIFIED THICKNESS ABOVE THE FORMATION LAYER WITH THE ABUTTING EXISTING STREAM BED MATERIAL PARTIALLY REMOVED OR ADJUSTED TO INTERLOCK WITH OR KEY INTO THE NEW UNDER LAYER STONES.
7. ON TOP OF THE UNDER LAYER, BOULDERS OF LARGER SIZE AS SPECIFIED IN THE CONTRACT SHALL BE PLACED RANDOMLY IN TWO LAYERS TO FORM THE UPPER LEVEL OF RIP RAP OF THE SPECIFIED THICKNESS. THIS TOP SURFACE MAY CONTAIN STONES LARGER THAN THE SPECIFIED SIZE PROTRUDING ABOVE THE SPECIFIED BED LEVEL TO FORM POOLS AND RIFFLES IN THE STREAMBED. THIS UPPER LAYER SHALL ALSO INTERLOCK WITH OR KEY INTO EXISTING STREAM BED MATERIALS.
8. WHEN COMPLETE THE PROPOSED STREAM BED SHALL BE FINISHED WITH WASHED ALLUVIAL SANDS AND GRAVELS THAT FILL THE INTERSTICES BETWEEN STONES; GIVE THE APPEARANCE OF A NATURAL STREAMBED AND ALSO REDUCE POROSITY.
9. A LAYER OF BIODEGRADABLE GEOTEXTILE WALL BE INSTALLED ON TOP OF ALL FORMED SLOPES.
10. THE GRADIENT OF CUT SLOPES AT RIVER HABITAT ZONE SHALL NOT BE GREATER THAN 1:2 UNLESS OTHERWISE STATED.

NOTES ON FORMATION FOR STRUCTURES

1. THE FOUNDING MATERIALS AT THE TOP 200mm BELOW FORMATIONS FOR STRUCTURES, ON-GRADE SLAB, FOOTING AND RAFT FOUNDATIONS SHALL BE KEPT IN DRY CONDITION. ADEQUATE TEMPORARY SUMP PUMPS SHALL BE INSTALLED TO AVOID GROUNDWATER TO CONTAMINATE OR LOOSEN THE FOUNDING MATERIALS.
2. PRIOR TO CASTING ON-GRADE SLAB, FOOTING AND RAFT FOUNDATIONS, THE FORMATION SHALL BE ADEQUATELY COMPACTED AND PROTECTED IN ACCORDANCE WITH CALUSES 6.34 AND 6.35, M&W SPECIFICATION.
3. IF THE FOUNDING MATERIALS ARE CONTAMINATED OR LOOSENED BY GROUNDWATER SUCH THAT THE COMPACTION WORKS MENTIONED IN CLAUSE 6.34, M&W SPECIFICATION CANNOT BE CARRIED OUT OR THE THICKNESS OF THE CONTAMINATED OR LOOSENED FOUNDING MATERIALS IS LARGER THAN 200mm, ALL THE CONTAMINATED SOIL SHALL BE REMOVED AND REPLACED BY HARDCORE.

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TENDER

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A	TENDER ISSUE	TW	22FEB10	JM

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DESIGNED	DL
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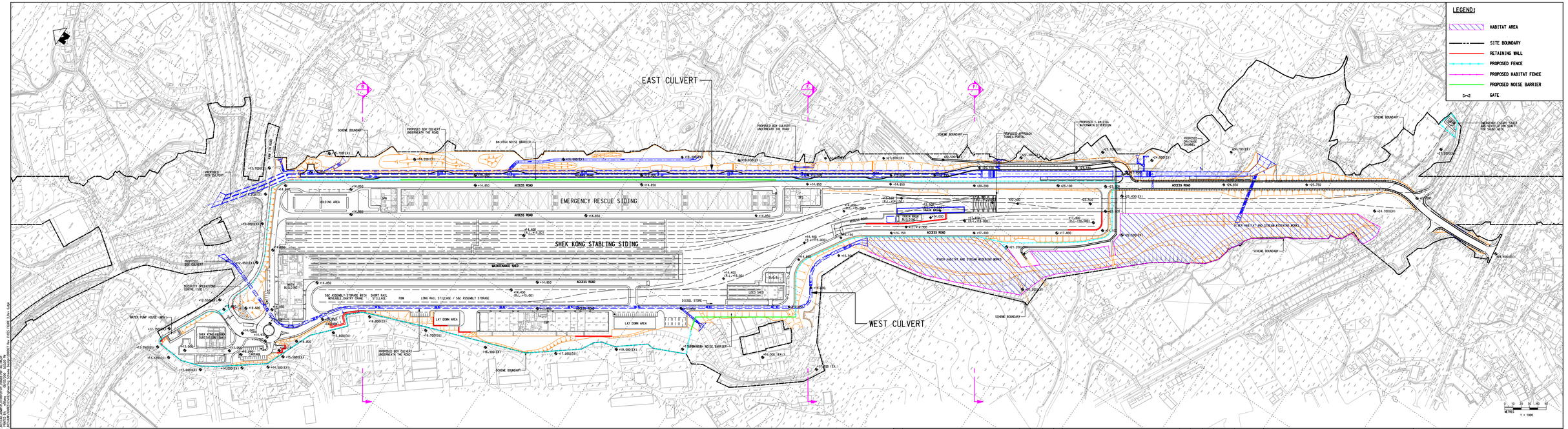
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SHEK KONG STABLING SIDINGS AND ERS
SITE FORMATION WORKS -
GENERAL NOTES

SCALE N.T.S.

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E	GENERAL UPDATE	HB	17NOV2009	MT
D	REVISED EARTHWORK EXTENT	HB	27OCT2009	MT
C	TRAIN WASH ACCESS ROAD REVISED	HB	15OCT2009	MT
B	REVISED SSD TRACK LAYOUT	HB	02SEP2009	MT
A	FIRST ISSUE	HB	01JUN2009	MT

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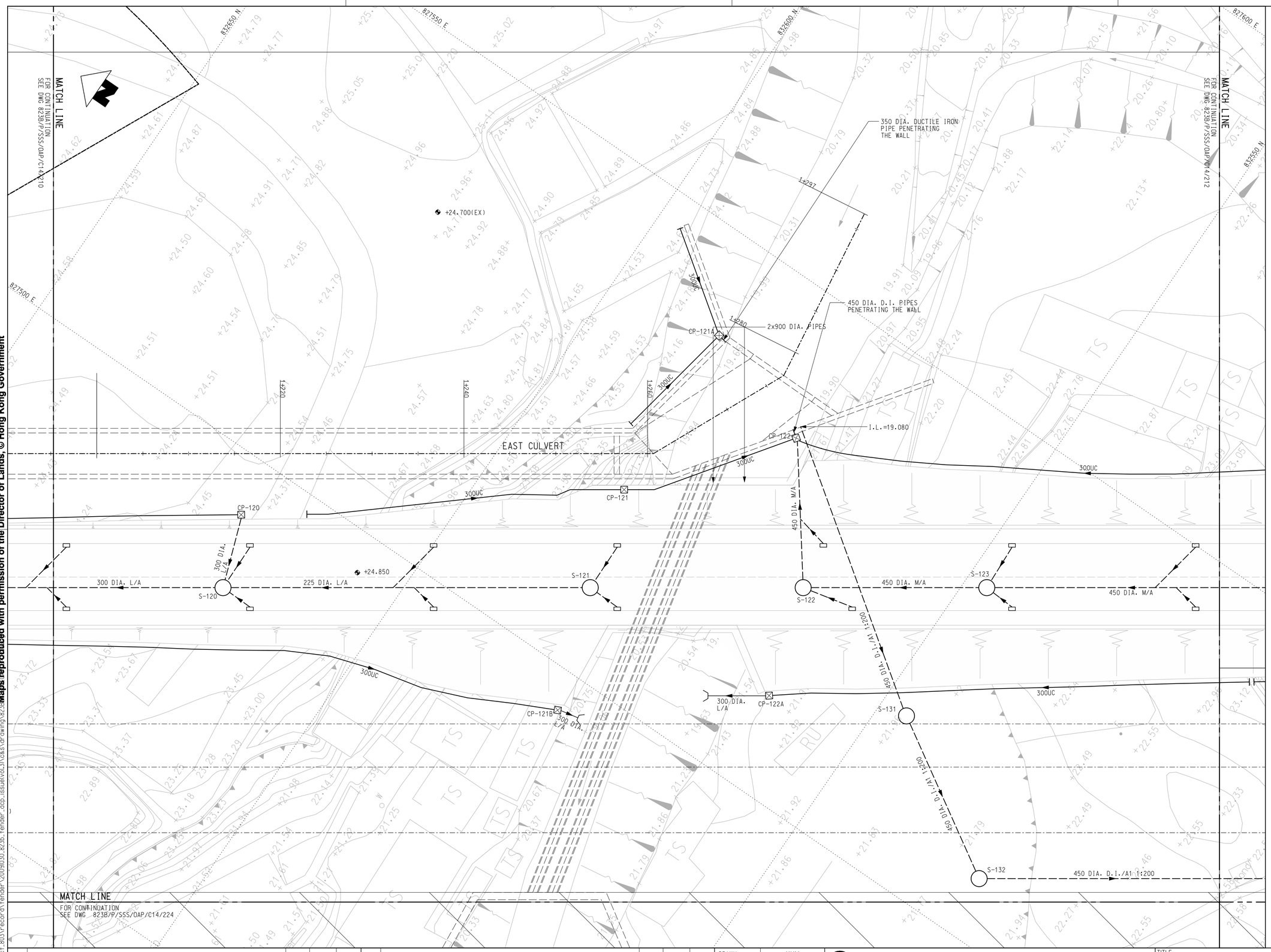
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TITLE: CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
LAYOUT PLAN

SCALE: 1 : 1000
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TITLE

CONTRACT 823B

SHEK KONG STABLING SIDINGS AND ERS

FOUL AND STORM WATER DRAINAGE LAYOUT PLAN

SHEET 11 OF 33

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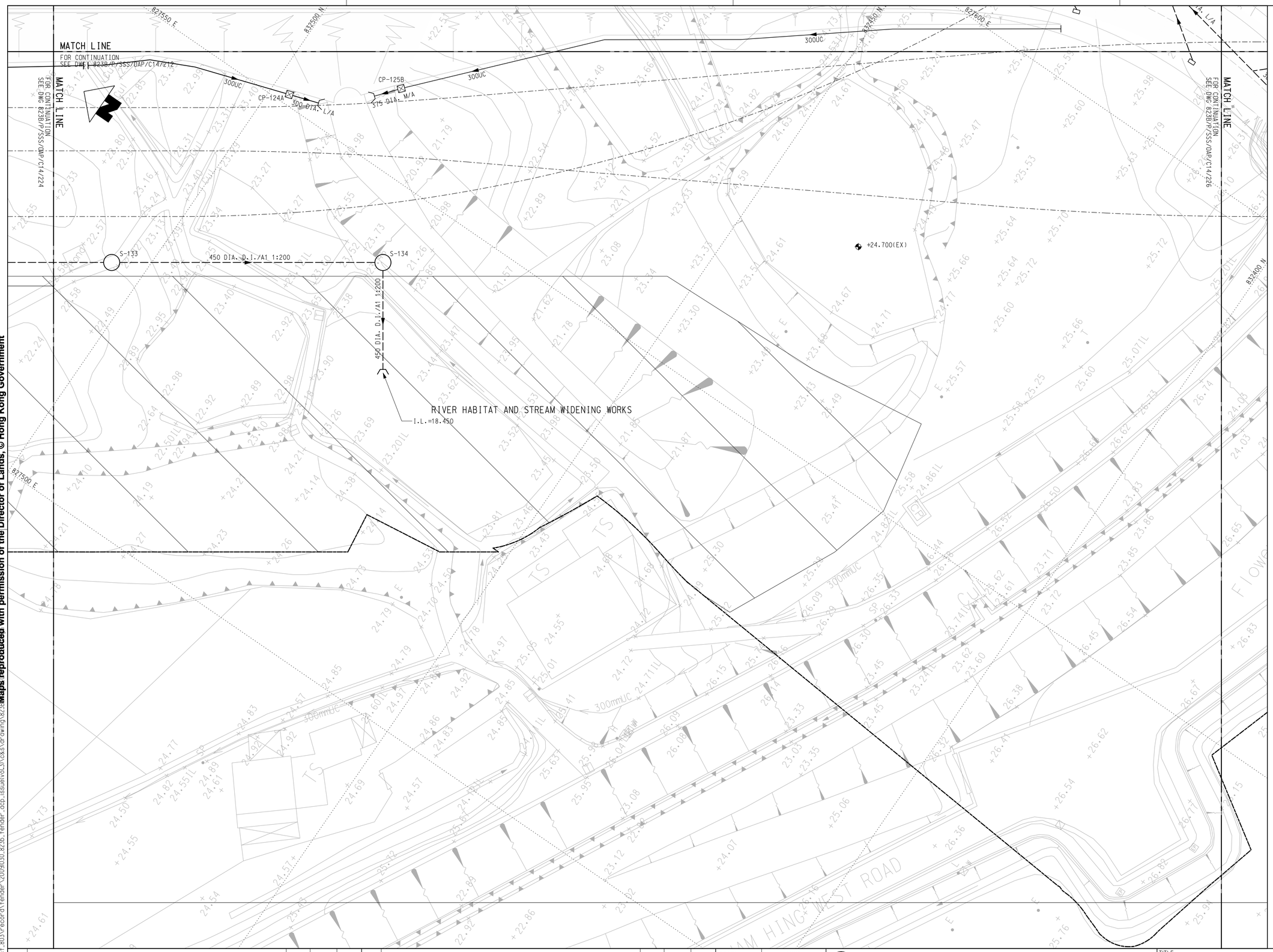
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SHEK KONG STABLING SIDINGS AND ERS
FOUL AND STORM WATER DRAINAGE LAYOUT PLAN

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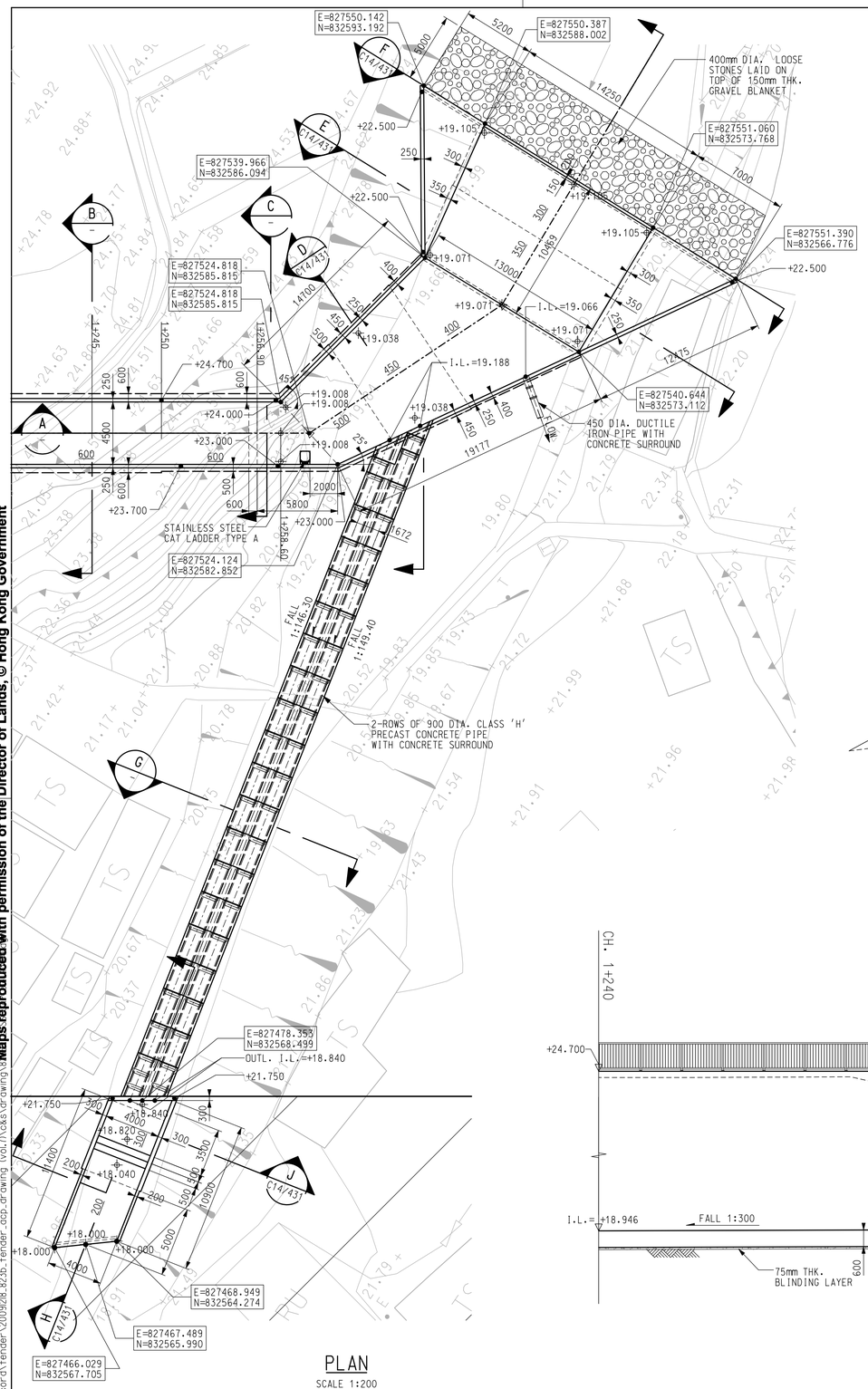
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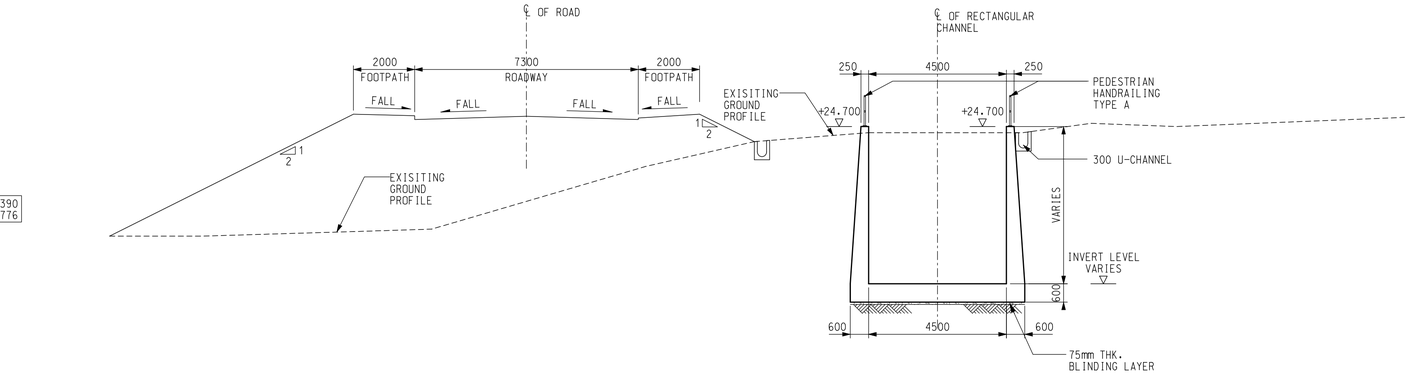
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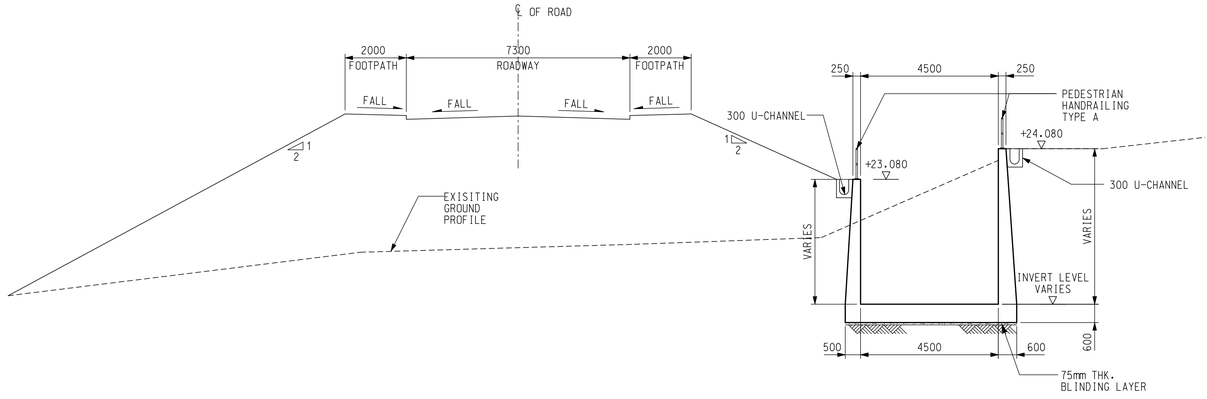
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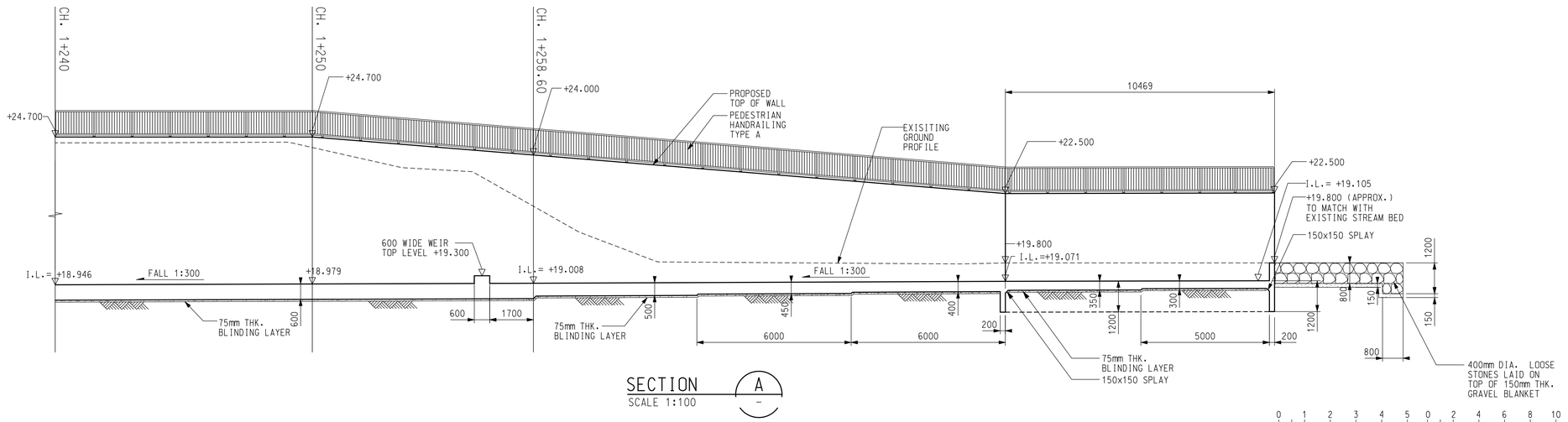
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SECTION C
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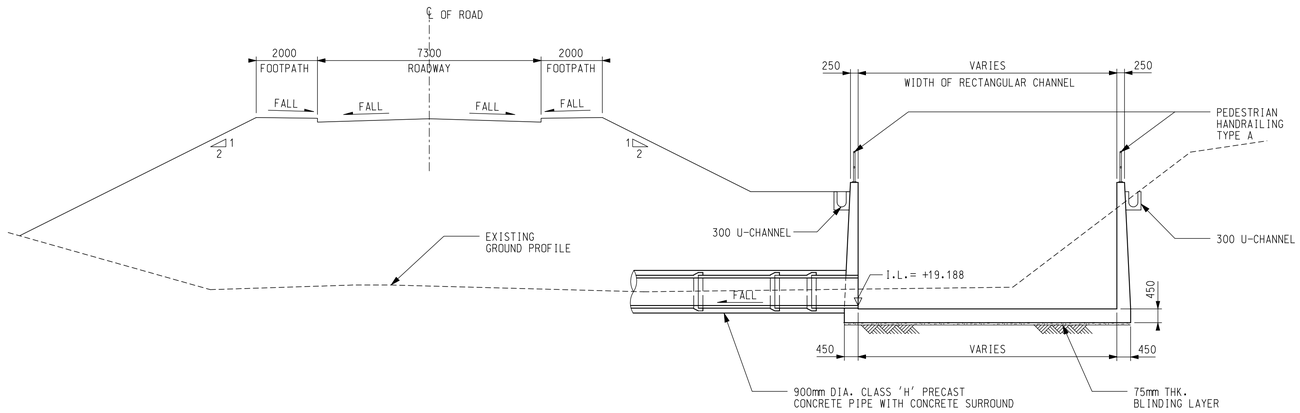
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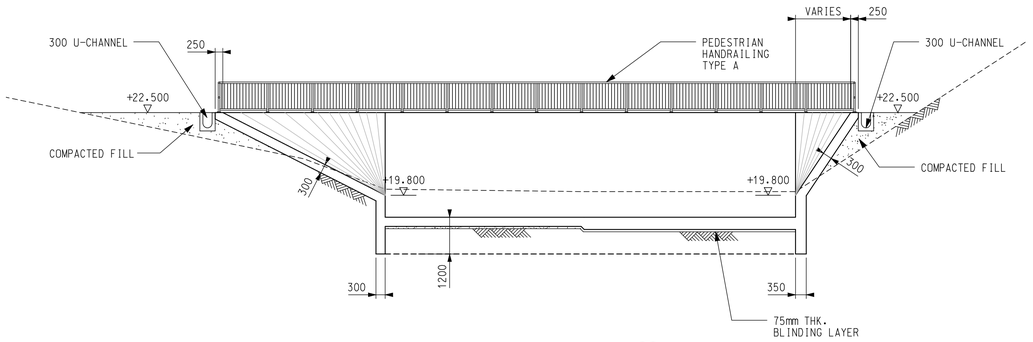
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SHEK KONG STABLING SIDINGS AND ERS
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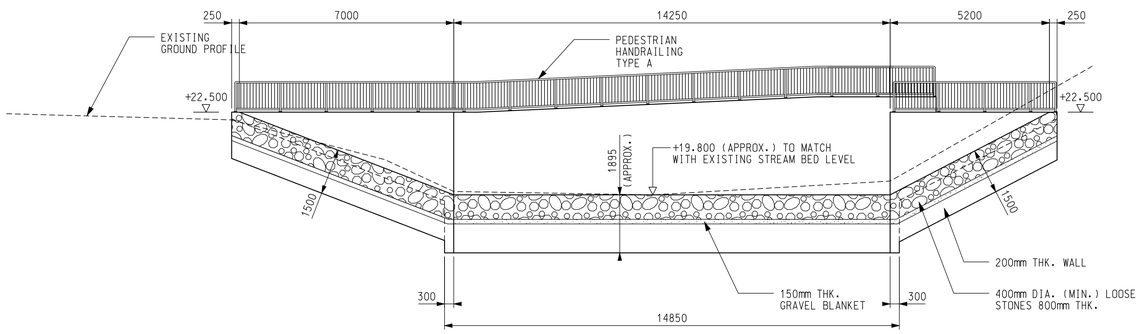
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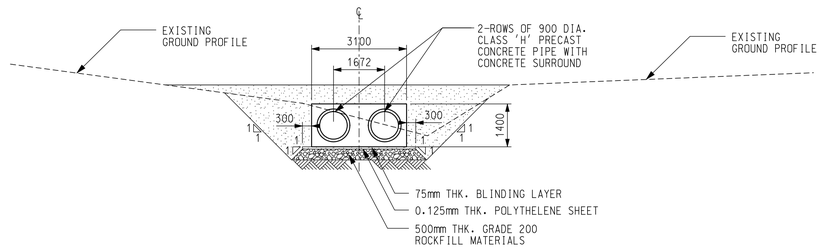
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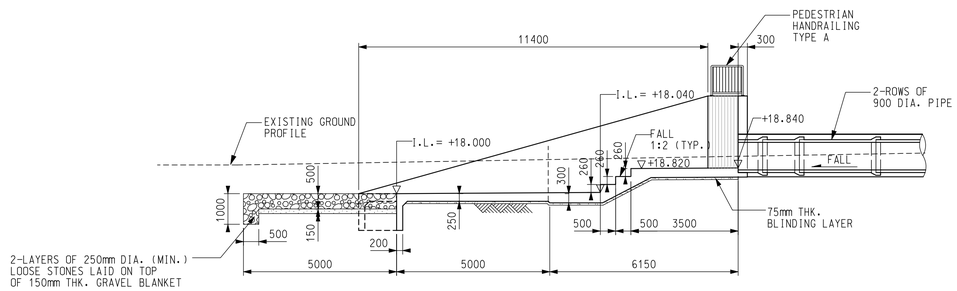
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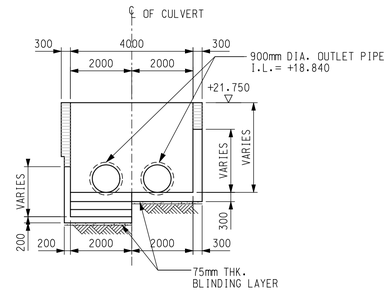
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SECTION G
SCALE 1:100 C14/430



SECTION H
SCALE 1:100 C14/430



SECTION J
SCALE 1:100 C14/430

0 1 2 3 4 5
METRES
1 : 100

EAST CULVERT INLET DETAILS (2 OF 2)

REV	DESCRIPTION	BY	DATE	APPROVED
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DRAWN	AC
DESIGNED	VC
CHECKED	YKL
APPROVED	JM
DATE	14/DEC/2009

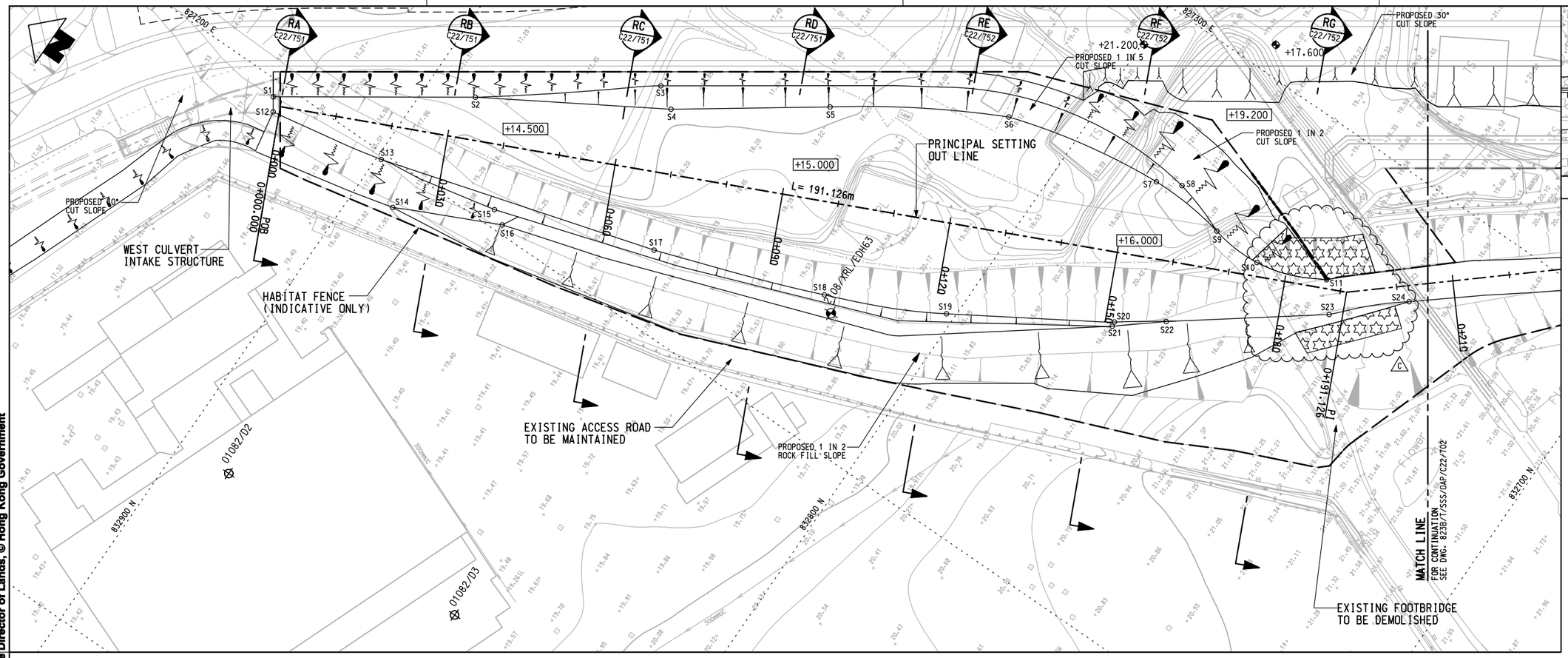
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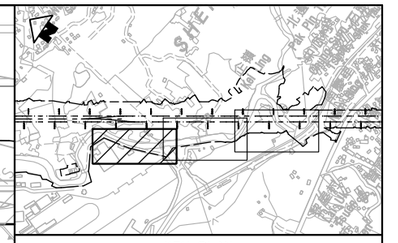
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ORIGINATOR ARUP
Supported by : Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia
CADD REF. 823B_T_SSS_OAP_C14_431A1.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
EAST CULVERT SECTIONS AND DETAILS
SHEET 11

SCALE AS SHOWN
DRAWING NO. 823B/T/SSS/OAP/C14/431
REV. A1

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KEY PLAN (N.T.S.)

NOTE:

1. THE DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 823B/T/SSS/OAP/C22/001 TO 009.
2. REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/751 - 756 FOR RIVER HABITAT SECTIONS.
3. REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/761 FOR HABITAT VERTICAL PROFILE.
4. THE LOCATION OF HABITAT FENCE SHOWN ARE INDICATIVE ONLY. FOR DETAIL, REFER TO DRG. NO. 823B/T/SSS/OAP/C24/777 TO 779.
5. THE LOCATION OF SSS SHOWN SECURITY FENCE ARE INDICATIVE ONLY. FOR DETAIL, REFER TO DRG. NO. 823B/T/SSS/OAP/C24/171-179.

LEGEND:

- PROJECT BOUNDARY
- +14.000 FINAL SITE FORMATION LEVEL
- PROPOSED 30° CUT SLOPE
- PROPOSED 1 IN 2 CUT SLOPE
- PROPOSED 1 IN 2 FILL SLOPE
- PROPOSED 1 IN 5 CUT SLOPE
- PROPOSED 1 IN 1.5 ROCK FILL SLOPE
- PROPOSED 1 IN 2 ROCK FILL SLOPE
- +20.86 EXISTING GROUND LEVEL
- 2108/XRL/A021b PROJECT SPECIFIC BOREHOLE
- SLOPE AREA TO BE PROTECTED BY EROSION CONTROL MAT UNDERLYING A LAYER OF NON-WOVEN GEOTEXTILE MATERIAL C

0 4 8 12 16 20
METRES
1 : 400

CO-ORDINATE TABLE FOR PRINCIPLE SETTING OUT LINE

CHAINAGE	EASTING	NORTHING
0+000.0000	827196.5071	832919.1529
0+030.0000	827209.0009	832891.8783
0+060.0000	827221.4947	832864.6037
0+090.0000	827233.9885	832837.3290
0+120.0000	827246.4824	832810.0544
0+150.0000	827258.9762	832782.7798
0+180.0000	827271.4700	832755.5052
0+210.0000	827288.3828	832731.0565
0+240.0000	827307.9007	832708.2738
0+270.0000	827327.4186	832685.4911
0+300.0000	827347.0380	832662.7985
0+330.0000	827370.5765	832644.4133
0+360.0000	827398.4641	832633.3656
0+390.0000	827418.4280	832611.7818
0+420.0000	827435.7941	832587.3845
0+450.0000	827457.9374	832567.1649
0+480.0000	827478.5694	832545.5785
0+510.0000	827495.8012	832521.0211
0+540.0000	827512.0402	832495.8034
0+570.0000	827530.3140	832472.1143
0+600.0000	827546.5855	832447.7767
0+629.3224	827541.4047	832419.1796

TABLE FOR SETTING OUT POINTS

POINT	EASTING	NORTHING
S1	827197.239	832921.174
S2	827217.380	832891.679
S3	827237.571	832865.829
S4	827235.184	832862.017
S5	827251.417	832839.088
S6	827267.818	832812.076
S7	827273.158	832784.108
S8	827275.137	832780.016
S9	827272.025	832770.418
S10	827271.462	832761.423
S11	827275.908	832749.560
S12	827195.029	832919.656
S13	827198.906	832899.168
S14	827193.077	832892.710
S15	827202.939	832877.691
S16	827201.500	832875.030
S17	827213.008	832850.409
S18	827223.516	832821.146
S19	827232.967	832801.481
S20	827248.567	832776.213
S21	827247.717	832776.115
S22	827253.817	832768.729
S23	827271.118	832745.725
S24	827280.981	832735.365

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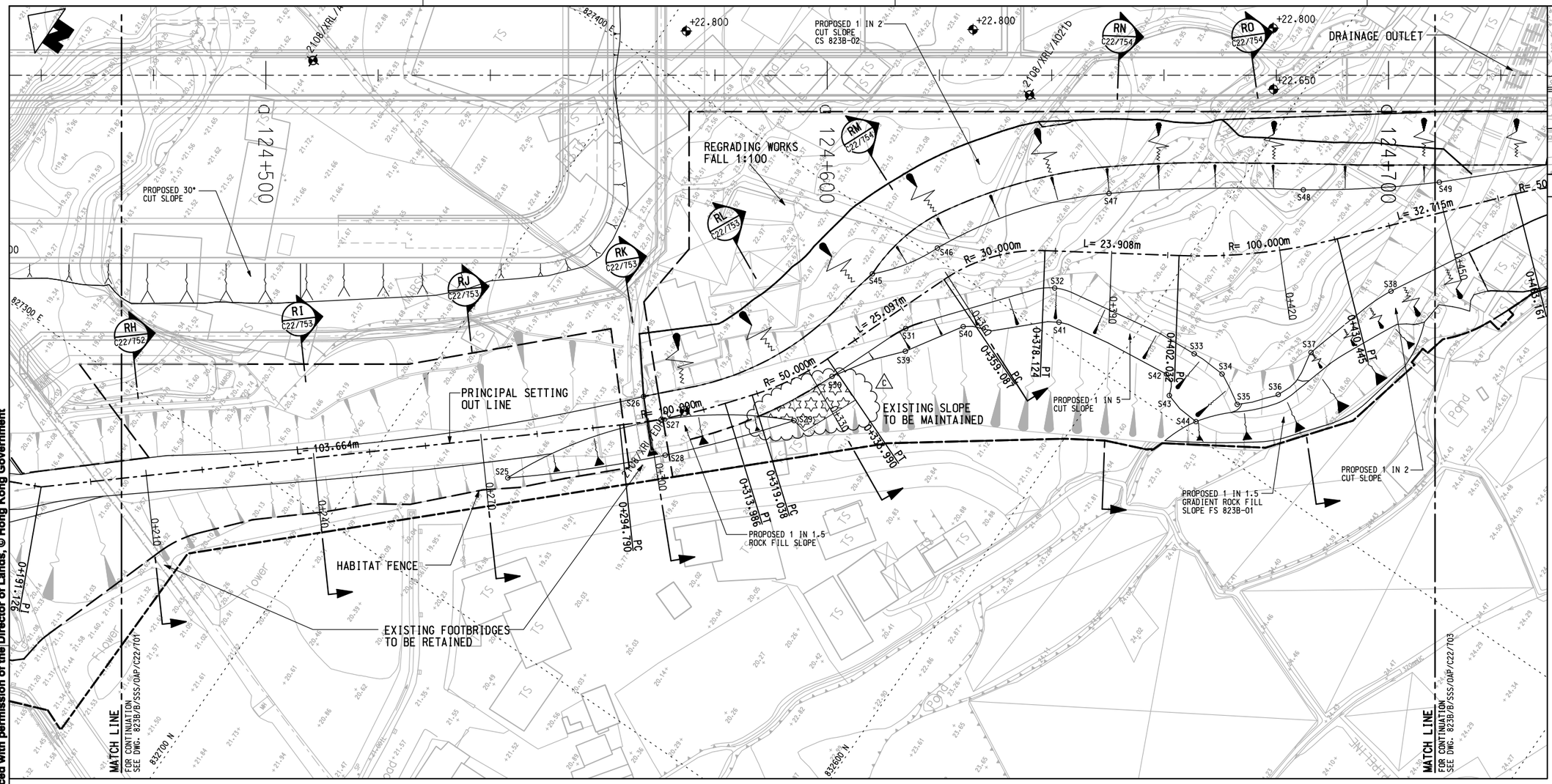
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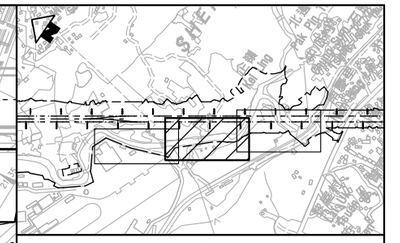
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ORIGINATOR
ARUP
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CADD REF. $FILEA$

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT LAYOUT PLAN
SHEET 1 OF 3

SCALE	DRAWING NO.	REV.
1 : 400 (A1)	823B/T/SSS/OAP/C22/701	C





KEY PLAN (N.T.S.)

NOTE:

1. FOR LEGEND, REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/701.

TABLE FOR SETTING OUT POINTS

POINT	EASTING	NORTHING
S25	827324.501	832677.779
S26	827350.172	832666.040
S27	827348.458	832661.147
S28	827343.725	832656.937
S29	827361.790	832641.509
S30	827372.126	832640.395
S31	827386.580	832634.419
S32	827407.548	832616.614
S33	827411.943	832589.492
S34	827411.777	832583.364
S35	827408.863	832578.080
S36	827414.454	832573.041
S37	827423.939	832572.476
S38	827440.986	832566.909
S39	827383.204	832632.158
S40	827392.655	832626.161
S41	827402.957	832612.536
S42	827406.172	832591.499
S43	827403.320	832588.944
S44	827402.168	832582.392
S45	827391.241	832644.819
S46	827401.582	832637.876
S47	827426.925	832618.176
S48	827447.047	832590.009
S49	827461.890	832570.812

0 4 8 12 16 20
METRES
1 : 400

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
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B	TENDER ADDENDUM NO.1 ISSUE	TW	01APR10	JM
A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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ORIGINATOR
ARUP
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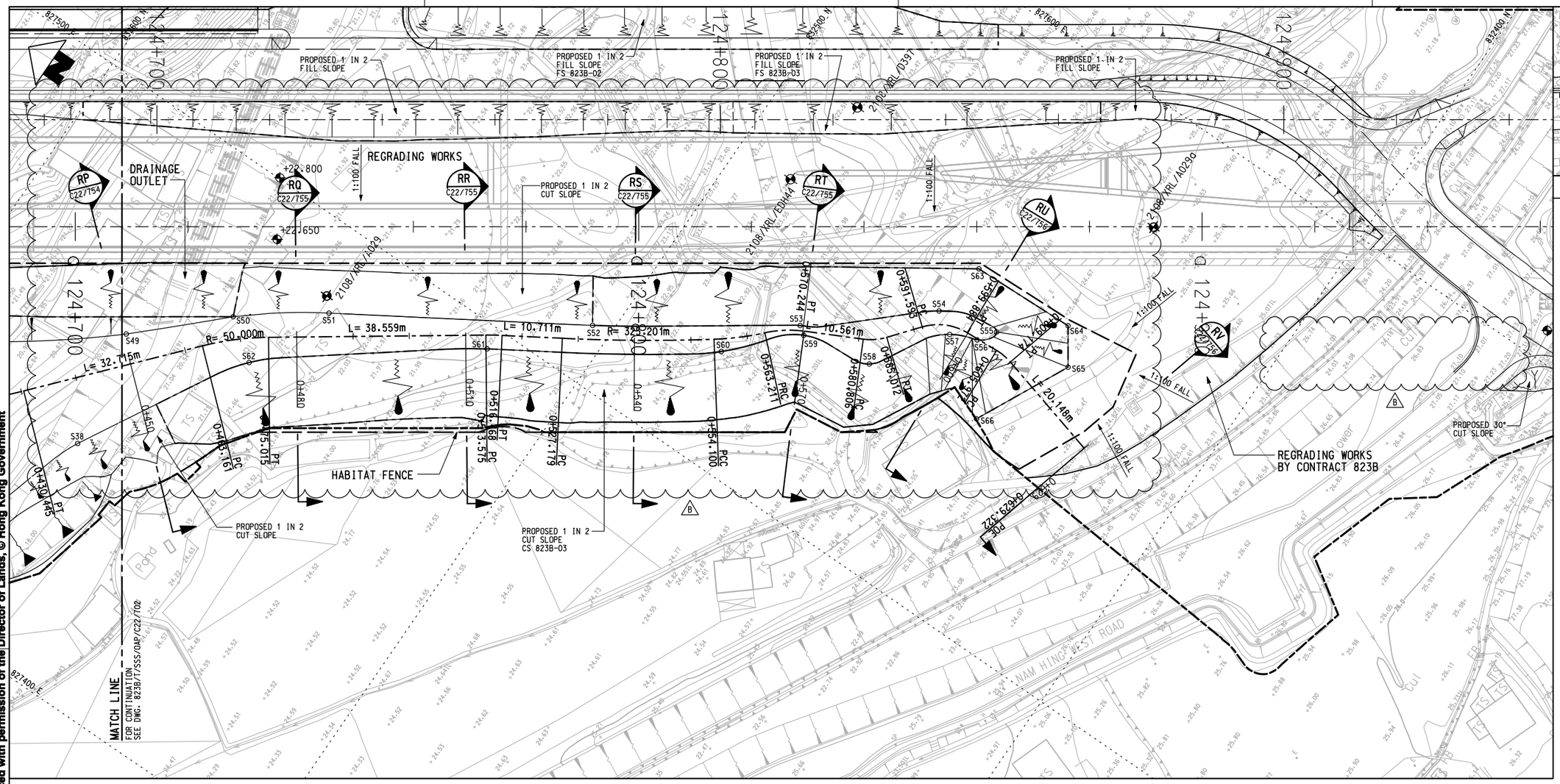
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SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT LAYOUT PLAN

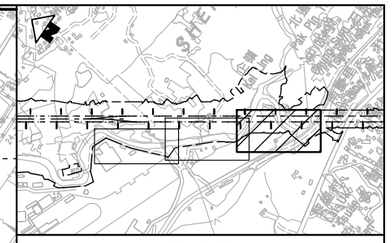
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SCALE 1 : 400 (A1)
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REV. C

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KEY PLAN (N.T.S.)

NOTE:

1. FOR LEGEND, REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/701.

TABLE FOR SETTING OUT POINTS

POINT	EASTING	NORTHING
S50	827475.171	832556.903
S51	827485.329	832543.242
S52	827509.999	832503.451
S53	827530.845	832473.068
S54	827546.926	832454.208
S55	827549.622	832443.689
S56	827546.520	832445.761
S57	827544.558	832450.300
S58	827532.160	832459.077
S59	827529.766	832471.564
S60	827519.125	832481.990
S61	827495.969	832516.512
S62	827470.062	832549.969
S63	827557.085	832452.610
S64	827557.721	832433.849
S65	827551.647	832429.677
S66	827534.897	832437.892

B

0 4 8 12 16 20
METRES
1 : 400

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DRAWN	HHW
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CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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CADD REF. $FILEA$

TITLE

CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT LAYOUT PLAN

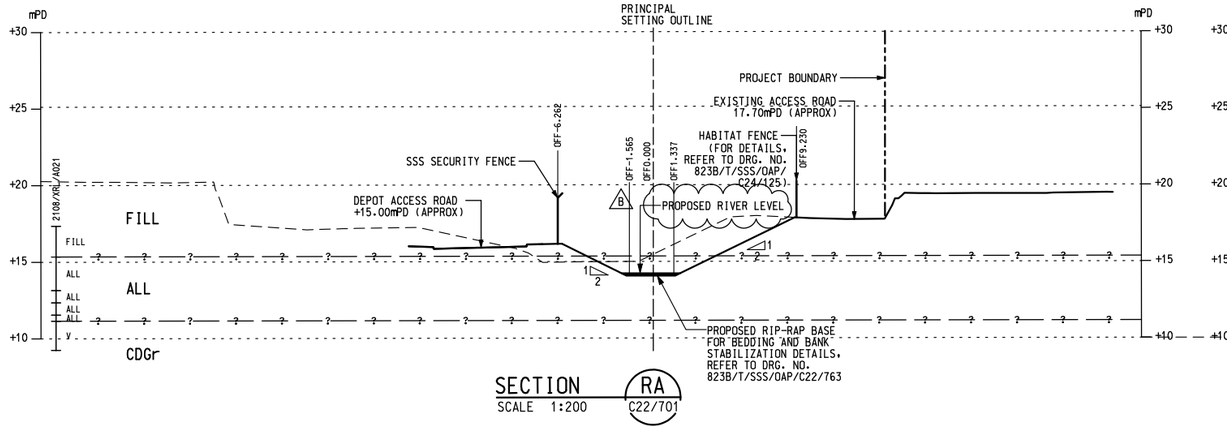
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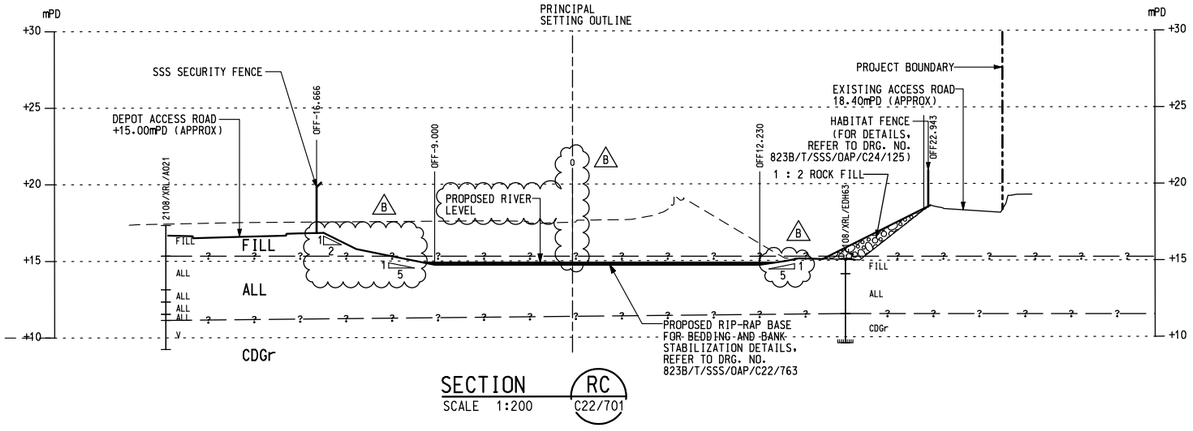
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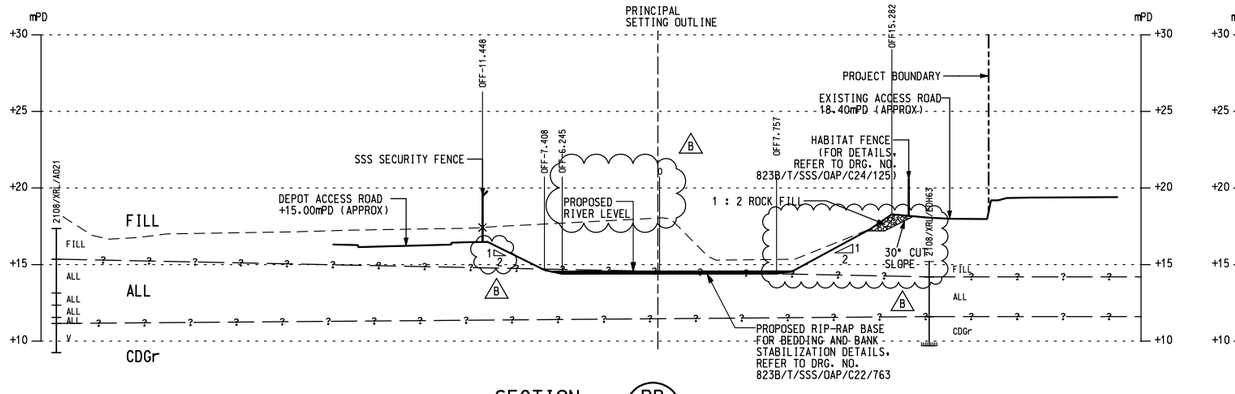
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CH 0+00



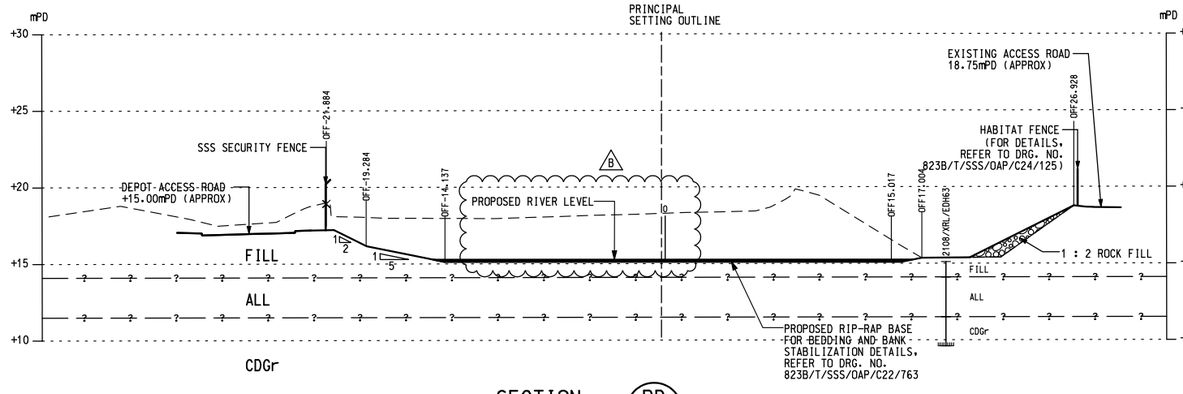
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CH 0+60



SECTION RB
SCALE 1:200 C22/701

CH 0+30



SECTION RD
SCALE 1:200 C22/701

CH 0+90

0 2 4 6 8 10
METRES
1 : 200

LEGEND :

DFD	DEBRIS FLOW DEPOSIT
ALL	ALLUVIUM
CDGr	COMPLETELY DECOMPOSED GRANODIORITE
MDGr	MODERATELY DECOMPOSED GRANODIORITE

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
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A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
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DATE	18/DEC/2009

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TITLE

CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT SECTION

SHEET 1

SCALE 1 : 200 (A1)

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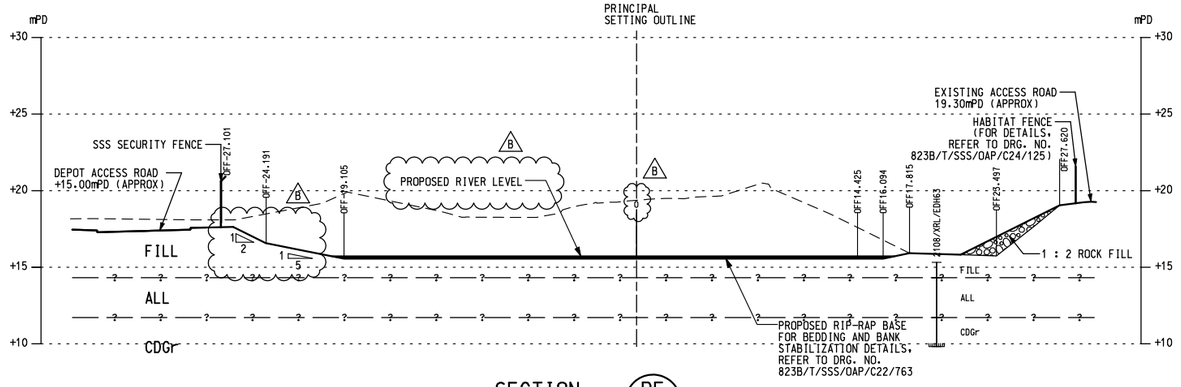
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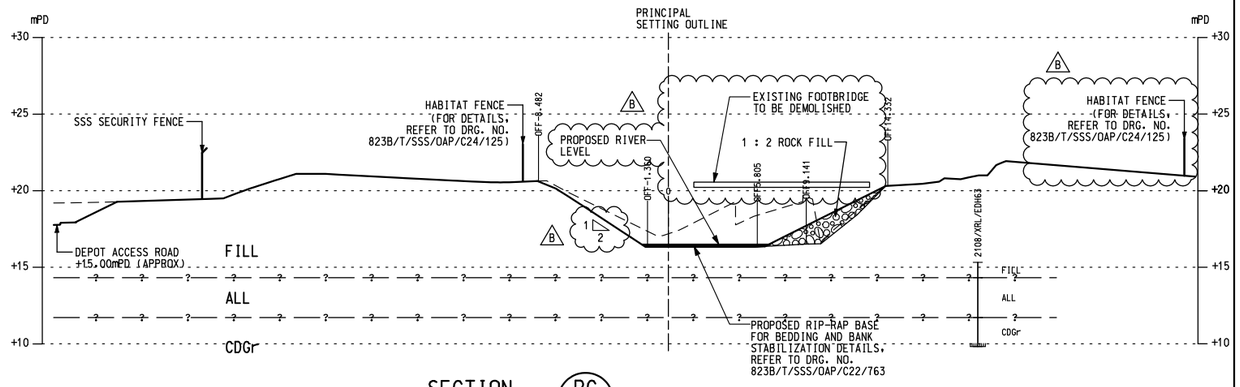
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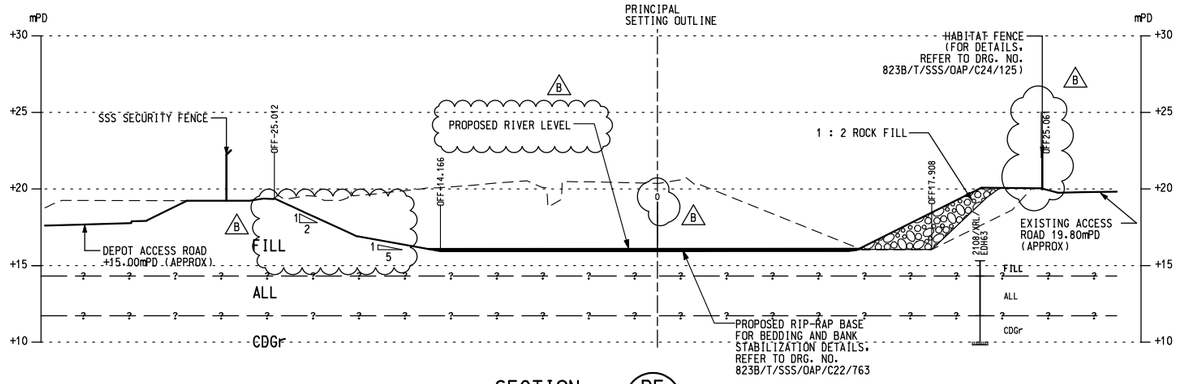
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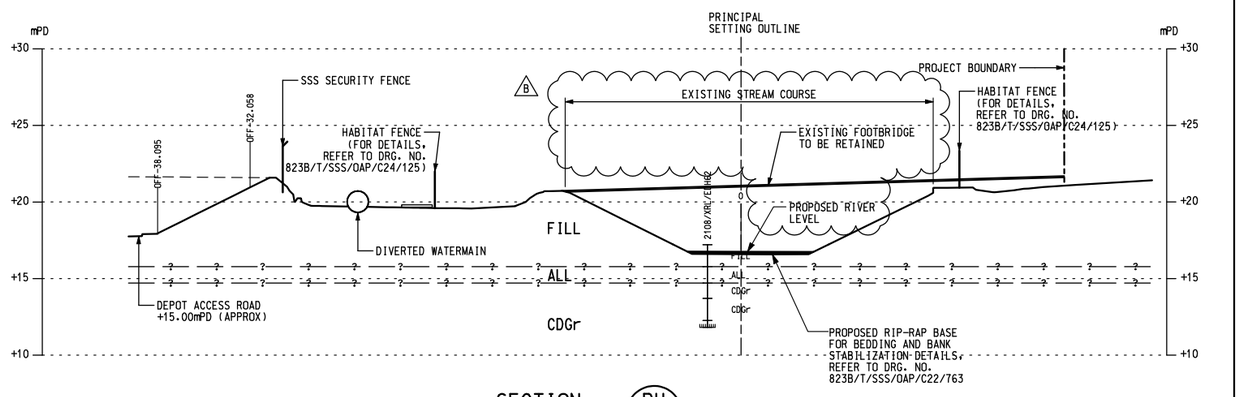
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CH 0+180



SECTION RF
SCALE 1:200 C22/701

CH 0+150



SECTION RH
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CH 0+210

0 2 4 6 8 10
METRES
1 : 200

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CADD REF. $FILEA$

TITLE

CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT SECTION

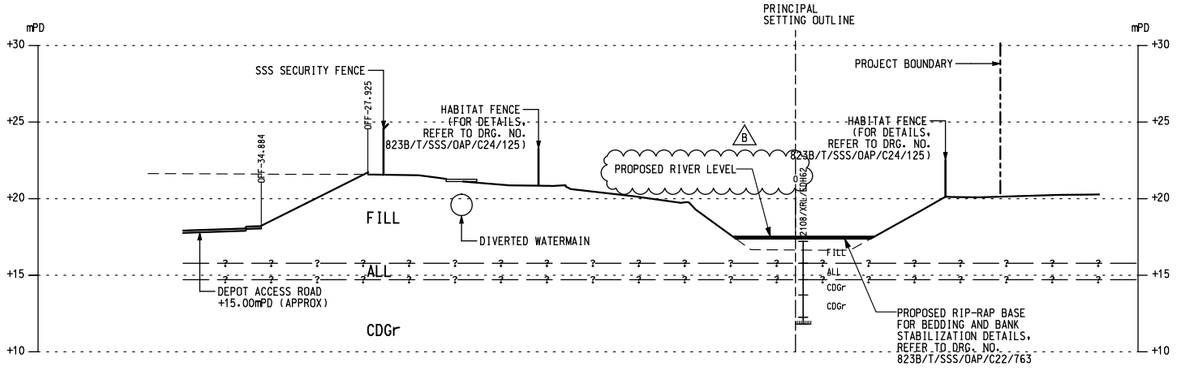
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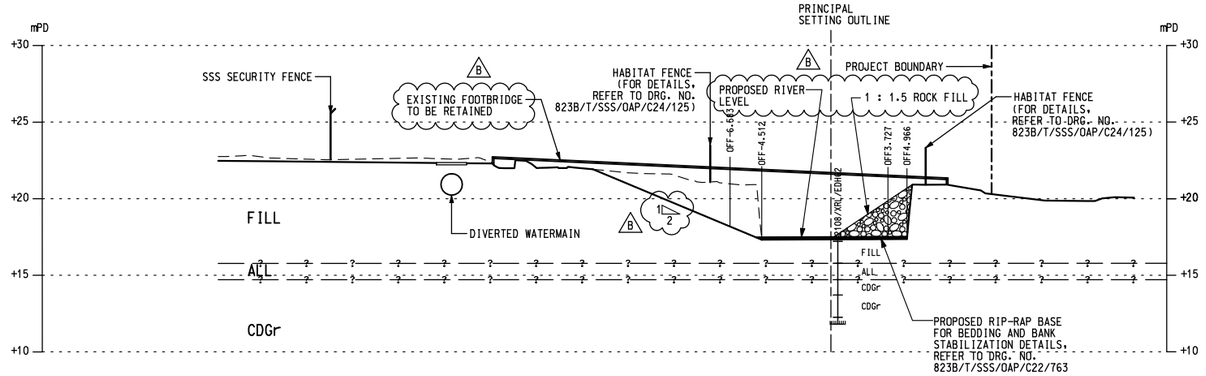
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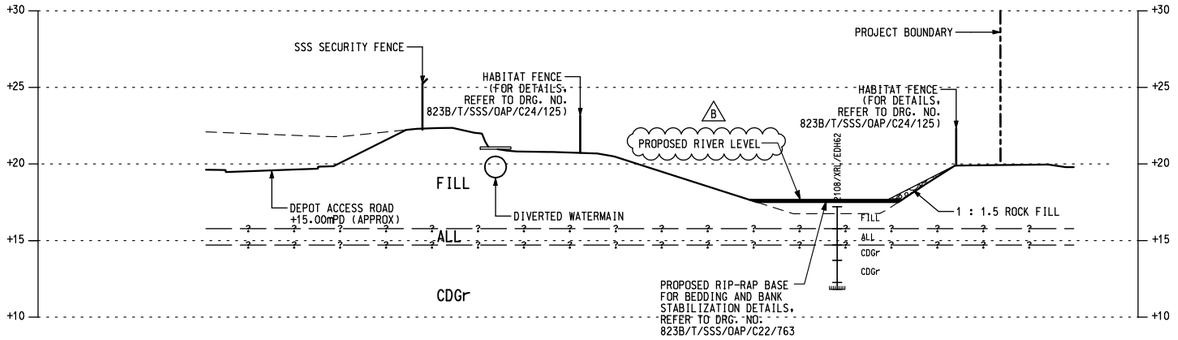
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SCALE 1:200 C22/702

CH 0+240



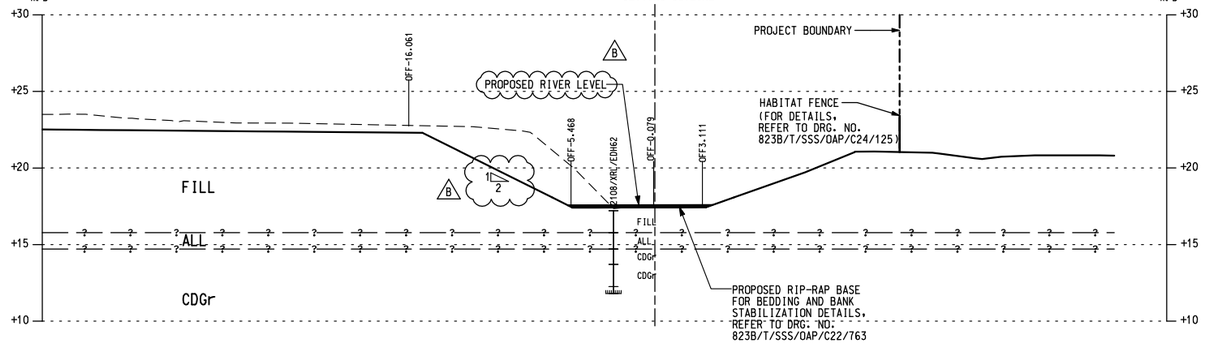
SECTION RK
SCALE 1:200 C22/702

CH 0+300



SECTION RJ
SCALE 1:200 C22/702

CH 0+270



SECTION RL
SCALE 1:200 C22/702

CH 0+330

0 2 4 6 8 10
METRES
1 : 200

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
B	TENDER ADDENDUM NO.1 ISSUE	TW	01APR10	JM
A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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ORIGINATOR ARUP

Supported by : Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia

CADD REF. $FILEA$

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT SECTION

SHEET 3

SCALE 1 : 200 (A1)

DRAWING NO. 823B/T/SSS/OAP/C22/753

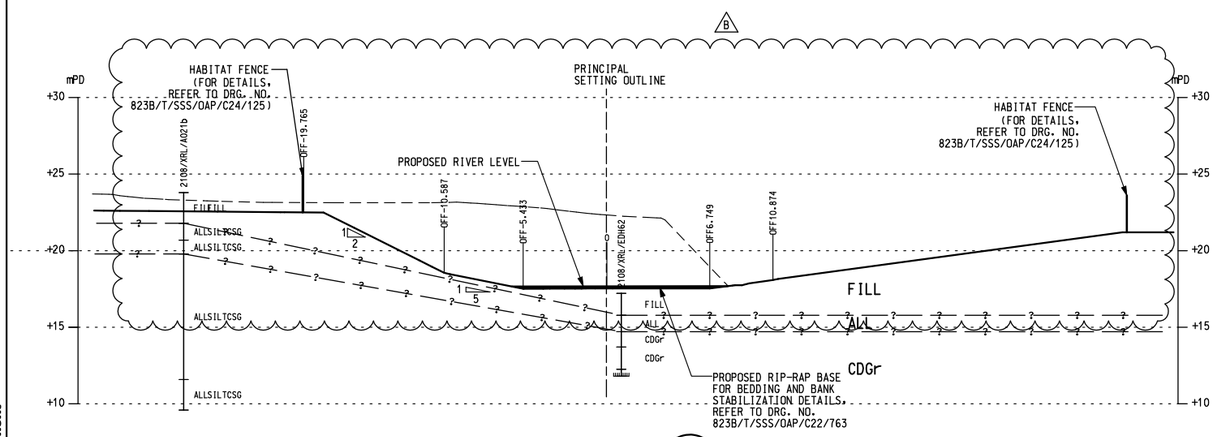
REV. B

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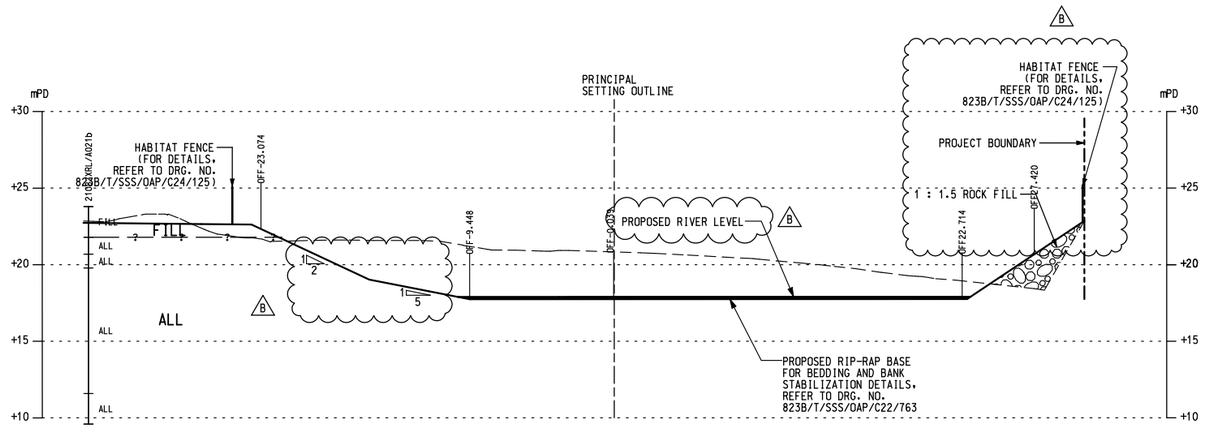
NOTES:

1. FOR NOTES & LEGEND, REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/751.



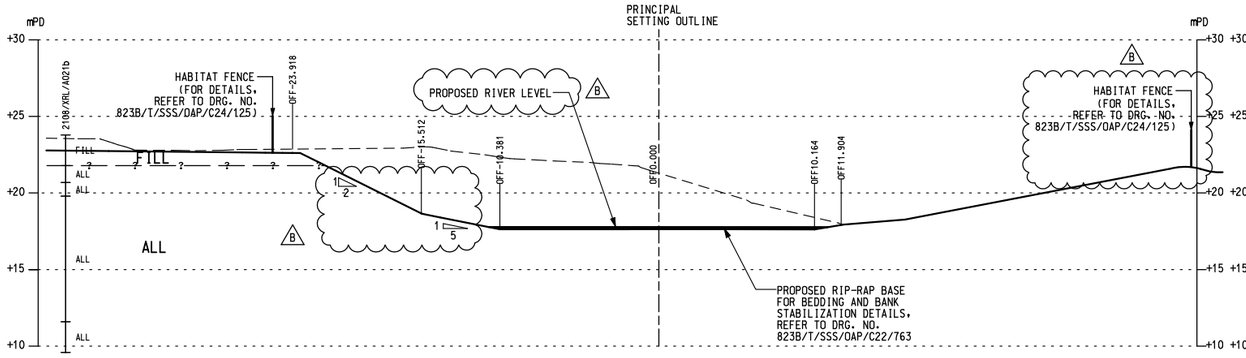
SECTION RM
SCALE 1:200 C22/702

CH 0+360



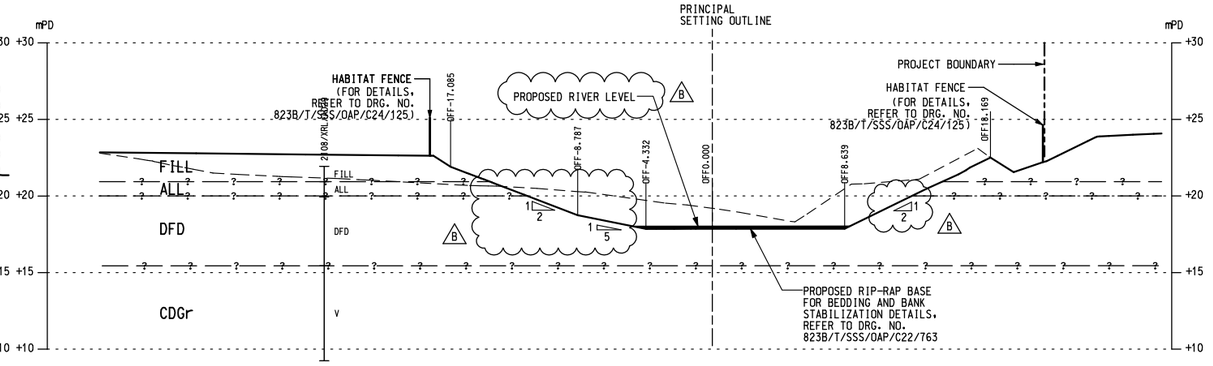
SECTION RO
SCALE 1:200 C22/703

CH 0+420



SECTION RN
SCALE 1:200 C22/702

CH 0+390



SECTION RP
SCALE 1:200 C22/703

CH 0+450

0 2 4 6 8 10
METRES
1 : 200

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
B	TENDER ADDENDUM NO.1 ISSUE	TW	01APR10	JM
A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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Urbis, BMT Asia

CADD REF. $FILEA$

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT SECTION

SHEET 4

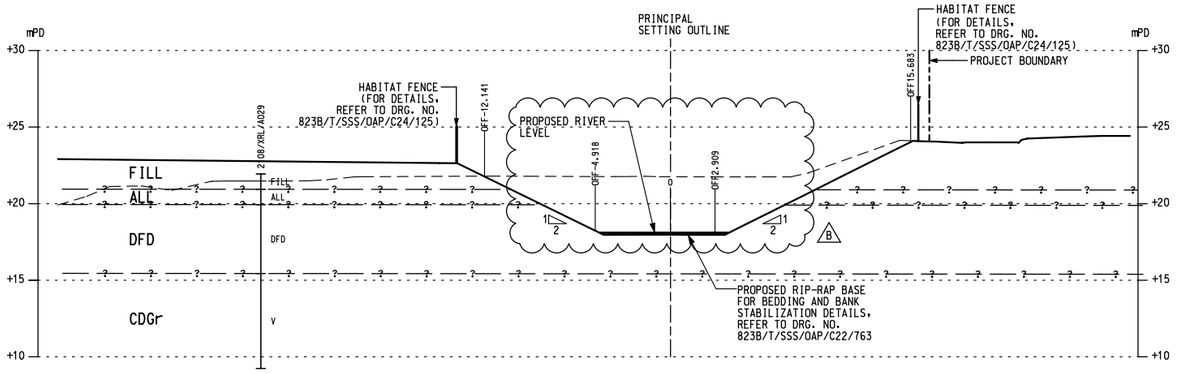
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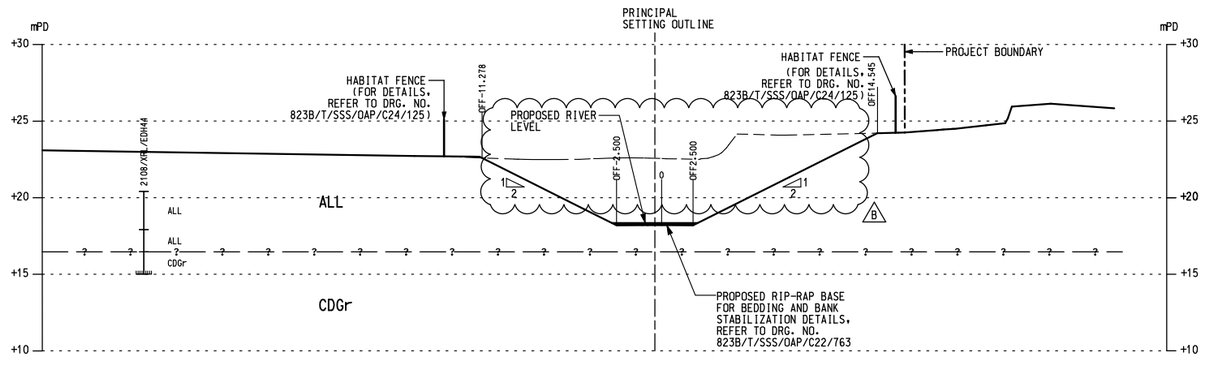
NOTES:

1. FOR NOTES & LEGEND, REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/751.



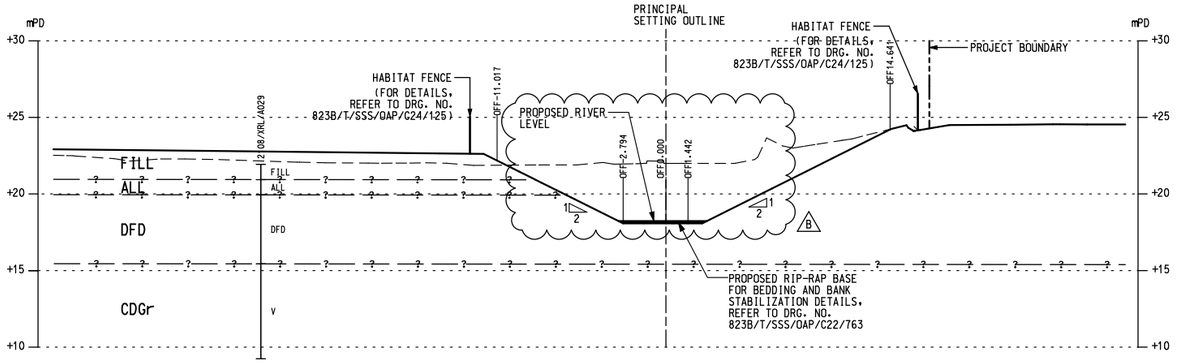
SECTION RQ
SCALE 1:200 C22/703

CH 0+480



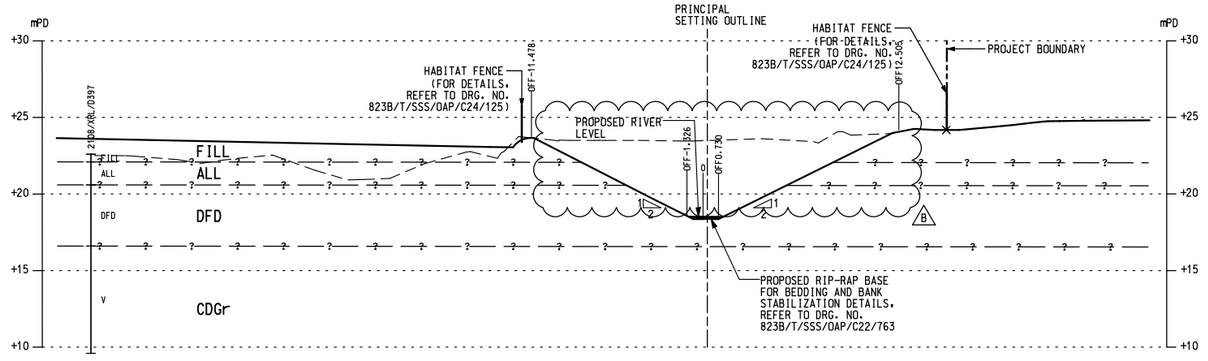
SECTION RS
SCALE 1:200 C22/703

CH 0+540



SECTION RR
SCALE 1:200 C22/703

CH 0+510



SECTION RT
SCALE 1:200 C22/703

CH 0+570

0 2 4 6 8 10
METRES
1 : 200

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
B	TENDER ADDENDUM NO.1 ISSUE	TW	01APR10	JM
A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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CADD REF. $FILEA$

TITLE

CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT SECTION

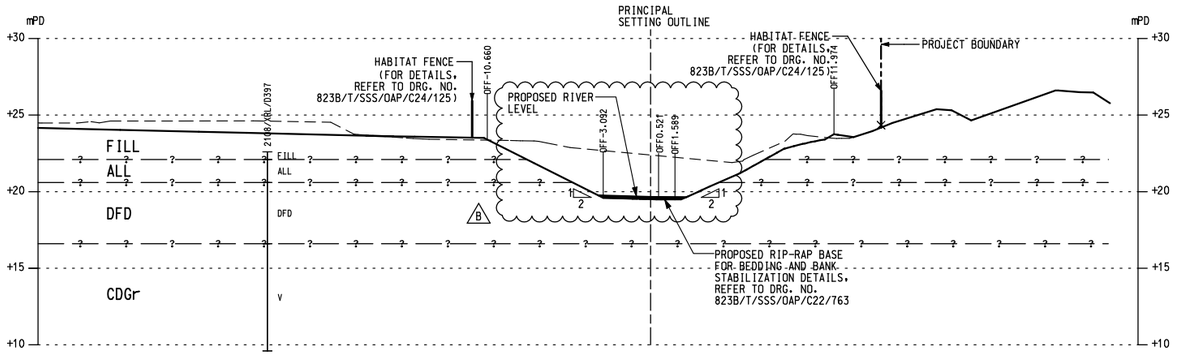
SHEET 5

SCALE	DRAWING NO.	REV.
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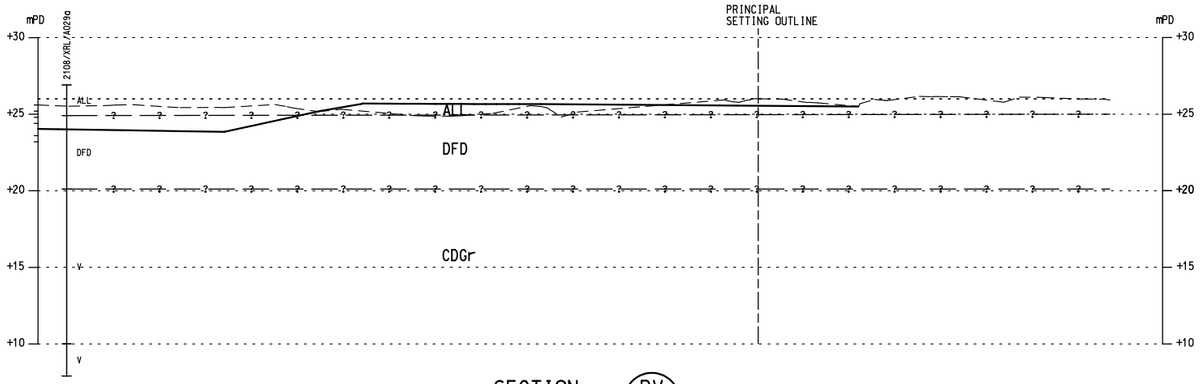
NOTES:

1. FOR NOTES & LEGEND, REFER TO DRAWING NO. 823B/T/SSS/OAP/C22/751.



SECTION RU
SCALE 1:200 C22/703

CH 0+600



SECTION RV
SCALE 1:200 C22/703

CH 0+629.322

0 2 4 6 8 10
METRES
1 : 200

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
B	TENDER ADDENDUM NO.1 ISSUE	TW	01APR10	JM
A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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CADD REF. $FILEA$

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER HABITAT SECTION

SHEET 6

SCALE 1 : 200 (A1)

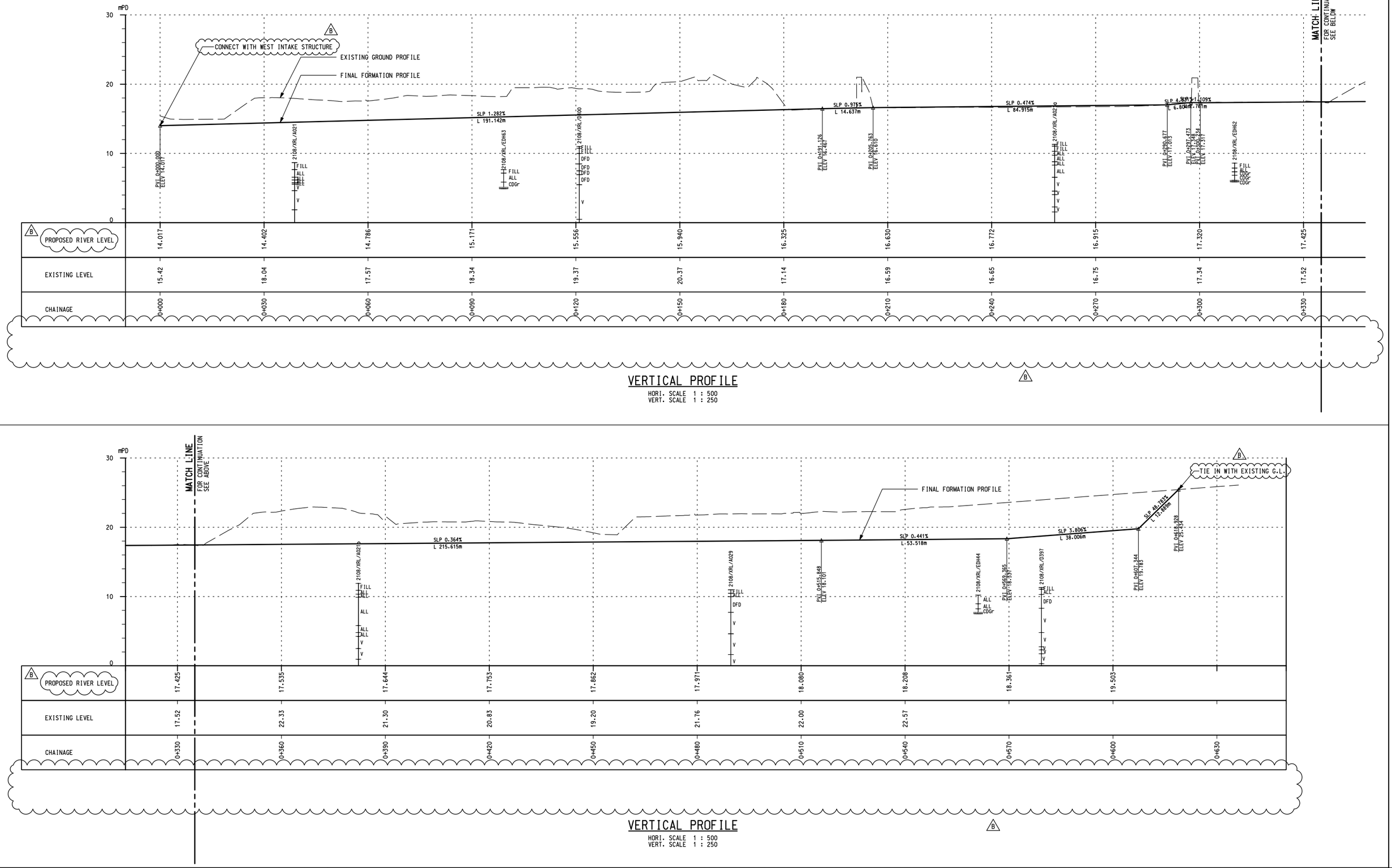
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REV. B

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VERTICAL PROFILE

HORI. SCALE 1 : 500
VERT. SCALE 1 : 250

VERTICAL PROFILE

HORI. SCALE 1 : 500
VERT. SCALE 1 : 250

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TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
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A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	CSK
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	22FEB/2010

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EXPRESS RAIL LINK

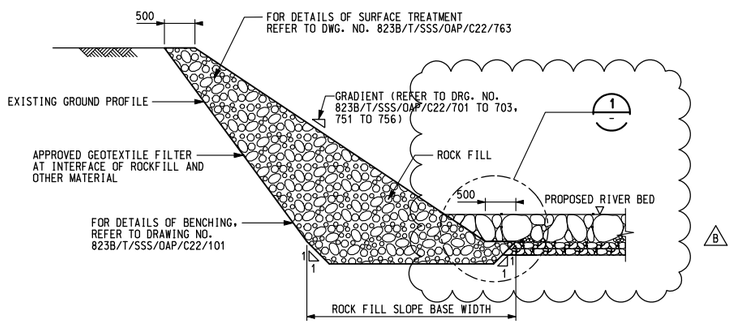
ORIGINATOR
ARUP

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Knight Frank, SIYUAN,
Urbis, BMT Asia

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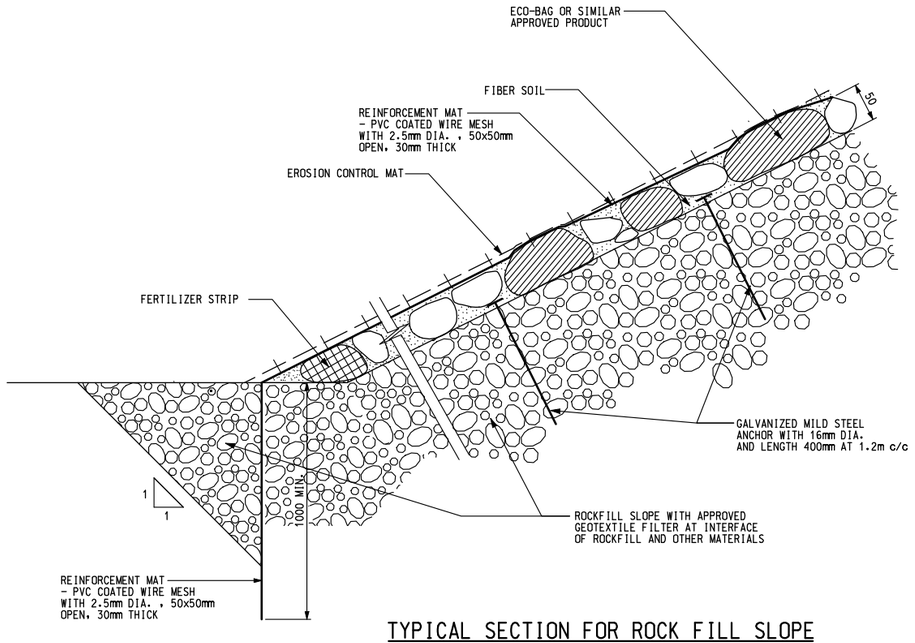
TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
SHEK KONG STABLING SIDINGS (SSS) -
RIVER HABITAT VERTICAL PROFILE

SCALE	DRAWING NO.	REV.
AS SHOWN (A1)	823B/T/SSS/OAP/C22/761	B

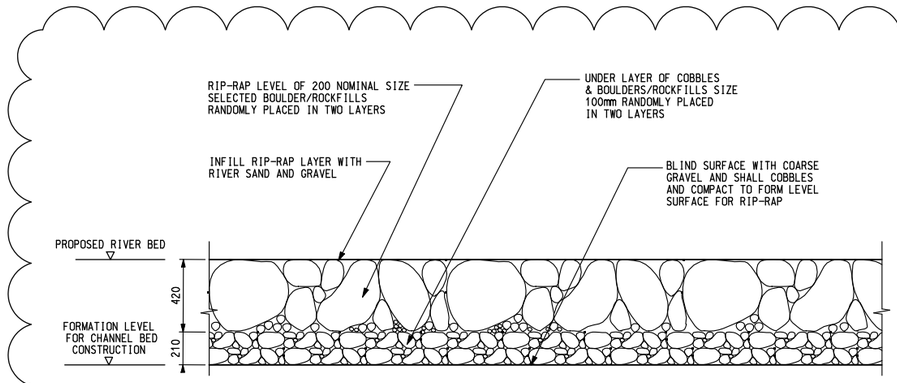


TYPICAL ROCK FILL SLOPE DETAIL

N.T.S.

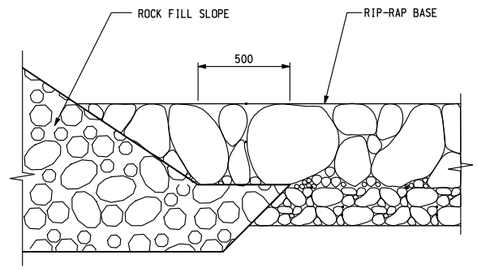


TYPICAL SECTION FOR ROCK FILL SLOPE



TYPICAL DETAILS OF RIP-RAP BASE N.T.S.

(REFER TO NOTES ON RIVER HABITAT ON DRG. NO. 823B/T/SSS/OAP/C01/601)



DETAIL 1
N.T.S.

NOTES :

1. FOR NOTES, REFER TO DRAWING NO. 823B/T/SSS/OAP/C01/601.

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A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	HHW
DESIGNED	DL
CHECKED	MT
APPROVED	JM
DATE	18/DEC/2009

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ORIGINATOR ARUP

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CADD REF. $FILEA$

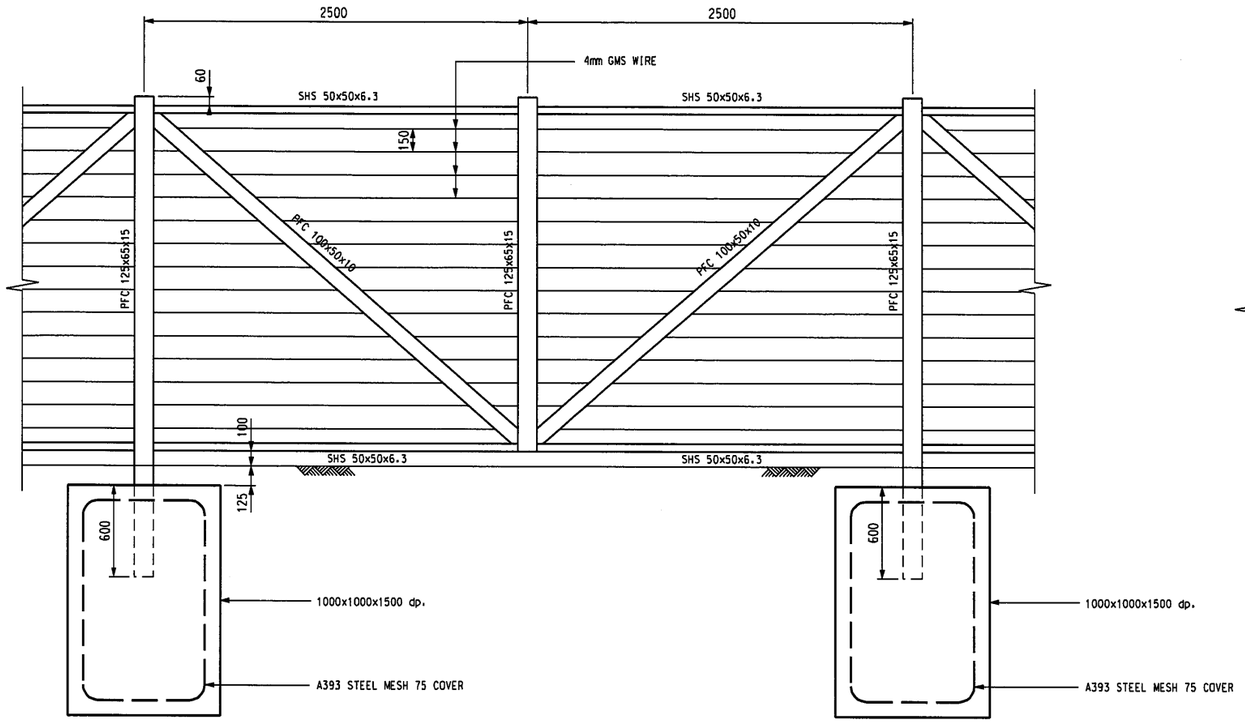
TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
SHEK KONG STABLING SIDINGS (SSS) –
RIVER HABITAT TYPICAL DETAILS

SCALE	DRAWING NO.	REV.
N.T.S.	823B/T/SSS/OAP/C22/763	B

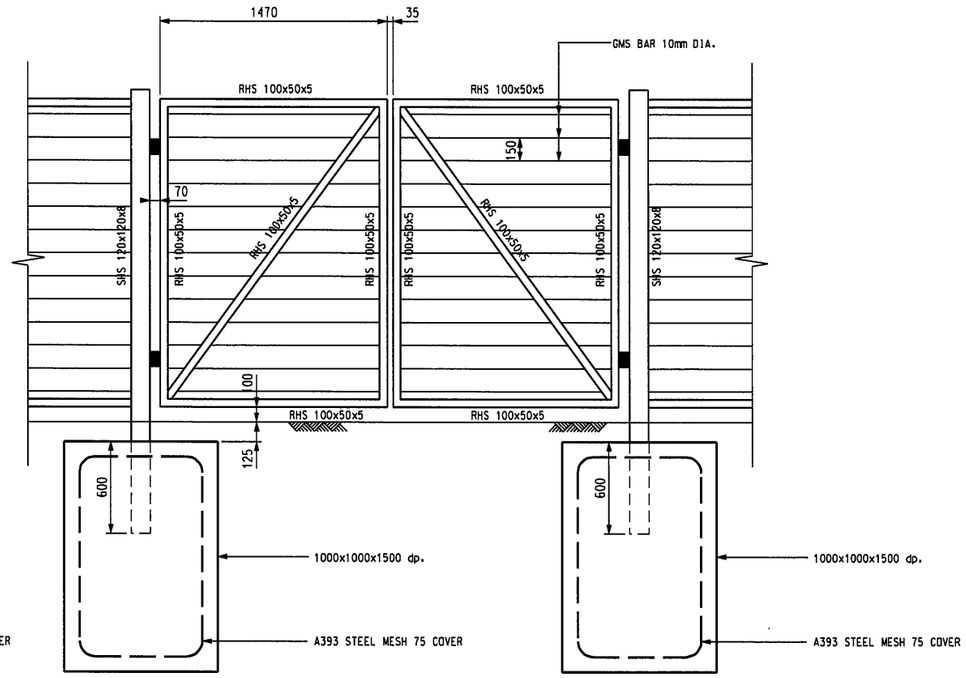
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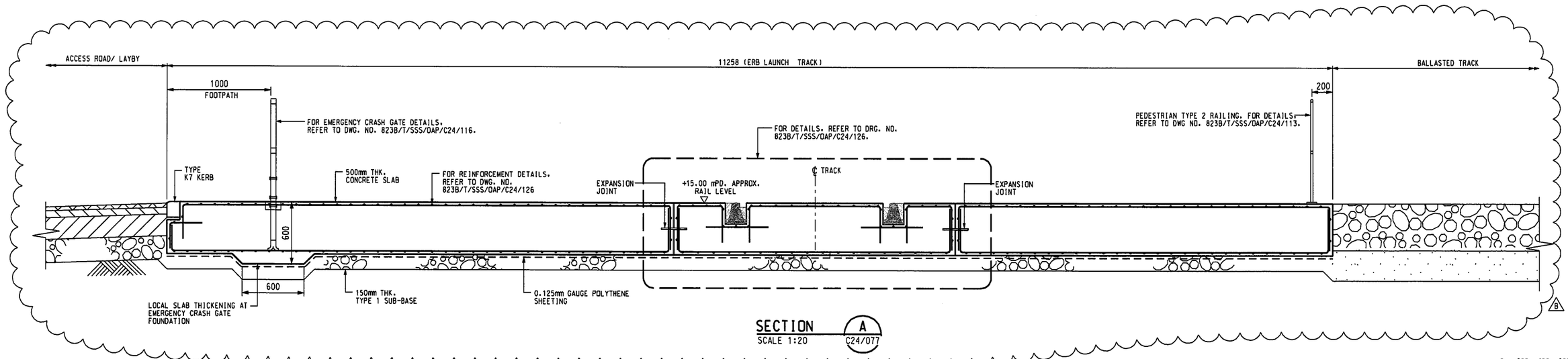
1. THE FENCE PORTS SHALL BE DOUBLE-COATED ENAMEL PAINT FINISH WITH DOUBLE-COATED PRIMER, AS APPROVED BY THE ENGINEER.
2. FENCE POST TO BE A RECESSIVE COLOUR-RAL 6000 PATINA GREEN, OR EQUIVALENT AS APPROVED BY THE ENGINEER.



2.4m HIGH FENCE WITH HORIZONTAL WIRE - TYPE D (B)



TYPE D - GATE DETAIL



SECTION A
SCALE 1:20 C24/077

0 200 400 600 800 1000
MILLIMETRES
1 : 20

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
B	0 & A	TW	09AUG10	JM
A	TENDER ISSUE	TW	22FEB10	JM

DRAWN	AL
DESIGNED	NN
CHECKED	YKL
APPROVED	JM
DATE	13/NOV/2009

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ORIGINATOR: ARUP

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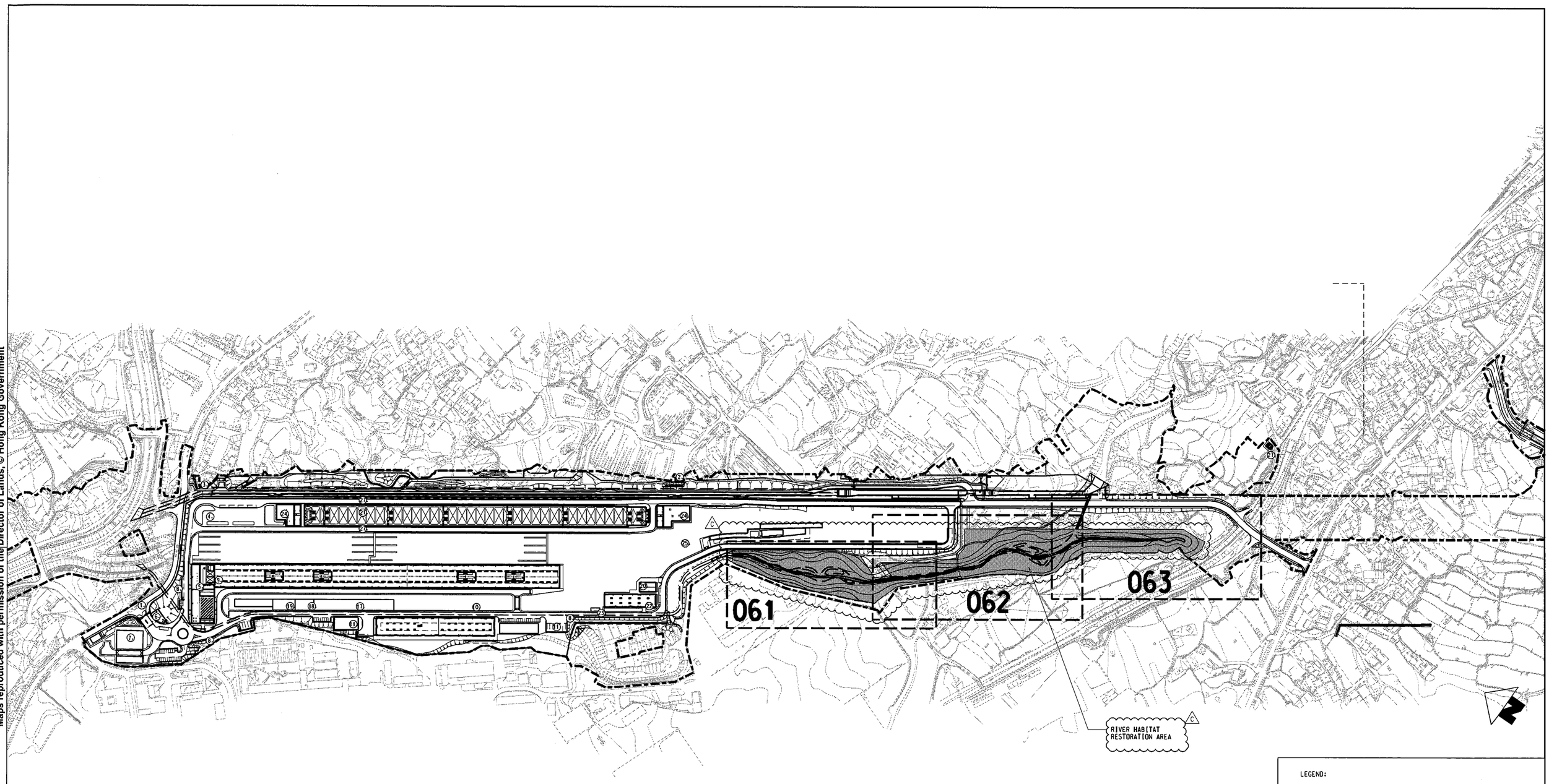
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TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
ROAD WORK DETAILS
RIVER HABITAT FENCING DETAILS - TYPE D (B)
SHEET 15

SCALE 1 : 20 (A1) | DRAWING NO. 823B/T/SSS/OAP/C24/125 | REV. B

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FILENAME: MAC803\CONTRACT_803\823B\Drawing\823B_T_SSS_OAP_C24_125B.dgn

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LEGEND:

1. MAIN ENTRANCE
2. BOUNDARY LINE
3. FUTURE EXPANSION
4. E.R HOLDING AREA
5. S.K.S. MAIN BLDG
6. GATE H.
7. TRACTION P.
8. CAR PARK
9. MAINTENANCE SHED
10. S & CC ASSEMBLY / STORAGE
11. LAY DOWN AREA
12. CIVIL/BUILDING/E&M
13. OHL BUILDING
14. PLANT ROOM
15. SIGNALING B.
16. PERMANENT W.
17. LONG RAIL STILLAGE
18. FBW
19. SHORT R.S.
20. D.C.S.
21. EXTENT OF ERS BOX
22. LOCO BLDG
23. DIESEL S.
24. V.B.B
25. WASH PLANT
27. SHUNT NECK

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
C	Q&A	TO	09AUG10	JM
B	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM
A	TENDER ISSUE	TO	22FEB10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	22/FEB/2010

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CADD REF. 823B_T_SSS_OAP_A58_060C.dgn

TITLE

CONTRACT 823B

SHEK KONG STABLING SIDINGS AND ERS

HABITAT RESTORATION AREA

KEY PLAN

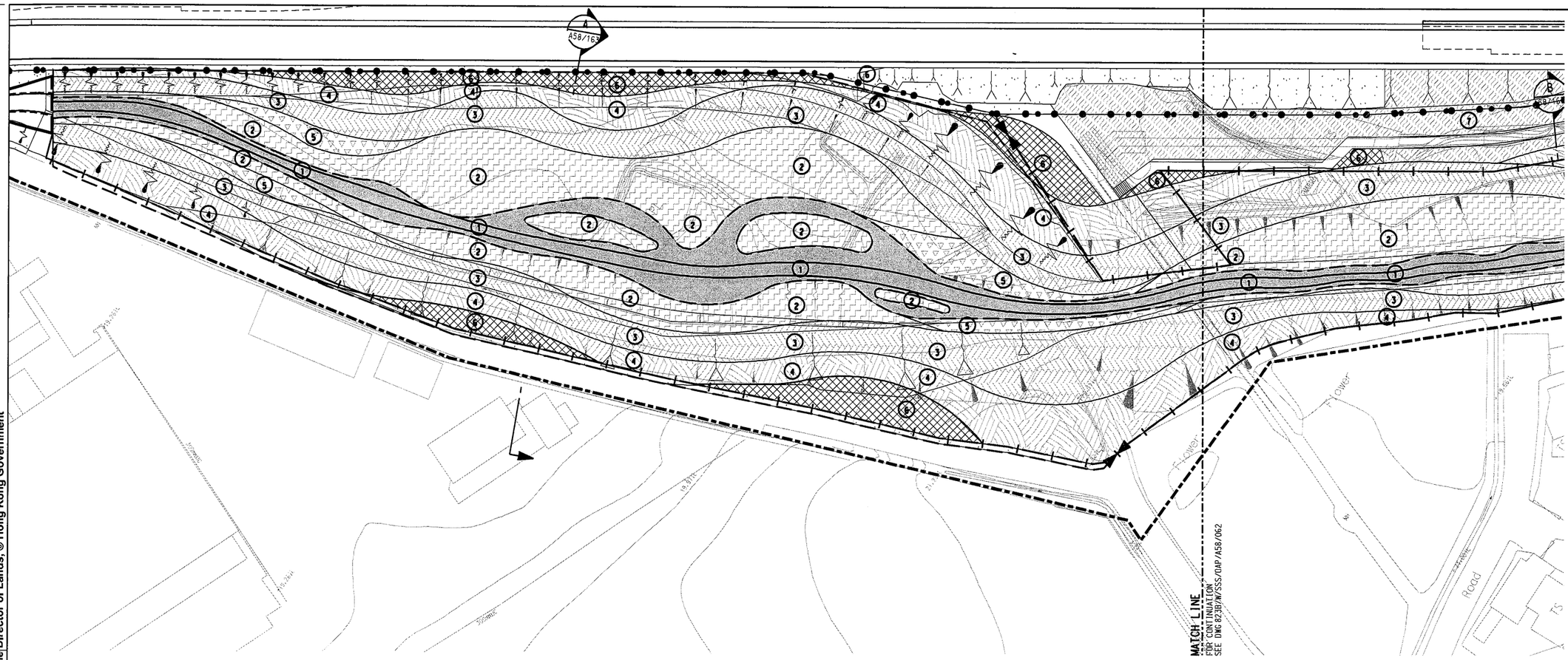
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DRAWING NO. 823B/T/SSS/OAP/A58/060

REV. C

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FILENAME: J:\OA42\DGN\823B_T_SSS_OAP_A58_060C.dgn

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LEGEND

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

PROJECT BOUNDARY

EXTERNAL RIVER HABITAT BOUNDARY/ FENCE

INTERNAL SSS RIVER HABITAT BOUNDARY/ FENCE

PROPOSED 30° CUT SLOPE

PROPOSED 1 IN 2 CUT SLOPE

PROPOSED 1 IN 2 FILL SLOPE

PROPOSED 1 IN 5 CUT SLOPE

PROPOSED 1 IN 1.5 ROCK FILL SLOPE

PROPOSED 1 IN 2 ROCK FILL SLOPE

NOTES:

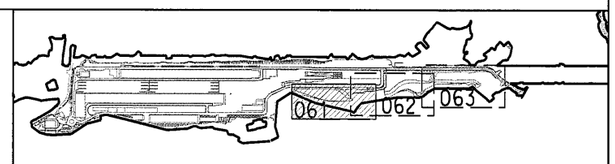
THERE ARE TWO MAIN CATEGORIES OF RIVER HABITAT PLANTS, AQUATIC AND TERRESTRIAL:

1. AQUATIC PLANTS ARE THOSE THAT WOULD BE CONSISTENTLY OR VERY OFTEN SUBMERGED. THESE INCLUDE THE FOLLOWING:
   * EMERGENT AND MARGINAL VEGETATION (STREAM CHANNEL HABITAT TYPE 1)
   * PARTS OF THE STREAM BANK VEGETATION WHICH MAY BE SEASONALLY INUNDATED (STREAM BANK HABITAT TYPE 2)
   * REED BED VEGETATION (HABITAT TYPE 5)
2. TERRESTRIAL PLANTS FORM THE REMAINING PARTS OF RIVER HABITAT AREAS. THESE INCLUDE THE FOLLOWING:
   * SHORT GRASS VEGETATION (HABITAT TYPE 3)
   * LONG GRASS / SHORT SHRUB (HABITAT TYPE 4)
   * BAMBOO CLUMP VEGETATION (HABITAT TYPE 6)
   * TALL SHRUB AND TREE VEGETATION (HABITAT TYPE 7)

METRES 0 2 4 6 8 10
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.

ACP



KEY LOCATION PLAN 1 : 10000

WORKING DRAWINGS

REV	DESCRIPTION	BY	DATE	APPROVED
B1	DRAFT ISSUE	TO	18OCT10	JM
A	WORKING DRAWINGS ISSUE	TO	08OCT10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	08/OCT/2010

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ORIGINATOR
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CADD REF. 823B_W_SSS_OAP_A58_061A.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES
SHEET 1 OF 3

SCALE 1 : 400 (A1)
DRAWING NO. 823B/W/SSS/OAP/A58/061
REV. B1

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MODEL NAME: Default
FILENAME: k:\0442\CONN-OUT\20DEC-04\823B working drawing issue-final\dgn\823B_W_SSS_OAP_A58_061A.dgn
PRINTED BY: Hebe 10/4/2010 8:03:33 AM

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LEGEND

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

PROJECT BOUNDARY

EXTERNAL RIVER HABITAT BOUNDARY/ FENCE

INTERNAL SSS RIVER HABITAT BOUNDARY/ FENCE

PROPOSED 30° CUT SLOPE

PROPOSED 1 IN 2 CUT SLOPE

PROPOSED 1 IN 2 FILL SLOPE

PROPOSED 1 IN 5 CUT SLOPE

PROPOSED 1 IN 1.5 ROCK FILL SLOPE

PROPOSED 1 IN 2 ROCK FILL SLOPE

NOTES:

THERE ARE TWO MAIN CATEGORIES OF RIVER HABITAT PLANTS, AQUATIC AND TERRESTRIAL:

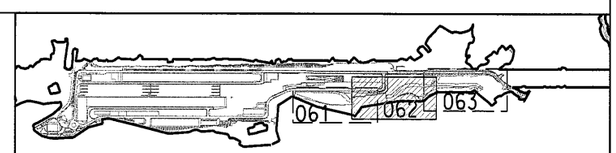
1. AQUATIC PLANTS ARE THOSE THAT WOULD BE CONSISTENTLY OR VERY OFTEN SUBMERGED. THESE INCLUDE THE FOLLOWING:
   * EMERGENT AND MARGINAL VEGETATION (STREAM CHANNEL HABITAT TYPE 1)
   * PARTS OF THE STREAM BANK VEGETATION WHICH MAY BE SEASONALLY INUNDATED (STREAM BANK HABITAT TYPE 2)
   * REED BED VEGETATION (HABITAT TYPE 5)

2. TERRESTRIAL PLANTS FORM THE REMAINING PARTS OF RIVER HABITAT AREAS. THESE INCLUDE THE FOLLOWING:
   * SHORT GRASS VEGETATION (HABITAT TYPE 3)
   * LONG GRASS / SHORT SHRUB (HABITAT TYPE 4)
   * BAMBOO CLUMP VEGETATION (HABITAT TYPE 6)
   * TALL SHRUB AND TREE VEGETATION (HABITAT TYPE 7)

ACP

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

WORKING DRAWINGS

REV	DESCRIPTION	BY	DATE	APPROVED
B1	DRAFT ISSUE	TO	18OCT10	JM
A	WORKING DRAWINGS ISSUE	TO	08OCT10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	08/OCT/2010

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EXPRESS RAIL LINK

ORIGINATOR
ARUP
Supported by :
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CADD REF. 823B_W_SSS_OAP_A58_062A.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES
SHEET 2 OF 3

SCALE 1 : 400 (A1)
DRAWING NO. 823B/W/SSS/OAP/A58/062
REV. B1

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10/4/2010 11:04:20 AM
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LEGEND

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

PROJECT BOUNDARY

EXTERNAL RIVER HABITAT BOUNDARY/ FENCE

INTERNAL SSS RIVER HABITAT BOUNDARY/ FENCE

PROPOSED 30° CUT SLOPE

PROPOSED 1 IN 2 CUT SLOPE

PROPOSED 1 IN 2 FILL SLOPE

PROPOSED 1 IN 5 CUT SLOPE

PROPOSED 1 IN 1.5 ROCK FILL SLOPE

PROPOSED 1 IN 2 ROCK FILL SLOPE

NOTES:

THERE ARE TWO MAIN CATEGORIES OF RIVER HABITAT PLANTS, AQUATIC AND TERRESTRIAL:

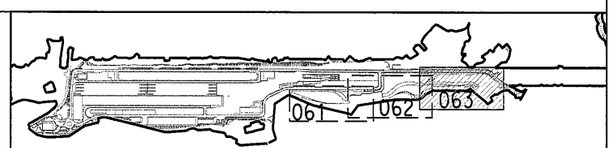
1. AQUATIC PLANTS ARE THOSE THAT WOULD BE CONSISTENTLY OR VERY OFTEN SUBMERGED. THESE INCLUDE THE FOLLOWING:
   * EMERGENT AND MARGINAL VEGETATION (STREAM CHANNEL HABITAT TYPE 1)
   * PARTS OF THE STREAM BANK VEGETATION WHICH MAY BE SEASONALLY INUNDATED (STREAM BANK HABITAT TYPE 2)
   * REED BED VEGETATION (HABITAT TYPE 5)

2. TERRESTRIAL PLANTS FORM THE REMAINING PARTS OF RIVER HABITAT AREAS. THESE INCLUDE THE FOLLOWING:
   * SHORT GRASS VEGETATION (HABITAT TYPE 3)
   * LONG GRASS / SHORT SHRUB (HABITAT TYPE 4)
   * BAMBOO CLUMP VEGETATION (HABITAT TYPE 6)
   * TALL SHRUB AND TREE VEGETATION (HABITAT TYPE 7)

ACP

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

WORKING DRAWINGS

REV	DESCRIPTION	BY	DATE	APPROVED
B1	DRAFT ISSUE	TO	18OCT10	JM
A	WORKING DRAWINGS ISSUE	TO	08OCT10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	08/OCT/2010

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CADD REF. 823B_W_SSS_OAP_A58_063A.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES
SHEET 3 OF 3

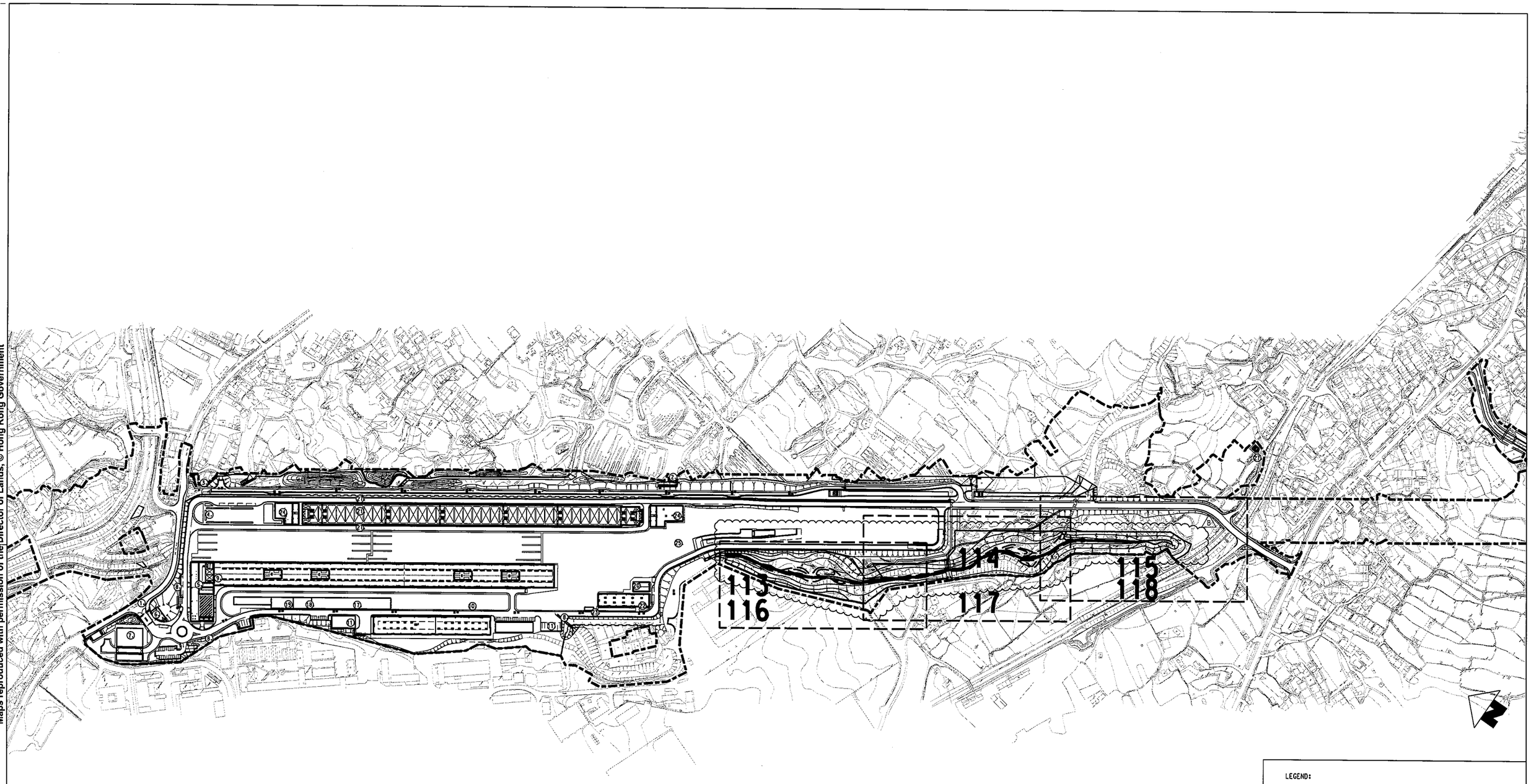
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DRAWING NO. 823B/W/SSS/OAP/A58/063

REV. B1

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PRINTED BY: Hebe

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LEGEND:

1. MAIN ENTRANCE
2. BOUNDARY LINE
3. FUTURE EXPANSION
4. E.R HOLDING AREA
5. S.K.S. MAIN BLDG
6. GATE H.
7. TRACTION P.
8. CAR PARK
9. MAINTENANCE SHED
10. S & CC ASSEMBLY / STORAGE
11. LAY DOWN AREA
12. CIVIL/BUILDING/E&M
13. OHL BUILDING
14. PLANT ROOM
15. SIGNALING B.
16. PERMANENT W.
17. LONG RAIL STILLAGE
18. FBW
19. SHORT R.S.
20. D.G.S.
21. EXTENT OF ERS BOX
22. LOCO BLDG
23. DIESEL S.
24. V.B.B
25. WASH PLANT
27. SHUNT NECK

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
B	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM
A	TENDER ISSUE	TO	22FEB10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	22/FEB/2010

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CADD REF. 823B_T_SSS_OAP_A58_112B.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA
TREE PLANTING & SOILING PLAN
KEYPLAN

SCALE 1 : 2500 (A1)

DRAWING NO. 823B/T/SSS/OAP/A58/112

REV. B

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5 NOS. BIS.JAV.
7 NOS. CIN.CAM.
2 NOS. BIS.JAV.
7 NOS. CIN.CAM.
3 NOS. BIS.JAV.
1 NO. CEL.SIN.
1 NO. CEL.SIN.
1 NO. FIC. VIR.
1 NO. FIC. VIR.
1 NO. FIC. VIR.
1 NO. FIC. VAR.
1 NO. CEL.SIN.
3 NOS. SAP.SEB.
1 NO. FIC. TIN.
4 NOS. AQU.S
3 NOS. CEL.SIN.
TREE SPECIES REFER TO A58/097
TRE REF
2 NOS. FIC. VIR.
4 NOS. CEL.SIN.
TREE SPECIES REFER TO A58/097
3 NOS. GLY.PEN.
TREE SPECIES REFER TO A58/097
3 NOS. FIC.SUP.
7 NOS. CEL.SIN.
MATCH LINE
FOR CONTINUATION
SEE DWG 823B/W/SSS/OAP/A58/114
Road

ACP

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

LEGEND

- RETAINED EXISTING TREES
- PROPOSED TREE
- TRANSPLANTED TREE FROM HOLDING NURSERY (BY OTHERS)
- 600mm REGULAR TOPSOIL FOR TREES, TALL SHRUB AREAS & BAMBOO AREAS
- 200mm TOPSOIL FOR HYDROSEEDING
- 300mm WETLAND TOPSOIL TYPE A (AEROBIC)
- 300mm WETLAND TOPSOIL TYPE B (HYDRIC SOILS ANAEROBIC)
- ROCKY STREAM BED (REFER TO ENGINEER'S DETAILS AND SPECIFICATIONS)

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.

113 116 114 117 115 118

KEY LOCATION PLAN 1 : 10000

WORKING DRAWINGS

REV	DESCRIPTION	BY	DATE	APPROVED
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A	WORKING DRAWINGS ISSUE	TO	08OCT10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	08/OCT/2010

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EXPRESS RAIL LINK

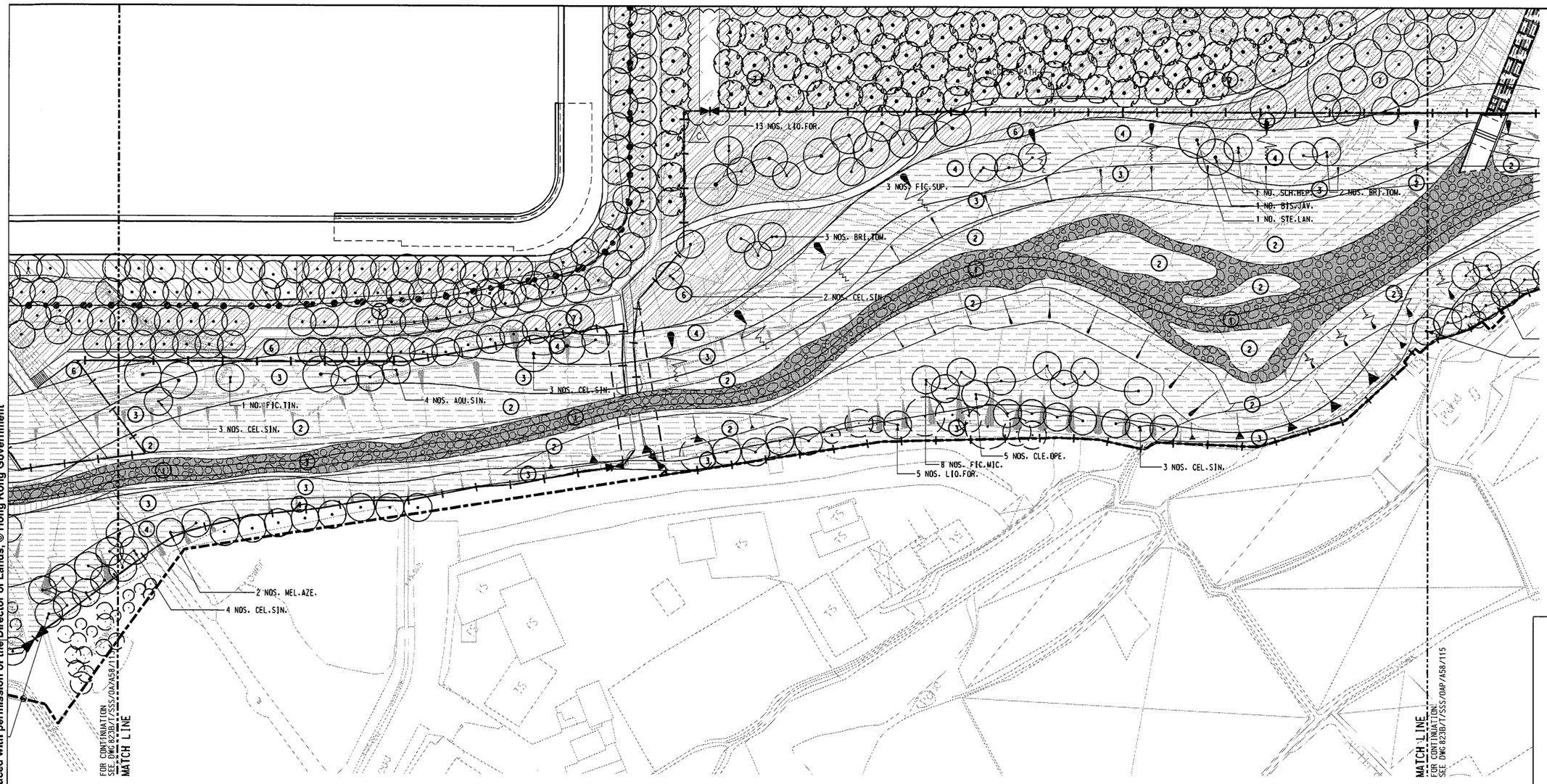
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ARUP
Supported by : Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia

CADD REF. 823B_W_SSS_OAP_A58_113A.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES
TREE PLANTING & SOILING PLAN
SHEET 1 OF 3

SCALE 1 : 400 (A1)
DRAWING NO. 823B/W/SSS/OAP/A58/113
REV. B1

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1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

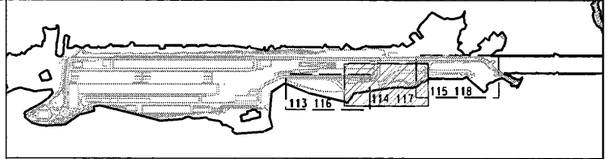
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LEGEND

- RETAINED EXISTING TREES
- PROPOSED TREE
- TRANSPLANTED TREE FROM HOLDING NURSERY (BY OTHERS)
- 600mm REGULAR TOPSOIL FOR TREES, TALL SHRUB AREAS & BAMBOO AREAS
- 200mm TOPSOIL FOR HYDROSEEDING
- 300mm WETLAND TOPSOIL TYPE A (AEROBIC)
- 300mm WETLAND TOPSOIL TYPE B (HYDRIC SOILS ANAEROBIC)
- ROCKY STREAM BED (REFER TO ENGINEER'S DETAILS AND SPECIFICATIONS)

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
C	Q&A	TO	09AUG10	JM
B	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM
A	TENDER ISSUE	TO	22FEB10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	22/FEB/2010

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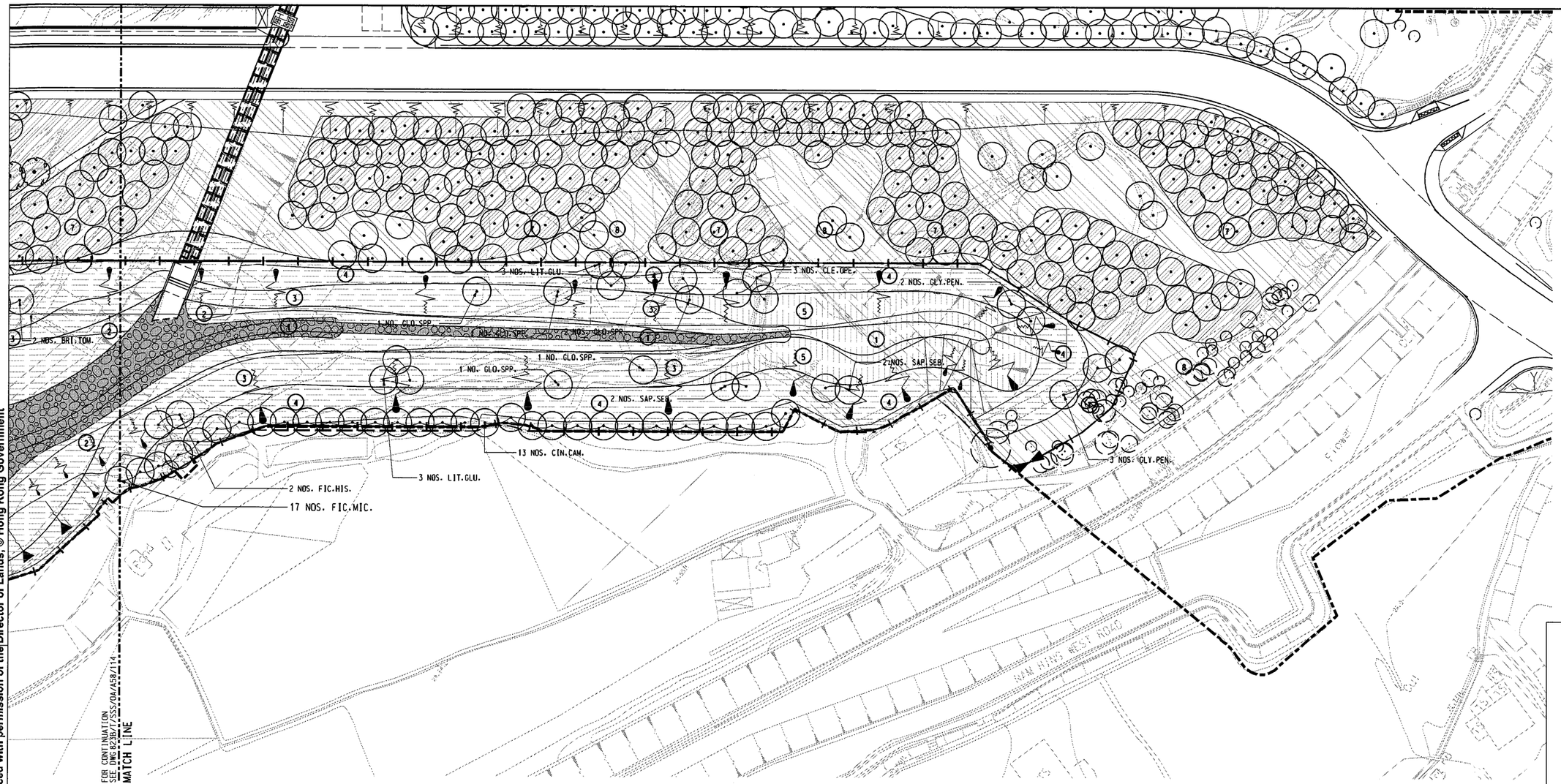
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TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES C
TREE PLANTING & SOILING PLAN
SHEET 2 OF 3

SCALE 1 : 400 (A1)
DRAWING NO. 823B/T/SSS/OAP/A58/114
REV. C

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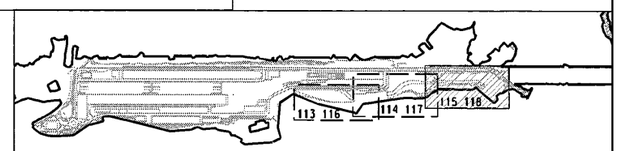
1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS (C)
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

LEGEND

- RETAINED EXISTING TREES
- PROPOSED TREE
- TRANSPLANTED TREE FROM HOLDING NURSERY (BY OTHERS)
- 600mm REGULAR TOPSOIL FOR TREES, TALL SHRUB AREAS & BAMBOO AREAS
- 200mm TOPSOIL FOR HYDROSEEDING
- 300mm WETLAND TOPSOIL TYPE A (AEROBIC)
- 300mm WETLAND TOPSOIL TYPE B (HYDRIC SOILS ANAEROBIC)
- ROCKY STREAM BED (REFER TO ENGINEER'S DETAILS AND SPECIFICATIONS)

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
C	Q&A	TO	09AUG10	JM
B	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM
A	TENDER ISSUE	TO	22FEB10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	22/FEB/2010

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EXPRESS RAIL LINK

ORIGINATOR
ARUP
Supported by : Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia

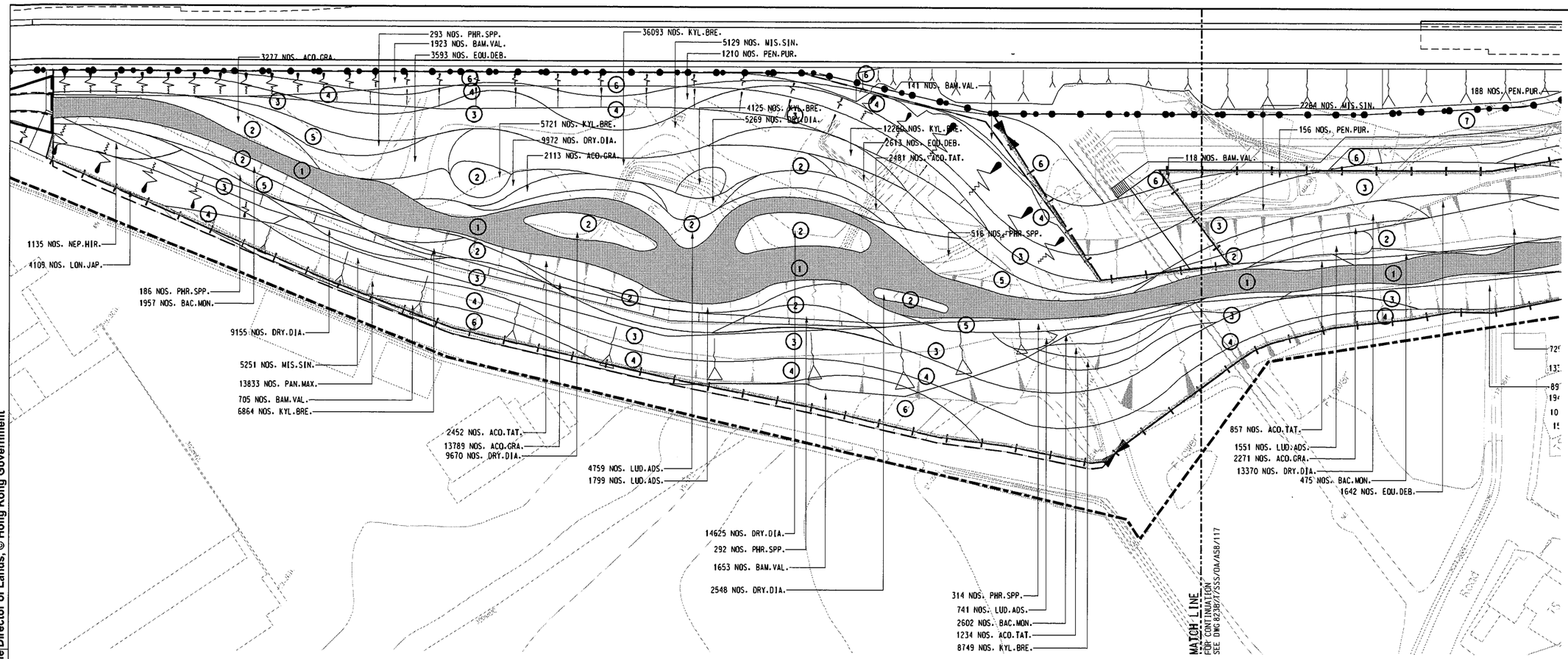
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TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES (C)
TREE PLANTING & SOILING PLAN
SHEET 3 OF 3

SCALE 1 : 400 (A1) | DRAWING NO. 823B/T/SSS/OAP/A58/115 | REV. C

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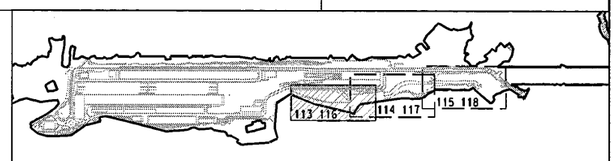


1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

C

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
C	O&A	TO	09AUG10	JM
B	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM
A	TENDER ISSUE	TO	22FEB10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	22/FEB/2010

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EXPRESS RAIL LINK

ORIGINATOR
ARUP
Supported by :
Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia

CADD REF. 823B_T_SSS_OAP_A58_116C.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES C
SHRUB PLANTING PLAN
SHEET 1 OF 3

SCALE 1 : 400 (A1)
DRAWING NO. 823B/T/SSS/OAP/A58/116
REV. C

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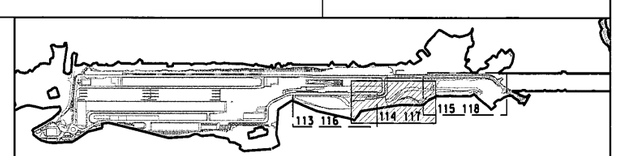
2831 NOS. BAM.VAL.
2264 NOS. MIS.SIN.
156 NOS. PEN.ALO.
188 NOS. PEN.ALO.
118 NOS. BAM.VAL.
3366 NOS. MIS.SIN.
7708 NOS. PHR.KAR.
1542 NOS. BAM.VAL.
632 NOS. PEN.ALO.
8095 NOS. PHR.KAR.
2482 NOS. NEP.HIR.
1809 NOS. NEP.HIR.
2073 NOS. NEP.HIR.
16145 NOS. DRY.DIA.
28955 NOS. KYL.BRE.
1188 NOS. BLE.ORI.
11158 NOS. DRY.DIA.
3607 NOS. EQU.DEB.
6878 NOS. DRY.DIA.
10434 NOS. DRY.DIA.
915
1900
1164
2236 NOS. LUD.ADS.
3720 NOS. BAC.MON.
9241 NOS. DRY.DIA.
8734 NOS. MIS.SIN.
8591 NOS. ACO.GRA.
2351 NOS. LUD.ADS.
18659 NOS. DRY.DIA.
2488 NOS. BLE.ORI.
2365 NOS. NEP.HIR.
2014 NOS. ACO.TAT.
1241 NOS. BAC.MON.
5908 NOS. ACO.GRA.
9265 NOS. EQU.DEB.
2472 NOS. ACO.GRA.
155 NOS. LUD.ADS.
7295 NOS. ACO.TAT.
1331 NOS. ACO.TAT.
8944 NOS. EQU.DEB.
1949 NOS. ACO.GRA.
1016 NOS. ACO.GRA.
158 NOS. LUD.ADS.
857 NOS. ACO.TAT.
1551 NOS. LUD.ADS.
2271 NOS. ACO.GRA.
13370 NOS. DRY.DIA.
475 NOS. BAC.MON.
1642 NOS. EQU.DEB.
POND
POND
POND
POND
T-TOWER
T-TOWER
TRAIL
TRAIL
TS
FOR CONTINUATION SEE DWG 823B/W/SSS/OAP/A58/118
MATCH LINE
FOR CONTINUATION SEE DWG 823B/W/SSS/OAP/A58/116
MATCH LINE

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

ACP

0 2 4 6 8 10
METRES
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

WORKING DRAWINGS

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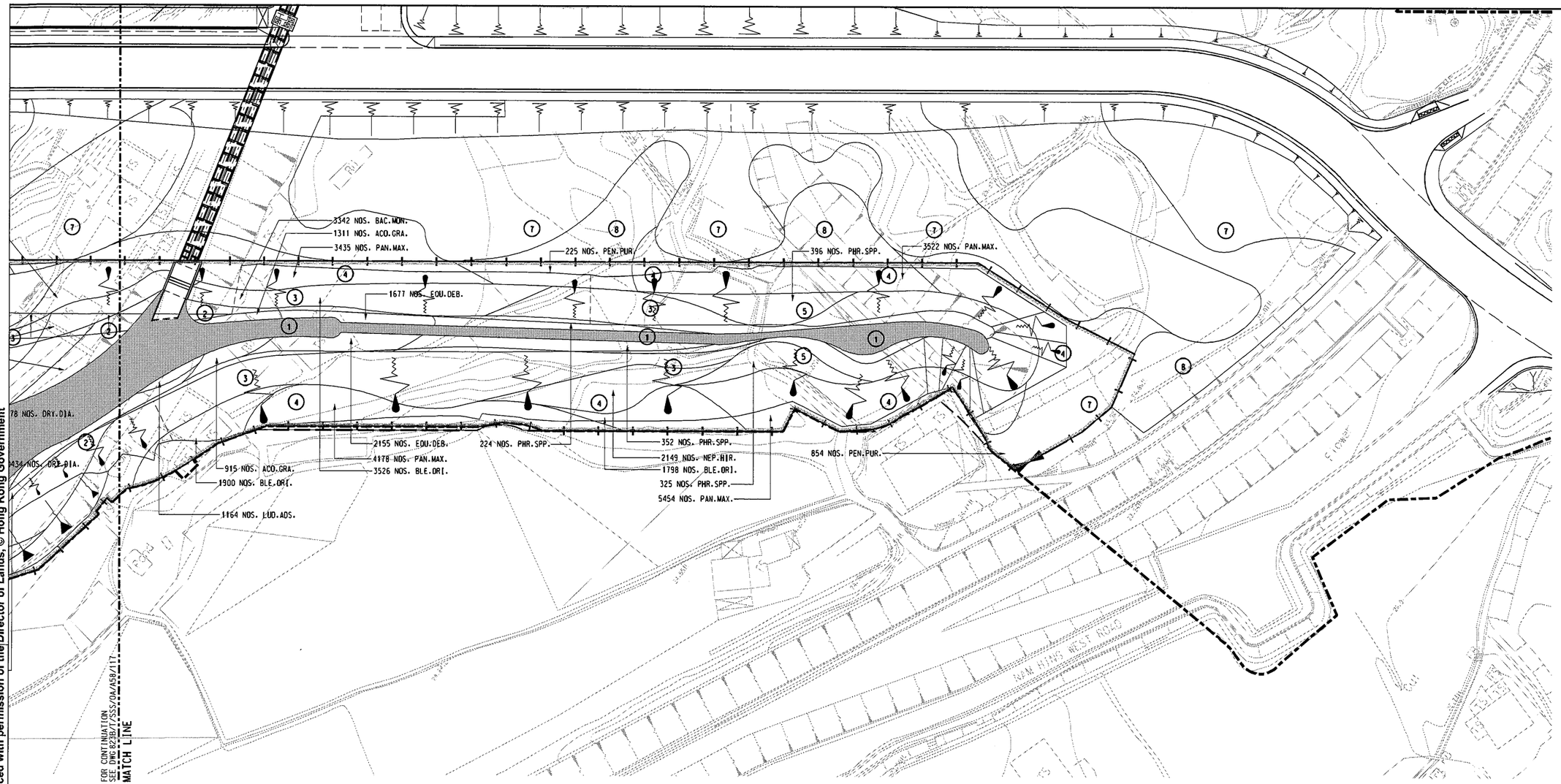
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DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	08/OCT/2010

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Supported by : Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia
CADD REF. 823B_W_SSS_OAP_A58_117A.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES
SHRUB PLANTING PLAN
SHEET 2 OF 3

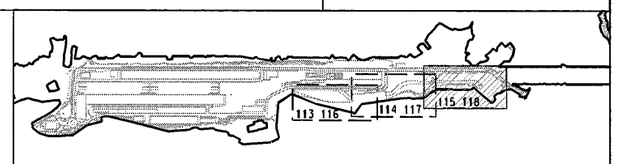
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DRAWING NO. 823B/W/SSS/OAP/A58/117
REV. B1



1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS (C)
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

METRES 0 2 4 6 8 10
1 : 200

NOTES:
1. INTERNAL SECURITY FENCES AND RAILINGS REFER TO CIVIL ENGINEERS DRAWINGS.



KEY LOCATION PLAN 1 : 10000

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
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B	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM
A	TENDER ISSUE	TO	22FEB10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	22/FEB/2010

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EXPRESS RAIL LINK

ORIGINATOR ARUP

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Knight Frank, SIYUAN,
Urbis, BMT Asia

CADD REF. 823B_T_SSS_OAP_A58_118C.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
HABITAT RESTORATION AREA - HABITAT ZONES (C)
SHRUB PLANTING PLAN
SHEET 3 OF 3

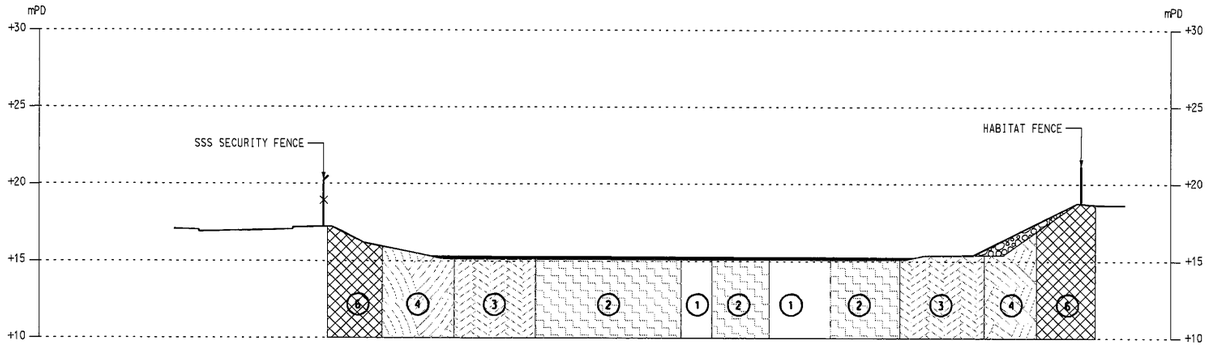
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DRAWING NO. 823B/T/SSS/OAP/A58/118

REV. C

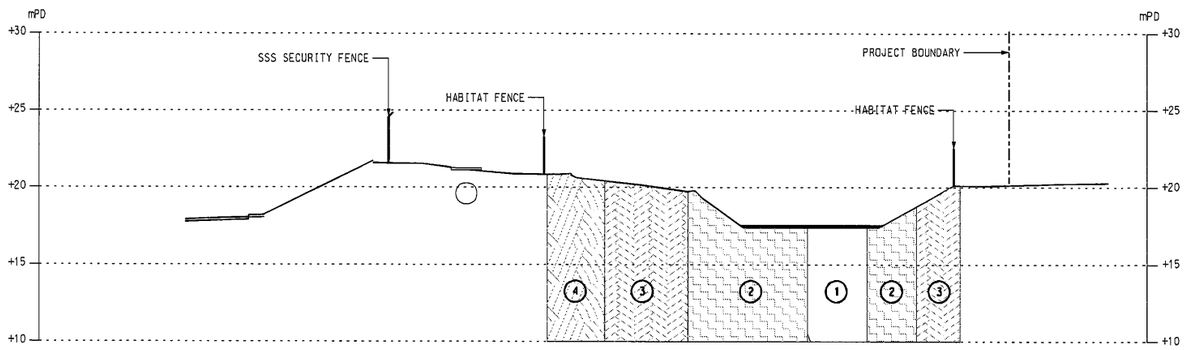
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SECTION A
SCALE 1:200 A58/061

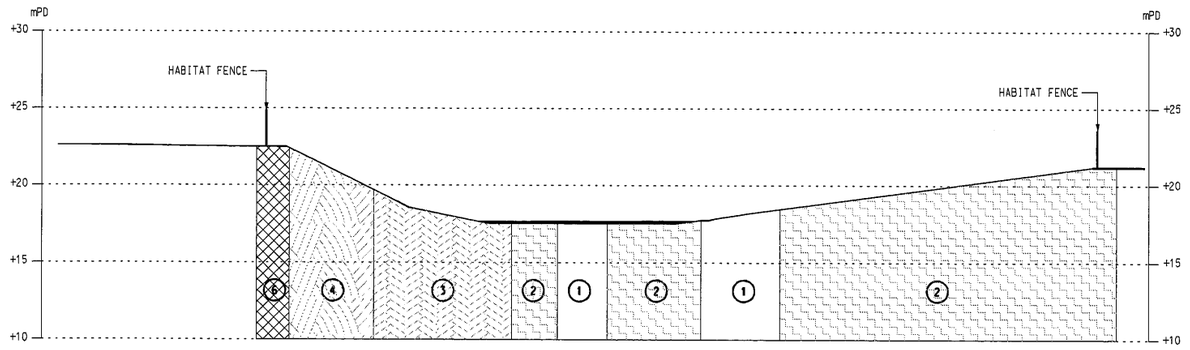
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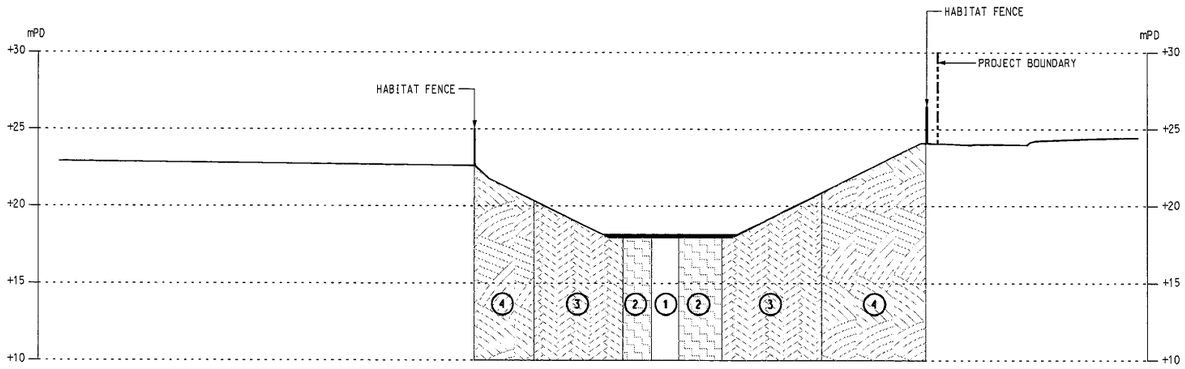
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REFER TO ENGINEERS
DETAIL 'RI' ON DRAWING C22/753

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS (B)
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING



SECTION C
SCALE 1:200 A58/062

NOTE:
REFER TO ENGINEERS
DETAIL 'RM' ON DRAWING C22/754



SECTION D
SCALE 1:200 A58/063

NOTE:
REFER TO ENGINEERS
DETAIL 'RO' ON DRAWING C22/755

TENDER

REV	DESCRIPTION	BY	DATE	APPROVED
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A	TENDER ADDENDUM NO. 1 ISSUE	TO	01APR10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	01/APR/2010

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ORIGINATOR ARUP
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CADD REF. 823B_T_SSS_OAP_A58_163B.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
RIVER RESTORATION AREA - SECTIONS

SCALE 1 : 200 (A1)
DRAWING NO. 823B/T/SSS/OAP/A58/163
REV. B

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KEY	BOTANICAL NAME	SPACING (mm)	SIZE (H x SPR) (M)	HABITATS	REMARKS	TOTAL QTY	AREA (m2)
TREES							
BRI.TOM.	BRIDELIA TOMENTOSA	AS SHOWN ON PLAN	2 X 1	4,6	LIGHT STANDARD	5	
CEL.SIN.	CELTIS SINENSIS	AS SHOWN ON PLAN	4 X 2	3,4,6	HEAVY STANDARD	25	
CLE.OPE.	CLEISTOCALYX OPERCULATUS	AS SHOWN ON PLAN	3.5 X 1	B1 2,3,4,5	STANDARD	8	
FIC.HIS.	FICUS HISPIDA	AS SHOWN ON PLAN	3 X 1	3	STANDARD	2	
FIC.MIC.	FICUS MICROCARPA	AS SHOWN ON PLAN	4 X 2	2,4	HEAVY STANDARD	25	
FIC.SUP.	FICUS SUPERBA VAR. JAPONICA	AS SHOWN ON PLAN	2 X 1	4	LIGHT STANDARD	6	
FIC.TIN.	FICUS TINCTORIA SUBSP. GIBBOSA	AS SHOWN ON PLAN	2 X 1	3	LIGHT STANDARD	1	
FIC.VAR.	FICUS VARIEGATA	AS SHOWN ON PLAN	4 X 2	3	LIGHT STANDARD	1	
LIT.GLU.	LITSEA GLUTINOSA	AS SHOWN ON PLAN	3 X 1	3,4	LIGHT STANDARD	6	
B1 FIC.VIR.	FICUS VIRENS VAR. SUBLANCEOLATA	AS SHOWN ON PLAN	4 X 2	3,4	HEAVY STANDARD	5	
GLO.SPP.	GLOCHIDION SPP	AS SHOWN ON PLAN	2 X 1	3,4,5	LIGHT STANDARD	6	
STE.LAN.	STERCULIA LANCEOLATA	AS SHOWN ON PLAN	3.5 X 1	4	STANDARD	1	
AQU.SIN.	AQUILARIA SINENSIS	AS SHOWN ON PLAN	3 X 1	3	LIGHT STANDARD	4	
BIS.JAV.	BISCHOFIA JAVANICA	AS SHOWN ON PLAN	4 X 1	4,6	HEAVY STANDARD	11	
GLY.PEN.	GLYPTOSTROBUS PENSILIS	AS SHOWN ON PLAN	3 X 1	4,7	LIGHT STANDARD	8	
LIQ.FOR.	LIQUIDAMBAR FORMOSANA	AS SHOWN ON PLAN	4 X 1	3,7	HEAVY STANDARD	18	
SAP.SEB.	SAPIUM SEBIFERUM	AS SHOWN ON PLAN	3 X 1	3,4	STANDARD	7	
SCH.HEP.	SCHEFFLERA HEPTAPHYLLA	AS SHOWN ON PLAN	3.5 X 1	4	LIGHT STANDARD	1	
CIN.CAM.	CINNAMOMUM CAMPHORA	AS SHOWN ON PLAN	4 X 1	B1 3,4,6	HEAVY STANDARD	37	
				TOTAL		177	

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

ACP

WORKING DRAWINGS

REV	DESCRIPTION	BY	DATE	APPROVED
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A	WORKING DRAWINGS ISSUE	TO	08OCT10	JM

DRAWN	JIMC
DESIGNED	DT
CHECKED	TO
APPROVED	JM
DATE	08/OCT/2010

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CADD REF. 823B_W_SSS_OAP_A58_197B.dgn

TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
SSS-MAIN BUILDING
PLANTING SCHEDULE FOR RIVER HABITAT & STREAM WIDENING WORKS
SHEET 1 OF 2

SCALE N.T.S (A1)

DRAWING NO. 823B/W/SSS/OAP/A58/197

REV. B1

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KEY	BOTANICAL NAME	SPACING (mm)	SIZE (H x SPR) (M)	HABITATS	REMARKS	TOTAL QTY	AREA (m2)
BAMBOO							
BAM.VUL.	BAMBOSA VULGARIS	600	500 X 500	6	MIN. 5 SHOOTS PER PLANT	8913	1237.90
SHRUBS, HERBS & CLIMBERS							
LON.JAP.	LONICERA JAPONICA	300	1.5m LENGTH	N/A	CONTAINER GROWN; FENCE PLANTING	4109	

KEY	BOTANICAL NAME	SPACING (mm)	SIZE (H x SPR) (M)	HABITATS	REMARKS	TOTAL QTY	AREA (m2)
REEDS							
PHR.SPP.	PHRAGMITES SPP.	600	400 X 300	5	CONTAINER GROWN	2898	905.72
HERBS							
EQU.DEB.	EQUISETUM DEBILE	200	200 X 200	2, 3	CONTAINER GROWN	33496	1159.05
DRY.DIA.	DRYMARIA DIANDRA	100	50 X 100	2, 3, 4	CONTAINER GROWN	137124	1187.21
KYL.BRE.	KYLLINGA BREVIFOLIA	100	100 X 100	2, 3, 4	CONTAINER GROWN	100767	872.44
PEN.ALO.	PENNISETUM ALOPECUROIDES	800	500 X 500	2, 3, 4	CONTAINER GROWN	3265	1813.85
PHR.KAR.	PHRAGMITES KARKA	300	500 X 200	3, 4	CONTAINER GROWN	46225	3611.35
MIS.SIN.	MISCANTHUS SINENSIS	500	300 X 300	3, 4	CONTAINER GROWN	24744	5379.22
BLE.ORI.	BLECHNUM ORIENTALE	300	300 X 200	3, 4	CONTAINER GROWN	10900	851.51
NEP.HIR.	NEPHROLEPIS HIRSUTULA	300	300 X 200	2, 3, 4	CONTAINER GROWN	12013	938.56
HERBS / LOWER RIVER BANK							
LUD.ADS.	LUDWIGIA ADSCENDENS	200	100 X 300	2	MIN. 3 SHOOTS PER PLANT	14914	516.05
ACO.GRA.	ACORUS GRAMINEUS	200	100 X 100	2	CONTAINER GROWN	43612	1509.03
BAC.MON.	BACOPA MONNIERI	200	100 X 200	2	CONTAINER GROWN	13337	928.77
ACO.TAT.	ACORUS TATARINOWII	200	100 X 200	2	CONTAINER GROWN	17664	611.23

1. MAIN CHANNEL
2. OPEN STREAM BANK
3. HERBS
4. HERBS & SHRUBS
5. REED BEDS
6. BAMBOO
7. TALL SHRUBS & TREES
8. HYDROSEEDING

WORKING DRAWINGS

ACP

REV	DESCRIPTION	BY	DATE	APPROVED
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A	WORKING DRAWINGS ISSUE	TO	08OCT10	JM

DRAWN	JIMC
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APPROVED	JM
DATE	08/OCT/2010

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TITLE
CONTRACT 823B
SHEK KONG STABLING SIDINGS AND ERS
SSS-MAIN BUILDING
PLANTING SCHEDULE FOR RIVER HABITAT & STREAM WIDENING WORKS
SHEET 2 OF 2

SCALE	DRAWING NO.	REV.
N.T.S (A1)	823B/W/SSS/OAP/A58/198	B1

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APPENDICES

















AECOM

Consultancy Agreement No. C8012

Ecological Habitat Management Plan and Baseline Bird Survey for Environmental Impact Assessment

Representative Photographs showing the Baseline Condition of the Proposed Area for Mitigation Stream Habitat

SCALE	N.T.S.	DATE	Dec 09
CHECK	GCCL	DRAWN	CMH
JOB NO.	60142424	DRAWING No. Appendix 2.1	Rev A

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CH 0.623
Q = 131.3m³/s

CH 0.565
WL = 11.33mPD
EXISTING GROUND LEVEL
~11.7mPD

KAM TIN RIVER
(WANF_T_S_96)

CH 0.775
Q = 153.0m³/s

AT CH 1.05
WL = 8.95mPD
EXISTING GROUND LEVEL
~11.1mPD

CH 1.095
Q = 244.8m³/s

AT CH 254.17
WL = 10.7mPD
EXISTING GROUND LEVEL
~11.5mPD

AT CH 253.79
WL = 14.3mPD
EXISTING GROUND LEVEL
~16.2mPD

FENCED BOUNDARY FOR SSS

AT CH 253.31
WL = 17.2mPD
EXISTING GROUND LEVEL
~16.0mPD

CH 252.62
WL = 22.0mPD
EXISTING GROUND LEVEL
~24.0mPD

CH 252.55
Q = 78.35m³/s

CH 0.52
WL = 27.1mPD
EXISTING GROUND LEVEL
~28mPD

CH 0.694
WL = 25.1mPD
EXISTING GROUND LEVEL
~26.5mPD

CH 253.02
WL = 19.42mPD
EXISTING GROUND LEVEL
~19.0mPD

AT CH 253.46
WL = 15.8mPD
EXISTING GROUND LEVEL
~15.0mPD

CH 253.70
Q = 101.30m³/s

CH 0.86
WL = 23.1mPD
EXISTING GROUND LEVEL
~26.0mPD

SHEK KONG STREAM
(KT-N)

AT CH 1.14
WL = 8.6mPD
EXISTING GROUND LEVEL
~9mPD

CH 1.507
Q = 274.2m³/s

KAM TIN RIVER (KT_N_96)

SHEK KONG AIRFIELD ROAD
DRAINAGE NULLAH
(KT-S)

LEGEND:

EXISTING STREAMS AND NULLAHS

EXISTING FLOOD PLAIN (1 IN 200 YR)

0 25 50 75 100 125
METRES
1 : 2500

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A	DIA STUDY REPORT	TW	28APR09	JM

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DESIGNED	RA
CHECKED	MT
APPROVED	JM
DATE	04/MAY/2009

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ORIGINATOR
ARUP
Supported by :
Atkins, TFP Farrells, DLS, Knight Frank, SIYUAN, Urbis, BMT Asia

CADD REF.
FIGURE_8.dgn

TITLE
C803
TUNNELS & ASSOCIATED STRUCTURES (NORTH)
ESTIMATED 200 YEAR
STORM EVENT WATER LEVEL AND FLOW AT THE SSS FROM YL DMP STUDY

SCALE
1 : 3000 (A1)

DRAWING NO.
FIGURE 8

REV.
B

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WANG TS_96
(KAM TIN RIVER)

FAN KAM ROAD

AREA DRAINS
NORTH

HPL04

WTS11

SHEK KONG
BARRACKS

KAM TIN ROAD

D3a
(AREA=336015m²)

D3b
(AREA=117112m²)

D4a
(AREA=118544m²)

NKT15

NKT13

D2a
(AREA=223918m²)

D1a
(AREA=1309892m²)

AIRFIELD

KT-N
(SHEK KONG STREAM)

KT13

NKT02/04/05

D2b
(AREA=128608m²)

D4b1
(AREA=32645m²)

SHEK KONG

NKT08

KT-N

SSS BOUNDARY

D4b2
(AREA=87202m²)

KT09

D1b
(AREA=1226926m²)

KAM SHEUNG
ROAD

SHEK KONG AIRFIELD ROAD
DRAINAGE NULLAH

TSE UK TSUEN
TEMPORARY SHAFT

CATCHMENT
(AREA=16210 m²)

LEGEND:

- CATCHMENT BOUNDARIES DRAINING TO EAST AND WEST CULVERTS
- CATCHMENT BOUNDARIES IN YLDMP STUDY
- D1a — CATCHMENT REFERENCE
- KT13 — CATCHMENT REFENCE IN YLDMP STUDY
- SURFACE FLOW PATHS
- EXISTING WATERCOURSES

0 50 100 150 200 250
METRES
1 : 5000

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B	DIA REPORT ISSUE 3	TW	31DEC09	JM
A	DIA REPORT ISSUE 2	TW	15MAY09	JM

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APPROVED	JM
DATE	03/APR/2009

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C803
TUNNELS & ASSOCIATED STRUCTURES (NORTH)
CATCHMENT AREAS RELEANT TO SHEK KONG SIDINGS (SSS)

SCALE	DRAWING NO.	REV.
1 : 5000 (A1)	FIGURE 7	B

APPENDIX AN

TREE WORKS, SOFT LANDSCAPE WORKS AND RELATED WORKS

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Works to be done by specialist landscape contractor

All works as described in this Appendix AN, shall be undertaken by a specialist landscape sub-contractor approved by the Engineer. In addition to the general requirements of the Contract the Contractor shall demonstrate that the proposed specialist landscape sub-contractor has sufficient experience.

AN5 STREAM HABITAT RESTORATION WORKS

AN5.1 GENERAL

General Requirements AN5.1.01 All soft landscape works components of the Stream Habitat Restoration Works shall comply with PS Section AN2, unless otherwise specified in this section.

Design Intent & Objective AN5.1.02 The Contractor shall recognise that the main objective of the Stream Habitat Restoration Works is to establish a functional and self-sustaining stream habitat that satisfies the requirements of the Environmental Permit for the SSS.

Wetland Construction Specialist and Wetland Ecologist AN5.1.03

(1) The construction of wetland habitats requires a detailed understanding of the ecology of the target wetland habitats, and the construction process required to establish them. It requires a detailed knowledge of specialist soil materials, water supply, and plant and animal species. The Contractor shall therefore employ the following specialists and these specialists shall be based in Hong Kong for the duration of their inputs and shall be responsible for the tasks outlined below.

(2) Wetland Construction Specialist (WCS)

(a) The WCS shall be fully familiar with the supply of and workmanship associated with hydric soil, water and plant materials, and the timing and sequencing of wetland construction operations.

(b) The WCS shall have as a minimum requirement, degree level or equivalent qualification in wetland construction, field ecology or plant biology, ecology, plant sciences or related disciplines, and a minimum of 1 year full time experience in freshwater or brackish water wetland creation or restoration.

(c) The WCS is required to be employed for the full duration of the Contract, including the Establishment Period. The WCS shall be responsible for all the Contractor's sub-soiling, top soiling, water supply, water management, plant sourcing, propagation, handling, planting and establishment works.

(3) Wetland Plant Ecologist (WPE)

(a) The WPE shall have as a minimum requirement degree level or equivalent qualification in either plant biology, ecology or plant sciences and a minimum of 1 year full time experience in the field of wetland habitat restoration. The WPE shall be responsible for all matters relating to plant sourcing, propagation, handling, planting and establishment works.

(b) The WPE is required to be employed full time on site for the full duration of the Contractor's work in sourcing and propagation of plant species and the physical planting works on site. The WPE shall also be available at all other times during the contract to supervise planting and related works.

(4) The Contractor shall submit for the approval of the Engineer names of the specialists to be employed and the periods of time which they will be employed. He shall also submit copies of their contracts of employment to work on the project and details of all relevant employment visas etc.

(5) If suitably qualified specialists need to be employed from locations outside Hong Kong, the Contractor shall ensure all necessary employment visas etc. are obtained prior to their employment to work on the project.

(6) Should any of the named specialists become unavailable, the Contractor shall seek the approval from the Engineer giving full details as to why the specialist is no longer available, written agreement of the existing specialist, the name of a substitute who also meets the minimum criteria set out in the tender documents, and evidence of their availability and willingness to work on the project. Substitutions will not be permitted for commercial or administrative reasons.

Government Approvals	AN5.1.04	The Contractor shall obtain all necessary import licences, and Government approvals for the works.
Abbreviations	AN5.1.05	The following abbreviations are adopted in this section: (1) WCS Wetland Construction Specialist (2) WPE Wetland Plant Ecologist (3) SSS Shek Kong Stabling Sidings

AN5.2 SUBMISSIONS

Samples of materials	AN5.2.01	(1) In addition to the requirements of clause AN2.3.05, samples of proposed River Habitat Restoration Area materials shall be submitted to the Engineer for approval at the same time as particulars of the material are submitted and before confirming orders, and delivery to and use on the Site. (2) The Contractor is not permitted to submit substitutions unless supplemented with suitable technical information to demonstrate compatibility in use, comparative performance, with proof that the originally specified material is not practically available, and demonstrate that the proposed substitution will offer benefit in establishing the aims set out in the Environmental Permit. (3) Any substitution shall be submitted to the Engineer for approval; the Engineer reserves the right to reject any substitution or replacement material.
Origin of Plants	AN5.2.02	(1) The Contractor shall note that in order to provide all the plant material as specified it may be necessary for him to propagate the material in his own nursery in advance of commencing planting works on Site. (2) Sufficient time should be allowed for the sourcing and propagation of all plants to allow their timely delivery to site for planting. (3) Any plants gathered or propagated in contravention of the laws of Hong Kong or of the People's Republic of China will not be accepted.
Soil submissions	AN5.2.03	The Contractor shall submit a 2kg sample of each soil type proposed in Section AN5.3, and under the direction of the Engineer, shall have the sand tested by an approved laboratory to show details of particle size, salt content, pH, and organic content to demonstrate that it is river sand as opposed to marine sand.

AN5.3 MATERIALS

Stream Habitat Soft Landscape Materials	AN5.3.01	All Stream Habitat Restoration Works soft landscape materials shall be in accordance with Section AN2, unless otherwise specified in this section.
Herbaceous Plants	AN5.3.02	In addition to clause AN2.4.17, a Herbaceous Plant shall have the following characteristics:

(a) Herbaceous Plants in pots shall be grown in appropriate compost for the species with sufficient nutrient reserves to maintain each plant in healthy condition for at least 12 months after placing on site. Plants shall not be pot bound and shall capable of at least 12 months growth before requiring potting on.

Aquatic Plants AN5.3.03

(1) In addition to clause AN2.4.20, Aquatic Plants shall have the following characteristics:

(2) Submergent plants shall have the following characteristics:

(a) thrives best in submerged conditions;

(b) vigorous main shoots with stem height of 500mm or above;

(c) well developed and vigorous root system;

(d) grown by propagation or as seedlings and supplied in a container not less than 125mm in diameter and 150mm deep

(3) Emergent plants shall have the following characteristics:

(a) thrives best in semi-submerged conditions;

(b) vigorous main shoots with stem height of 300mm or above;

(c) well developed and vigorous root system;

(d) grown by propagation or as seedlings and supplied in a container not less than 125mm in diameter and 150mm deep

(4) Floating aquatic plants shall have the following characteristics:

(a) minimum of 5 vigorous shoots;

(b) well developed rhizome and root system;

(c) grown by propagation and supplied in a container not less than 350mm in diameter and 400mm deep

Wild Grasses AN5.3.04

Wild Grasses shall have the following characteristics:

(a) culms of 400mm or above unless specified otherwise;

(b) well developed roots, rhizomes and/or stolons;

(c) grown by propagation or as seedlings and supplied in a container not less than 125mm in diameter and 150mm deep

Stream Habitat Topsoil AN5.3.05

The Contractor shall ensure that proper soiling occurs at the various zones within the stream habitat area as shown on the drawings. Two types of topsoil are required:

(a) Topsoil Type A : Regular topsoil / soil mix as specified in clauses AN2.4.36 and 2.4.37.

(b) Topsoil Type B: special hydric anaerobic stream habitat topsoil.

Topsoil Type B: Special Hydric Anaerobic Topsoil AN5.3.06

(1) Topsoil Type B shall wherever possible be derived from the site and stockpiled separately in a safe area, and in a manner which does not adversely affect the nutrient and functional attributes of the soil.

(2) The Contractor in tendering shall have inspected the existing stream topsoil and satisfied himself that it is acceptable for the work specified herein. No claims shall subsequently be considered in respect of this material which would relieve the Contractor of his responsibilities.

(3) If imported Topsoil Type B is required, it shall be composed of the following proportions (measured by volume):

(a) 55% pond bund material,

(b) 30% completely decomposed granite,

(c) 15% clean river sand.

Pond Bund Material AN5.3.07 (1) Pond Bund Material shall be a hydric soil material (naturally occurring in the bunds of local fish ponds) and having the following characteristics :

Parameter	Unit	Value
pH (H2O)	-	4.5 to 7.5
Organic Carbon	(%)	2.0 to 3.0
Organic matter (dry weight)	(%)	> 7.5
Total nitrogen	(%)	0.09 to 0.15
Exchangeable (K20)	(mg/100g)	15 to 30
Available (P205)	(mg/100g)	7 to 10
Carbon/Nitrogen ratio	-	25:1 to 45:1
Cation Exchange Capacity	m.e. %	16 to 20
Physical properties	-	dense clay, silty clay, or clayey silt (as defined by Geoguide No.3 - 2nd Rpnt.4)

(2) Pond bund material shall contain no stones exceeding 10 mm in diameter, and the proportion of stones, by volume within soil shall not exceed 2%.

(3) Pond bund material shall be augmented by calcium oxide at the rate of 0.68kg/cu.m of pond bund material, prior to mixing with other topsoil constituents.

(4) The Contractor shall identify suitable sources for the pond bund material, and submit, for the approval of the Engineer, a 2kg sample of pond bund material from each separate source proposed, and shall give details of it's location, tests on the physical and chemical composition indicating it's likely suitability, written approval to excavate and remove the material form the land owners at the source, and details of it's transportation and stockpiling on site.

(5) Approval to the sample must be obtained before bulk delivery commences, and approval of the sample will not preclude the right of the Engineer to reject any imported material which in the opinion of the Engineer falls appreciably below the standard of the sample. The sample shall be retained by the Engineer in a location on Site which will allow inspection and comparison throughout the period of the Contract.

River Sand AN5.3.08 (1) River sand shall be clean natural medium or fine texture 'sand' as described in Geoguide 3, Guide to Rock and Soil Descriptions (2nd Reprint) Geotechnical Engineering Office, Civil Engineering Department, HK, (1994) and shall be free from salt with rounded, as opposed to angular particles. All particles shall be between 0.2mm and 0.06mm in diameter. The Contractor shall note that river sand must originate from a terrestrial / inland location and that marine sand will not be accepted.

(2) The Contractor shall identify suitable sources for the river sand, and submit, for the approval of the engineer details of it's location, written approval to excavate and remove the material from the land owners at the source, and

details of it's transportation and stockpiling on site.

AN5.4 STREAM HABITAT RESTORATION WORKS

Summary of Work AN5.4.01

(1) Stream Habitat Restoration Work by the Contractor shall be governed by the Contract Documents and shall include but not be limited to the following:

(a) The supply, delivery, storage, hoisting and installation of materials for the stream habitat shall be in accordance with drawings, specifications and design.

(b) The provision of materials, labour, equipment and all services necessary to furnish, deliver and install all work as shown on the drawings, as specified herein, and/or as required by job conditions.

(c) The timely submission of all necessary submittals including but not limited to shop-drawings, calculations, proof of compliance with standards, test results, and substituted materials.

(2) After installation has been completed and approved by the Engineer, maintenance shall remain the responsibility of the Contractor until the completion of the establishment period.

Method Statement and Phasing AN5.4.02

(1) Prior to commencement of planting works on site, the Contractor is required to submit to the Engineer for approval a Method Statement and Planting Phasing Plan demonstrating how planting works are to be carried out within the main open stream channel, banks and reed beds.

(2) The Contractor must provide proof that an adequate temporary or permanent source of water supply is available.

(3) Prior to commencement of planting works within the main open stream channel, banks and reed beds, the Contractor must demonstrate to the satisfaction of the Engineer his ability to control and manipulate the water levels as required within the planting work operations.

(4) Within the stream channel and reed beds, planting works for marginal / emergent plants shall be carried out only when the soil is well hydrated.

Erosion Control AN5.4.03

The Contractor shall take preventative measures to control erosion and siltation of all areas and shall restore or replace any portion of the Site which erodes, silts up or is otherwise damaged.

Preparation of Plant Material for Transportation AN5.4.04

(1) Containerised stock shall be well watered prior to despatch from the nursery and shall remain in the containers until required for planting.

(2) Prior to transporting aquatic plants from off-site nursery to site, the Contractor is required to submit to the engineer for approval a method statement demonstrating how the plants are protected from damage and cared for during transit.

Sub-soiling in Aquatic Planting Areas AN5.4.05

Sub-soil (obtained initially from on-site stockpiles, and where the quantity is insufficient imported from other approved sources), shall be spread and compacted in the river habitat restoration areas and reed bed areas. The depth of sub-soil shall be sufficient to ensure finished surface levels are achieved, after placement of topsoil to the specified depth, and after any settlement has taken place.

Planting of Aquatic Plants AN5.4.06

(1) Prior to commencement of planting of Aquatic plants, the Contractor is required to draw up the water levels to the maximum levels possible and allowed to soak for at least 48 hours to saturate the soil and allow for soil settlement.

(2) The water levels are then allowed to be drawn down to suitable levels and planting of submergent / emergent plants carried out.

(3) In order to minimize the disturbance of the topsoil surface, sprig planting of submergent / emergent plants should be worked off wooden mats or rafts.

(4) Once the planting is completed, the Contractor is to gradually raise the water levels to the operating levels and maintain within the prescribed range.

AN5.5 STREAM HABITAT RESTORATION AREA ESTABLISHMENT WORKS

Establishment Works	AN5.5.01	Establishment works shall be carried out as stated in Section AN2.9.
Maintenance Manual	AN5.5.02	Immediately before the end of the period for establishment works the Contractor shall prepare a comprehensive Management, Operation and Maintenance Manual which shall address all aspects required to keep the stream habitat restoration area in a healthy or vigorous condition, to the satisfaction of the Engineer.

MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU - SHENZHEN - HONG KONG EXPRESS RAIL LINK

(No. EP-349/2009/B)

Baseline Ground-borne Noise Monitoring Report

- Addendum Pages

Certified by: _____

Position: for Environmental Team Leader

30 JUL 2011

Date: _____

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EXECUTIVE SUMMARY

The environmental baseline monitoring for the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link, hereinafter referred to "the XRL" was conducted at the designated ground-borne noise monitoring locations along the XRL alignment (Figures 1A – 1C). Noise measurements were taken in terms of L_{eq} with L_{10} and L_{90} as reference.

Baseline ground-borne noise monitoring was conducted during daytime (0700-1900 hours), evening time (1900-2300 hours) and night-time (2300-0700 hours) for seven consecutive days at each of the five ground-borne noise monitoring location, namely Yaumati Catholic Primary School (Hoi Wang Road) (GN3), Tower 5, Park Avenue (GN5), Tai Fung Building (Block F) Cosmopolitan Estates (GN7), Chung Yew Building (GN8) and DD110 LOT 482, Wang Toi Shan (GN31) according to Section 4 of the EM&A Manual.

In this report, the measured ground-borne noise levels on weekdays were presented separately from general holidays and Sundays. According to the monitoring results, average baseline ground-borne noise levels for daytime (0700-1900) during normal weekdays at the designated ground-borne noise monitoring locations range from 39 to 53 dB(A). The average daytime baseline ground-borne noise level at GN3 was below the ground-borne construction noise criteria for education institutions of 60 dB(A) and 55 dB(A) for school during examination period. The average daytime baseline ground-borne noise levels at all other monitoring locations were below the daytime criteria of 65 dB (A) for residential premises.

1. INTRODUCTION

1.1 Background

Further to the Government's decision made in April 2008, MTR Corporation (MTR) commenced to plan and design the Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link (hereinafter referred to "the XRL" or "the Project"), which is a committed cross boundary transport infrastructure project.

The XRL will provide high speed rail services between Hong Kong and Guangzhou, and a connection to the national high-speed passenger rail network serving major mainland cities outside of Guangdong province. The Hong Kong section of the XRL is about 26km from new terminus located in West Kowloon (i.e. West Kowloon Terminus (WKT)) to the boundary at Huang Gang. Along the railway corridor, there will be a total of eight ventilation buildings/ emergency access point (EAP), stabling sidings and a maintenance facility at Shek Kong (SSS) and an Emergency Rescue Station (ERS) next to SSS serving the operation of the XRL.

1.2 Purpose of the report

In accordance with the Environmental Monitoring and Audit (EM&A) Manual, baseline ground-borne noise monitoring should be carried out before the commencement of the operation of tunnel boring machine (TBM). The purpose of this Baseline Ground-borne Noise Monitoring Report is to present the baseline monitoring results at the designated ground-borne noise monitoring locations in the vicinity of the XRL alignment (Figures 1A – 1C) and to establish the compliance levels for the subsequent environmental impact monitoring during construction stage.

2. GROUND-BORNE NOISE

2.1 Monitoring Methodology

Consecutive noise measurements were undertaken over a period of at least 7 days to establish the ambient noise levels at representative sensitive receivers. Continuous 5 minute A-weighted noise levels were recorded throughout the daytime, evening and night-time on weekdays (Monday to Saturday) and also on Sundays.

As referred to the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. In this baseline monitoring, B&K 2238 sound level meters, which comply with the above-mentioned specifications, were used.

No tunnelling activities were being conducted in the vicinity of the monitoring stations during the baseline monitoring. Any non-project related construction activities in the vicinity of the monitoring stations during the baseline monitoring were noted and the source and location of such activities were recorded.

With reference to Section 4.11 of the EM&A Manual, the ground-borne noise monitoring stations were located at the lowest sensitive floor of each designated monitoring location and at a position 1.2m above ground inside the building structures.

2.2 Monitoring Frequency

The baseline monitoring was measured daily for a continuous period of at least 7 consecutive days at a minimum logging interval of 30 minutes for daytime (between 0700 and 1900 hours of normal weekdays) and 15 minutes (as three consecutive $L_{eq, (5\ minutes)}$ readings) for evening time (between 1900 and 2300 hours of normal weekdays), general holidays including Sundays (between 0700 and 2300 hours) and night-time (between 2300 and 0700 of all days). The L_{eq}, L_{10} and L_{90} were recorded at the specified interval.

2.3 Monitoring Location

Baseline ground-borne noise monitoring was carried out at GN3, GN5, GN7, GN8 and GN31 located in the vicinity of the XRL alignment (Figures 1A – 1C). The locations of these monitoring stations are shown in Figures 2A – 2C. The monitoring locations were chosen with reference to Section 4.10 and 4.11 of the approved EM&A Manual. All monitoring locations were within enclosure environment which disturbance from occupants activity would be minimal. A summary of monitoring locations and periods is presented in the table below:

Monitoring Station ID	**Ground-borne Noise Monitoring Location**	**Lowest Sensitive Floor**	**Monitoring period**	**Serial number of Sound Level Meter**
GN 3	Yaumati Catholic Primary School (Hoi Wang Road) - Store Room, 1st Floor	1st Floor	17/8/2010 – 24/8/2010	2255677
GN5	Tower 5, Park Avenue - Water Meter Room, 2nd Floor	2nd Floor	8/12/2010 - 15/12/2010	2255677
GN7	Tai Fung Building (Block F) Cosmopolitan Estates - CCTV Room, UG 1st Floor	Ground Floor	7/3/2011 - 14/3/2011	2255680
GN8	Chung Yew Building - Store Room, Ground Floor	1st Floor	29/11/2010 - 6/12/2010	2255677
GN31*	DD110 LOT 482, Wang Toi Shan - Store Room, Ground Floor	Ground Floor	7/1/2011 - 14/1/2011	2285692

Note:

* Due to site constraint and consent to install monitoring station at other premises nearby GN31 was not granted, ground-borne noise monitoring at GN31 was conducted at position of 0.8m above ground. Same monitoring location will be adopted during future impact noise monitoring. The approach was agreed by IEC.

Table 2.1: Details of Ground-borne Noise Monitoring Locations

2.4 Calibration Requirements

B&K 2238 sound level meters which comply with the International Electrotechnical Commission Publication 651:1979 (Type 1) and 804:1985 (Type 1), specification as referred to in the Technical Memoranda to the NCO were used for the baseline ground-borne noise monitoring. The sound level meters and calibrator are calibrated by the certified laboratory or manufacturer once every year to ensure they perform to the same level of accuracy as stated in the manufacturer's specifications. Calibration certificates of the sound level meters and calibrator are attached in Appendix B.

Immediately prior to and following each noise measurement the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the difference between calibration levels obtained before and after the noise measurement is less than 1.0 dB.

2.5 Ground-borne Construction Noise Criteria

Acceptable Noise Levels are assigned depending upon the Area Sensitivity Ratings. The criteria applicable to construction ground-borne noise as defined in the EM&A Manual are presented below for reference.

Description	**Ground-borne Construction Noise Criteria, dB(A)**						
	Daytime (0700-1900 hrs) (except General Holidays & Sunday)	**Daytime during general holidays and Sundays and all days during Evening (1900 to 2300 hrs)**			**Night-time (2300 to 0700 hrs)**		
		A	**B**	**C**	**A**	**B**	**C**
Education institutions	60/55 [a]	50	55	60	[b]		
Domestic premises, hotels	65	50	55	60	35	40	45

Notes:

[a] A 5dB(A) reduction in the ground-borne noise criterion is recommended for school during examination period.

[b] No sensitive use during this period.

Table 2.2: Ground-borne Construction Noise Criteria

2.6 Monitoring Results

Baseline ground-borne noise monitoring was conducted during the period shown in Table 2.1 at the five designated ground-borne noise monitoring locations. The weather condition was generally fine during the monitoring period with occasional rainfall. The major noise sources at respective monitoring locations are summarized at the table below:

Monitoring Station ID	**Ground-borne Noise Monitoring Location**	**Major Noise Source**
GN3*	Yaumati Catholic Primary School (Hoi Wang Road)	Noise from cleaning and occasional school activities.
GN5	Tower 5, Park Avenue	Noise from domestic premises.
GN7	Tai Fung Building (Block F) Cosmopolitan Estates	Noise from domestic premises.
GN8	Chung Yew Building	Noise from domestic premises.
GN31	DD110 LOT 482, Wang Toi Shan	Noise from domestic premises.

Notes:

*During the monitoring period, the school was in summer vacation and there were extracurricular activities conducted in school premises occasionally.

Table 2.3: Major Noise Source at Ground-borne Noise Monitoring Locations

Baseline ground-borne noise monitoring results are summarised in Table 2.4. Detailed monitoring data at each monitoring location together with the graphical presentation are given in Appendix A.

Monitoring result at GN3			
Period	**$L_{eq(30min)}$, dB(A) (Range)**	**$L_{10(30min)}$, dB(A) (Range)**	**$L_{90(30min)}$, dB(A) (Range)**
0700 – 1900	41	43	36
(Daytime, Normal weekday)	(36 - 44)	(37 - 46)	(34 - 38)

Period	**$L_{eq(5min)}$, dB(A) (Range)**	**$L_{10(5min)}$, dB(A) (Range)**	**$L_{90(5min)}$, dB(A) (Range)**
1900 – 2300	35	35	34
(Evening, Normal weekday)	(33 - 36)	(34 - 38)	(33 - 34)
0700 – 2300	36	36	35
(General Holiday including Sunday)	(34 - 40)	(34 - 43)	(33 - 36)
2300 – 0700	35	35	34
(Night-time, all days)	(34 - 35)	(34 - 36)	(33 - 35)
Monitoring result at GN5			
Period	**$L_{eq(30min)}$, dB(A) (Range)**	**$L_{10(30min)}$, dB(A) (Range)**	**$L_{90(30min)}$, dB(A) (Range)**
0700 – 1900	45	46	36
(Daytime, Normal weekday)	(43 - 46)	(44 - 47)	(34 - 39)
Period	**$L_{eq(5min)}$, dB(A) (Range)**	**$L_{10(5min)}$, dB(A) (Range)**	**$L_{90(5min)}$, dB(A) (Range)**
1900 – 2300	45	45	38
(Evening, Normal weekday)	(42 - 46)	(41 - 48)	(35 - 39)
0700 – 2300	43	44	36
(General Holiday including Sunday)	(35 - 52)	(38 - 50)	(30 - 43)
2300 – 0700	37	38	31
(Night-time, all days)	(28 - 42)	(30 - 43)	(26 - 36)
Monitoring result at GN7			
Period	**$L_{eq(30min)}$, dB(A) (Range)**	**$L_{10(30min)}$, dB(A) (Range)**	**$L_{90(30min)}$, dB(A) (Range)**
0700 – 1900	48	50	46
(Daytime, Normal weekday)	(47 - 49)	(47 - 52)	(46 - 46)
Period	**$L_{eq(5min)}$, dB(A) (Range)**	**$L_{10(5min)}$, dB(A) (Range)**	**$L_{90(5min)}$, dB(A) (Range)**
1900 – 2300	48	50	46
(Evening, Normal weekday)	(46 - 53)	(46 - 56)	(45 - 46)

Period	**$L_{eq(5min)}$, dB(A) (Range)**	**$L_{10(5min)}$, dB(A) (Range)**	**$L_{90(5min)}$, dB(A) (Range)**
0700 – 2300	47	48	46
(General Holiday including Sunday)	(46 - 57)	(47 - 61)	(45 - 47)
2300 – 0700	47	48	46
(Night-time, all days)	(46 - 53)	(46 - 55)	(46 - 46)
Monitoring result at GN8			
Period	**$L_{eq(30min)}$, dB(A) (Range)**	**$L_{10(30min)}$, dB(A) (Range)**	**$L_{90(30min)}$, dB(A) (Range)**
0700 – 1900	39	40	33
(Daytime, Normal weekday)	(36 - 40)	(37 - 43)	(32 - 34)
Period	**$L_{eq(5min)}$, dB(A) (Range)**	**$L_{10(5min)}$, dB(A) (Range)**	**$L_{90(5min)}$, dB(A) (Range)**
1900 – 2300	36	37	33
(Evening, Normal weekday)	(33 - 38)	(32 - 38)	(31 - 33)
0700 – 2300	37	39	32
(General Holiday including Sunday)	(32 - 48)	(31 - 48)	(23 - 37)
2300 – 0700	34	34	32
(Night-time, all days)	(32 - 37)	(32 - 39)	(31 - 33)
Monitoring result at GN31			
Period	**$L_{eq(30min)}$, dB(A) (Range)**	**$L_{10(30min)}$, dB(A) (Range)**	**$L_{90(30min)}$, dB(A) (Range)**
0700 – 1900	53	54	49
(Daytime, Normal weekday)	(50 - 53)	(52 - 55)	(46 - 51)
Period	**$L_{eq(5min)}$, dB(A) (Range)**	**$L_{10(5min)}$, dB(A) (Range)**	**$L_{90(5min)}$, dB(A) (Range)**
1900 – 2300	50	52	46
(Evening, Normal weekday)	(49 - 52)	(50 - 52)	(44 - 46)
0700 – 2300	52	53	47
(General Holiday including Sunday)	(51 - 60)	(53 - 61)	(47 - 50)

Period	$L_{eq(5min)}$, dB(A) (Range)	$L_{10(5min)}$, dB(A) (Range)	$L_{90(5min)}$, dB(A) (Range)
2300 – 0700	50	51	45
(Night-time, all days)	(50 - 51)	(51 - 52)	(45 - 46)

Table 2.4: Baseline Ground-borne Noise Monitoring Results

As revealed from the monitoring results, average baseline ground-borne noise levels for daytime (0700-1900) during normal weekdays at the five designated ground-borne noise monitoring locations range from 39 to 53 dB(A). The average daytime baseline ground-borne noise level at GN3 was below the ground-borne construction noise criteria for education institutions of 60 dB(A) and 55 dB(A) for school during examination period. The average daytime ground-borne baseline noise levels at all other monitoring locations are below the daytime criteria of 65 dB (A) for residential premises.

3. CONCLUSION

3.1 Ground-borne Construction Noise

Baseline noise monitoring was carried between August 2010 and March 2011 at the five designated ground-borne noise monitoring locations. The weather condition was generally fine during the monitoring period with occasional rainfall.

According to the monitoring results, average baseline ground-borne noise levels for daytime (0700-1900) during normal weekdays at the designated ground-borne noise monitoring locations range from 39 to 53 dB(A), which are well within ground-borne construction noise criteria for education institutions and residential premises.

Appendix A

Baseline ground-borne noise monitoring data

Baseline Ground-borne Noise Monitoring Result

Location: GN3 Yaumati Catholic Primary School (Hoi Wang Road)
Baseline monitoring period: 17/8/2010 – 24/8/2010

Parameter: Leq
Time Slot Averaged Baselines

1) Weekdays Daytime Noise Level, dB(A)

Time slot	$L_{eq\ (30\ min)}$	$L_{10\ (30mins)}$	$L_{90\ (30\ mins)}$
07:00-07:30	35.6	36.7	34.0
07:30-08:00	37.3	38.7	34.4
08:00-08:30	40.0	39.4	34.8
08:30-09:00	41.1	43.9	36.5
09:00-09:30	43.6	45.9	38.4
09:30-10:00	41.2	43.3	37.1
10:00-10:30	42.6	45.0	37.3
10:30-11:00	42.7	45.1	37.7
11:00-11:30	41.4	44.1	36.7
11:30-12:00	42.9	44.7	37.5
12:00-12:30	41.4	43.3	36.4
12:30-13:00	40.4	42.6	35.6
13:00-13:30	39.9	42.3	35.6
13:30-14:00	39.3	41.1	35.7
14:00-14:30	39.5	41.3	35.6
14:30-15:00	40.7	43.0	35.9
15:00-15:30	38.8	40.5	35.6
15:30-16:00	41.1	43.6	35.6
16:00-16:30	40.2	41.9	35.2
16:30-17:00	39.5	41.5	35.6
17:00-17:30	39.1	41.1	35.4
17:30-18:00	38.2	39.7	35.2
18:00-18:30	42.0	44.7	35.9
18:30-19:00	38.7	40.1	34.5
Average	40.7	42.8	36.1
Max	43.6	45.9	38.4
Min	35.6	36.7	34.0

Noise Control Period Averaged Baselines

2) Weekdays Evening Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
19:00-19:15	34.7	35.3	33.5
	34.4	35.0	33.6
	34.5	35.3	33.6
19:15-19:30	34.2	34.9	33.4
	34.2	34.6	33.6
	34.4	34.8	33.6
19:30-19:45	34.5	35.1	33.7
	36.0	37.6	33.7
	34.8	35.7	33.7
19:45-20:00	34.3	34.8	33.6
	34.3	35.0	33.6
	34.3	34.8	33.7
20:00-20:15	34.6	35.2	33.9
	34.4	34.9	33.7
	34.4	34.8	33.7
20:15-20:30	34.3	35.0	33.6
	34.1	34.6	33.6
	34.3	34.9	33.5
20:30-20:45	34.1	34.7	33.4
	33.8	34.3	33.0
	33.8	34.3	33.1
20:45-21:00	34.1	35.0	33.1
	33.6	34.1	32.8
	33.4	33.9	32.7
21:00-21:15	33.6	34.3	32.9
	33.6	34.1	32.8
	33.8	34.3	32.8
21:15-21:30	33.4	33.9	32.8
	33.4	33.8	32.7
	33.3	33.8	32.7
21:30-21:45	33.3	33.8	32.6
	33.3	33.8	32.8

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	33.3	33.7	32.8
21:45-22:00	33.3	33.6	32.7
	33.4	34.0	32.8
	33.5	34.0	32.8
22:00-22:15	33.6	33.8	32.9
	33.3	33.7	32.9
	33.3	33.7	32.7
22:15-22:30	34.4	35.1	33.1
	34.0	34.5	33.3
	33.7	34.1	32.9
22:30-22:45	33.6	33.6	32.8
	33.3	33.6	32.8
	33.2	33.6	32.6
22:45-23:00	33.4	33.5	32.6
	33.3	33.5	32.8
	33.5	33.9	32.9
Average	34.6	35.2	33.8
Max	36.0	37.6	33.9
Min	33.2	33.5	32.6

3) General Holidays (including Sundays) (0700-2300) Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
0700-07:15	36.4	37.5	33.5
	35.6	35.5	34.0
	34.7	35.0	34.0
07:15-07:30	34.7	35.0	34.0
	34.7	35.0	34.0
	35.1	35.5	34.5
07:30-07:45	35.7	37.5	34.5
	35.0	35.5	34.5
	35.1	35.5	34.5
07:45-08:00	35.9	37.0	35.0
	37.3	37.0	35.5
	35.8	36.0	35.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
08:00-08:15	35.9	36.5	35.5
	36.3	37.0	35.5
	36.3	36.5	35.5
08:15-08:30	36.8	38.0	35.5
	36.2	36.5	35.0
	40.3	43.0	35.0
08:30-08:45	35.6	36.0	35.0
	36.1	37.0	35.0
	35.7	36.5	34.5
08:45-09:00	35.0	35.5	34.5
	35.8	36.5	34.5
	36.2	36.0	34.5
09:00-09:15	39.4	39.0	34.5
	35.7	35.5	34.5
	35.5	36.5	34.5
09:15-09:30	34.7	35.0	34.0
	35.0	35.5	34.0
	34.8	35.5	34.0
09:30-09:45	34.9	35.5	34.0
	34.9	36.0	34.0
	35.1	36.0	34.0
09:45-10:00	34.5	35.0	34.0
	34.5	35.0	34.0
	34.8	35.5	34.0
10:00-10:15	35.6	36.5	34.5
	35.4	36.5	34.0
	34.8	35.5	34.0
10:15-10:30	34.8	35.5	34.0
	34.9	35.5	34.0
	34.7	35.0	34.0
10:30-10:45	34.7	35.5	34.0
	35.2	36.5	34.0
	35.1	36.0	34.5
10:45-11:00	34.9	35.5	34.0
	34.9	36.0	34.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	34.9	35.5	34.0
11:00-11:15	39.5	39.0	34.0
	35.3	35.0	34.0
	34.8	36.0	34.0
11:15-11:30	34.6	35.5	33.5
	34.9	35.5	34.0
	35.1	36.0	34.5
11:30-11:45	35.8	37.0	34.5
	35.7	36.5	34.5
	35.4	36.0	34.5
11:45-12:00	35.7	36.0	34.5
	35.6	36.0	35.0
	35.5	36.0	35.0
12:00-12:15	35.2	35.5	34.5
	35.2	35.5	34.5
	35.7	36.5	35.0
12:15-12:30	36.0	35.5	34.5
	35.4	36.5	34.5
	37.6	37.0	34.5
12:30-12:45	37.1	36.0	34.0
	34.6	35.0	34.0
	35.5	36.5	34.5
12:45-13:00	35.3	35.5	34.5
	36.1	37.0	35.0
	36.0	36.5	35.5
13:00-13:15	36.3	36.0	35.5
	36.1	36.5	35.5
	36.3	37.0	35.5
13:15-13:30	36.3	36.0	35.5
	36.2	36.5	35.5
	36.5	37.5	35.5
13:30-13:45	36.0	36.0	35.5
	36.2	37.0	35.5
	35.8	36.0	35.5
13:45-14:00	36.1	37.0	35.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	35.8	36.0	35.5
	36.0	36.5	35.5
14:00-14:15	36.1	36.5	35.5
	35.6	36.0	35.0
	35.9	36.5	35.0
14:15-14:30	35.9	36.5	35.0
	35.7	36.0	35.0
	35.8	36.5	35.0
14:30-14:45	36.1	37.0	35.5
	35.8	36.5	35.0
	35.7	36.0	35.0
14:45-15:00	36.2	36.5	35.0
	35.7	36.0	35.0
	35.8	36.5	35.0
15:00-15:15	35.9	37.0	35.0
	35.3	35.5	35.0
	35.5	36.0	35.0
15:15-15:30	35.6	36.0	35.0
	35.5	36.0	35.0
	35.8	37.0	35.0
15:30-15:45	35.3	36.0	34.5
	35.4	36.0	34.5
	35.3	36.0	34.5
15:45-16:00	35.3	35.5	34.5
	35.2	35.5	34.5
	35.5	36.0	35.0
16:00-16:15	35.5	36.0	34.5
	35.3	36.0	34.5
	35.9	37.0	35.0
16:15-16:30	35.8	36.5	34.5
	36.9	38.5	35.0
	37.9	38.5	35.0
16:30-16:45	36.4	37.0	35.0
	35.8	36.5	35.0
	36.0	36.5	35.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
16:45-17:00	35.9	36.5	35.0
	37.4	37.0	35.5
	36.1	36.5	35.5
17:00-17:15	36.3	37.0	35.5
	37.2	38.0	35.5
	37.7	39.0	36.0
17:15-17:30	36.6	37.0	36.0
	36.4	37.0	36.0
	36.4	37.0	36.0
17:30-17:45	36.4	37.0	36.0
	36.6	37.0	36.0
	36.4	37.0	35.5
17:45-18:00	36.2	36.5	35.5
	36.3	36.5	35.5
	36.0	36.5	35.0
18:00-18:15	35.8	36.5	35.0
	35.8	36.5	35.0
	36.0	35.5	35.0
18:15-18:30	36.3	36.5	34.5
	35.0	35.0	34.5
	35.4	36.0	34.5
18:30-18:45	35.1	36.0	34.5
	34.7	35.0	34.0
	35.3	36.0	34.0
18:45-19:00	35.0	36.0	33.5
	33.7	34.0	33.0
	33.5	34.0	33.0
19:00-19:15	33.9	34.5	33.0
	33.9	34.0	33.5
	34.0	34.0	33.5
19:15-19:30	34.4	35.0	33.5
	34.3	34.5	34.0
	34.4	35.0	34.0
19:30-19:45	34.4	35.0	34.0
	34.3	34.5	34.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	34.2	34.5	34.0
19:45-20:00	34.6	35.0	34.0
	34.4	34.5	34.0
	34.7	35.0	34.0
20:00-20:15	34.8	35.0	34.0
	34.7	35.0	34.0
	34.8	35.0	34.5
20:15-20:30	35.1	35.5	34.5
	34.9	35.0	34.5
	34.8	35.0	34.5
20:30-20:45	35.2	35.5	35.0
	35.2	35.5	35.0
	35.2	35.5	35.0
20:45-21:00	35.5	36.0	35.0
	35.6	36.0	35.0
	35.6	36.0	35.0
21:00-21:15	35.9	36.5	35.5
	36.0	36.5	35.5
	36.3	36.5	36.0
21:15-21:30	36.2	36.5	36.0
	36.2	36.5	36.0
	36.5	37.0	36.0
21:30-21:45	36.6	37.0	36.0
	36.4	36.5	35.5
	35.0	35.0	34.5
21:45-22:00	34.5	35.0	34.0
	34.6	35.0	34.0
	34.2	34.5	33.5
22:00-22:15	34.6	35.0	34.0
	34.7	35.0	34.5
	34.8	35.0	34.5
22:15-22:30	35.2	35.5	34.5
	35.1	35.5	34.5
	35.2	35.5	34.5
22:30-22:45	35.5	36.0	34.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	34.4	34.5	34.0
	34.3	34.5	34.0
22:45-23:00	34.1	34.5	33.5
	34.2	34.5	33.5
	34.0	34.0	33.5
Average	35.7	36.2	34.7
Max	40.3	43.0	36.0
Min	33.5	34.0	33.0

4) Night-time (for all days) Noise Level, dB(A)

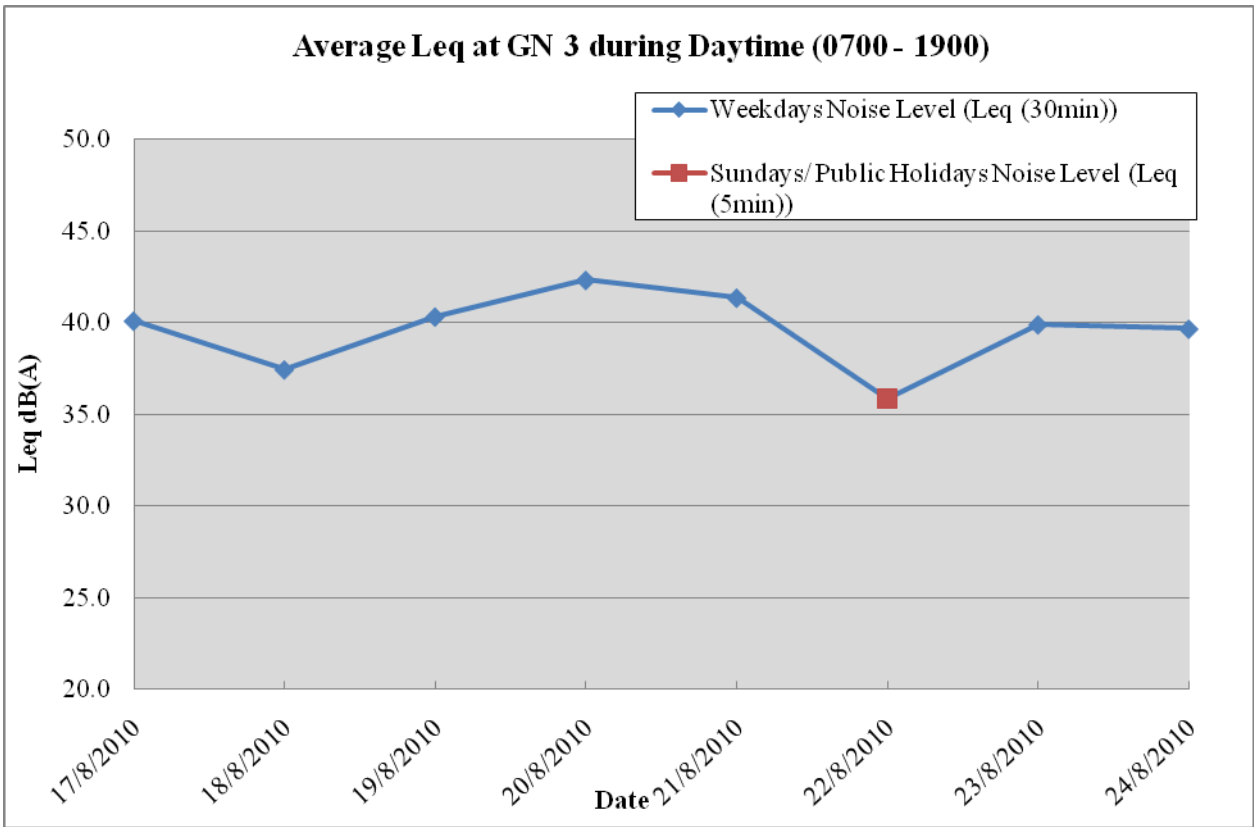
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
23:00-23:15	34.3	34.6	33.8
	34.1	34.4	33.6
	34.1	34.4	33.6
23:15-23:30	34.1	34.4	33.6
	34.2	34.5	33.6
	34.2	34.5	33.6
23:30-23:45	34.0	34.2	33.5
	33.9	34.2	33.4
	33.9	34.3	33.3
23:45-00:00	33.8	33.9	33.3
	33.7	33.9	33.3
	33.9	34.2	33.3
00:00-00:15	33.9	34.0	33.4
	34.0	34.2	33.6
	34.2	34.4	33.7
00:15-00:30	34.3	34.3	34.0
	34.3	34.4	33.9
	34.6	34.7	34.1
00:30-00:45	34.3	34.5	33.9
	34.3	34.4	33.8
	34.1	34.3	33.6
00:45:01:00	34.0	34.0	33.6
	34.1	34.1	33.7

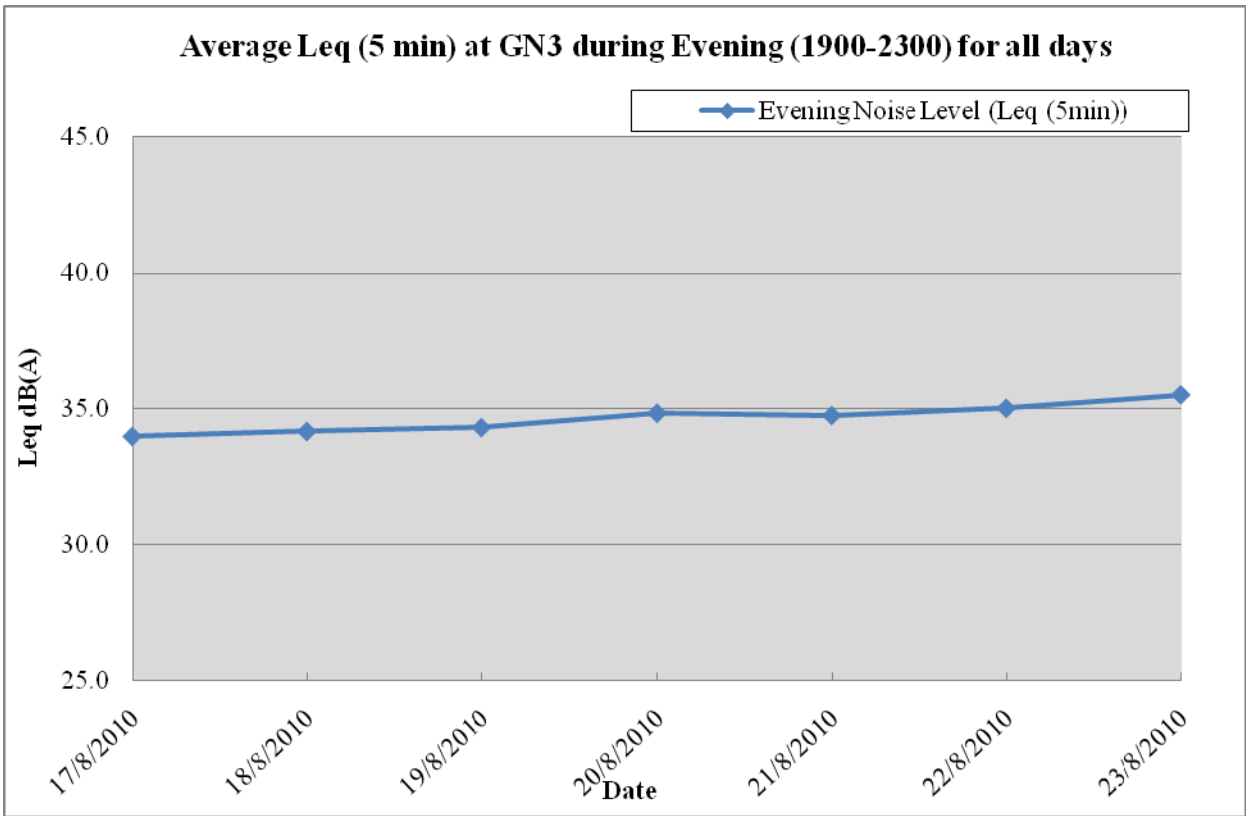
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	34.1	34.3	33.6
01:00-01:15	34.0	34.2	33.7
	33.8	33.8	33.6
	34.1	34.2	33.7
01:15-01:30	34.3	34.5	33.9
	34.1	34.2	33.8
	34.2	34.2	33.8
01:30-01:45	34.2	34.3	33.8
	34.1	34.1	33.8
	34.1	34.2	33.8
01:45-02:00	34.1	34.1	33.8
	34.1	34.2	33.7
	34.3	34.5	33.8
02:00-02:15	34.6	34.8	34.0
	34.4	34.5	34.0
	34.4	34.5	33.9
02:15-02:30	34.4	34.4	34.2
	34.3	34.4	34.0
	34.3	34.4	33.9
02:30-02:45	34.5	34.9	34.2
	35.0	35.5	34.3
	34.6	34.8	34.3
02:45-03:00	34.7	34.7	34.3
	34.6	34.8	34.3
	34.5	34.5	34.3
03:00-03:15	34.6	34.6	34.3
	34.6	34.7	34.3
	34.8	34.8	34.4
03:15-03:30	35.3	35.8	34.7
	35.0	35.4	34.4
	34.8	35.0	34.4
03:30-03:45	34.9	34.9	34.5
	34.7	34.7	34.3
	34.6	34.5	34.3
03:45-04:00	34.7	34.7	34.4

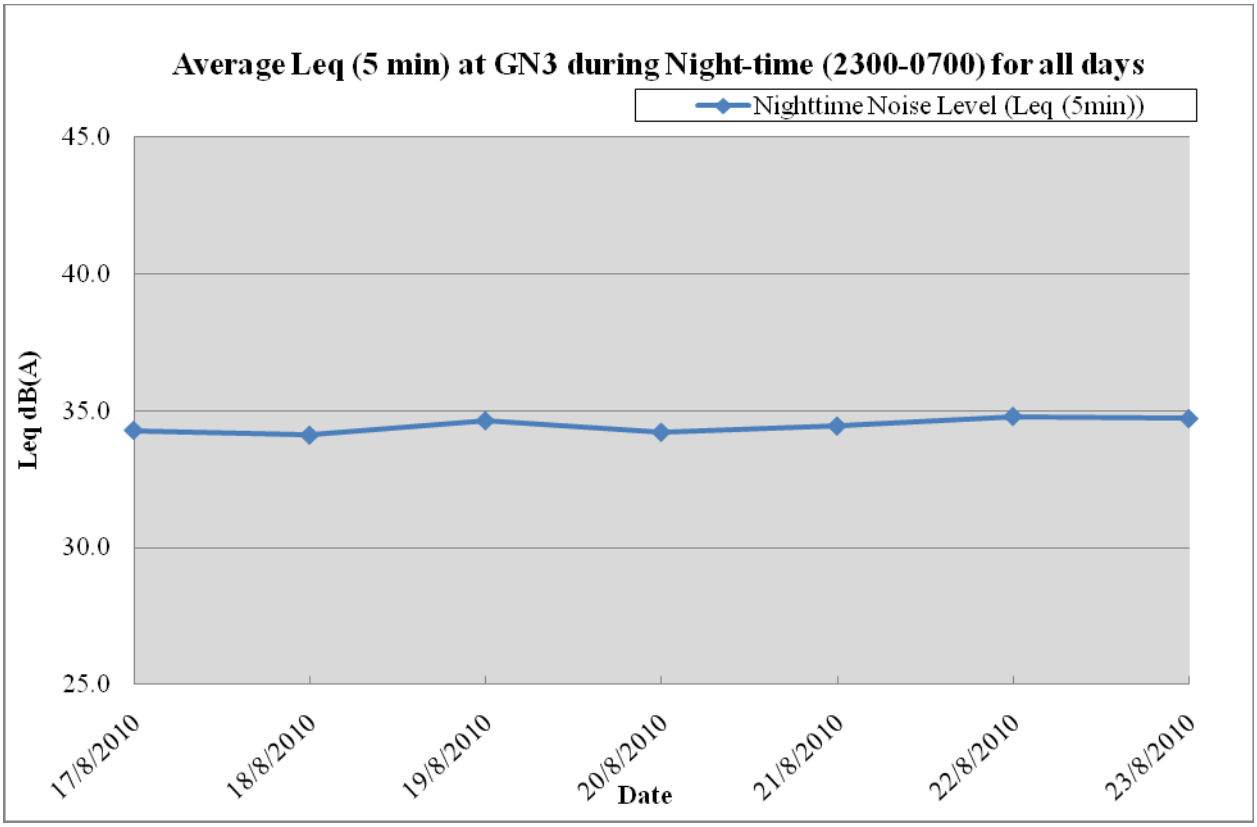
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	34.6	34.7	34.2
	34.4	34.5	34.2
04:00-04:15	34.6	34.7	34.3
	34.8	34.8	34.5
	34.8	34.9	34.5
04:15-04:30	34.7	34.7	34.4
	34.7	34.8	34.4
	34.6	34.7	34.4
04:30-04:45	34.6	34.6	34.4
	34.6	34.7	34.3
	34.8	35.1	34.4
04:45-05:00	34.9	35.0	34.4
	34.8	34.8	34.4
	34.7	34.7	34.4
05:00-05:15	34.6	34.7	34.3
	34.7	34.7	34.3
	34.6	34.7	34.4
05:15-05:30	34.7	34.7	34.4
	34.6	34.7	34.3
	34.6	34.7	34.3
05:30-05:45	34.5	34.5	34.2
	34.5	34.5	34.2
	34.5	34.5	34.2
05:45-06:00	34.5	34.6	34.2
	34.4	34.6	34.1
	34.4	34.5	33.9
06:00-06:15	34.2	34.3	33.8
	34.6	34.7	34.0
	34.5	34.5	33.8
06:15-06:30	34.4	34.5	33.8
	34.5	34.7	33.8
	34.4	34.6	33.9
06:30-06:45	34.7	34.9	33.9
	34.7	35.3	33.9
	34.8	35.5	33.8

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
06:45-07:00	34.8	35.0	33.9
	35.4	35.9	34.1
	35.2	36.0	34.0
Average	34.5	34.6	34.0
Max	35.4	36.0	34.7
Min	33.7	33.8	33.3

Log average was used.




Average Leq (5 min) at GN3 during Evening (1900-2300) for all days
Evening Noise Level (Leq (5min))
45.0
40.0
35.0
30.0
25.0
Leq dB(A)
17/8/2010
18/8/2010
19/8/2010
20/8/2010
21/8/2010
22/8/2010
23/8/2010
Date


Average Leq (5 min) at GN3 during Night-time (2300-0700) for all days
Nighttime Noise Level (Leq (5min))
45.0
40.0
35.0
30.0
25.0
Leq dB(A)
17/8/2010
18/8/2010
19/8/2010
20/8/2010
21/8/2010
22/8/2010
23/8/2010
Date

Baseline Ground-borne Noise Monitoring Result

Location: GN5 Tower 5, Park Avenue
Baseline monitoring period: 8/12/2010 - 15/12/2010

Parameter: Leq
Time Slot Averaged Baselines

1) Weekdays Daytime Noise Level, dB(A)

Time slot	$L_{eq\ (30\ min)}$	$L_{10\ (30mins)}$	$L_{90\ (30\ mins)}$
07:00-07:30	42.8	43.8	36.2
07:30-08:00	43.5	45.3	36.5
08:00-08:30	45.0	46.0	38.5
08:30-09:00	46.1	45.3	36.8
09:00-09:30	44.8	44.8	36.2
09:30-10:00	43.8	44.5	37.1
10:00-10:30	43.3	44.0	35.7
10:30-11:00	43.5	45.2	36.2
11:00-11:30	45.0	45.0	36.6
11:30-12:00	46.3	47.1	35.9
12:00-12:30	44.3	45.3	35.9
12:30-13:00	44.0	46.1	35.5
13:00-13:30	44.8	46.1	35.1
13:30-14:00	44.6	45.7	36.3
14:00-14:30	45.4	47.1	36.3
14:30-15:00	44.1	45.0	35.8
15:00-15:30	44.4	45.5	35.5
15:30-16:00	44.7	44.8	34.0
16:00-16:30	44.8	44.9	34.8
16:30-17:00	42.9	44.9	34.7
17:00-17:30	45.9	47.0	35.5
17:30-18:00	44.5	45.1	36.5
18:00-18:30	44.8	46.5	36.9
18:30-19:00	45.0	45.6	38.4
Average	44.6	45.5	36.2
Max	46.3	47.1	38.5
Min	42.8	43.8	34.0

Noise Control Period Averaged Baselines

2) Weekdays Evening Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
19:00-19:15	44.7	45.4	38.1
	44.5	45.4	38.8
	43.8	45.4	37.3
19:15-19:30	43.9	45.6	36.7
	44.0	45.5	37.3
	42.6	44.0	37.1
19:30-19:45	44.5	45.2	38.3
	43.4	45.1	38.3
	45.5	46.2	38.0
19:45-20:00	45.4	46.1	38.3
	45.1	45.8	38.9
	44.5	44.7	37.7
20:00-20:15	45.4	45.6	38.9
	44.6	45.5	39.2
	44.7	44.9	38.5
20:15-20:30	46.0	48.0	37.4
	45.5	44.9	37.2
	42.9	44.6	37.2
20:30-20:45	43.4	45.0	36.9
	43.8	45.1	38.6
	43.5	44.3	38.2
20:45-21:00	42.8	44.1	36.8
	43.6	44.4	39.3
	42.5	43.8	38.1
21:00-21:15	42.8	43.3	37.1
	44.0	43.7	37.1
	43.9	43.5	35.9
21:15-21:30	42.6	43.8	36.1
	43.2	44.1	36.9
	43.9	44.9	36.8
21:30-21:45	43.5	44.1	36.3
	44.3	43.7	37.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	43.3	43.5	37.1
21:45-22:00	43.7	43.1	36.5
	45.5	42.8	36.3
	44.0	43.6	36.8
22:00-22:15	44.5	43.0	37.3
	45.0	43.1	36.3
	44.3	43.2	36.6
22:15-22:30	46.2	42.8	36.2
	44.5	42.6	36.6
	42.4	43.0	34.9
22:30-22:45	43.8	43.3	35.5
	43.6	43.5	36.8
	43.2	43.6	36.2
22:45-23:00	43.7	42.6	36.7
	43.7	42.0	36.0
	43.7	41.3	35.1
Average	44.8	45.1	38.0
Max	46.2	48.0	39.3
Min	42.4	41.3	34.9

3) General Holidays (including Sundays) (0700-2300) Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
0700-07:15	35.1	37.5	30.0
	39.0	39.5	33.0
	37.1	38.5	31.5
07:15-07:30	38.6	41.0	34.0
	39.9	41.5	32.5
	38.5	42.0	30.5
07:30-07:45	39.6	43.5	32.5
	41.3	45.0	32.0
	40.5	43.5	35.5
07:45-08:00	41.3	45.0	33.0
	38.6	41.0	31.0
	41.0	43.0	34.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
08:00-08:15	39.2	41.5	30.0
	39.5	40.5	31.0
	40.2	43.0	35.5
08:15-08:30	42.2	45.0	36.0
	44.4	41.0	33.5
	45.7	42.5	32.5
08:30-08:45	51.3	47.0	34.0
	40.7	44.0	34.5
	41.3	43.5	35.5
08:45-09:00	39.8	42.5	34.0
	39.7	40.5	32.0
	39.3	42.5	32.0
09:00-09:15	39.2	41.5	34.5
	40.6	44.0	33.5
	43.7	45.0	38.0
09:15-09:30	44.9	45.5	37.5
	44.4	44.0	37.0
	44.7	45.0	34.5
09:30-09:45	41.9	43.0	34.5
	44.6	47.0	36.0
	45.6	46.5	42.5
09:45-10:00	44.9	45.5	39.5
	40.7	43.5	34.5
	43.9	44.0	39.5
10:00-10:15	41.5	43.0	37.5
	45.3	45.0	40.0
	43.8	42.5	34.5
10:15-10:30	40.5	41.5	34.5
	39.3	40.5	34.5
	41.9	45.0	33.5
10:30-10:45	43.7	45.0	34.5
	44.7	47.0	36.0
	42.6	42.5	35.0
10:45-11:00	43.2	44.5	36.0
	40.7	44.0	34.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	39.3	41.5	34.0
11:00-11:15	44.5	44.5	37.5
	40.9	42.5	33.5
	45.4	43.0	36.0
11:15-11:30	40.8	43.5	33.5
	43.2	42.5	35.0
	40.1	41.5	35.0
11:30-11:45	41.0	43.5	34.0
	40.4	42.5	34.5
	41.6	43.0	36.5
11:45-12:00	44.2	44.0	36.0
	41.8	45.5	36.5
	41.8	44.5	36.5
12:00-12:15	43.8	43.5	33.5
	42.9	42.0	34.0
	39.6	39.5	35.0
12:15-12:30	40.5	43.0	35.0
	41.1	44.0	36.0
	41.0	43.0	37.5
12:30-12:45	41.0	43.0	36.5
	38.2	40.0	33.5
	40.6	44.0	34.5
12:45-13:00	42.9	44.5	36.5
	41.5	43.5	38.0
	40.5	43.5	34.5
13:00-13:15	41.3	45.0	33.5
	42.5	44.0	35.5
	43.7	43.5	35.5
13:15-13:30	40.3	43.0	36.0
	40.0	43.0	34.5
	40.8	44.0	35.0
13:30-13:45	41.0	43.0	34.0
	40.4	44.0	32.5
	41.1	44.0	33.0
13:45-14:00	41.4	44.5	35.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	39.7	42.0	33.5
	40.8	45.5	33.0
14:00-14:15	39.2	42.0	33.5
	38.6	40.5	33.0
	46.7	45.0	34.0
14:15-14:30	42.3	43.5	33.5
	40.1	42.5	33.5
	40.2	44.0	34.0
14:30-14:45	41.4	43.5	33.0
	44.7	50.0	34.0
	41.5	45.0	34.5
14:45-15:00	42.3	44.0	34.5
	42.1	43.5	33.5
	39.4	43.0	32.5
15:00-15:15	40.1	42.5	34.0
	41.6	45.0	34.5
	39.6	41.0	33.0
15:15-15:30	40.9	44.0	34.5
	42.6	45.0	37.0
	40.1	43.0	32.0
15:30-15:45	51.9	46.5	33.5
	40.7	43.5	32.5
	41.6	43.5	32.5
15:45-16:00	40.3	42.5	32.5
	42.7	45.0	34.0
	40.9	41.0	35.0
16:00-16:15	41.3	43.0	37.0
	42.5	43.0	35.0
	40.3	41.5	36.0
16:15-16:30	42.7	41.5	34.5
	38.0	39.5	33.5
	40.6	43.5	32.5
16:30-16:45	41.1	44.5	33.0
	40.8	42.5	35.0
	40.1	42.5	33.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
16:45-17:00	41.0	44.0	34.0
	41.3	44.0	34.5
	41.5	44.0	35.0
17:00-17:15	42.0	43.5	35.5
	45.3	45.5	36.5
	44.7	46.5	36.5
17:15-17:30	43.5	43.5	36.5
	41.5	44.0	35.0
	43.2	46.0	36.0
17:30-17:45	42.8	45.0	35.0
	42.2	44.5	37.0
	42.3	44.5	36.0
17:45-18:00	41.7	45.5	35.0
	44.8	46.0	35.5
	44.7	45.5	35.0
18:00-18:15	44.5	45.0	37.5
	43.8	46.0	36.5
	45.4	46.0	36.5
18:15-18:30	42.0	43.0	35.0
	45.2	46.0	37.0
	43.9	45.5	37.0
18:30-18:45	43.8	45.5	36.0
	39.8	41.5	35.5
	42.2	45.0	36.0
18:45-19:00	43.2	44.5	38.0
	43.5	44.5	38.5
	41.4	44.0	37.0
19:00-19:15	41.9	45.0	37.5
	41.5	44.5	37.0
	40.2	42.5	37.0
19:15-19:30	43.4	45.0	38.5
	44.1	44.5	38.0
	44.5	46.0	39.0
19:30-19:45	43.3	45.0	38.0
	42.4	43.5	37.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	44.0	45.5	39.0
19:45-20:00	42.6	44.5	38.5
	43.3	46.0	38.0
	43.5	45.0	37.0
20:00-20:15	44.0	45.0	40.0
	44.0	44.0	40.5
	44.1	43.5	39.5
20:15-20:30	44.4	44.5	37.5
	42.6	44.5	38.0
	42.8	44.5	37.0
20:30-20:45	41.9	42.5	37.0
	44.2	45.5	39.0
	43.8	44.5	37.0
20:45-21:00	41.4	43.0	37.5
	41.9	44.0	37.0
	44.0	45.5	38.0
21:00-21:15	49.8	46.0	38.0
	45.3	46.5	39.0
	45.1	44.0	39.0
21:15-21:30	50.9	44.5	37.0
	44.3	45.0	38.0
	43.7	44.0	37.5
21:30-21:45	45.6	44.0	37.0
	44.2	46.0	38.0
	46.7	44.5	38.0
21:45-22:00	45.2	44.0	38.0
	43.1	44.0	36.0
	43.2	45.5	35.5
22:00-22:15	46.4	45.5	33.5
	46.1	44.0	36.0
	46.5	45.5	36.5
22:15-22:30	45.7	45.5	38.0
	42.7	43.0	37.5
	44.3	43.5	35.5
22:30-22:45	45.2	46.0	37.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	42.5	43.5	40.0
	42.3	42.5	36.5
22:45-23:00	43.5	44.0	38.0
	40.1	41.0	35.5
	40.8	42.0	36.0
Average	43.2	44.1	36.0
Max	51.9	50.0	42.5
Min	35.1	37.5	30.0

4) Night-time (for all days) Noise Level, dB(A)

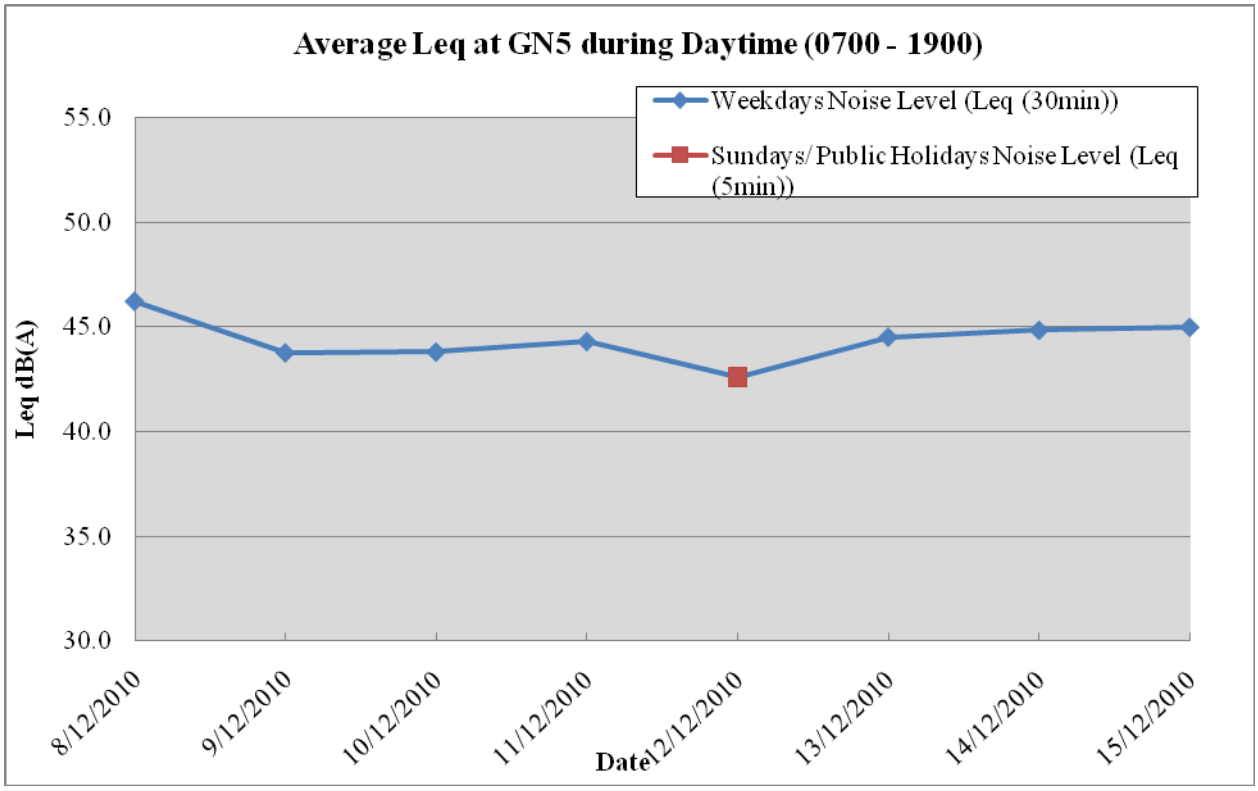
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
23:00-23:15	41.0	41.8	35.2
	41.3	40.9	35.5
	40.8	41.2	35.0
23:15-23:30	41.4	41.7	35.5
	41.2	42.3	35.4
	40.5	41.1	35.5
23:30-23:45	39.6	41.2	35.4
	40.5	41.2	34.7
	40.5	41.7	36.0
23:45-00:00	41.1	41.5	35.6
	39.2	39.8	34.8
	39.5	40.8	34.7
00:00-00:15	39.2	40.0	34.8
	38.4	39.9	34.4
	38.6	39.6	34.5
00:15-00:30	37.5	38.6	34.0
	38.3	39.3	35.2
	39.1	40.1	34.0
00:30-00:45	38.2	39.5	33.9
	38.7	39.9	33.6
	38.0	39.5	32.9
00:45:01:00	38.7	40.6	33.1
	38.1	39.4	33.3

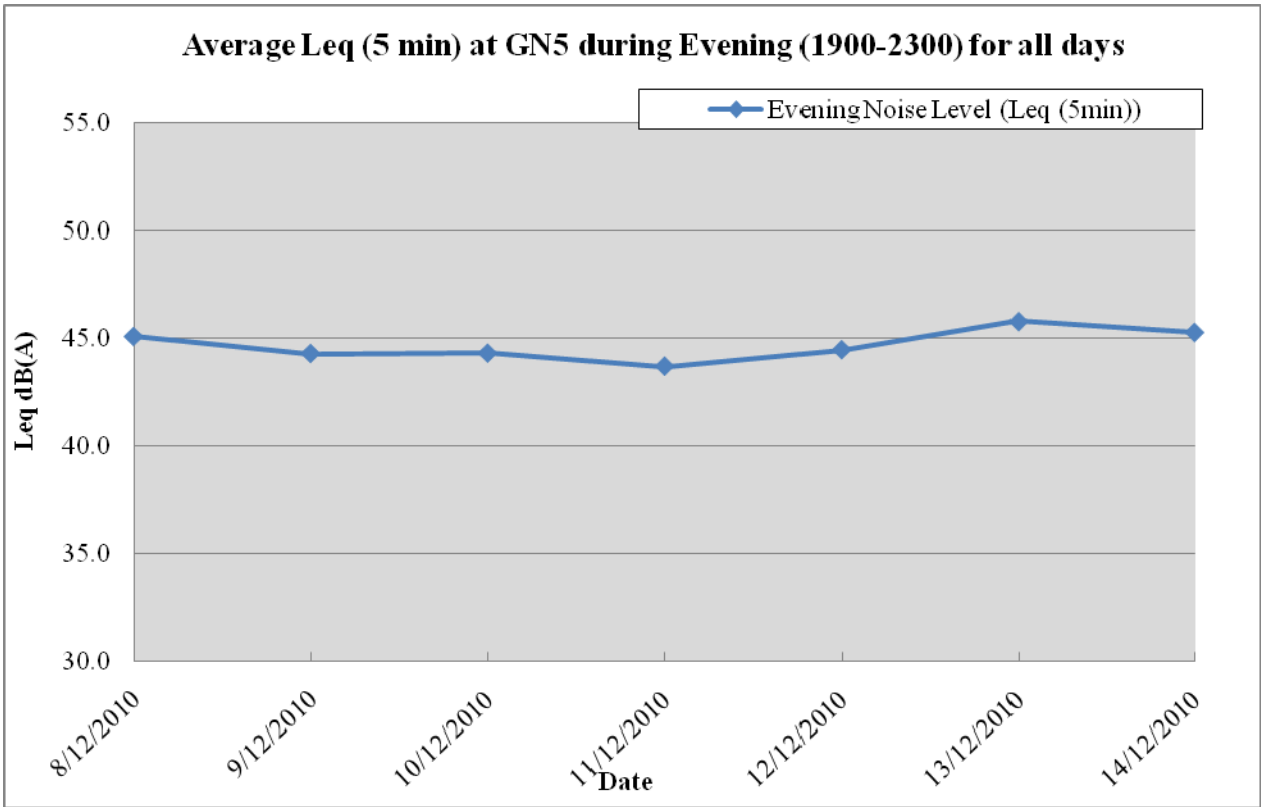
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	37.5	38.5	33.7
01:00-01:15	37.2	38.7	34.0
	36.3	37.3	33.2
	38.3	38.2	31.6
01:15-01:30	38.9	39.1	31.7
	38.0	37.8	32.0
	37.5	37.0	31.5
01:30-01:45	37.3	38.0	31.8
	36.6	36.6	31.0
	35.3	35.3	29.9
01:45-02:00	34.3	35.9	29.0
	33.5	34.1	29.2
	33.7	35.8	29.4
02:00-02:15	35.4	35.2	28.1
	32.9	35.0	28.3
	35.0	36.7	28.8
02:15-02:30	34.3	35.6	29.2
	34.7	35.2	28.7
	33.3	34.0	27.7
02:30-02:45	33.4	33.0	27.6
	33.5	33.8	27.8
	31.0	33.2	27.2
02:45-03:00	32.5	33.9	26.5
	31.4	33.5	27.0
	33.3	32.8	26.5
03:00-03:15	31.0	34.1	26.5
	32.0	33.7	28.3
	30.7	32.1	26.4
03:15-03:30	33.5	33.3	28.2
	34.1	33.8	27.2
	30.4	31.8	26.4
03:30-03:45	30.2	32.2	26.2
	30.4	31.7	26.1
	30.1	32.0	26.2
03:45-04:00	28.5	29.5	25.8

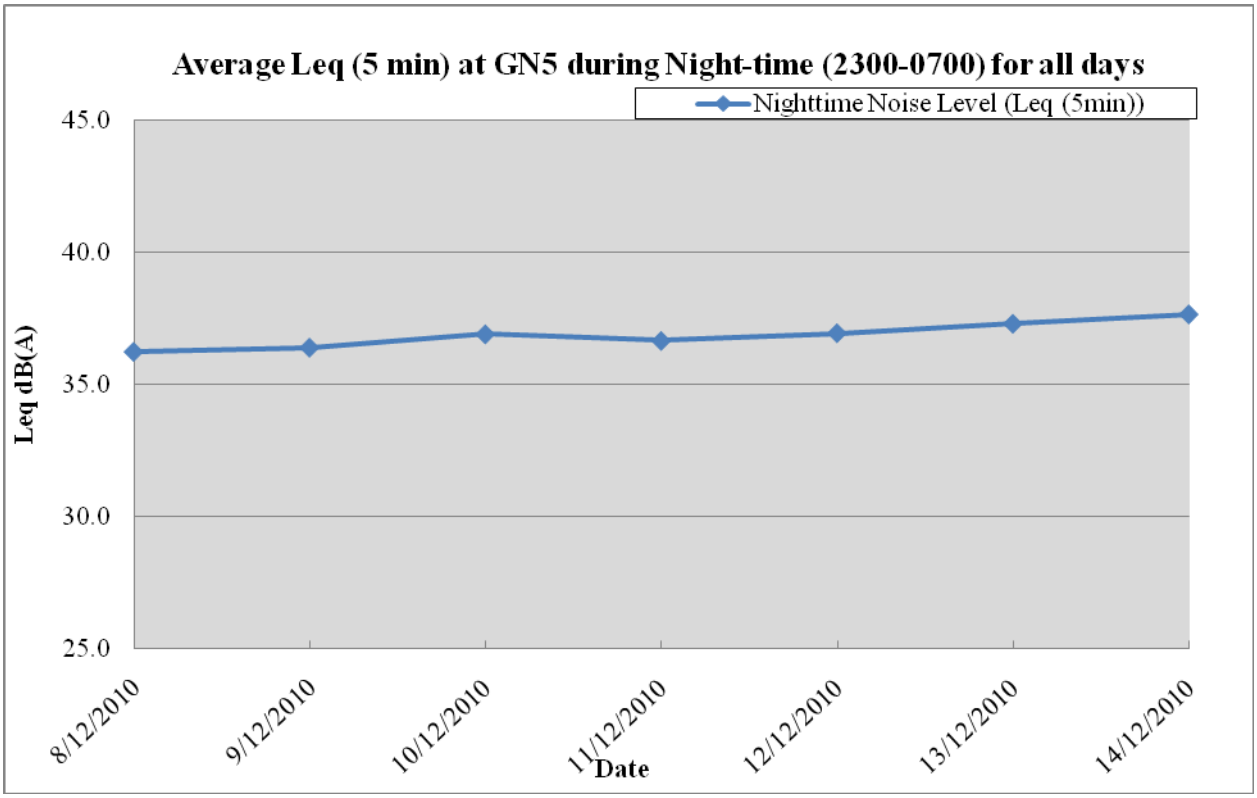
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	28.2	30.0	25.7
	30.2	32.0	27.0
04:00-04:15	30.1	32.6	26.7
	30.6	33.3	26.2
	30.2	31.4	27.7
04:15-04:30	30.9	32.9	26.2
	31.2	32.9	26.1
	34.0	31.9	26.0
04:30-04:45	32.2	31.7	26.2
	30.1	32.1	25.7
	30.7	32.5	25.6
04:45-05:00	30.7	33.7	25.5
	33.9	36.6	26.0
	33.1	35.2	26.1
05:00-05:15	30.6	31.9	25.5
	31.4	32.4	26.2
	32.1	32.9	26.1
05:15-05:30	33.3	34.7	26.5
	35.9	33.7	26.4
	33.4	33.8	26.3
05:30-05:45	33.0	34.4	26.8
	32.2	33.9	27.4
	35.7	35.7	26.9
05:45-06:00	37.6	37.9	27.4
	36.7	38.0	28.1
	37.9	39.4	29.4
06:00-06:15	37.2	39.2	30.0
	36.3	37.6	30.7
	36.0	37.1	30.9
06:15-06:30	36.2	38.3	30.3
	37.2	39.4	30.3
	37.6	38.9	31.2
06:30-06:45	40.2	40.6	32.3
	41.6	41.8	31.9
	41.2	43.4	32.9

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
06:45-07:00	40.2	42.0	33.4
	40.3	42.0	34.1
	41.5	43.3	34.7
Average	36.9	37.9	31.3
Max	41.6	43.4	36.0
Min	28.2	29.5	25.5

Log average was used.




Average Leq (5 min) at GN5 during Evening (1900-2300) for all days
Evening Noise Level (Leq (5min))
55.0
50.0
45.0
40.0
35.0
30.0
Leq dB(A)
8/12/2010
9/12/2010
10/12/2010
11/12/2010
12/12/2010
13/12/2010
14/12/2010
Date


Average Leq (5 min) at GN5 during Night-time (2300-0700) for all days
Nighttime Noise Level (Leq (5min))
45.0
40.0
35.0
30.0
25.0
Leq dB(A)
8/12/2010
9/12/2010
10/12/2010
11/12/2010
12/12/2010
13/12/2010
14/12/2010
Date

Baseline Ground-borne Noise Monitoring Result

Location: GN7 Tai Fung Building (Block F) Cosmopolitan Estates
Baseline monitoring period: 7/3/2011 - 14/3/2011

Parameter: Leq
Time Slot Averaged Baselines

1) Weekdays Daytime Noise Level, dB(A)

Time slot	$L_{eq\ (30\ min)}$	$L_{10\ (30mins)}$	$L_{90\ (30\ mins)}$
07:00-07:30	46.5	46.8	45.8
07:30-08:00	46.7	47.3	45.9
08:00-08:30	47.4	48.1	45.7
08:30-09:00	46.7	47.2	45.7
09:00-09:30	49.1	50.8	45.9
09:30-10:00	49.4	51.2	46.0
10:00-10:30	48.6	49.6	45.9
10:30-11:00	48.2	50.8	46.0
11:00-11:30	48.2	48.5	46.1
11:30-12:00	47.4	47.8	46.2
12:00-12:30	47.8	48.9	46.3
12:30-13:00	47.5	48.0	46.3
13:00-13:30	49.3	51.7	46.3
13:30-14:00	48.5	49.8	46.0
14:00-14:30	49.0	49.1	46.0
14:30-15:00	48.5	50.6	46.2
15:00-15:30	47.8	49.1	46.1
15:30-16:00	46.7	47.0	46.0
16:00-16:30	47.8	49.3	45.8
16:30-17:00	48.5	49.9	45.8
17:00-17:30	48.1	50.0	45.9
17:30-18:00	48.2	50.2	45.8
18:00-18:30	49.1	52.0	45.9
18:30-19:00	47.8	48.5	45.9
Average	48.1	49.5	46.0
Max	49.4	52.0	46.3
Min	46.5	46.8	45.7

Noise Control Period Averaged Baselines

2) Weekdays Evening Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
19:00-19:15	52.5	55.5	45.4
	46.5	46.9	45.3
	46.4	46.4	45.3
19:15-19:30	46.5	47.6	45.1
	47.0	48.0	45.3
	47.1	48.3	45.5
19:30-19:45	48.6	50.7	45.1
	46.1	46.3	45.0
	45.9	46.3	45.0
19:45-20:00	45.7	46.0	45.0
	45.7	46.2	45.1
	45.7	46.2	45.0
20:00-20:15	45.9	46.2	45.1
	49.6	52.9	45.3
	48.2	50.6	45.1
20:15-20:30	50.4	53.7	45.2
	45.9	46.3	45.2
	45.7	46.1	45.0
20:30-20:45	47.9	49.0	45.0
	50.1	53.8	45.1
	48.5	51.8	45.1
20:45-21:00	47.0	47.5	45.0
	46.0	46.3	45.1
	46.0	46.3	45.1
21:00-21:15	49.0	48.0	45.1
	47.7	49.7	45.2
	48.0	50.7	45.2
21:15-21:30	46.7	46.3	45.1
	45.9	46.4	45.1
	45.8	46.1	45.1
21:30-21:45	45.8	46.1	44.9
	45.8	46.2	45.2

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.0	46.5	45.0
21:45-22:00	48.8	52.5	45.0
	45.8	46.0	44.9
	45.7	46.0	44.9
22:00-22:15	45.9	46.5	45.1
	46.5	47.5	45.1
	48.1	48.5	45.1
22:15-22:30	46.4	46.8	45.0
	46.1	46.4	45.1
	49.6	51.1	45.4
22:30-22:45	45.9	46.3	45.0
	46.1	46.3	45.1
	46.4	46.9	44.8
22:45-23:00	46.9	48.7	45.2
	45.8	46.3	45.2
	47.6	47.5	45.2
Average	48.0	49.6	45.8
Max	52.5	55.5	45.5
Min	45.7	46.0	44.8

3) General Holidays (including Sundays) (0700-2300) Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
0700-07:15	46.4	47.0	45.5
	49.3	52.0	46.0
	46.5	47.0	46.0
07:15-07:30	46.4	47.0	45.5
	46.8	47.5	46.0
	46.9	47.5	46.0
07:30-07:45	46.7	47.0	46.0
	46.9	47.5	46.0
	46.7	47.0	46.0
07:45-08:00	46.4	47.0	45.5
	46.6	47.0	46.0
	46.6	47.0	46.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
08:00-08:15	46.5	47.0	46.0
	46.5	47.0	45.5
	46.6	47.0	46.0
08:15-08:30	46.6	47.0	46.0
	46.2	46.5	45.5
	46.1	46.5	45.5
08:30-08:45	46.4	47.0	45.5
	46.5	47.0	46.0
	46.7	47.0	46.0
08:45-09:00	46.7	47.5	46.0
	46.7	47.5	46.0
	46.5	47.0	45.5
09:00-09:15	46.5	47.0	45.5
	51.0	54.5	46.0
	46.8	47.5	46.0
09:15-09:30	46.5	47.0	45.5
	46.3	47.0	45.5
	46.4	47.0	45.5
09:30-09:45	46.2	46.5	45.5
	46.7	47.5	46.0
	47.7	49.5	46.0
09:45-10:00	46.8	47.5	46.0
	47.4	48.0	46.0
	46.9	47.5	46.0
10:00-10:15	46.8	47.5	46.0
	46.8	47.0	46.0
	46.9	47.5	46.0
10:15-10:30	46.8	47.0	46.0
	46.7	47.0	46.0
	46.3	47.0	45.5
10:30-10:45	46.3	46.5	45.5
	46.2	46.5	45.5
	46.1	46.5	45.5
10:45-11:00	46.7	47.0	46.0
	46.7	47.5	46.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.6	47.0	46.0
11:00-11:15	46.6	47.0	46.0
	46.9	47.0	46.0
	46.5	47.0	46.0
11:15-11:30	46.7	47.0	46.0
	46.8	47.0	46.0
	46.7	47.0	46.0
11:30-11:45	46.3	47.0	45.5
	46.5	47.0	45.5
	46.4	47.0	45.5
11:45-12:00	46.6	47.0	45.5
	46.6	47.0	45.5
	46.4	47.0	45.5
12:00-12:15	46.5	47.0	45.5
	46.2	46.5	45.5
	46.3	47.0	45.5
12:15-12:30	46.4	47.0	45.5
	46.7	47.0	45.5
	46.2	46.5	45.5
12:30-12:45	47.8	49.5	46.0
	46.6	47.0	46.0
	46.5	47.0	45.5
12:45-13:00	46.4	47.0	45.5
	46.7	47.0	46.0
	46.5	47.0	45.5
13:00-13:15	46.2	46.5	45.5
	46.3	46.5	45.5
	46.5	47.0	45.5
13:15-13:30	46.3	46.5	45.5
	46.4	47.0	45.5
	46.7	47.0	45.5
13:30-13:45	46.9	47.5	46.0
	46.5	47.0	45.5
	54.2	58.0	46.0
13:45-14:00	46.2	46.5	45.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.3	46.5	45.5
	46.2	46.5	45.5
14:00-14:15	46.2	46.5	45.5
	46.2	46.5	45.5
	45.9	46.5	45.0
14:15-14:30	46.2	46.5	45.5
	46.2	46.5	45.5
	46.5	47.0	46.0
14:30-14:45	46.3	46.5	45.5
	46.3	46.5	45.5
	46.4	46.5	45.5
14:45-15:00	52.6	48.0	45.5
	53.5	58.0	46.0
	46.8	47.0	46.0
15:00-15:15	46.7	47.0	46.0
	46.7	47.0	46.0
	46.7	47.0	46.0
15:15-15:30	46.7	47.0	46.0
	46.6	47.0	46.0
	46.9	47.5	46.0
15:30-15:45	46.8	47.5	46.0
	46.6	47.0	46.0
	46.5	47.0	46.0
15:45-16:00	46.7	47.0	45.5
	46.8	47.0	46.0
	46.7	47.0	46.0
16:00-16:15	46.7	47.0	46.0
	46.7	47.0	46.0
	46.9	47.5	46.0
16:15-16:30	46.8	47.5	46.0
	46.8	47.0	46.0
	46.8	47.5	46.0
16:30-16:45	46.7	47.0	46.0
	46.4	47.0	45.5
	46.9	47.5	46.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
16:45-17:00	46.8	47.0	46.0
	46.8	47.0	46.0
	46.6	47.0	46.0
17:00-17:15	46.5	47.0	46.0
	48.4	48.5	46.0
	47.4	47.5	46.0
17:15-17:30	46.9	47.5	46.0
	46.8	47.0	46.0
	46.7	47.0	46.0
17:30-17:45	46.7	47.0	46.0
	47.0	47.5	46.0
	47.1	47.5	46.0
17:45-18:00	47.0	47.5	46.0
	46.9	47.5	46.0
	47.0	47.5	46.0
18:00-18:15	46.9	47.5	46.0
	46.6	47.0	46.0
	46.2	46.5	45.5
18:15-18:30	47.1	47.5	46.0
	46.8	47.0	46.0
	46.8	47.5	46.0
18:30-18:45	46.7	47.0	46.0
	46.8	47.0	46.0
	46.8	47.0	46.0
18:45-19:00	46.8	47.0	46.0
	46.9	47.5	46.0
	46.8	47.0	46.0
19:00-19:15	46.8	47.0	46.0
	46.7	47.0	46.0
	46.4	47.0	45.5
19:15-19:30	46.8	47.5	46.0
	46.6	47.0	46.0
	46.5	47.0	46.0
19:30-19:45	46.8	47.0	46.0
	47.1	47.5	46.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.8	47.5	46.0
19:45-20:00	46.8	47.0	46.0
	46.7	47.0	46.0
	46.5	47.0	46.0
20:00-20:15	46.7	47.0	46.0
	46.8	47.5	46.0
	46.8	47.5	46.0
20:15-20:30	47.1	47.5	46.0
	57.2	61.0	47.0
	48.3	49.5	46.0
20:30-20:45	46.8	47.0	46.0
	46.7	47.0	46.0
	46.7	47.0	46.0
20:45-21:00	46.6	47.0	46.0
	46.9	47.0	46.0
	46.9	47.5	46.0
21:00-21:15	46.6	47.0	46.0
	46.7	47.0	46.0
	46.7	47.0	46.0
21:15-21:30	46.8	47.5	46.0
	46.7	47.0	46.0
	46.7	47.0	46.0
21:30-21:45	46.9	47.5	46.0
	46.7	47.0	46.0
	46.7	47.0	46.0
21:45-22:00	46.8	47.0	46.0
	46.6	47.0	46.0
	46.6	47.0	46.0
22:00-22:15	46.9	47.5	46.0
	46.5	47.0	45.5
	46.3	46.5	45.5
22:15-22:30	46.3	46.5	45.5
	46.6	47.0	46.0
	46.8	47.0	46.0
22:30-22:45	46.8	47.0	46.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.7	47.0	46.0
	48.8	50.5	46.0
22:45-23:00	46.7	47.0	46.0
	46.5	47.0	46.0
	46.4	47.0	45.5
Average	47.2	48.2	45.9
Max	57.2	61.0	47.0
Min	45.9	46.5	45.0

4) Night-time (for all days) Noise Level, dB(A)

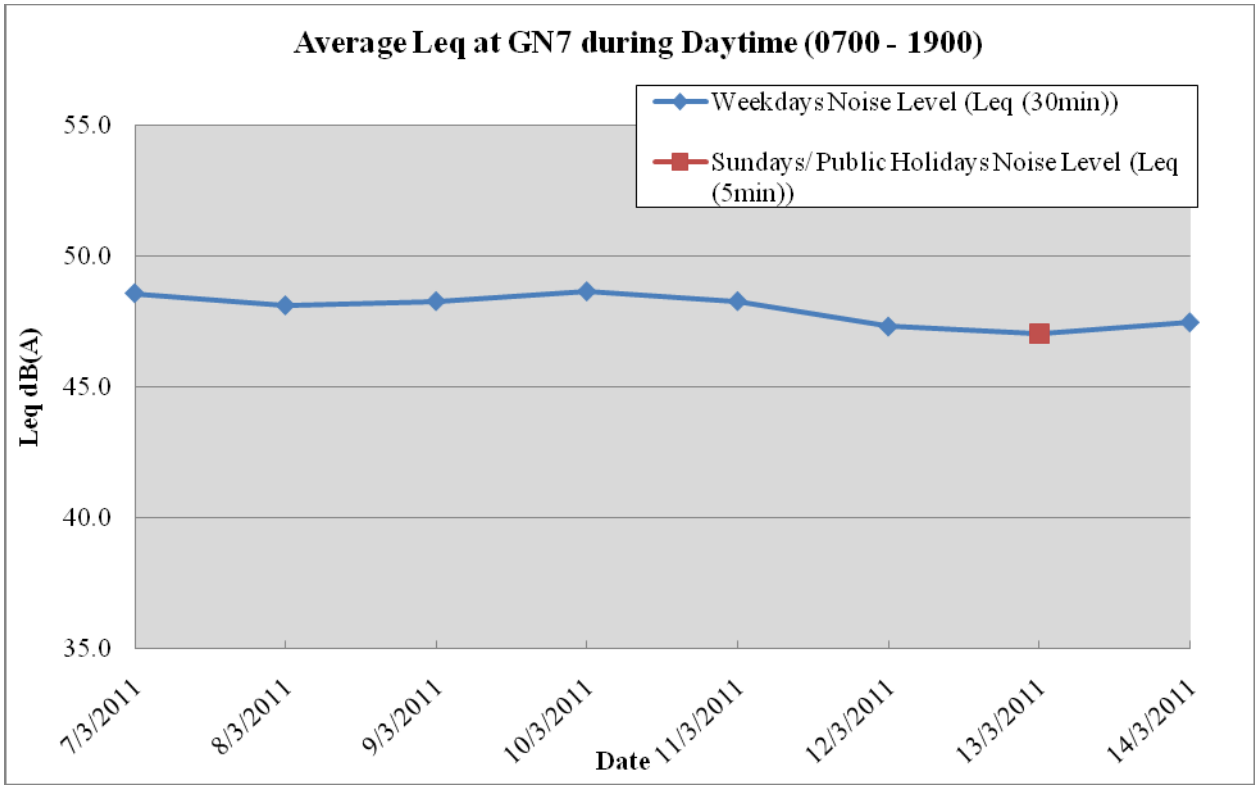
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
23:00-23:15	46.7	47.1	45.9
	46.6	47.1	45.9
	47.6	49.5	45.9
23:15-23:30	49.4	51.6	46.0
	48.8	49.0	46.0
	47.0	47.4	46.3
23:30-23:45	46.9	47.4	46.1
	46.8	47.2	46.1
	47.5	48.2	46.1
23:45-00:00	47.1	47.3	46.0
	48.0	49.7	46.0
	46.9	47.4	46.0
00:00-00:15	47.4	48.2	46.2
	46.8	47.2	45.9
	47.5	47.6	46.2
00:15-00:30	47.1	47.5	46.2
	46.7	47.1	46.0
	46.7	47.1	46.0
00:30-00:45	46.9	47.3	46.0
	46.6	47.1	45.9
	46.8	47.1	45.7
00:45:01:00	48.4	48.1	45.7
	46.3	46.6	45.7

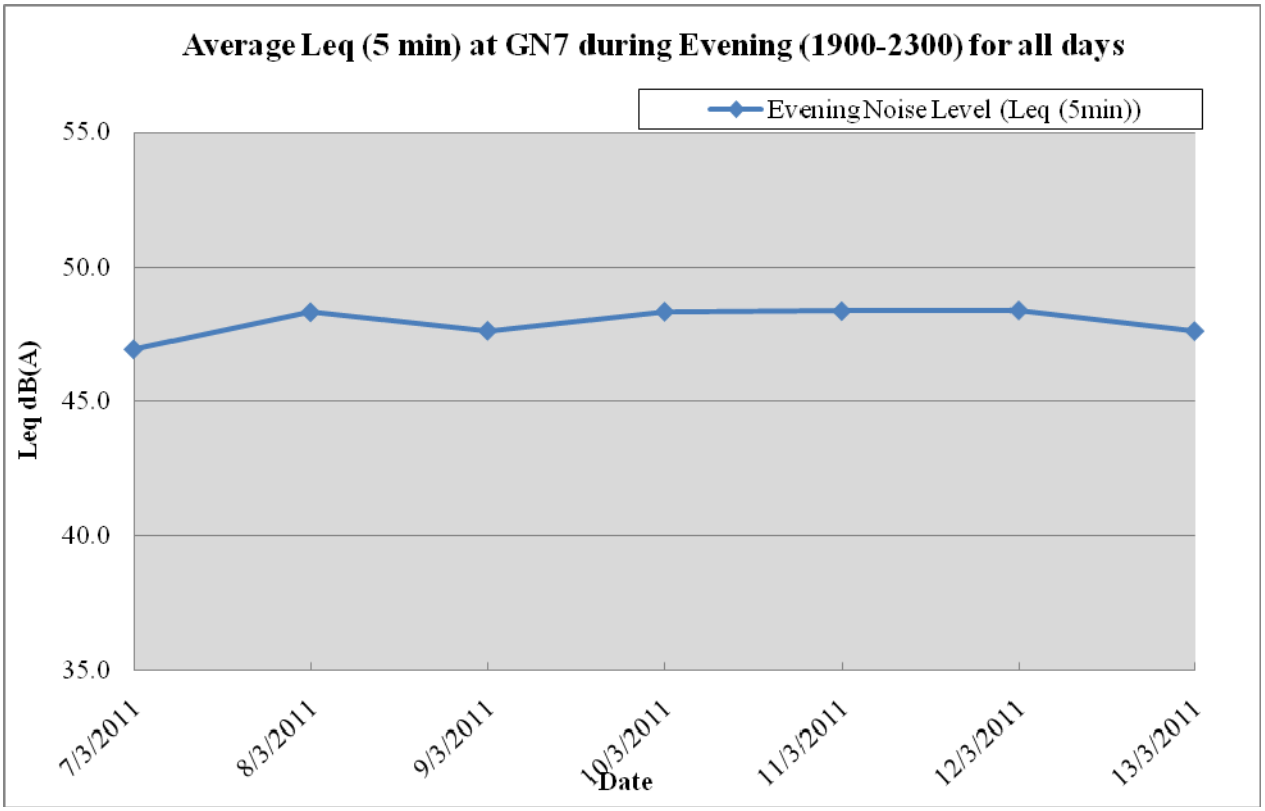
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.3	46.5	45.7
01:00-01:15	46.2	46.4	45.6
	46.3	46.7	45.6
	46.3	46.5	45.6
01:15-01:30	48.2	50.4	45.6
	46.3	46.6	45.6
	46.6	47.0	45.7
01:30-01:45	46.3	46.4	45.6
	46.3	46.5	45.6
	46.4	46.6	45.6
01:45-02:00	46.4	46.7	45.6
	46.5	46.7	45.6
	46.3	46.5	45.6
02:00-02:15	46.4	46.7	45.6
	46.3	46.6	45.6
	46.3	46.6	45.7
02:15-02:30	46.4	46.7	45.7
	46.5	46.7	45.9
	46.4	46.7	45.7
02:30-02:45	46.4	46.8	45.7
	48.7	49.0	45.7
	46.4	46.7	45.8
02:45-03:00	46.5	46.8	45.8
	46.5	46.6	45.9
	46.5	46.7	45.8
03:00-03:15	46.4	46.6	45.7
	46.5	46.7	45.8
	48.6	51.1	45.7
03:15-03:30	46.4	46.7	45.7
	46.4	46.7	45.7
	46.3	46.6	45.7
03:30-03:45	46.3	46.6	45.6
	46.3	46.6	45.7
	46.4	46.7	45.8
03:45-04:00	46.3	46.6	45.6

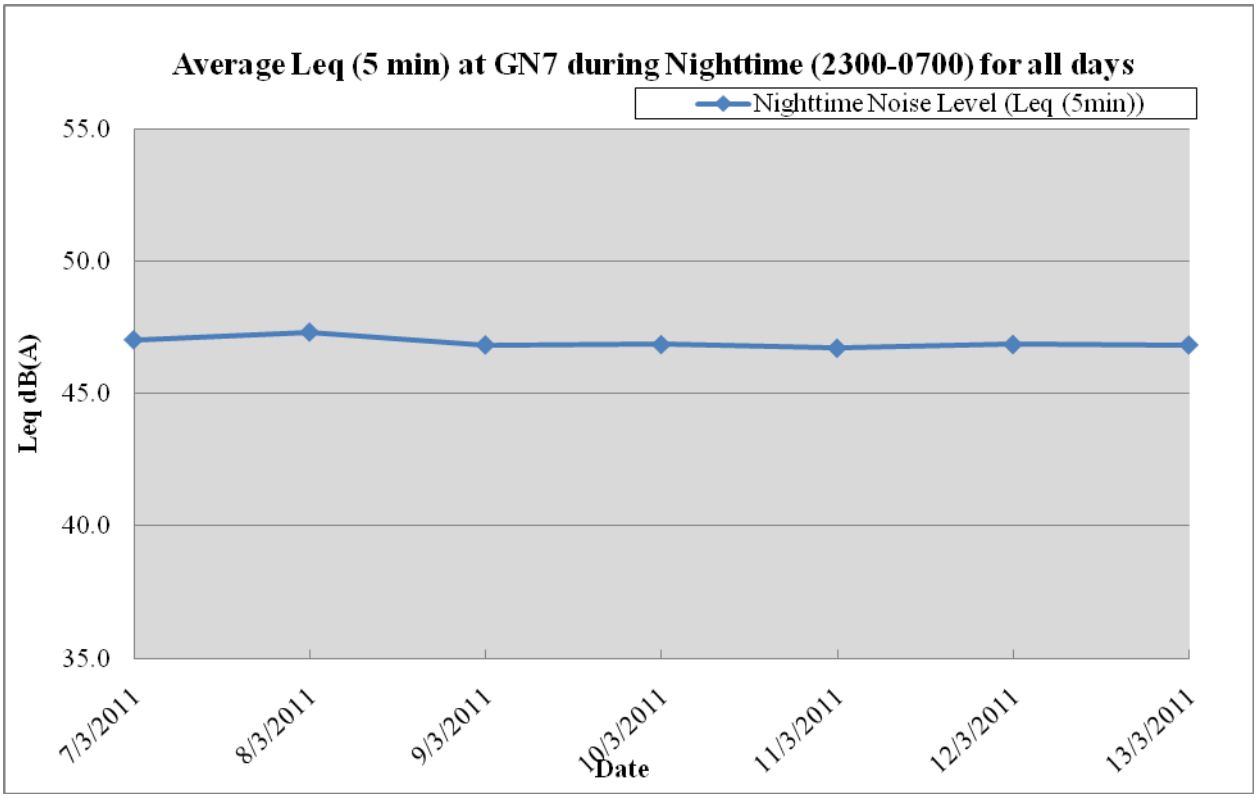
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	46.4	46.7	45.7
	46.4	46.7	45.7
04:00-04:15	46.3	46.5	45.6
	46.3	46.6	45.7
	46.3	46.6	45.6
04:15-04:30	46.3	46.6	45.7
	46.3	46.5	45.6
	46.4	46.6	45.6
04:30-04:45	46.4	46.7	45.6
	46.4	46.7	45.7
	46.4	46.7	45.7
04:45-05:00	46.5	46.6	45.7
	46.5	46.7	45.7
	46.3	46.6	45.6
05:00-05:15	46.3	46.6	45.6
	46.4	46.7	45.6
	46.3	46.6	45.7
05:15-05:30	46.2	46.4	45.5
	46.1	46.4	45.6
	46.0	46.4	45.5
05:30-05:45	46.1	46.4	45.5
	46.1	46.4	45.6
	47.5	49.7	45.5
05:45-06:00	50.4	51.9	45.6
	52.7	55.4	45.7
	49.9	50.3	45.8
06:00-06:15	46.4	46.7	45.7
	46.3	46.6	45.6
	46.3	46.6	45.7
06:15-06:30	46.3	46.6	45.6
	46.2	46.6	45.7
	46.3	46.6	45.6
06:30-06:45	46.4	46.6	45.8
	46.5	46.8	45.8
	46.5	47.0	45.9

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
06:45-07:00	46.5	47.0	45.9
	46.4	46.8	45.9
	46.4	46.8	45.9
Average	46.9	47.6	45.8
Max	52.7	55.4	46.3
Min	46.0	46.4	45.5

Log average was used.




Average Leq (5 min) at GN7 during Evening (1900-2300) for all days
Evening Noise Level (Leq (5min))
55.0
50.0
45.0
40.0
35.0
Leq dB(A)
7/3/2011
8/3/2011
9/3/2011
10/3/2011
11/3/2011
12/3/2011
13/3/2011
Date


Average Leq (5 min) at GN7 during Nighttime (2300-0700) for all days
Nighttime Noise Level (Leq (5min))
55.0
50.0
45.0
40.0
35.0
Leq dB(A)
7/3/2011
8/3/2011
9/3/2011
10/3/2011
11/3/2011
12/3/2011
13/3/2011
Date

Baseline Ground-borne Noise Monitoring Result
Location: GN8 Chung Yew Building

Baseline monitoring period: 29/11/2010 - 6/12/2010
Parameter: Leq

Time Slot Averaged Baselines

1) Weekdays Daytime Noise Level, dB(A)

Time slot	$L_{eq\ (30\ min)}$	$L_{10\ (30mins)}$	$L_{90\ (30\ mins)}$
07:00-07:30	36.4	37.7	32.2
07:30-08:00	37.8	39.8	33.0
08:00-08:30	38.8	41.0	32.8
08:30-09:00	39.6	41.9	33.8
09:00-09:30	39.2	41.3	33.7
09:30-10:00	39.0	40.5	33.6
10:00-10:30	39.9	42.0	33.2
10:30-11:00	38.2	39.8	33.4
11:00-11:30	37.1	38.3	33.1
11:30-12:00	38.9	39.4	33.3
12:00-12:30	36.8	37.9	32.7
12:30-13:00	37.1	37.9	32.7
13:00-13:30	38.9	38.9	33.2
13:30-14:00	38.8	40.2	33.4
14:00-14:30	37.7	39.3	33.9
14:30-15:00	37.9	39.3	33.7
15:00-15:30	39.3	39.8	33.5
15:30-16:00	39.1	42.2	33.5
16:00-16:30	38.9	40.5	33.2
16:30-17:00	38.9	40.8	33.0
17:00-17:30	40.0	43.1	33.9
17:30-18:00	40.0	41.5	32.9
18:00-18:30	37.9	38.3	33.4
18:30-19:00	36.2	37.1	32.4
Average	38.6	40.2	33.3
Max	40.0	43.1	33.9
Min	36.2	37.1	32.2

Noise Control Period Averaged Baselines

2) Weekdays Evening Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
19:00-19:15	35.3	35.0	31.9
	35.7	37.1	31.8
	35.8	36.6	33.0
19:15-19:30	36.4	37.6	33.1
	35.1	35.8	32.6
	36.1	37.0	32.3
19:30-19:45	36.5	38.0	32.4
	36.8	38.0	32.6
	36.6	38.1	32.3
19:45-20:00	36.3	37.3	32.2
	37.1	37.6	32.3
	37.1	38.3	32.3
20:00-20:15	37.5	38.2	32.4
	36.8	37.7	32.0
	36.1	37.8	31.9
20:15-20:30	36.9	38.3	32.0
	34.5	35.2	31.9
	34.6	35.5	32.0
20:30-20:45	35.5	35.6	31.8
	33.6	33.6	31.2
	33.7	35.1	31.3
20:45-21:00	34.5	35.7	32.0
	34.9	36.1	31.6
	35.4	36.7	31.7
21:00-21:15	34.0	35.1	31.2
	34.1	34.8	31.2
	34.8	36.0	32.8
21:15-21:30	35.0	35.5	32.3
	34.2	34.9	32.1
	33.9	33.9	32.1
21:30-21:45	34.5	34.9	31.8

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	33.9	34.9	31.4
	35.9	35.3	31.3
21:45-22:00	33.0	34.1	31.2
	33.5	34.0	31.2
	33.6	34.2	31.2
22:00-22:15	34.6	35.4	31.3
	34.6	35.3	31.5
	34.4	34.6	32.3
22:15-22:30	34.5	34.4	31.9
	33.8	33.9	31.8
	33.2	34.0	31.7
22:30-22:45	34.2	35.4	31.6
	33.7	34.8	31.5
	33.2	33.5	30.9
22:45-23:00	32.8	32.8	30.9
	32.9	32.4	30.8
	33.9	36.0	30.8
Average	35.8	36.6	32.5
Max	37.5	38.3	33.1
Min	32.8	32.4	30.8

3) General Holidays (including Sundays) (0700-2300) Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
0700-07:15	35.2	36.0	33.0
	35.2	36.0	33.0
	35.9	38.0	33.0
07:15-07:30	36.9	39.5	32.5
	36.6	39.0	32.5
	39.6	43.5	32.0
07:30-07:45	34.0	34.5	32.0
	34.6	34.5	32.0
	40.3	43.5	32.5
07:45-08:00	36.2	38.0	32.0
	36.7	38.0	32.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	38.5	42.5	32.0
08:00-08:15	39.3	43.0	32.5
	39.8	43.5	32.5
	43.2	47.0	32.0
08:15-08:30	37.8	39.5	31.5
	38.6	41.5	32.0
	39.0	43.0	32.0
08:30-08:45	35.9	39.0	32.0
	39.2	42.5	32.5
	37.8	41.0	32.0
08:45-09:00	37.7	40.0	32.0
	34.6	35.5	32.0
	35.6	36.5	31.5
09:00-09:15	34.7	35.0	31.5
	34.7	35.0	32.0
	35.4	35.5	32.0
09:15-09:30	34.9	36.5	31.5
	33.9	34.0	31.5
	33.6	34.0	31.5
09:30-09:45	37.4	38.0	32.0
	34.8	34.5	32.0
	34.7	36.0	31.5
09:45-10:00	36.7	36.5	32.0
	39.1	42.0	33.0
	38.1	41.0	32.5
10:00-10:15	34.3	34.5	32.0
	34.7	35.0	32.0
	35.3	36.0	32.5
10:15-10:30	34.8	35.5	32.5
	36.1	36.5	32.5
	34.9	36.0	31.5
10:30-10:45	33.8	34.0	31.5
	35.2	37.0	32.0
	38.0	38.5	32.0
10:45-11:00	38.7	41.5	33.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	36.0	39.0	32.0
	36.7	36.5	32.0
11:00-11:15	37.7	40.5	32.0
	35.0	35.0	32.5
	35.1	35.5	32.0
11:15-11:30	36.6	36.5	32.0
	36.2	36.0	32.5
	37.0	37.5	32.0
11:30-11:45	37.3	40.0	31.5
	35.8	38.0	32.0
	34.8	34.5	31.5
11:45-12:00	33.9	34.0	31.5
	34.4	34.0	31.5
	37.9	40.0	32.0
12:00-12:15	35.5	36.0	31.5
	37.3	37.5	32.0
	34.1	34.5	31.0
12:15-12:30	33.3	34.0	31.0
	33.4	33.5	31.0
	33.9	34.0	31.0
12:30-12:45	32.8	34.0	31.0
	35.6	34.5	31.0
	34.0	34.5	31.5
12:45-13:00	34.3	35.0	31.5
	36.1	35.5	31.5
	33.7	35.0	31.0
13:00-13:15	36.1	35.5	31.5
	33.7	34.0	31.0
	33.2	33.5	31.0
13:15-13:30	33.9	34.0	31.5
	34.0	34.5	31.5
	33.6	34.0	31.5
13:30-13:45	33.6	33.5	31.5
	34.7	36.5	31.5
	35.0	35.0	31.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
13:45-14:00	36.5	37.5	32.0
	35.5	36.0	32.0
	34.7	35.5	32.0
14:00-14:15	40.2	44.0	32.0
	41.6	45.0	34.0
	38.9	41.5	32.5
14:15-14:30	39.5	42.0	32.0
	37.2	40.0	32.0
	39.3	42.0	32.5
14:30-14:45	36.2	37.5	32.5
	39.0	41.5	32.5
	39.9	43.5	33.0
14:45-15:00	40.4	44.0	32.0
	43.7	48.0	33.5
	43.7	47.0	34.0
15:00-15:15	36.6	38.5	31.5
	35.9	35.0	31.5
	37.1	37.5	31.5
15:15-15:30	34.0	33.5	31.5
	31.9	32.5	23.0
	31.6	32.5	23.0
15:30-15:45	32.9	32.0	24.0
	32.3	31.5	22.5
	31.5	31.0	22.5
15:45-16:00	40.2	33.5	23.5
	34.3	38.0	24.0
	39.0	39.5	37.0
16:00-16:15	37.8	39.5	34.5
	35.9	36.0	34.0
	37.7	40.0	34.5
16:15-16:30	35.7	36.0	33.5
	35.0	35.5	33.0
	36.5	37.0	33.5
16:30-16:45	41.2	44.5	34.0
	36.1	38.5	32.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	33.9	34.5	32.0
16:45-17:00	35.6	35.0	32.5
	34.6	35.0	32.5
	35.2	36.5	32.0
17:00-17:15	35.9	35.5	32.5
	35.3	36.0	32.0
	37.9	35.5	32.5
17:15-17:30	35.2	35.0	32.0
	34.5	34.5	32.0
	37.0	38.0	32.0
17:30-17:45	37.2	36.5	32.5
	33.4	34.0	31.5
	35.6	37.5	32.5
17:45-18:00	36.9	38.5	32.0
	35.7	37.0	32.5
	37.6	41.0	32.0
18:00-18:15	33.9	34.0	32.0
	34.3	34.5	31.5
	35.9	36.5	32.0
18:15-18:30	34.7	35.5	31.5
	34.5	34.5	31.5
	34.8	34.5	32.0
18:30-18:45	39.3	42.5	32.5
	38.5	41.0	33.0
	35.5	39.0	32.0
18:45-19:00	36.3	37.5	31.5
	35.3	35.5	32.0
	34.6	34.0	32.0
19:00-19:15	35.3	37.0	32.0
	36.0	38.0	32.0
	33.8	34.0	31.5
19:15-19:30	34.3	34.5	31.5
	36.1	37.0	31.5
	36.2	38.5	32.0
19:30-19:45	36.2	36.5	32.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	35.2	35.0	31.5
	41.8	45.5	32.5
19:45-20:00	44.5	45.0	32.5
	47.9	47.0	32.0
	36.8	37.5	31.5
20:00-20:15	35.7	37.0	31.5
	37.6	37.5	31.5
	33.9	34.0	31.0
20:15-20:30	33.4	33.5	31.0
	36.7	37.5	31.5
	36.8	36.5	31.0
20:30-20:45	33.8	34.0	31.5
	35.2	36.0	32.0
	37.6	35.5	32.0
20:45-21:00	34.6	35.5	32.0
	34.6	34.0	31.5
	32.7	33.0	31.5
21:00-21:15	36.1	36.5	32.0
	33.3	33.5	32.0
	34.8	35.0	32.0
21:15-21:30	33.6	34.0	32.0
	34.9	35.0	32.0
	37.0	36.5	32.0
21:30-21:45	34.7	34.5	32.0
	34.2	34.5	31.5
	32.5	33.0	31.5
21:45-22:00	34.3	35.0	31.5
	33.4	33.5	31.5
	33.5	33.5	31.5
22:00-22:15	33.5	34.5	31.5
	34.7	37.0	31.5
	36.4	39.0	32.0
22:15-22:30	32.0	32.5	31.0
	32.6	32.5	31.0
	33.9	36.0	31.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
22:30-22:45	35.8	38.0	31.5
	34.6	36.5	31.5
	33.9	36.5	31.0
22:45-23:00	32.6	32.5	31.0
	32.8	33.0	31.0
	32.1	32.0	31.0
Average	36.9	38.7	31.9
Max	47.9	48.0	37.0
Min	31.5	31.0	22.5

4) Night-time (for all days) Noise Level, dB(A)

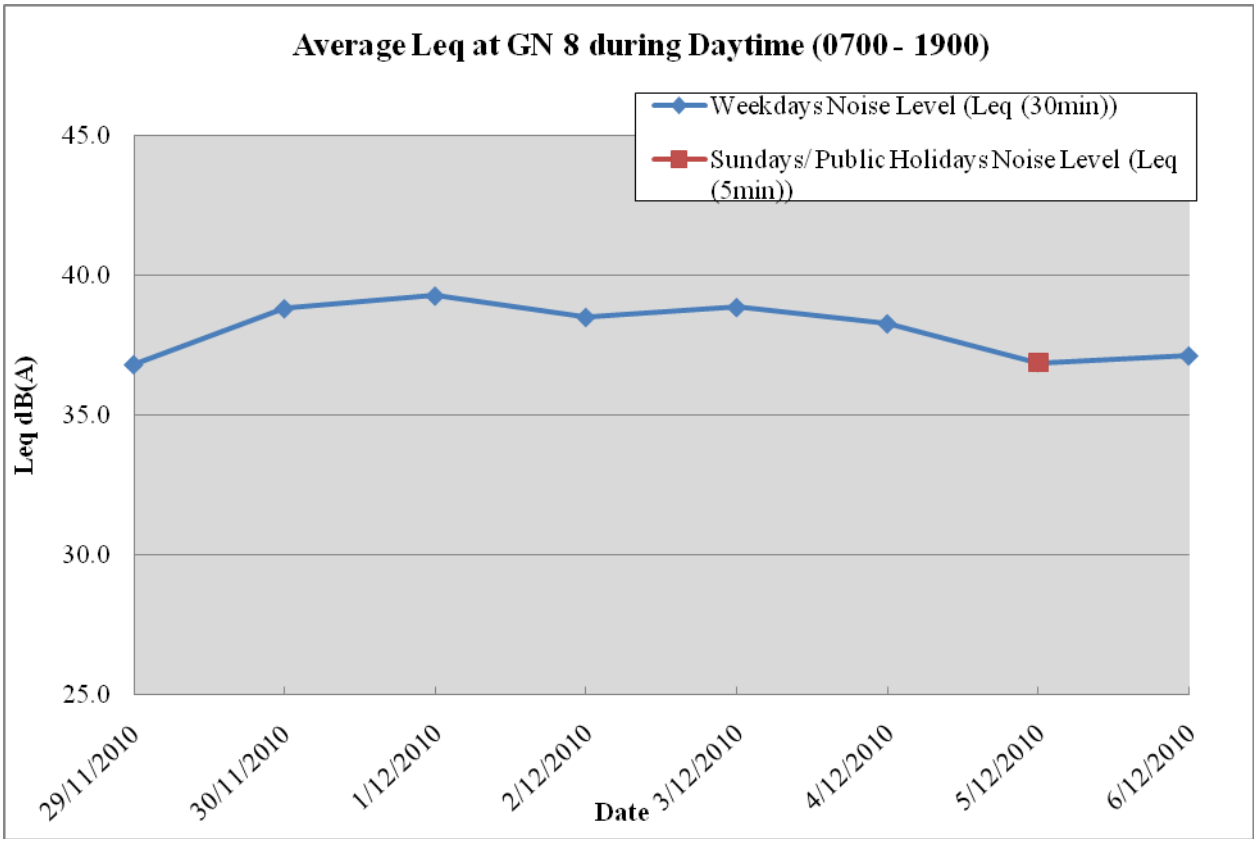
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
23:00-23:15	33.2	33.3	31.4
	33.7	33.7	31.4
	33.4	34.0	31.3
23:15-23:30	34.5	35.1	31.3
	35.1	35.5	33.0
	34.7	35.5	32.7
23:30-23:45	34.9	35.9	32.5
	34.2	34.5	32.4
	34.1	34.1	32.1
23:45-00:00	37.2	35.2	32.1
	33.3	33.4	32.0
	34.0	34.0	32.0
00:00-00:15	33.4	33.8	32.1
	33.9	34.2	32.1
	33.7	34.2	32.1
00:15-00:30	33.6	33.8	32.0
	33.6	33.7	32.0
	33.9	33.8	32.0
00:30-00:45	33.4	33.6	32.0
	33.4	33.3	32.1
	33.3	33.5	31.7
00:45:01:00	33.7	33.5	31.6

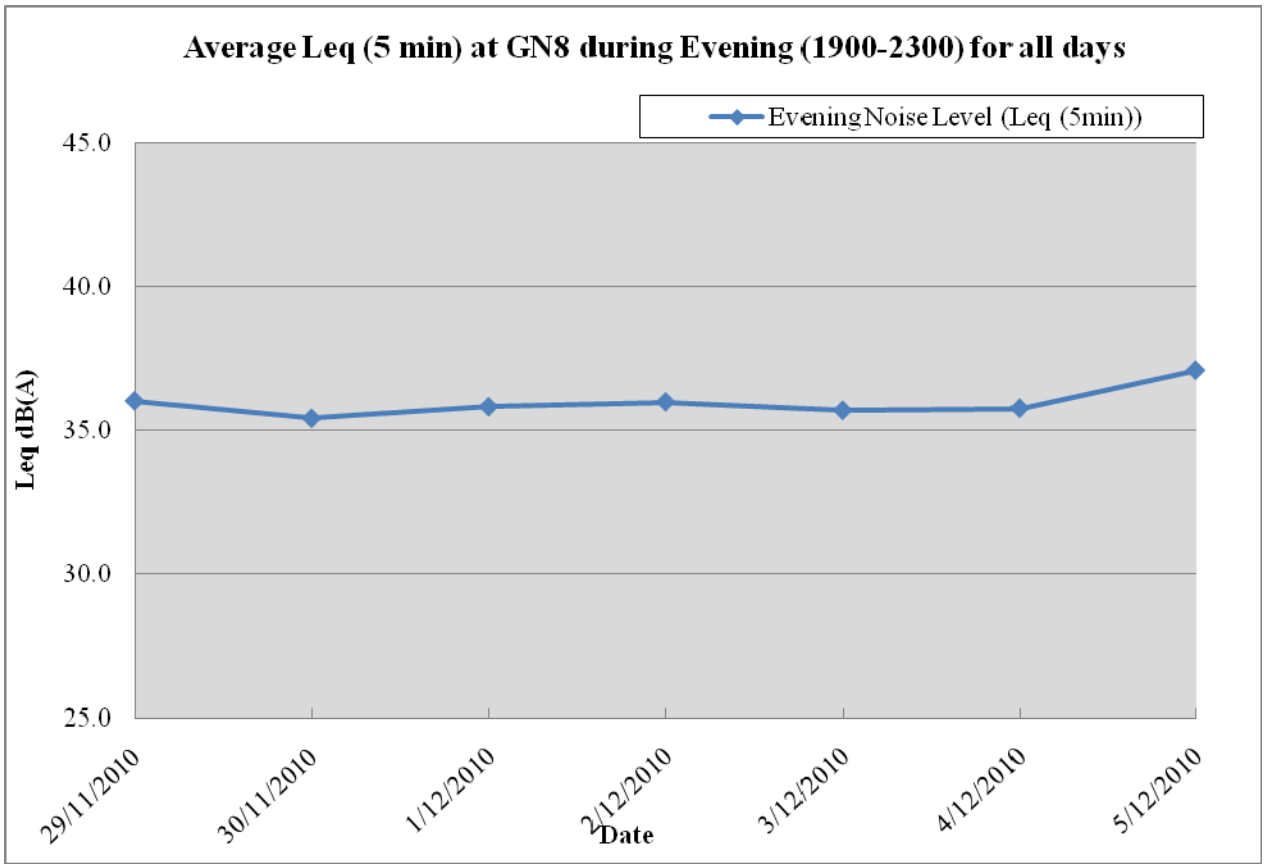
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	33.2	33.4	31.6
	33.0	33.4	31.6
01:00-01:15	32.6	32.9	31.6
	33.3	33.4	31.7
	32.8	33.3	31.6
01:15-01:30	33.3	33.7	31.6
	33.6	34.0	32.7
	33.4	33.9	32.4
01:30-01:45	33.5	33.8	32.4
	33.4	33.8	32.3
	33.1	33.4	32.2
01:45-02:00	32.6	32.9	31.6
	32.2	32.5	31.5
	32.2	32.3	31.5
02:00-02:15	32.1	32.4	31.4
	32.3	32.6	31.5
	32.5	32.6	31.5
02:15-02:30	32.8	32.8	31.5
	33.4	33.8	32.8
	33.3	33.5	32.5
02:30-02:45	32.9	33.0	32.3
	33.1	33.3	32.2
	32.7	33.0	32.1
02:45-03:00	33.0	33.3	32.1
	32.9	33.3	32.1
	32.2	32.9	31.4
03:00-03:15	32.1	32.8	31.4
	32.0	32.1	31.4
	32.2	32.3	31.4
03:15-03:30	32.1	32.2	31.3
	32.0	32.2	31.3
	32.4	33.4	31.3
03:30-03:45	33.4	33.6	32.7
	33.3	33.6	32.6
	33.2	33.4	32.5

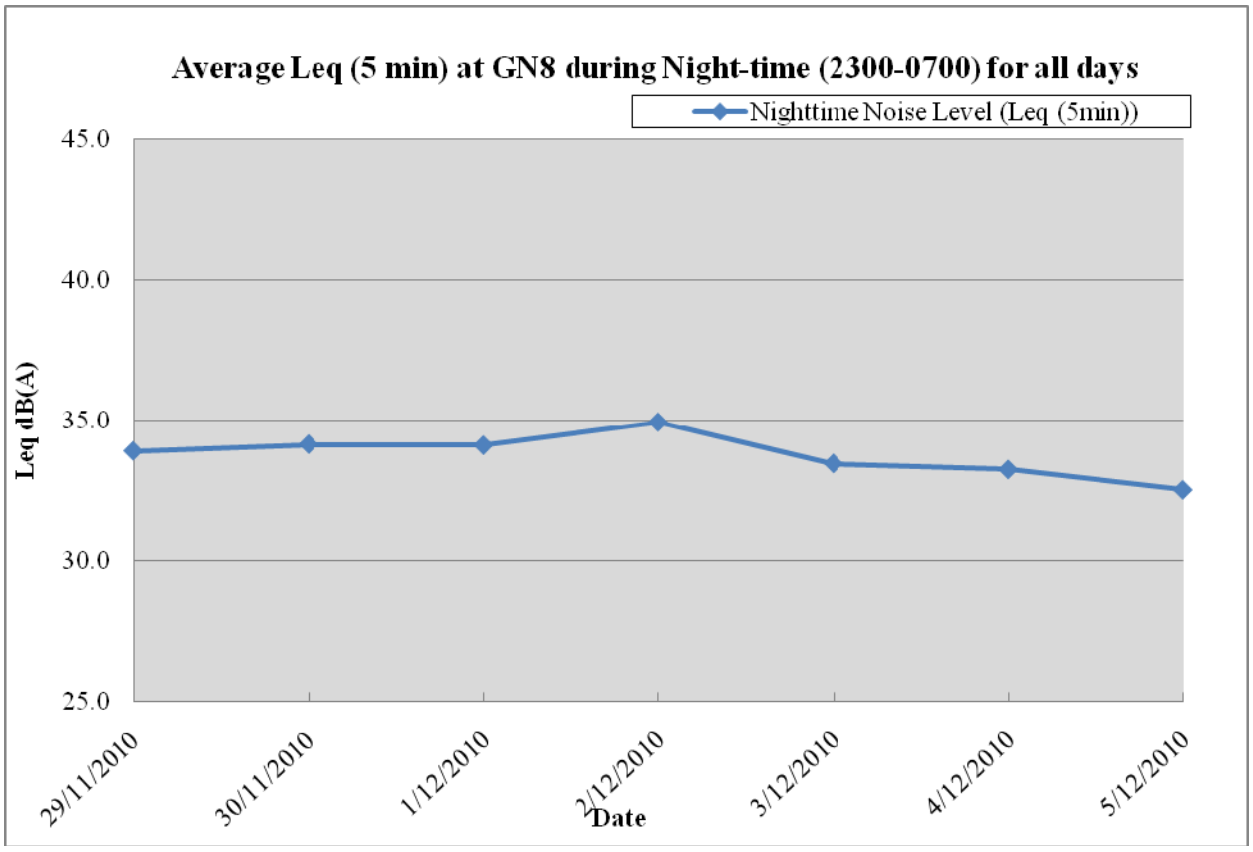
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
03:45-04:00	33.0	33.2	32.3
	32.6	32.7	31.9
	32.5	33.0	31.3
04:00-04:15	31.9	32.0	31.3
	32.5	32.6	31.7
	32.3	32.5	31.7
04:15-04:30	32.5	32.7	31.8
	32.6	32.7	31.7
	32.9	32.8	31.7
04:30-04:45	33.6	33.6	32.7
	33.2	33.4	32.5
	33.7	33.5	32.3
04:45-05:00	33.2	33.3	32.3
	32.9	33.0	32.2
	33.0	33.0	31.9
05:00-05:15	32.9	33.0	31.9
	32.8	32.7	31.8
	33.1	33.0	31.8
05:15-05:30	34.0	34.1	31.9
	33.3	33.8	31.8
	33.3	33.4	31.8
05:30-05:45	33.1	33.5	31.8
	33.2	34.0	31.8
	33.9	34.8	31.9
05:45-06:00	34.1	34.8	32.0
	34.2	35.3	32.0
	36.0	37.6	31.6
06:00-06:15	33.8	34.9	31.5
	35.6	37.2	32.1
	37.0	36.7	31.8
06:15-06:30	36.5	39.0	31.6
	35.9	37.1	31.8
	35.0	36.8	31.7
06:30-06:45	36.5	38.4	32.1
	35.5	36.5	33.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	36.1	37.7	32.7
06:45-07:00	36.1	38.1	32.6
	37.4	38.9	32.6
	36.7	37.8	32.2
Average	33.8	34.4	32.0
Max	37.4	39.0	33.0
Min	31.9	32.0	31.3

Log average was used.




Average Leq (5 min) at GN8 during Evening (1900-2300) for all days
Evening Noise Level (Leq (5min))
45.0
40.0
35.0
30.0
25.0
Leq dB(A)
29/11/2010
30/11/2010
1/12/2010
2/12/2010
3/12/2010
4/12/2010
5/12/2010
Date


Average Leq (5 min) at GN8 during Night-time (2300-0700) for all days
Nighttime Noise Level (Leq (5min))
45.0
40.0
35.0
30.0
25.0
Leq dB(A)
29/11/2010
30/11/2010
1/12/2010
2/12/2010
3/12/2010
4/12/2010
5/12/2010
Date

Baseline Ground-borne Noise Monitoring Result

Location: GN31 DD110 LOT 482, Wang Toi Shan
Baseline monitoring period: 7/1/2011 - 14/1/2011

Parameter: Leq
Time Slot Averaged Baselines

1) Weekdays Daytime Noise Level, dB(A)

Time slot	$L_{eq\ (30\ min)}$	$L_{10\ (30mins)}$	$L_{90\ (30\ mins)}$
07:00-07:30	50.4	51.6	45.8
07:30-08:00	50.9	52.1	46.7
08:00-08:30	51.2	52.6	47.2
08:30-09:00	52.1	53.5	48.8
09:00-09:30	52.9	54.3	50.1
09:30-10:00	53.1	54.4	50.2
10:00-10:30	53.2	54.5	50.5
10:30-11:00	53.0	54.2	50.3
11:00-11:30	53.1	54.3	50.3
11:30-12:00	52.6	53.9	49.5
12:00-12:30	51.7	53.1	48.1
12:30-13:00	51.4	52.8	47.2
13:00-13:30	51.9	53.0	48.0
13:30-14:00	53.1	54.5	50.2
14:00-14:30	53.4	54.6	50.5
14:30-15:00	53.2	54.4	50.4
15:00-15:30	53.3	54.6	50.6
15:30-16:00	53.2	54.6	50.4
16:00-16:30	53.2	54.6	50.4
16:30-17:00	53.3	54.8	50.2
17:00-17:30	53.4	54.8	50.0
17:30-18:00	52.7	54.1	48.9
18:00-18:30	51.9	53.3	47.8
18:30-19:00	51.0	52.2	46.8
Average	52.6	53.9	49.3
Max	53.4	54.8	50.6
Min	50.4	51.6	45.8

Noise Control Period Averaged Baselines

2) Weekdays Evening Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
19:00-19:15	50.0	51.6	45.6
	50.2	51.4	45.8
	50.5	51.7	45.8
19:15-19:30	51.9	51.9	45.8
	50.2	51.6	46.1
	50.1	51.3	45.9
19:30-19:45	50.3	51.7	45.9
	49.8	51.0	45.4
	50.0	51.1	45.7
19:45-20:00	49.8	51.0	45.5
	49.9	50.9	45.4
	50.1	51.4	45.5
20:00-20:15	50.0	50.8	45.3
	49.7	51.1	45.3
	49.8	50.9	45.3
20:15-20:30	49.8	51.0	45.2
	49.9	51.3	45.4
	50.2	51.5	45.5
20:30-20:45	49.7	51.1	45.3
	50.2	51.6	45.4
	49.8	50.9	45.2
20:45-21:00	49.5	50.8	45.1
	49.7	50.9	45.3
	49.5	50.9	45.1
21:00-21:15	49.6	50.9	45.2
	49.5	50.7	44.9
	49.5	50.7	45.1
21:15-21:30	50.1	51.0	45.2
	49.5	50.7	45.1
	49.6	50.8	44.9
21:30-21:45	49.4	50.4	44.9
	49.4	50.6	44.9

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	49.4	50.7	44.8
21:45-22:00	49.5	50.7	45.0
	49.5	50.4	44.8
	49.3	50.4	44.7
22:00-22:15	49.4	50.6	44.8
	49.3	50.5	44.6
	49.5	50.5	44.6
22:15-22:30	49.3	50.6	44.7
	49.8	50.6	45.0
	49.2	50.3	44.6
22:30-22:45	49.2	50.4	44.5
	49.3	50.4	44.7
	49.4	50.4	44.6
22:45-23:00	49.2	50.3	44.5
	49.2	50.3	44.5
	49.2	50.5	44.4
Average	50.4	51.6	45.8
Max	51.9	51.9	46.1
Min	49.2	50.3	44.4

3) General Holidays (including Sundays) (0700-2300) Noise Level, dB(A)

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
0700-07:15	51.4	52.5	46.5
	52.1	52.5	47.0
	51.4	52.5	47.0
07:15-07:30	51.7	53.0	47.5
	51.4	52.5	47.0
	51.4	52.5	47.0
07:30-07:45	52.0	53.0	47.0
	51.3	52.5	46.5
	51.6	52.5	47.0
07:45-08:00	51.4	52.5	46.5
	51.4	52.5	47.0
	51.3	52.5	46.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
08:00-08:15	51.5	52.5	47.0
	51.6	53.0	47.0
	52.2	53.0	47.0
08:15-08:30	51.6	52.5	47.0
	51.5	52.5	47.0
	52.4	53.5	47.5
08:30-08:45	51.5	53.0	47.0
	51.6	52.5	47.0
	52.0	52.5	47.0
08:45-09:00	51.8	53.0	47.5
	51.7	53.0	47.5
	51.9	53.0	47.5
09:00-09:15	51.6	53.0	47.5
	51.9	53.0	48.0
	51.9	53.0	47.5
09:15-09:30	51.8	53.0	47.5
	51.8	53.0	47.5
	52.1	53.5	48.0
09:30-09:45	52.0	53.5	48.0
	51.8	53.0	47.5
	52.0	53.0	47.5
09:45-10:00	51.6	53.0	47.0
	51.7	53.0	47.5
	52.6	54.0	48.0
10:00-10:15	52.1	53.5	47.5
	52.6	53.5	47.5
	51.8	52.5	47.0
10:15-10:30	51.9	53.0	47.5
	52.4	53.5	48.0
	52.4	53.5	47.5
10:30-10:45	51.7	53.0	47.5
	51.8	53.0	47.5
	52.2	53.5	48.0
10:45-11:00	52.1	53.0	48.0
	51.6	53.0	47.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	52.5	53.5	48.0
11:00-11:15	52.0	53.0	48.0
	51.5	52.5	47.0
	51.8	53.0	47.5
11:15-11:30	51.8	53.0	47.0
	51.7	53.0	47.5
	54.4	55.0	48.0
11:30-11:45	51.6	52.5	47.0
	51.8	53.0	47.5
	52.7	54.0	48.5
11:45-12:00	51.9	53.0	47.5
	51.6	53.0	47.0
	51.9	53.0	47.5
12:00-12:15	51.6	53.0	47.0
	52.1	53.0	47.5
	52.0	53.0	47.0
12:15-12:30	52.3	53.0	47.5
	52.0	53.0	47.5
	54.1	53.5	47.5
12:30-12:45	53.3	53.5	48.0
	53.0	53.5	48.0
	53.0	54.5	48.0
12:45-13:00	52.4	54.0	48.0
	56.1	56.0	48.0
	52.4	53.5	48.0
13:00-13:15	51.8	53.0	47.5
	51.9	53.0	47.5
	52.0	53.0	47.5
13:15-13:30	52.6	54.0	48.0
	53.8	55.5	49.0
	52.3	53.5	48.0
13:30-13:45	51.7	53.0	47.5
	52.0	53.0	47.5
	53.5	53.5	47.5
13:45-14:00	51.7	53.0	47.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	51.7	53.0	47.5
	51.7	53.0	47.5
14:00-14:15	52.4	53.5	47.5
	51.8	53.0	47.5
	51.8	53.0	47.5
14:15-14:30	52.0	53.0	47.0
	52.3	54.0	47.5
	51.5	52.5	47.0
14:30-14:45	52.8	53.0	47.5
	51.6	53.0	47.0
	51.9	53.0	47.5
14:45-15:00	52.3	53.5	47.5
	51.9	53.0	47.5
	52.6	54.5	48.0
15:00-15:15	51.8	53.0	47.5
	51.9	53.0	47.5
	51.6	53.0	47.0
15:15-15:30	60.4	61.0	49.5
	55.5	55.5	49.5
	56.5	53.0	47.5
15:30-15:45	54.0	56.0	48.5
	53.4	53.0	47.0
	52.0	53.5	47.5
15:45-16:00	51.7	53.0	47.0
	52.6	53.5	47.5
	51.8	53.0	47.5
16:00-16:15	53.0	53.0	47.5
	52.0	53.0	47.5
	51.8	53.0	47.0
16:15-16:30	52.4	53.5	48.0
	53.4	54.0	48.5
	52.7	54.0	48.5
16:30-16:45	55.1	54.0	48.0
	53.2	55.5	48.0
	52.5	53.5	48.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
16:45-17:00	52.9	54.5	48.5
	52.1	53.0	47.5
	51.9	53.0	47.5
17:00-17:15	51.6	52.5	47.0
	52.1	53.5	48.0
	51.5	52.5	47.0
17:15-17:30	51.7	53.0	47.5
	51.8	53.0	47.5
	52.4	53.0	47.5
17:30-17:45	52.2	53.5	48.0
	51.8	53.0	47.0
	52.7	54.0	48.0
17:45-18:00	52.0	53.0	47.5
	52.0	53.0	47.5
	51.8	53.0	47.5
18:00-18:15	52.4	53.0	47.5
	51.9	53.0	47.5
	51.7	53.0	47.0
18:15-18:30	51.8	53.0	47.5
	52.0	53.0	47.5
	51.6	53.0	47.0
18:30-18:45	51.8	53.0	47.5
	51.7	53.0	47.5
	51.5	52.5	47.0
18:45-19:00	51.6	53.0	47.5
	51.7	53.0	47.0
	51.6	53.0	47.0
19:00-19:15	51.6	53.0	47.0
	51.6	52.5	47.0
	52.4	53.0	47.0
19:15-19:30	52.3	53.0	47.5
	52.1	53.0	47.5
	51.7	53.0	47.0
19:30-19:45	51.4	52.5	46.5
	51.8	53.0	47.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	51.5	52.5	47.0
19:45-20:00	51.5	52.5	47.0
	51.8	53.0	47.0
	51.5	52.5	46.5
20:00-20:15	51.5	52.5	47.0
	51.8	53.0	47.0
	51.7	53.0	47.0
20:15-20:30	51.6	53.0	47.0
	52.1	53.0	47.5
	51.5	52.5	47.0
20:30-20:45	51.5	52.5	47.0
	51.5	52.5	47.0
	51.7	53.0	47.0
20:45-21:00	51.6	52.5	47.0
	51.5	52.5	47.0
	51.5	52.5	47.0
21:00-21:15	51.5	52.5	46.5
	51.8	53.0	47.0
	51.7	52.5	47.0
21:15-21:30	51.5	52.5	47.0
	51.8	52.5	47.0
	51.6	53.0	47.0
21:30-21:45	51.5	52.5	47.0
	51.6	52.5	47.0
	51.5	52.5	47.0
21:45-22:00	51.6	52.5	47.0
	51.7	53.0	47.0
	51.6	52.5	47.0
22:00-22:15	51.5	52.5	47.0
	51.8	53.0	47.0
	51.5	52.5	47.0
22:15-22:30	51.4	52.5	46.5
	51.6	52.5	47.0
	51.4	52.5	47.0
22:30-22:45	51.5	52.5	46.5

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	51.4	52.5	47.0
	51.5	52.5	47.0
22:45-23:00	51.7	52.5	47.0
	51.4	52.5	46.5
	51.3	52.5	46.5
Average	52.2	53.2	47.4
Max	60.4	61.0	49.5
Min	51.3	52.5	46.5

4) Night-time (for all days) Noise Level, dB(A)

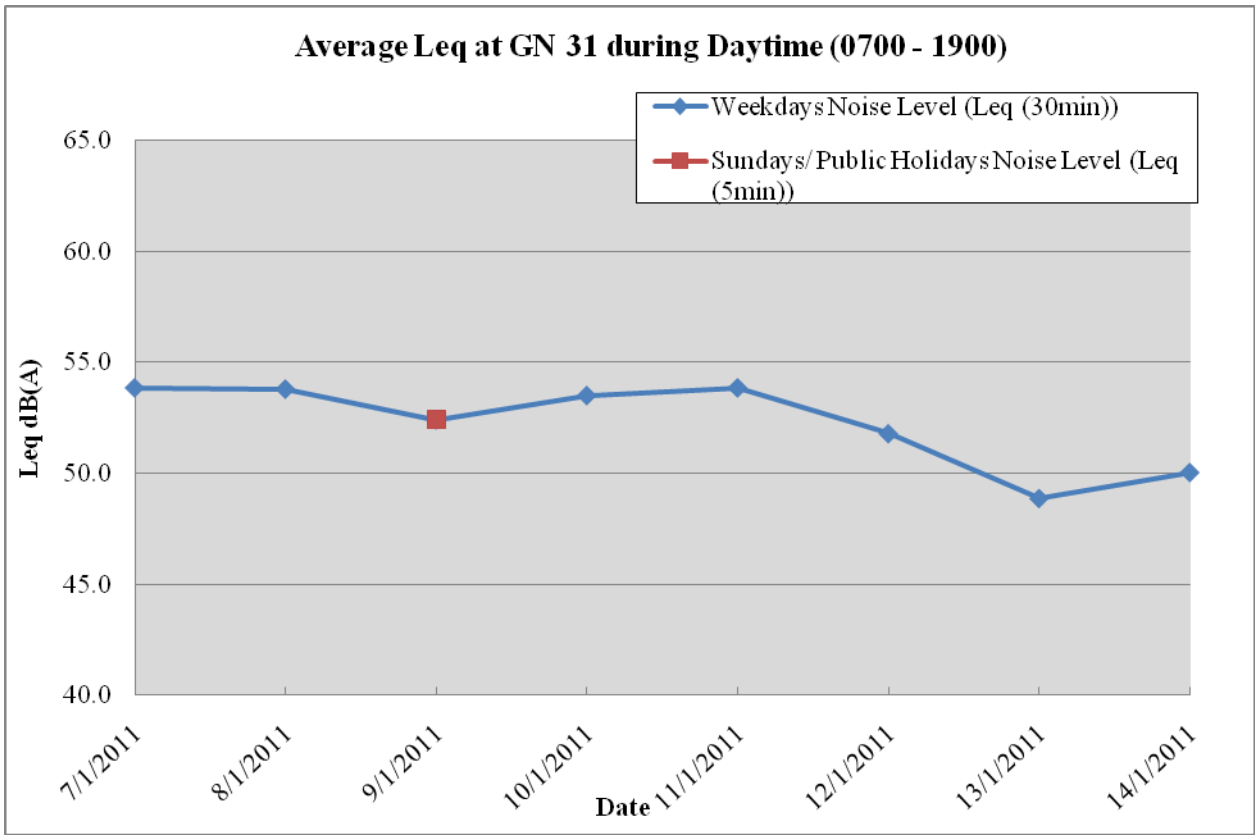
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
23:00-23:15	50.2	51.4	45.5
	50.1	51.2	45.4
	50.1	51.2	45.5
23:15-23:30	50.2	51.4	45.2
	50.1	51.2	45.5
	50.1	51.3	45.2
23:30-23:45	50.2	51.4	45.4
	50.0	51.2	45.2
	49.9	51.1	45.1
23:45-00:00	50.0	51.2	45.2
	50.0	51.2	45.1
	50.0	51.1	45.3
00:00-00:15	50.1	51.2	45.1
	49.9	51.1	45.1
	50.0	51.1	45.2
00:15-00:30	50.0	51.1	45.0
	50.3	51.8	45.6
	50.1	51.3	45.4
00:30-00:45	50.3	51.5	46.3
	50.1	51.3	45.7
	50.0	51.3	45.3
00:45:01:00	50.1	51.2	45.4
	50.0	51.2	45.2

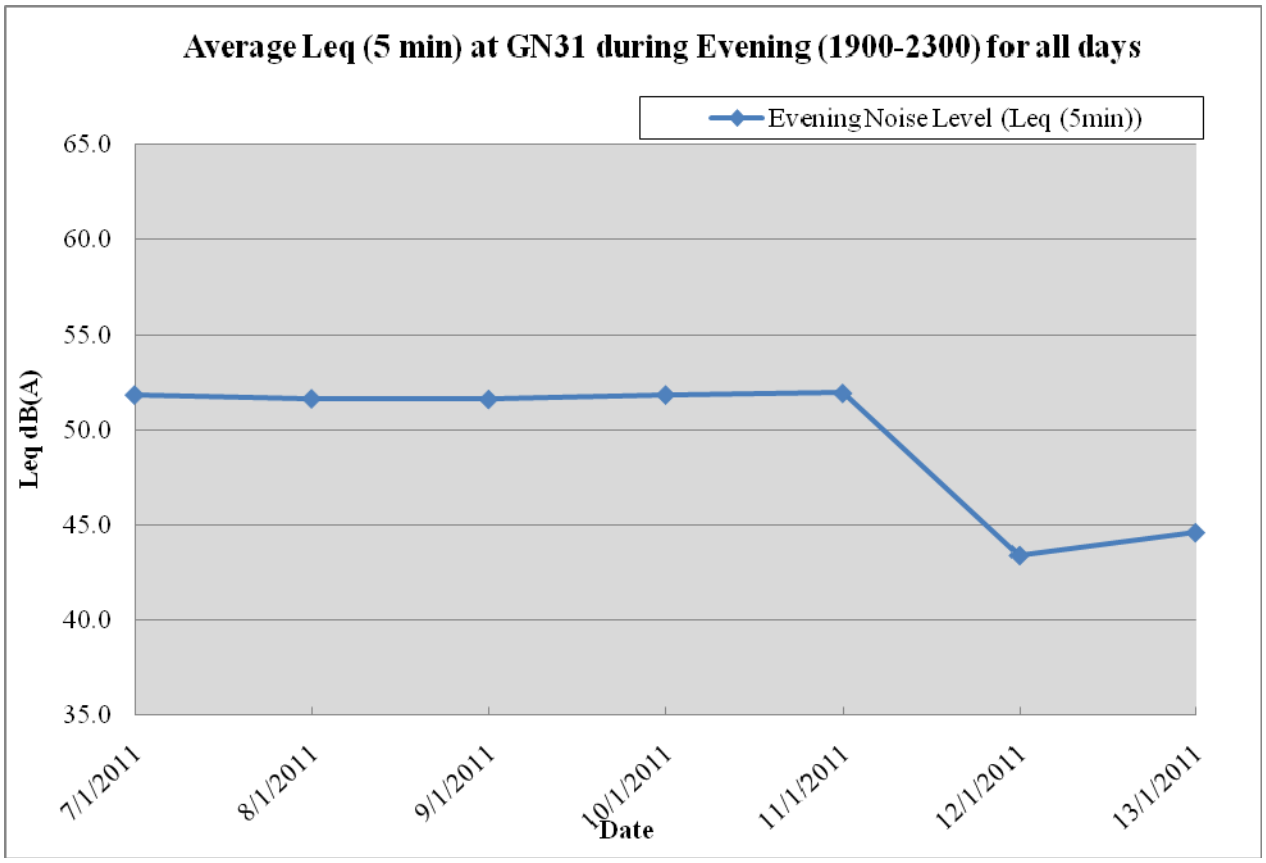
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	49.9	51.1	44.9
01:00-01:15	50.0	51.2	44.9
	49.8	51.1	44.8
	49.9	51.1	44.9
01:15-01:30	49.8	51.1	44.6
	49.9	51.2	44.8
	50.0	51.1	44.9
01:30-01:45	49.8	51.1	44.7
	49.8	51.1	44.6
	49.8	51.1	44.7
01:45-02:00	49.8	51.1	44.8
	49.8	51.1	44.8
	49.8	51.1	44.7
02:00-02:15	49.8	51.1	44.8
	49.9	51.3	45.2
	50.1	51.3	45.4
02:15-02:30	50.0	51.3	45.2
	49.8	51.1	44.7
	49.7	51.1	44.6
02:30-02:45	49.8	51.1	44.6
	49.8	51.1	44.7
	50.0	51.6	45.0
02:45-03:00	50.0	51.3	45.3
	49.8	51.1	44.7
	49.7	51.1	44.6
03:00-03:15	49.7	51.1	44.6
	49.7	51.1	44.5
	49.7	51.1	44.6
03:15-03:30	49.7	51.1	44.5
	49.8	51.1	44.6
	49.7	51.1	44.5
03:30-03:45	49.7	51.1	44.6
	49.7	51.1	44.6
	49.7	51.1	44.6
3:45-04:00	49.8	51.1	44.7

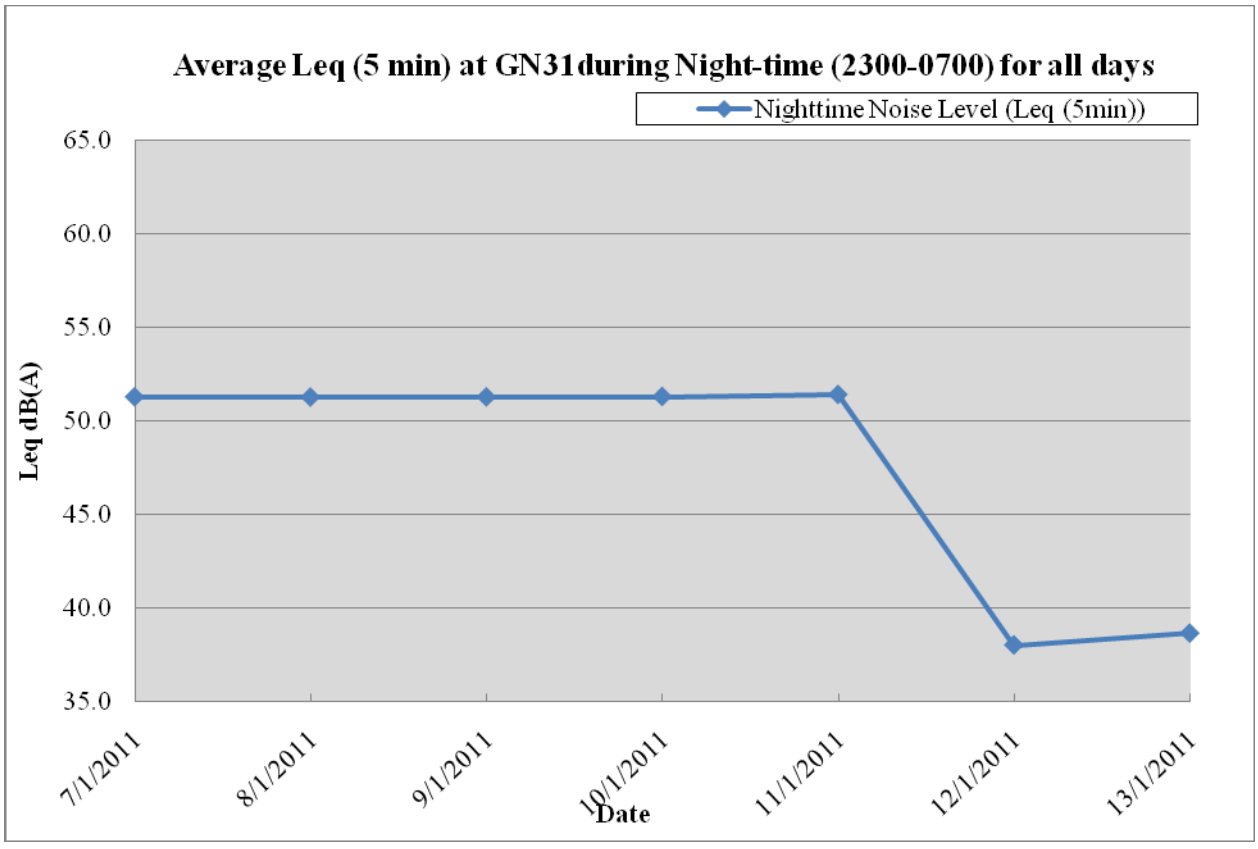
Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
	49.8	51.1	44.8
	49.8	51.1	44.7
04:00-04:15	49.8	51.1	44.6
	49.7	51.1	44.6
	49.7	51.1	44.7
04:15-04:30	49.7	51.1	44.6
	49.8	51.1	44.7
	49.7	51.1	44.7
04:30-04:45	49.8	51.1	44.7
	49.7	51.1	44.5
	49.8	51.1	44.7
04:45-05:00	49.8	51.1	44.6
	49.9	51.2	44.7
	49.9	51.1	44.6
05:00-05:15	49.7	51.1	44.5
	49.8	51.1	44.6
	49.8	51.1	44.6
05:15-05:30	49.7	51.1	44.6
	49.7	51.1	44.6
	49.7	51.1	44.6
05:30-05:45	49.7	51.1	44.6
	49.7	51.1	44.6
	49.8	51.2	44.7
05:45-06:00	49.7	51.1	44.6
	49.8	51.2	44.7
	49.8	51.2	44.8
06:00-06:15	49.8	51.2	44.7
	50.0	51.2	45.3
	50.1	51.5	45.7
06:15-06:30	50.8	51.9	45.6
	50.3	51.2	45.1
	50.0	51.2	45.2
06:30-06:45	50.4	51.3	45.2
	50.0	51.2	45.3
	50.0	51.2	45.0

Time Slot	$L_{eq\ (5\ min)}$	$L_{10\ (5mins)}$	$L_{90\ (5\ mins)}$
06:45-07:00	50.2	51.4	45.5
	50.4	51.7	45.5
	50.1	51.2	45.4
Average	49.9	51.2	45.0
Max	50.8	51.9	46.3
Min	49.7	51.1	44.5

Log average was used.




Average Leq (5 min) at GN31 during Evening (1900-2300) for all days
Evening Noise Level (Leq (5min))
65.0
60.0
55.0
50.0
45.0
40.0
35.0
Leq dB(A)
7/1/2011
8/1/2011
9/1/2011
10/1/2011
11/1/2011
12/1/2011
13/1/2011
Date


Average Leq (5 min) at GN31during Night-time (2300-0700) for all days
Nighttime Noise Level (Leq (5min))
65.0
60.0
55.0
50.0
45.0
40.0
35.0
Leq dB(A)
7/1/2011
8/1/2011
9/1/2011
10/1/2011
11/1/2011
12/1/2011
13/1/2011
Date

Appendix B

Calibration Certificates for Monitoring Equipments

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533
HOKLAS 028

CERTIFICATE OF CALIBRATION

Certificate No.: 10CA0708 04-01 **Page:** 1 **of** 2

Item tested

Description:	Acoustical Calibrator (Class 1)
Manufacturer:	B&K
Type/Model No.:	4231
Serial/Equipment No.:	1790985 / N004.01
Adaptors used:	-

Item submitted by

Curstomer:	AECOM ASIA CO. LTD
Address of Customer:	-
Request No.:	-
Date of request:	08-Jul-2010

Date of test: 14-Jul-2010

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	02-Jul-2011	SCL
Preamplifier	B&K 2673	2239857	15-Dec-2010	CEPREI
Measuring amplifier	B&K 2610	2346941	11-Dec-2010	CEPREI
Signal generator	DS 360	61227	24-Jun-2011	CEPREI
Digital multi-meter	34401A	US36087050	03-Dec-2010	CIGISMEC
Audio analyzer	8903B	GB41300350	07-Dec-2010	CEPREI
Universal counter	53132A	MY40003662	05-Jul-2011	CEPREI

Ambient conditions

Temperature:	22 ± 1 °C
Relative humidity:	60 ± 5 %
Air pressure:	1000 ± 5 hPa

Test specifications

1, The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.

2, The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.

3, The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 14-Jul-2010 **Company Chop:**

SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the conditon of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation. Such terms of accreditation stipulate that the results shall be traceable to the International System of Units (S.I.) or recognised measurement standards. This certificate shall not be reproduced except in full.

綜合試驗有限公司
SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong.
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓
E-mail: smec@cigismec.com Website: www.cigismec.com
Tel : (852) 2873 6860
Fax : (852) 2555 7533
HOKLAS 028

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 10CA0708 04-01 **Page:** 2 of 2

1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

(Output level in dB re 20 μPa)

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	Estimated Uncertainty dB
1000	94.00	94.06	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz **STF = 0.002 dB**

Estimated uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz **Actual Frequency = 999.8 Hz**

Estimated uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz **TND = 0.7%**

Estimated uncertainty 0.7%

The uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95 %. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: C.Y. Fung **Checked by:**
Date: 14-Jul-2010 **Date:** 14-Jul-2010

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories. The results shown in this certificate were determined by this laboratory in accordance with its terms of accreditation. Such terms of accreditation stipulate that the results shall be traceable to the International System of Units (S.I.) or recognised measurement standards. This certificate shall not be reproduced except in full.

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SOILS & MATERIALS ENGINEERING CO., LTD.
G/F., 9/F., 12/F., 13/F. & 20/F., Leader Centre, 37 Wong Chuk Hang Road, Aberdeen, Hong Kong. Tel : (852) 2873 6860
香港黃竹坑道37號利達中心地下，9樓，12樓，13樓及20樓 Fax : (852) 2555 7533
E-mail: smec@cigismec.com Website: www.cigismec.com

HOKLAS 028

CERTIFICATE OF CALIBRATION

Certificate No.: 10CA0313 05-03 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2238	,	4188
Serial/Equipment No.:	2285692	,	2565556
Adaptors used:	-	,	-

Item submitted by

Customer Name:	AECOM ASIA CO., LTD.
Address of Customer:	-
Request No.:	-
Date of request:	13-Mar-2010

Date of test: 15-Mar-2010

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	12-Jan-2011	CIGISMEC
Signal generator	DS 360	33873	22-Jun-2010	CEPREI
Signal generator	DS 360	61227	22-Jun-2010	CEPREI

Ambient conditions

Temperature:	(22 ± 1) °C
Relative humidity:	(60 ± 10) %
Air pressure:	(1010 ± 5) hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 27-Mar-2010 **Company Chop:**

SOILS & MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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HOKLAS 028

CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 10CA0313 05-03 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Uncertainty (dB) / Coverage Factor	
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Uncertainty (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

3, Response to associated sound calibrator

N/A

The uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95 %. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: C.Y. Fung **Checked by:**
Date: 15-Mar-2010 **Date:** 27-Mar-2010

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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HKLAS 028

CERTIFICATE OF CALIBRATION

Certificate No.: 10CA0724 01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2238	,	4188
Serial/Equipment No.:	2255677	,	2250455
Adaptors used:	-	,	- -

Item submitted by

Customer Name:	AECOM ASIA CO., LTD.
Address of Customer:	-
Request No.:	-
Date of request:	24-Jul-2010

Date of test: 26-Jul-2010

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	12-Jan-2011	CIGISMEC
Signal generator	DS 360	33873	28-Jun-2011	CEPREI
Signal generator	DS 360	61227	24-Jun-2011	CEPREI

Ambient conditions

Temperature:	(21 ± 1) °C
Relative humidity:	(60 ± 5) %
Air pressure:	(1000 ± 5) hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 26-Jul-2010 **Company Chop:** SOILS AND MATERIALS ENGINEERING COMPANY LTD. 綜合試驗有限公司

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 10CA0724 01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Uncertainty (dB) / Coverage Factor	
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Uncertainty (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

3, Response to associated sound calibrator

N/A

The uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95 %. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: C.Y. Fung **Checked by:**
Date: 26-Jul-2010 **Date:** 26-Jul-2010

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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HOKLAS 026

CERTIFICATE OF CALIBRATION

Certificate No.: 10CA0728 02-01 **Page** 1 **of** 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2238	,	4188
Serial/Equipment No.:	2255680	,	2250447
Adaptors used:	-	,	-

Item submitted by

Customer Name:	AECOM ASIA CO., LTD.
Address of Customer:	-
Request No.:	-
Date of request:	28-Jul-2010

Date of test: 29-Jul-2010

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	12-Jan-2011	CIGISMEC
Signal generator	DS 360	33873	28-Jun-2011	CEPREI
Signal generator	DS 360	61227	24-Jun-2011	CEPREI

Ambient conditions

Temperature:	(21 ± 1) °C
Relative humidity:	(60 ± 5) %
Air pressure:	(1000 ± 5) hPa

Test specifications

1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.

2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.

3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsess of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory: Huang Jian Min/Feng Jun Qi **Date:** 29-Jul-2010 **Company Chop:** 綜合試驗有限公司 SOILS & MATERIALS ENGINEERING COMPANY LTD.

Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.

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CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 10CA0728 02-01 **Page** 2 **of** 2

1, Electrical Tests

The electrical tests were perfomed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status: -	Uncertainty (dB) / Coverage Factor	
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	2.1
	Lin	Pass	1.6	2.2
Linearity range for Leq	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range , Step 5 dB at 4 kHz	Pass	0.3	
Frequency weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Time weightings	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100μs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor $1/10^3$ at 4kHz	Pass	0.3	
	1 ms burst duty factor $1/10^4$ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Uncertainty (dB) / Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3
	Weighting A at 8000 Hz	Pass	0.5

3, Response to associated sound calibrator

N/A

The uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95 %. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by: C.Y. Fung **Checked by:**
Date: 29-Jul-2010 **Date:** 29-Jul-2010

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.

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Appendix C

Figures

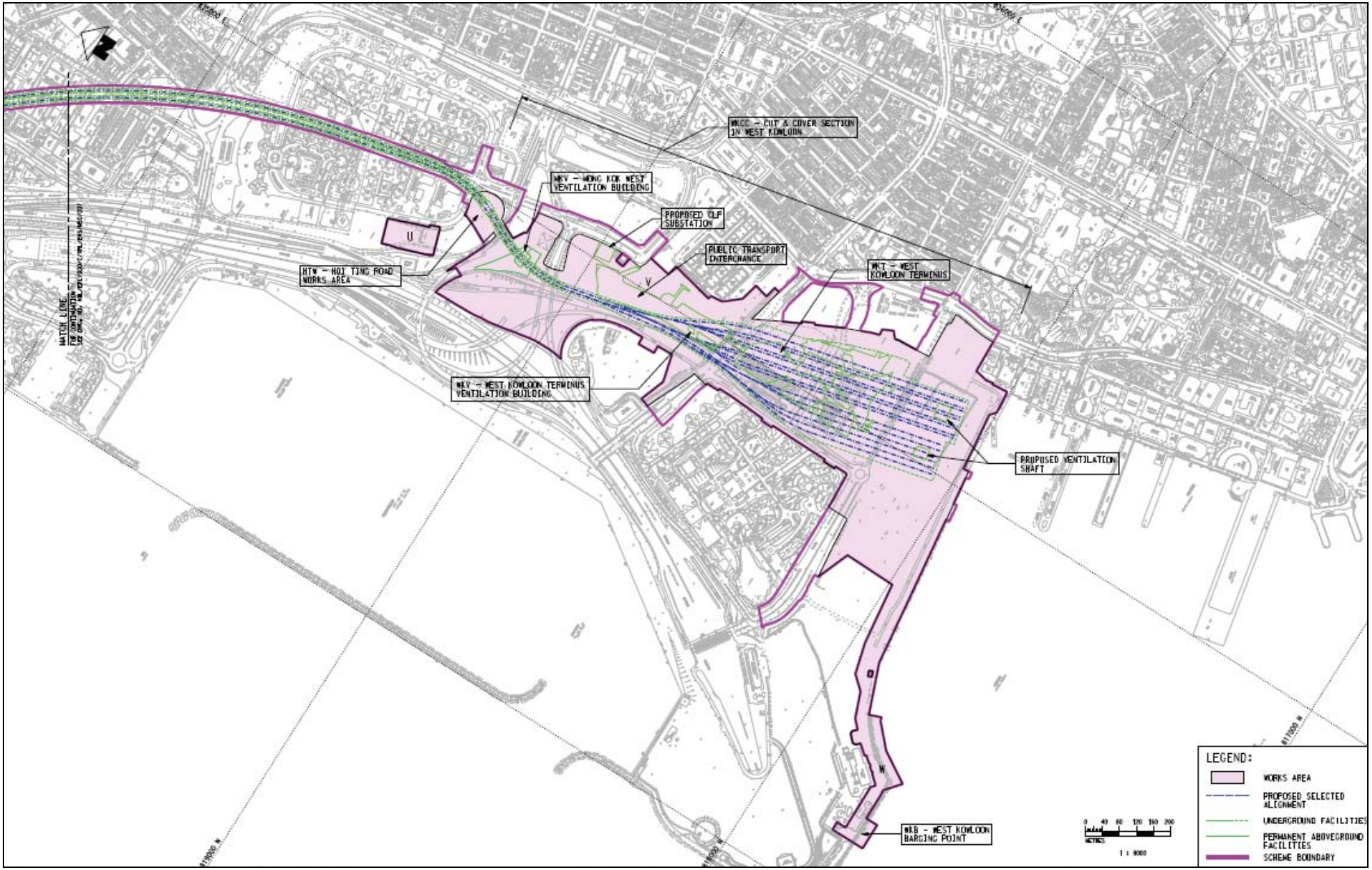


Figure 1A - Alignment of the Project
(Mongkok West and West Kowloon)

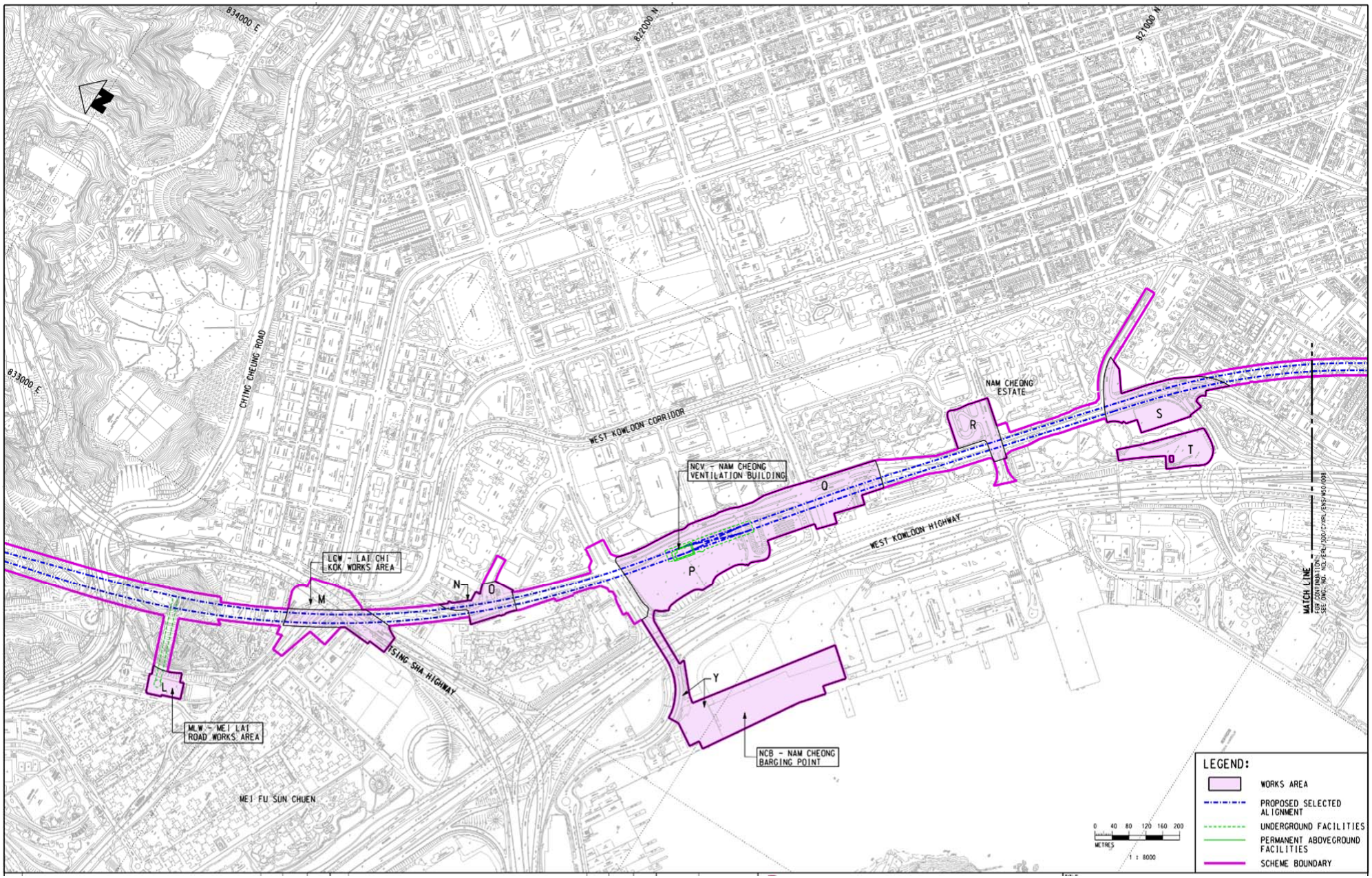


Figure 1B - Alignment of the Project (Tai Kok Tsui and Nam Cheong)

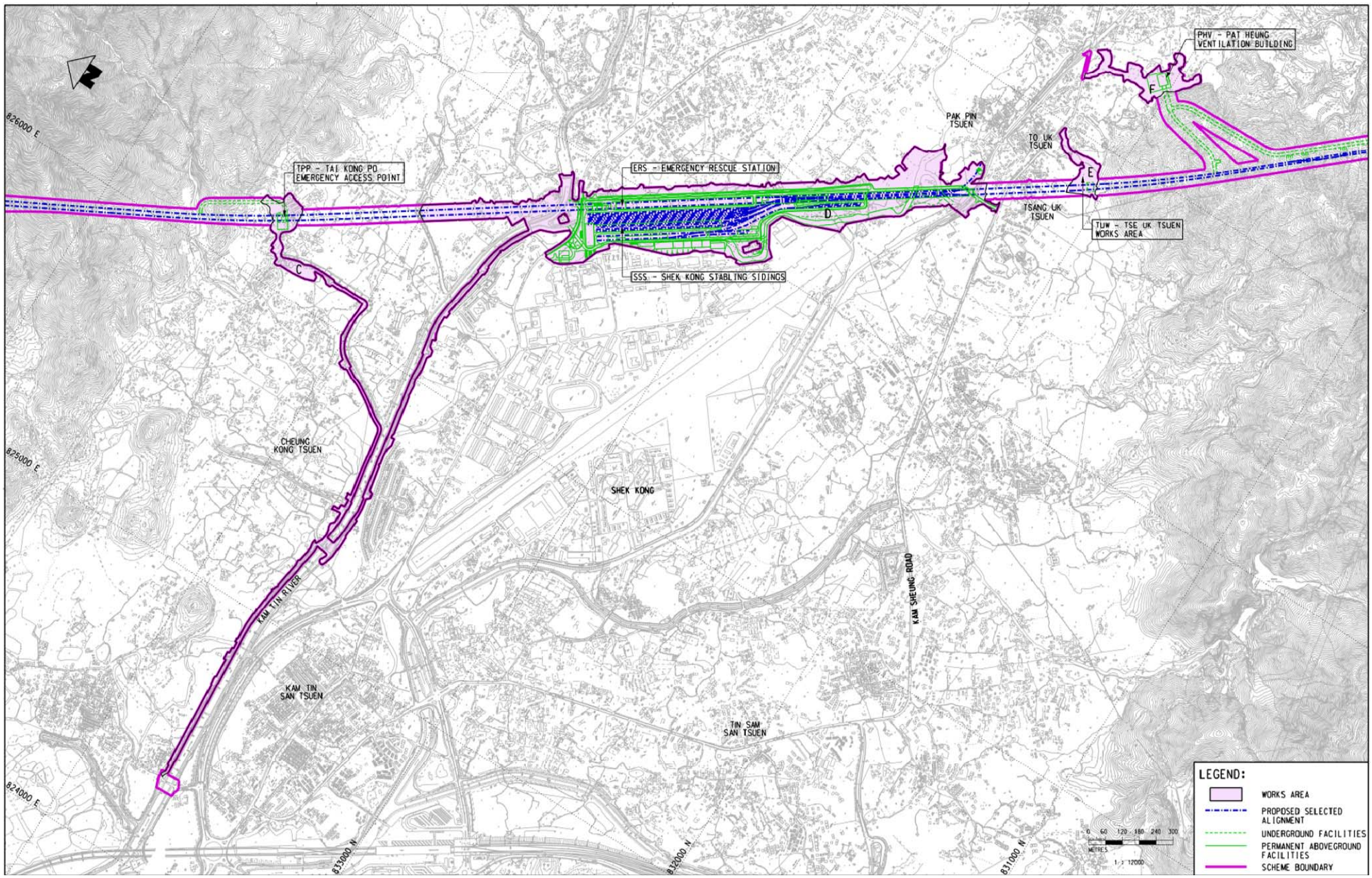


Figure 1C - Alignment of the Project (Shek Kong)

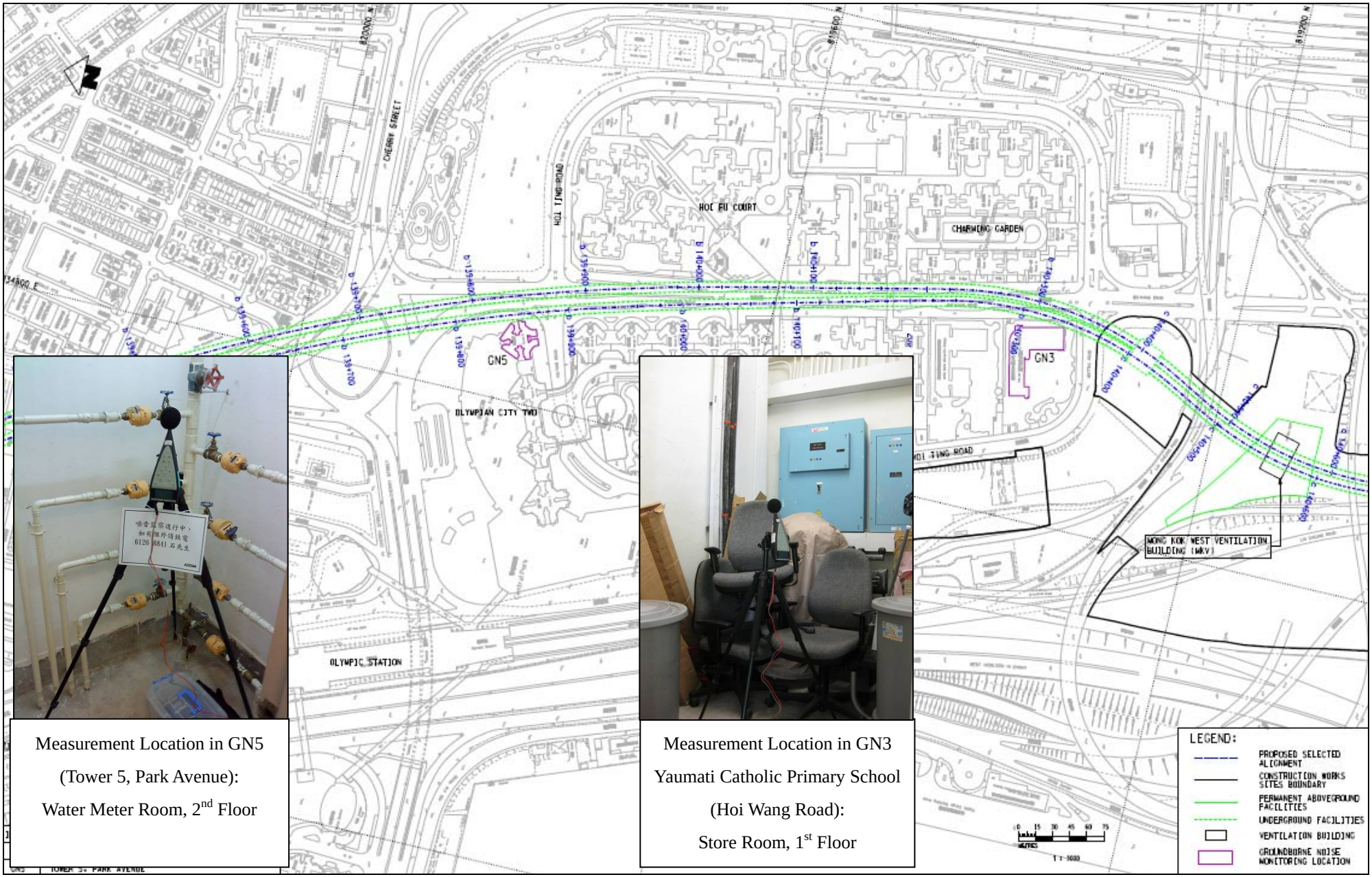
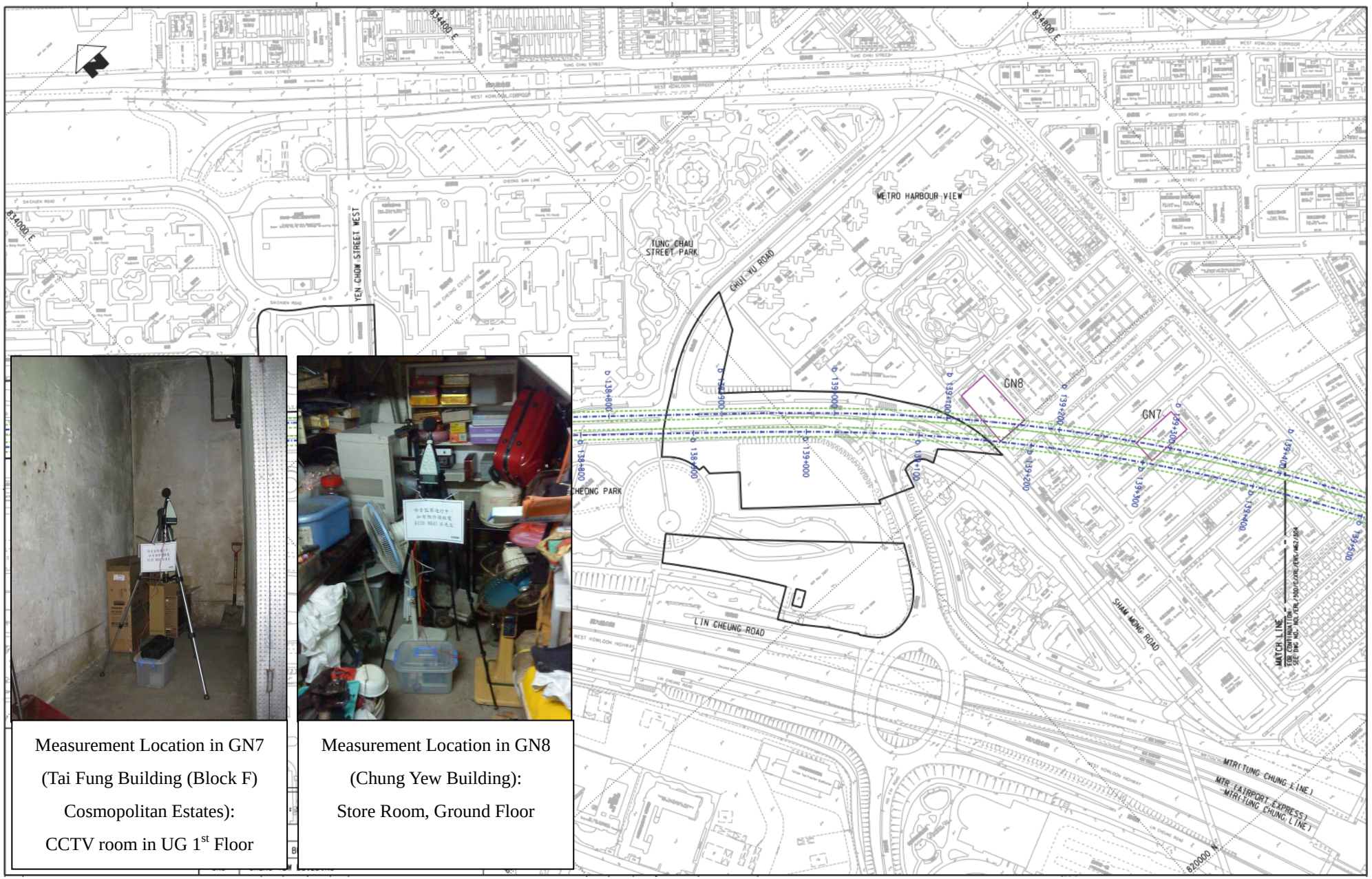


Figure 2A - Ground-borne Noise Monitoring Locations

Remarks: All measurement location are located approximately at the centre of the room.

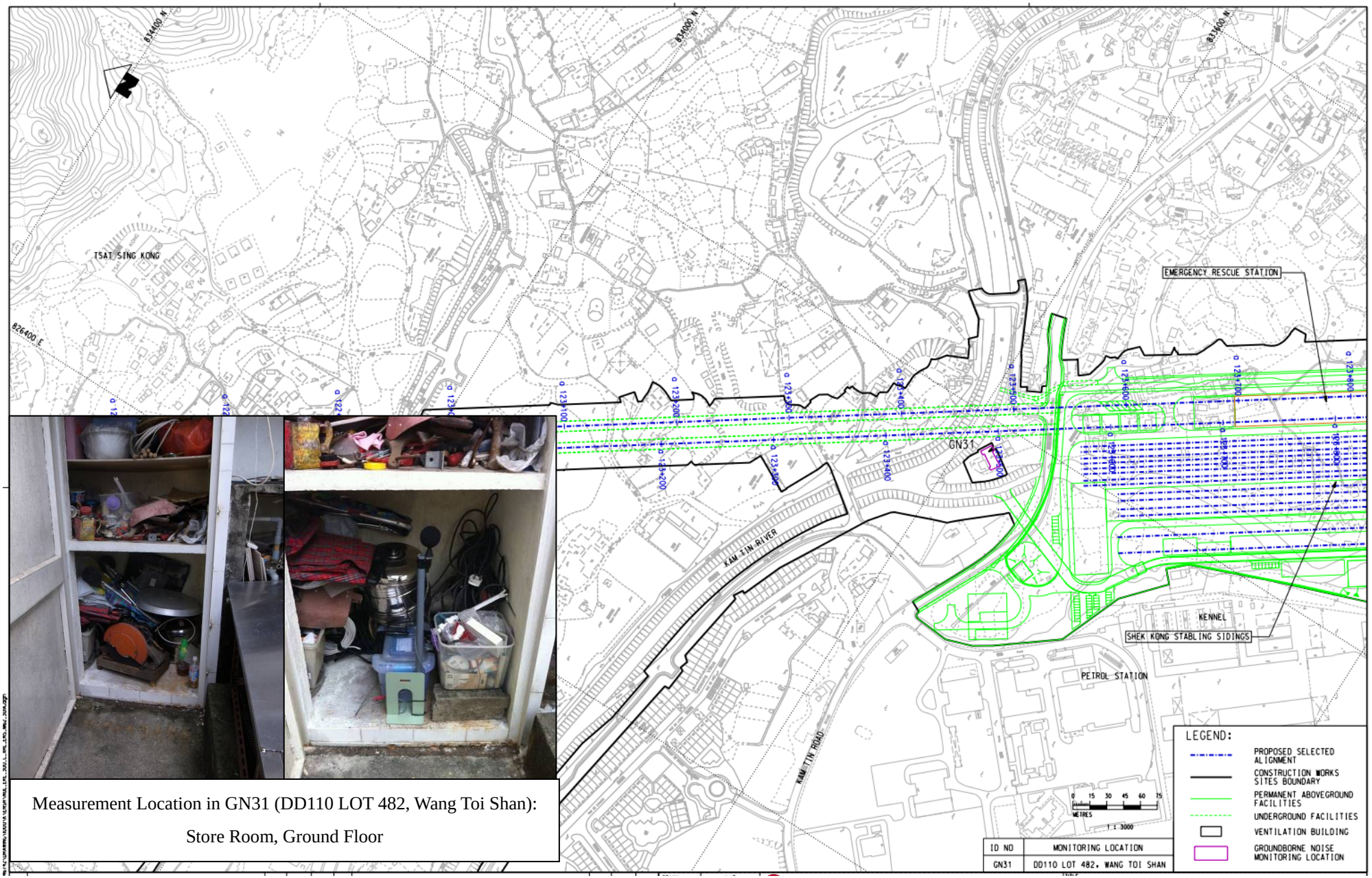


Measurement Location in GN7
(Tai Fung Building (Block F)
Cosmopolitan Estates):
CCTV room in UG 1st Floor

Measurement Location in GN8
(Chung Yew Building):
Store Room, Ground Floor

Figure 2B - Ground-borne Noise Monitoring Locations

Remarks: All measurement location are located approximately at the centre of the room.



Measurement Location in GN31 (DD110 LOT 482, Wang Toi Shan):

Store Room, Ground Floor

Figure 2C - Ground-borne Noise Monitoring Locations

Remarks: All measurement location are located approximately at the centre of the room.