

**Erection of a Temporary Wind Monitoring Station
at Pottinger Peak - Project Profile**

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**Submitted by:
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Table of Contents

1	BASIC INFORMATION.....	1
1.1	PROJECT TITLE.....	1
1.2	PURPOSE AND NATURE OF PROJECT	1
1.3	NAME OF PROJECT PROPONENT.....	1
1.4	LOCATION & SCALE OF PROJECT AND HISTORY OF SITE.....	1
1.5	NUMBER AND TYPES OF DESIGNATED PROJECTS COVERED BY THE PROJECT PROFILE	2
1.6	NAME AND TELEPHONE NUMBER OF CONTACT PERSONS	2
2	OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME	2
2.1	GENERAL.....	2
2.2	PROJECT TIME-TABLE	2
2.3	INTERACTIONS WITH OTHER PROJECTS	2
3	POSSIBLE IMPACT ON THE ENVIRONMENT.....	3
3.1	AIR QUALITY.....	3
3.2	NOISE	3
3.3	WATER QUALITY	3
3.4	WASTE MANAGEMENT.....	4
3.5	ECOLOGY.....	4
3.6	LANDSCAPE AND VISUAL IMPACT	4
4	MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT.....	5
4.1	GENERAL.....	5
4.2	EXISTING SENSITIVE RECEIVERS	5
4.3	ECOLOGY.....	5
5	ENVIRONMENTAL PROTECTION MEASURE TO BE INCORPORATED IN THE DESIGN AND OTHER ENVIRONMENTAL IMPLICATIONS.....	7
5.1	GENERAL.....	7
5.2	CONSTRUCTION METHOD	7
5.3	NOISE, WATER & AIR QUALITY	7
5.4	LANDSCAPE AND VISUAL IMPACT	8
5.5	ECOLOGY.....	8
6	REFERENCE TO PREVIOUSLY APPROVED EIA REPORTS	9
	FIGURES AND ANNEX 1.....	10

1 BASIC INFORMATION

1.1 Project Title

'Erection of a Temporary Wind Monitoring Station at Pottinger Peak'.

1.2 Purpose and Nature of Project

The main purpose of the proposed temporary wind monitoring station (the Station) is to collect wind speed, wind direction and air temperature data so as to characterise wind energy resource profiles in eastern coastal regions of Hong Kong for one year. Wind speed data are the most important indicators of wind energy resource. Measurement will be taken at different heights (wind anemometers at 30m, 40m and 50m above ground level), for determining wind shear characteristics and turbulence at the proposed location.

The proposed work involves the construction, operation, maintenance and decommissioning of a wind monitoring station at Pottinger Peak, Hong Kong Island. A 13-month wind monitoring cycle is considered appropriate to determine the diurnal and seasonal variability of the wind regime at the location. Inclusive of the time for erection and decommissioning of the Station, maximum period of site occupation will be 15 months.

1.3 Name of Project Proponent

Energy Efficiency Office, Electrical and Mechanical Services Department (EMSD) of the Hong Kong Special Administrative Region Government.

1.4 Location & Scale of Project and History of Site

1.4.1 Location

The proposed location for the Station is at +200mPD resting on natural terrain, on a east facing aspect of the ridgeline that rises towards a hill (+228mPD) within the Shek O Country Park, as shown in **Figure 1**. The site is outside the areas reachable by the walking trails.

1.4.2 Scale

The Station is a tilt-up guyed tubular tower 152mm in diameter, and 50m in height. Wind anemometers, wind direction vanes, a temperature sensor, a data logger, and an equipment enclosure will be mounted on the tower (see **Figure 2**). The tower is rested on a steel base plate that does not need a foundation, and is held by guy wires attached to four inner guy anchors and four outer guy anchors at radii of 30.5m and 33.5m respectively. Two additional anchors will also be required for setting up the tower. Subject to the results of the ground investigation, it is expected that a total of 10 rock anchor points would be needed for securing the tower, and each rock anchor would be placed in a pre-drilled hole (45mm diameter and 400mm depth) on bedrock (see **Figure 3**). There are also other alternative anchoring systems that could be used for securing the tower. The most common alternative is to place concrete anchor in an excavated hole at the anchor position. The four anchor corners will form a work boundary with dimensions 55m × 55m, as shown in **Figure 4**.

During operation the site will be visited twice a month. After 13-month monitoring period, the Station will be dismantled and removed from the location.

1.5 Number and Types of Designated Projects Covered by the Project Profile

This project is designated under item Q.1 of Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance, as the site is within an existing country park, namely Shek O Country Park.

1.6 Name and Telephone Number of Contact Persons

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2 OUTLINE OF PLANNING AND IMPLEMENTATION PROGRAMME

2.1 General

Electrical and Mechanical Services Department (EMSD) is responsible for the planning and supervision of the proposed project. The proposed works will be implemented by EMSD's contractor.

2.2 Project Time-Table

The programme for the proposed work is as follows:

- Planning/Approval and Design up to February/March 2004
- Construction and Commissioning March 2004
- Operation March 2004 to April 2005
- Decommissioning May 2005

2.3 Interactions with Other Projects

There is no known interaction with other projects in the vicinity of the proposed location.

3 POSSIBLE IMPACT ON THE ENVIRONMENT

The potential environmental impacts that may arise from the construction and operation of the Station are reviewed in this section.

3.1 Air Quality

3.1.1 Construction Phase

As fugitive dust emissions arising from drilling of rock anchor holes would be the only source of air emissions, no significant air impacts are anticipated given the small scale of the works. In respect to dust suppression, mitigation measures according to the Air Pollution Control (Construction Dust) Regulation will be implemented where necessary.

3.1.2 Operation Phase

No air emissions are anticipated during operation.

3.2 Noise

3.2.1 Construction Phase

As the only mechanical equipment to be used would be an electric rock drill powered by a portable generator set which is used to set the anchor points, there will not be any potential noise issues associated with the construction activities (see Annex 1 for the predicated construction noise level at NSR). Also all the construction activities will only be carried out between 8:00 am and 6:00 pm.

3.2.2 Operation Phase

No noise emissions are expected from any of the components of the Station during operation.

3.3 Water Quality

3.3.1 Construction Phase

The soil generated from drilling of anchor holes will be properly handled to ensure that there will be no water quality impacts from surface run-off arising from rainfall.

Given the scale and duration of the construction works, there will be no sewerage impacts from the construction workforce (likely to include only a few workers). Also the generation of liquid chemical waste such as fuel and oil is not anticipated from the works.

3.3.2 Operation Phase

No water quality issues are expected from the Station during operation.

3.4 Waste Management

3.4.1 Construction Phase

During construction, small quantities of packaging materials (e.g. plastic wrapping) will be generated from the site. Such waste materials will be properly removed from the site for reuse/recycle or disposal at landfills. The generation of chemical wastes is not anticipated from construction plant and equipment.

3.4.2 Operation Phase

There will be no personnel permanently stationed at the site, hence no significant environmental issues are expected.

3.5 Ecology

3.5.1 Construction Phase

The proposed location of the Station is considered a typical low shrub-land habitat on hillside. During construction, there will be some environmental impact on the vegetation communities due to drilling of rock anchor holes. The affected plants during construction would be re-colonised after decommissioning of the Station. As identified in survey, no endangered or rare species were recorded at the site and there will be no anticipated ecological impact.

3.5.2 Operation Phase

Access to site for regular inspection and maintenance will be made mainly via the existing footpaths and trails and at very limited intervals, about twice a month. Therefore there will not be any environmental effect on the vegetation community.

During site survey, two Black-eared Kites *Milvus lineatus* were observed soaring on air currents above the proposed site. No other animals were seen at the site. The site is apparently exposed to a strong wind impact and not favourable for animal inhabitation. The tower can be considered a low collision risk for birds, particularly when birds are locally resident and become familiar with the tower location. It is not known if the guy wires may pose a risk to kites, which may be injured if they hunt in proximity to the monitoring station and collide with a guy wire. However, two factors will make this risk very small. Firstly, kites have exceptional eyesight for hunting. Secondly, during times of poor visibility such as bad weather the hunting activity of the birds will decrease. Therefore, it is anticipated that birds will avoid collision with the Station when it is in use. No significant environmental issues are anticipated.

3.6 Landscape and Visual Impact

3.6.1 Construction Phase

The proposed works include the construction of 10 rock anchors and a baseplate for the erection of the Station. There will be minor adverse landscape impact due to the loss of approximately 10m² of typical low shrub-land habitat.

3.6.2 Operation Phase

The Station will be visible to the occupants of Cape Collinson Correctional Institution. Although the Station will also be visible to hikers who walking along the trails through the Country Park (see **Figure 7**), there will not be any significant impact because of its non-permanent nature.

4 MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1 General

The proposed location for the Station is at +200mPD resting on natural terrain where is on the eastern-most area of Hong Kong Island, about 350m from the nearest occupied building (Cape Collinson Correctional Institution).

4.2 Existing Sensitive Receivers

Due to the remote hilltop location there are no sensitive receivers in close proximity to the Station. The main local sensitive receivers will be the hikers walking along the footpaths and trails through the Country Park, but they are transitory in nature. The main permanent sensitive receivers from the Station are mostly residential in nature and are located at a considerable distance and lower elevation towards the south (i.e. Cape Collinson Correctional Institution) and the north (i.e. the residential areas of Siu Sai Wan). The nearest permanent visual sensitive receiver is the Cape Collinson Correctional Institution which is located at a distance of approximately 350m from the Station.

4.3 Ecology

The proposed location is a typical low shrub-land habitat on hillside with dense plant coverage (see **Figure 8**). Vegetation comprises several shrubs, grasses, climbers, ferns and a few small trees. The flora is a typical *Dicranopteris pedata* - *Rhodomyrtus tomentosa* - *Eurya japonica* community (see **Figure 9**) which can be easily found in Hong Kong.

In total, 50 species of plants were recorded during the survey, and a list of those species is given in **Table 1**. All recorded plants are commonly found in Hong Kong except one small tree *Podocarpus macrophyllus*, which is an uncommon plant in natural habitat. No endangered or rare plants were recorded at the site, and no bird nesting sites were observed.

Table 1: Species identified at the Proposed Site

	Family	Species	Form
1	Anacardiaceae	<i>Rhus succedanea</i>	Shrub
2	Aquifoliaceae	<i>Ilex asprella</i>	Shrub
3	Aquifoliaceae	<i>Ilex pubescens</i>	Shrub
4	Araliaceae	<i>Schefflera octophylla</i>	Shrub
5	Compositae	<i>Aster baccharoides</i>	Shrub
6	Daphniphyllaceae	<i>Daphniphyllum calycinum</i>	Shrub
7	Dilleniaceae	<i>Tetracera asiatica</i>	Climber

Erection of a Temporary Wind Monitoring Station
at Pottinger Peak - Project Profile

	Family	Species	Form
8	Escalloniaceae	<i>Itea chinensis</i>	Shrub
9	Euphorbiaceae	<i>Breynia fruticosa</i>	Shrub
10	Euphorbiaceae	<i>Glochidion wrightii</i>	Shrub
11	Euphorbiaceae	<i>Phyllanthus emblica</i>	Shrub
12	Flacourtiaceae	<i>Scolopia chinensis</i>	Shrub
13	Gleicheniaceae	<i>Dicranopteris pedata</i>	Shrub
14	Gnetaceae	<i>Gnetum montanum</i>	Climber
15	Gramineae	<i>Arundinella setosa</i>	Grass
16	Gramineae	<i>Eremochloa ciliaris</i>	Grass
17	Gramineae	<i>Ischaemum barbatum</i>	Grass
18	Gramineae	<i>Miscanthus sinensis</i>	Grass
19	Lauraceae	<i>Cassytha filiformis</i>	Climber
20	Lauraceae	<i>Litsea glutinosa</i>	Shrub
21	Lauraceae	<i>Litsea rotundifolia</i>	Shrub
22	Lauraceae	<i>Machilus chekiangensis</i>	Small tree
23	Liliaceae	<i>Dianella ensifolia</i>	Grass
24	Liliaceae	<i>Liriope spicata</i>	Grass
25	Loganiaceae	<i>Gelsemium elegans</i>	Grass
26	Lycopodiaceae	<i>Lycopodium cernuum</i>	Fern
27	Melastomataceae	<i>Melastoma candidum</i>	Shrub
28	Melastomataceae	<i>Melastoma dodecandrum</i>	Shrub
29	Melastomataceae	<i>Melastoma sanguineum</i>	Shrub
30	Moraceae	<i>Ficus variolosa</i>	Shrub
31	Myrsinaceae	<i>Ardisia crenata</i>	Shrub
32	Myrsinaceae	<i>Embelia laeta</i>	Climber
33	Myrtaceae	<i>Rhodomyrtus tomentosa</i>	Shrub
34	Papilionaceae	<i>Dalbergia benthami</i>	Climber
35	Papilionaceae	<i>Millettia dielsiana</i>	Climber
36	Papilionaceae	<i>Millettia nitida</i>	Climber
37	Podocarpaceae	<i>Podocarpus macrophyllus</i>	Small tree
38	Rosaceae	<i>Rhaphiolepis indica</i>	Shrub
39	Rosaceae	<i>Rubus reflexus</i>	Climber
40	Rubiaceae	<i>Mussaenda pubescens</i>	Climber
41	Rubiaceae	<i>Psychotria rubra</i>	Shrub
42	Rubiaceae	<i>Psychotria serpens</i>	Shrub
43	Rutaceae	<i>Zanthoxylum avicennae</i>	Shrub
44	Rutaceae	<i>Zanthoxylum nitidum</i>	Climber
45	Samydaceae	<i>Homalium cochinchinense</i>	Shrub
46	Schizaeaceae	<i>Lygodium scandens</i>	Fern

	Family	Species	Form
47	Smilacaceae	<i>smilax glabra</i>	Climber
48	Theaceae	<i>Eurya japonica</i>	Climber
49	Verbenaceae	<i>Clerodendrum fortunatum</i>	Climber
50	Rubiaceae	<i>Tricalysia dubia</i>	Climber

During site survey, two Black-eared Kites *Milvus lineatus* were observed soaring on air currents above the proposed site. No other animals were seen at the site.

5 ENVIRONMENTAL PROTECTION MEASURE TO BE INCORPORATED IN THE DESIGN AND OTHER ENVIRONMENTAL IMPLICATIONS

5.1 General

The proposed site is located in an area with predominantly low shrub vegetation and thin soil cover. Impact to the environment is minimised by the use of a light tower and anchoring system which uses only 10 rock anchors. It is considered that the minimal environmental effect of the Station should be acceptable. There will be no long-term environmental effect as this Station is unmanned during operation. Effective mitigation measures will be incorporated to ensure that the impact of the Project can be minimised.

5.2 Construction Method

As the site is located within the Country Park, the method of construction utilised is very important in respect to minimising any significant environmental impacts. It is proposed to utilise the following construction method for the installation of the Station and removal of all waste materials:

- No heavy machinery will be used during the construction of station so that soil compaction and disturbance will be minimal.
- The complete tower package will be hand-delivered to the site and set down at the base-plate location and then assembled by hand and raised using an electric winch.
- Drill the rock anchor holes within the site area to the required depths.
- Load debris into sandbags and remove from site at the end of each working day.

5.3 Noise, Water & Air Quality

All tools and equipment will be checked to ensure in good conditions before being brought to site. The battery for the electric winch will be a sealed type so that no battery acid can leak at the site.

As far as possible all construction activities will be undertaken in such a way as to minimise any noise, water or air quality impacts. All construction activities will be undertaken during

the daylight hours, between 8.00 am and 6.00 pm, to minimise noise impact. There will be no construction activities between 6.00 pm and 8.00 am.

During the construction stage there will not be a generation of polluted water. However, to ensure that there will be no surface run-off during construction, a row of sand bags will be placed along the down slope of the site to prevent any excess earth or storm water flowing down to any watercourses. No sewage arising from the construction work will be generated from the site.

Mitigation measures in respect to dust suppression will be implemented according to the Air Pollution Control (Construction Dust) Regulation whenever necessary.

5.4 Landscape and Visual Impact

The size of the Station is not extensive. The Station will not create significant visual and landscape impact. The only potential visual and landscape impact is that this new tall structure will be visible to hikers walking along the trails through the Country Park. The degree of such impact is illustrated in **Figure 7**, comparing with the existing condition in **Figure 6**.

To further reduce the visual impact, the tower will use a low glare subtle grey colour (Pantone 462U, BS10B25 or equivalent)¹ and will be managed and maintained by the contractor of the applicant. All construction activities will be undertaken between 8.00 am and 6.00 pm and therefore there will be no night time lighting “glare”.

As far as possible the disturbance to existing landscape will be limited to the 10 rock anchor points, and this will cause the loss of a few square metres (no more than 10m²) of shrub. The affected area will be reinstated upon removal of the tower. Since the affected plants are common shrubs and grasses, the re-colonisation of vegetation after disturbance is expected to be rapid.

5.5 Ecology

Movement of workers will be controlled and co-ordinated to minimise vegetation damage due to walking. Access to the site will be made mainly via the existing footpath and trails until near to site.

Some impact on the site vegetation will occur during 2-4 days of the construction and decommissioning periods when construction and removal of rock anchors are needed. This will cause the loss of a few square metres (no more than 10m²) of shrub. The likely ecological impact is considered minor, as the Station will not permanently occupy the land. Since the affected plants are common shrubs and grasses, the re-colonisation of vegetation after disturbance is expected to be rapid.

¹ In compliance with the requirements of Director of Agriculture, Fisheries and Conservation as given in his memo of 29 November 2003 to District Lands Officer/Hong Kong East and District Lands Officer/Sai Kung.

6 REFERENCE TO PREVIOUSLY APPROVED EIA REPORTS

Reference is made to “Proposal to establish one temporary wind monitoring station on Lamma Island for evaluating wind power as a renewable energy source – Project Profile”, by Friends of the Earth (Charity) Limited, 2001.

FIGURES

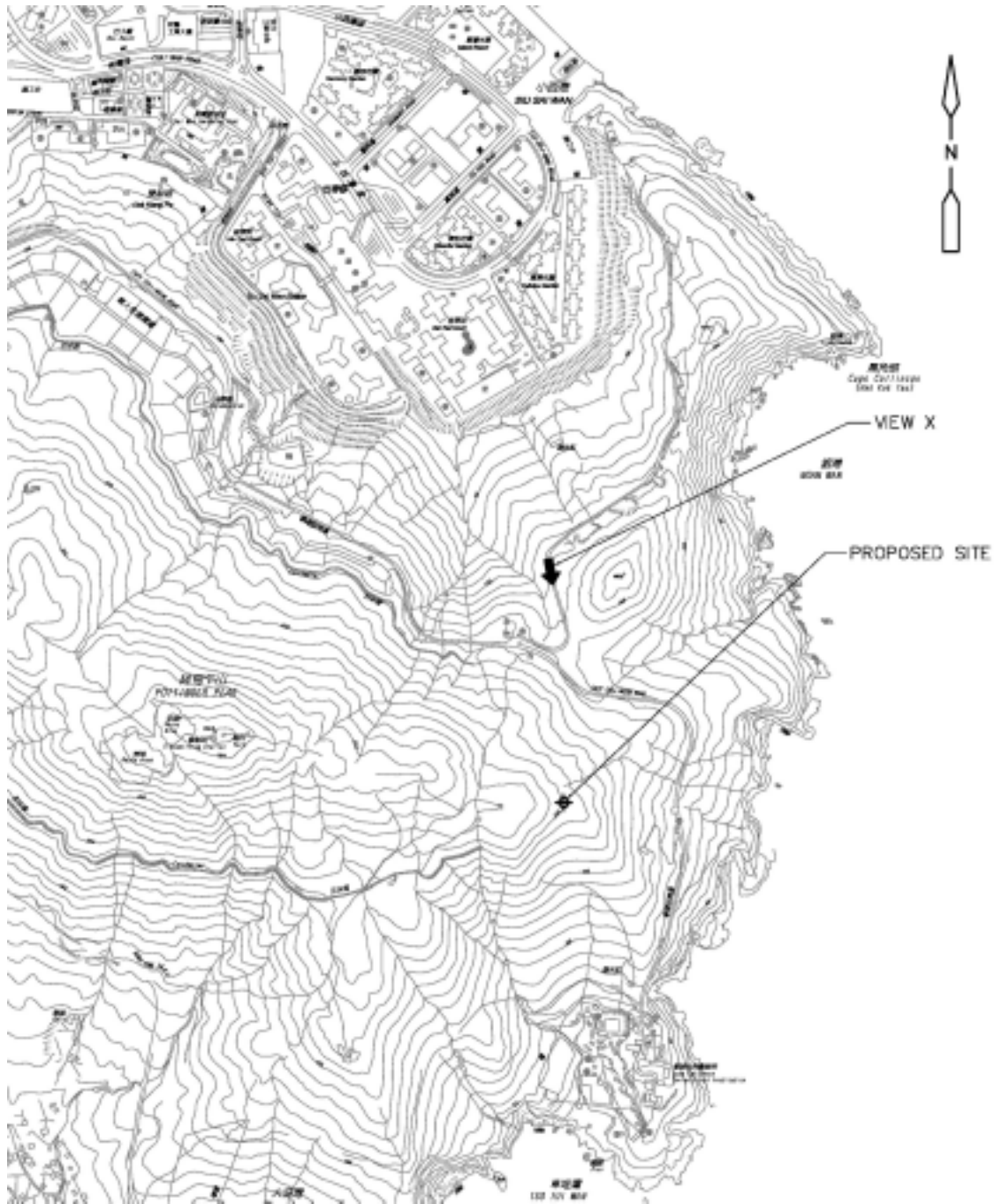
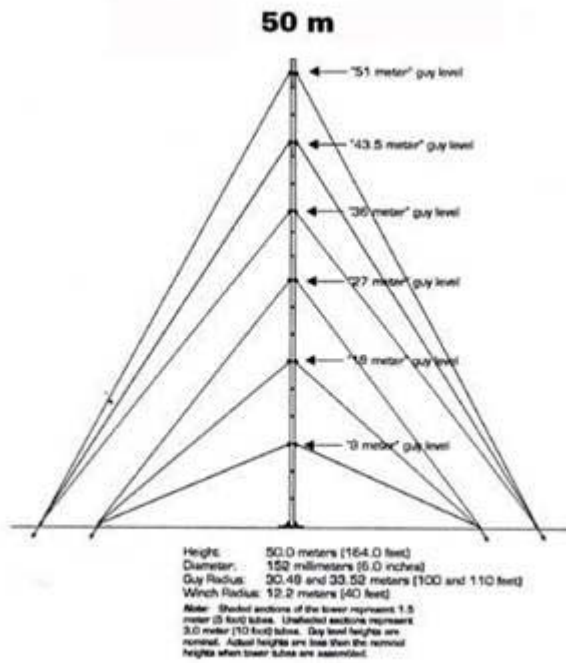


Figure 1: Location Plan



**Anemometer and Wind Vane
Mounted on top of Wind
Monitoring Tower**

Figure 2: 50m Tall Wind Monitoring Tower

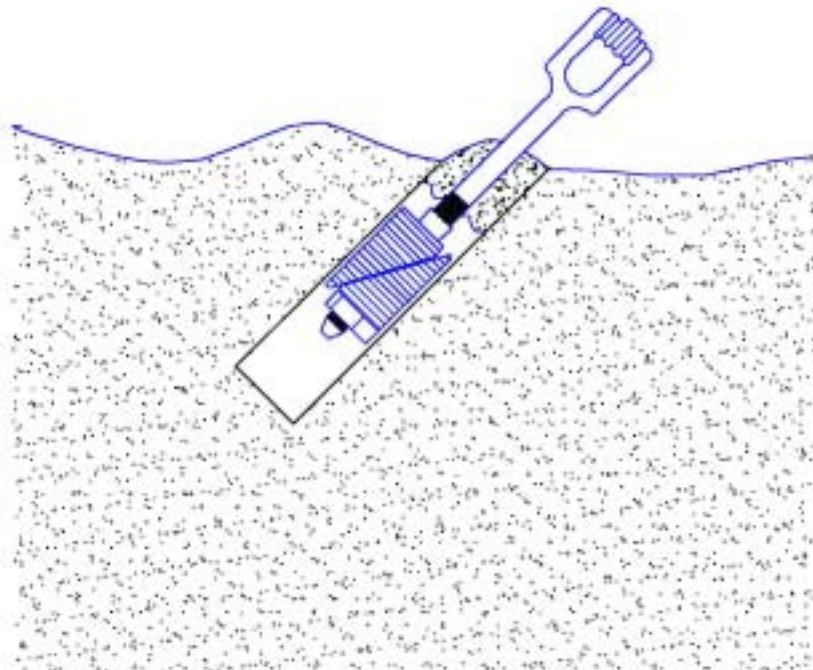


Figure 3: Rock Anchor

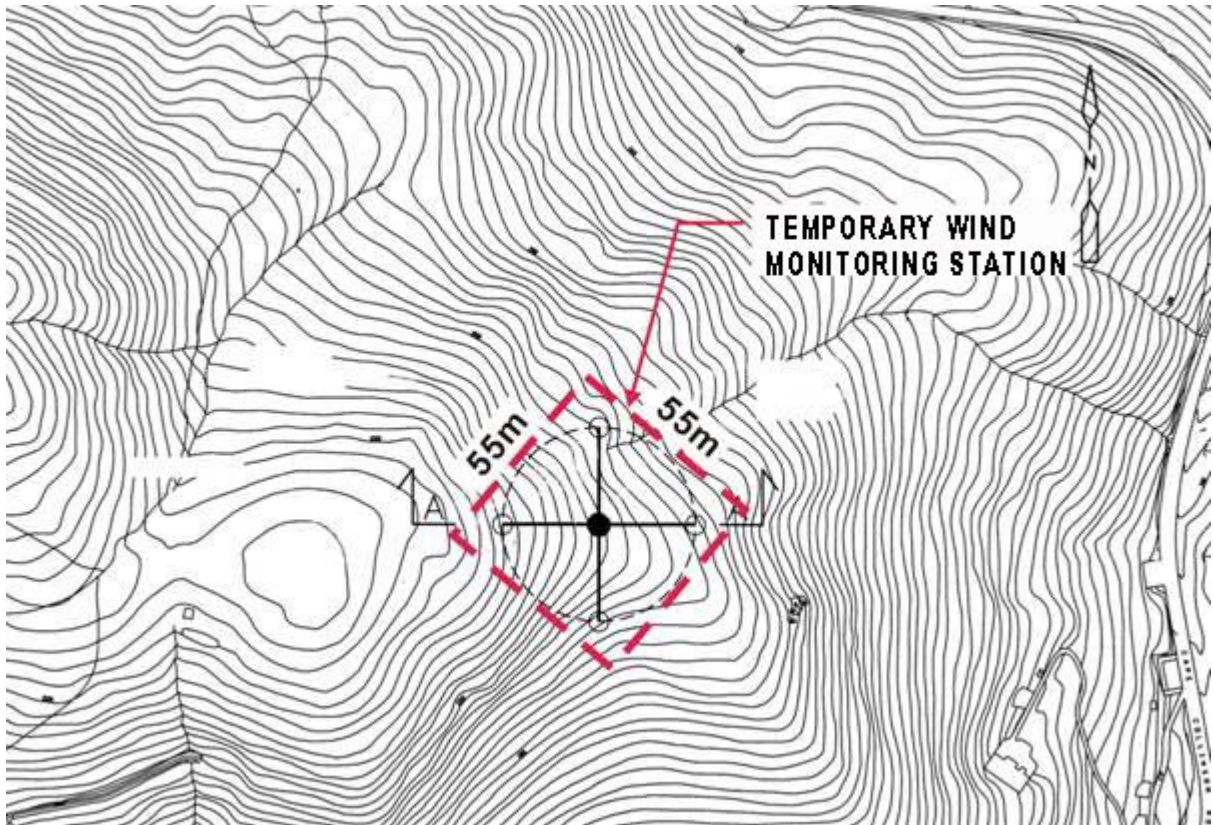


Figure 4: Site Plan

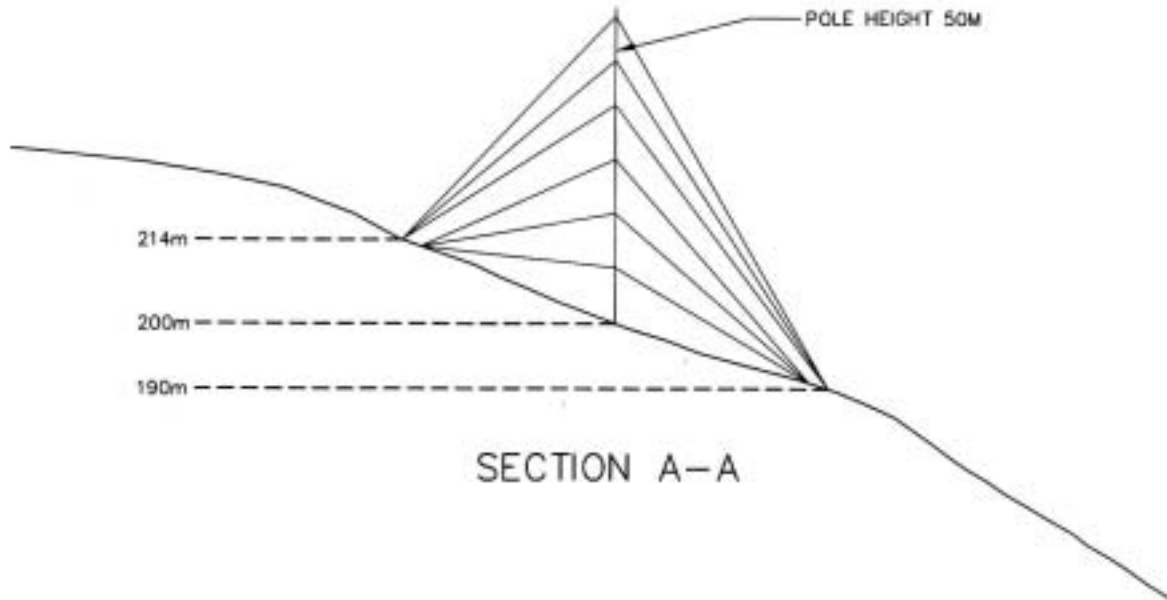


Figure 5: Section View A-A



Figure 6: Existing Site Conditions viewed from location "X"



Figure 7: Proposed Wind Monitoring Station viewed from location "X"



Figure 8: Shrub Habitat



Figure 9: Plant community of *Dicranopteris pedata* - *Rhodomyrtus tomentosa* - *Eurya japonica*

ANNEX 1

Predicated Construction Noise Level at the nearest noise sensitive receiver, NSR (Cape Collinson Correctional Institution).

SPME	Sound Power Level, dB(A)	Total Sound Power Level, dB(A)	Distance to the nearest NSR, m	Predicted Noise Level @ NSR, dB(A) ²
CNP101 Generator	108	108.5	380	49
CNP 065 Drill	98			

The estimate shows that the electric drill with portable generator set will not exceed 49 dB(A) at the noise sensitive receiver. This complies with the noise criteria listed in Table 1B of Annex 5 of the Technical Memorandum on Environmental Impact Assessment Process.

² The total sound power level is estimated in accordance with the Annex A of the *TECHNICAL MEMORANDUM ON NOISE FROM CONSTRUCTION WORK IN DESIGNATED AREAS*. Sound Pressure Calculation assuming Free-field Radiation into Hemisphere:

$$\begin{aligned}\text{Predicated Noise Level} &= \text{Total Sound Power Level} - 20 \log (\text{distance to NSR}) - 8 \text{ dB} \\ &= 49 \text{ dB(A)}\end{aligned}$$