

Issue No : 1  
Issue Date : November 2008  
Project No. : 873

**EXPERT EVALUATION REPORT  
FOR TOWN PARK, INDOOR  
VELODROME-CUM-SPORTS  
CENTRE IN AREA 45, TSEUNG  
KWAN O**

Report Prepared by :  
**Allied Environmental Consultants Ltd.**

**COMMERCIAL-IN-CONFIDENCE**

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## TABLE OF CONTENTS

<b>LIST OF TABLES</b>	<b>4</b>
<b>LIST OF DIAGRAMS</b>	<b>4</b>
<b>LIST OF FIGURES</b>	<b>4</b>
<b>1. Introduction</b>	<b>6</b>
<b>1.1 Background</b>	<b>6</b>
<b>1.2 Description of Site and Adjoining Area</b>	<b>6</b>
<b>2 Site Wind Availability Data</b>	<b>7</b>
<b>2.1 Wind Data from Hong Kong Observatory</b>	<b>7</b>
<b>2.2 Wind Data from MM5</b>	<b>9</b>
<b>3 Expert Evaluation</b>	<b>11</b>
<b>3.1 Northeasterly winds</b>	<b>11</b>
<b>3.2 Southwesterly winds</b>	<b>12</b>
<b>4. Conclusions</b>	<b>13</b>

### LIST OF TABLES

<b>Table 1</b>	Site Wind Availability Data of Tseung Kwan O, HKO, September 2007 – August 2008, (Hourly 60-min wind)
<b>Table 2</b>	Summary of the MM5 Wind Data for Grid (33, 27) of a Year
<b>Table 3</b>	Summary of the Wind Velocity of the 8 Most Probable Wind Directions

### LIST OF DIAGRAMS

<b>Diagram 1</b>	Tseung Kwan O Annual Wind Roses (2004-2006)
<b>Diagram 2</b>	Wind Rose of Grid (33, 27)

### LIST OF FIGURES

<b>Figure 1</b>	Site Location Plan
<b>Figure 2a-d</b>	Master Layout Plans

## AIM

To qualitatively evaluate the proposed design to advise any adverse effect on wind environment caused by the building structure to immediate local area.

## SUMMARY

As the proposed development of Town Park, Indoor Velodrome-cum-Sports Centre is located within a breezeway, an air ventilation assessment is required in accordance with Technical Circular No. 1/06 Air Ventilation Assessments. An expert evaluation (EE) was carried out to evaluate the air ventilation condition of the surrounding environment in relation to the proposed development.

The predominant wind directions, as well as the interaction between the wind direction and the building morphology in the area were considered for the air ventilation assessment for the proposed Town Park, Indoor Velodrome-cum-Sports Centre. It was determined that significant impacts on air ventilation to the nearby area are not anticipated.

## 1. Introduction

In accordance with Technical Circular No. 1/06 Air Ventilation Assessments jointly issued by Housing, Planning and Lands Bureau and Environment, Transport and Works Bureau, proponent departments / bureaux or authorities should assess the need to apply Air Ventilation Assessment (AVA) to some categories of major government project during the planning stage. The proposed development of Town Park, Indoor Velodrome-cum-Sports Centre falls within the category of “*Buildings with height exceeding 15metres within a public open space or breezeway designed on layout plans / outline development plans / outline zoning plans or proposed by planning studies*”. Allied Environmental Consultants Limited (AEC) has been appointed to undertake an air ventilation assessment for the proposed development of Town Park, Indoor Velodrome-cum-Sports Centre in Area 45, Tseung Kwan O.

### 1.1 Background

The proposed Town Park, Indoor Velodrome-cum-Sports Centre is stated as a priority item under the Project Definition Statement (PDS) which was issued on 25 April 2007 by the Secretary for Home Affairs. The proposed development would provide public open space and an indoor velodrome-cum-sports centre which can complement the adjoining Tseung Kwan O Sports Ground under construction.

### 1.2 Description of Site and Adjoining Area

The site of the proposed Town Park, Indoor Velodrome-cum-Sports Centre is partly zoned as Open Space (O) and partly falls within an area zoned Government / Institution / Community (GIC) on the current approved Tseung Kwan O Outline Zoning Plan No. S/TKO/15. Planning Department is now processing amendment of this OZP. Under the revised OZP, the site is zoned as “Open Space (I)” and usage as velodrome and sports centre is always permitted.

The construction site is located within a residential area. The surrounding residential developments include Kwong Ming Court, On Ning Garden and Nan Fung Plaza. The site is bounded to the northeast by Wan Po Road and southwest by Po Hong Road. *Figure 1* shows the subject site and its surrounding environment. The master layout plan of the development and plans of the proposed Indoor Velodrome-cum-Sports Centre are shown in *Figures 2a to 2d*.

## 2 Site Wind Availability Data

Both weather data provided by Hong Kong Observatory and Mesoscale Model (MM5) published in the website of Planning Department are acceptable for assessment, as recommended in "Technical Guide for Air Ventilation Assessment for Developments in Hong Kong" published by Housing, Planning and Lands Bureau (HPLB) and Environment, Transport and Works Bureau (ETWB).

### 2.1 Wind Data from Hong Kong Observatory

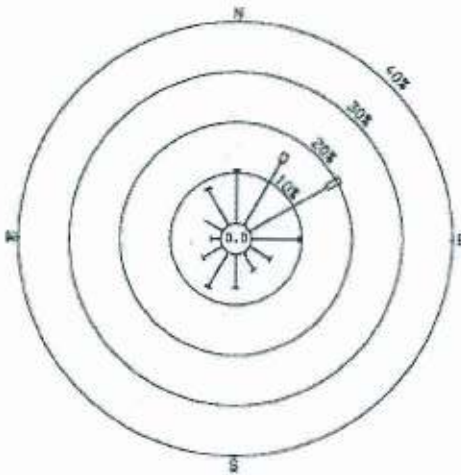
The frequency of occurrence of each wind direction throughout a year was estimated with reference to Site Availability Data of Tseung Kwan O, the nearest anemometer station, July 2007 – August 2008, obtained from the Hong Kong Observatory (HKO) and shown in *Table 1*. In accordance with the wind data, wind would mostly come from the northeast quadrant throughout a year whereas in summer (Jun – Aug), wind from south-southwest also attributes a significant portion.

*Table 1 Site Wind Availability Data of Tseung Kwan O, HKO, July 2008 – August 2008, (Hourly 60-min wind)*

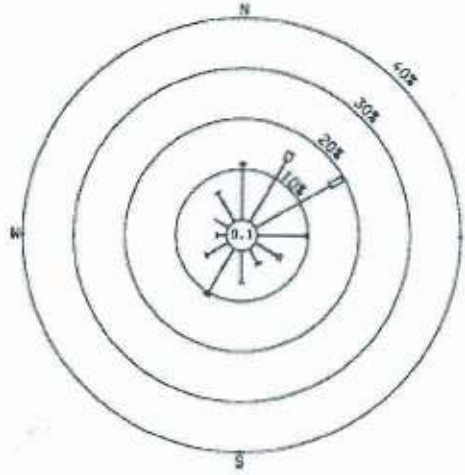
Wind Direction	Frequency of Occurrence			
	Dec – Feb	Mar – May	Jun – Aug	Sep - Nov
N	12.09%	8.20%	4.35%	14.29%
NNE	23.08%	23.77%	8.70%	19.78%
NE	5.49%	5.74%	1.09%	4.40%
ENE	43.96%	8.20%	2.17%	32.97%
E	13.19%	33.61%	3.26%	9.89%
ESE	0.00%	0.00%	3.26%	0.00%
SE	0.00%	0.00%	3.26%	4.40%
SSE	0.00%	0.00%	0.00%	2.20%
S	0.00%	7.38%	3.26%	1.10%
SSW	0.00%	11.48%	47.83%	2.20%
SW	0.00%	0.82%	9.78%	1.10%
WSW	0.00%	0.00%	7.61%	1.10%
W	0.00%	0.00%	2.17%	1.10%
WNW	0.00%	0.00%	2.17%	3.30%
NW	0.00%	0.00%	0.00%	0.00%
NNW	2.20%	0.82%	1.09%	2.20%

Diagram 1 Tseung Kwan O Annual Wind Roses (2004-2006)

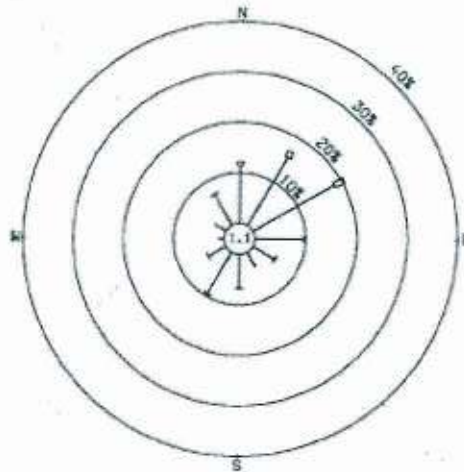
2004  
將軍澳 Tseung Kwan O



2005  
將軍澳 Tseung Kwan O



2006  
將軍澳 Tseung Kwan O



圖例 :  
Legend :



0.1-3.2	3.3-8.2	8.3-14.2	>14.2	米特 m/s
1-2	3-4	5-6	>6	蒲福氏風級 Beaufort force

風速 Wind Speed



本圖內的數字表示出現的風及風向不定之情況的頻率百分比  
The number in the inner circle is the percentage frequency of occurrence of calm and variable wind.

頻率百分比 Percentage Frequency



The mean speed measured at the HKO Tseung Kwan O Station is around 6.67km/hr according to the Meteorological and Tidal Observations in Hong Kong 2004-2006. Prevailing wind comes from the east-northeast direction.

## 2.2 Wind Data from MM5

The assumption of wind data refers to the "Site Wind Availability Data" published by the Planning Department which is simulated by Fifth-Generation NCAR/ Penn State Mesoscale Model (MM5). It indicates wind velocity ranges from 0 to 22m/s from 16 wind directions, predicted at the nearest grid (33, 27) to the site and at 596m above the terrain level. The probability of the sixteen wind directions at this grid are summarized in *Table 2* and the eight most probably wind velocities are summarized in *Table 3*.

*Diagram 2 Wind Rose of Grid (33, 27)*



*Note: Height of wind rose resolved is 596mPD.*

*Table 2 Summary of the MM5 Wind Data for Grid (33, 27) of a Year*

Prevailing Wind Direction	Degree of Wind Direction	Probability
N	0°	3.7%
NNE	22.5°	6.5%
NE	45°	13.0%
ENE	67.5°	18.9%
E	90°	14.9%
ESE	112.5°	8.4%
SE	135°	5.6%
SSE	157.5°	4.5%
S	180°	3.5%
SSW	202.5°	5.6%
SW	225°	5.6%
WSW	247.5°	3.0%
W	270°	1.8%
WNW	292.5°	1.3%
NW	315°	1.2%
NNW	337.5°	2.4%

*Table 3 Summary of the Wind Velocity of the 8 Most Probable Wind Directions*

Velocity infinity (m/s)	Probability \ Wind Directions							
	NNE	NE	ENE	E	ESE	SE	SSW	SW
0 to 1	0	0.001	0.001	0.001	0.001	0.001	0.001	0.001
1 to 2	0.002	0.003	0.003	0.002	0.002	0.002	0.002	0.003
2 to 3	0.003	0.005	0.004	0.003	0.006	0.005	0.005	0.004
3 to 4	0.006	0.009	0.008	0.008	0.007	0.005	0.005	0.004
4 to 5	0.005	0.01	0.012	0.009	0.007	0.007	0.005	0.007
5 to 6	0.004	0.01	0.012	0.012	0.01	0.007	0.006	0.009
6 to 7	0.002	0.007	0.013	0.015	0.012	0.008	0.006	0.008
7 to 8	0.004	0.01	0.013	0.014	0.013	0.005	0.006	0.007
8 to 9	0.005	0.009	0.015	0.013	0.009	0.005	0.005	0.006
9 to 10	0.04	0.007	0.014	0.02	0.008	0.004	0.006	0.003

Velocity infinity (m/s)	Probability \ Wind Directions							
	NNE	NE	ENE	E	ESE	SE	SSW	SW
10 to 11	0.005	0.01	0.013	0.02	0.003	0.002	0.004	0.001
11 to 12	0.003	0.011	0.019	0.017	0.002	0.001	0.002	0.001
12 to 13	0.005	0.011	0.02	0.006	0.001	0.001	0.001	0.001
13 to 14	0.002	0.009	0.013	0.004	0.001	0	0.001	0.001
14 to 15	0.002	0.008	0.012	0.003	0	0	0	0
15 to 16	0.002	0.002	0.006	0.002	0	0	0	0
16 to 17	0.001	0.003	0.003	0.001	0	0	0.001	0
17 to 18	0.002	0.001	0.002	0	0	0	0	0
18 to 19	0.003	0.001	0	0	0	0	0	0
19 to 20	0.002	0.002	0	0	0	0	0	0
20 to 21	0.002	0.001	0.001	0	0	0	0	0
21 to 22	0.001	0	0.001	0	0	0	0	0
22 to 23	0	0.001	0.001	0	0	0	0	0
23 to 24	0	0	0	0	0	0	0	0

The mean speed predicted at the nearest grid by MM5 is around 7.72m/s according to the provided wind speeds and wind probabilities. The prevailing wind direction is of east-northeast. There are also major components from East and Northeast.

### 3 Expert Evaluation

For the predominant wind directions, the interaction between the wind and the building morphology in the area was considered. Important features taken into account include the distances between the proposed building and other existing buildings, overall heights, and the landform.

#### 3.1 Northeasterly winds

With reference to the wind data, prevailing northeasterly winds contribute nearly 60% of wind in a year. The subject site is located at a downwind area where high-rise residential developments and a shopping centre are sited at the northeast of the site. To the east of the site, there is currently a vacant land adjacent to La Cite Noble, subject to future development.

Located at southwest downwind area of the site are high-rise residential developments, schools, and a shopping centre. Prevailing wind coming from the northeastern direction towards the proposed Town Park, Indoor Velodrome-cum-Sports Centre is likely to be obstructed by these residential developments. As developments to the north are mainly low-rise developments, such as Tseung Kwan O Swimming Pool and Sheung Ning Road Playground, and road network, wind obstruction from north is less significant.

The proposed Town Park, Indoor Velodrome-cum-Sports Centre is a low-rise building (i.e. less than 30m above ground) where significant obstruction of prevailing wind flow into the downwind residential area across Po Hong Road is considered minimal. Its oval-shaped building design could reduce drag to the prevailing wind flow to the southwest area. Moreover, there are sufficient separation distances between the proposed development and surrounding buildings, which allows the penetration of prevailing wind to Tseung Kwan O Sports Ground.

Immediate to the southeast of the Indoor Velodrome-cum-Sports Centre is the Tseung Kwan O Sports Ground, to the northwest is an artificial lake, and further is the Town Park. As the development is not located at upstream of prevailing wind direction, wind obstruction to the Tseung Kwan O Sports Ground, the artificial lake and the Town Park is unlikely.

### **3.2 Southwesterly winds**

Wind from southwest attributes mainly in summer. The flat topography of Tseung Kwan O Sports Ground to the southeast of proposed development and the building separations between the proposed development and residential buildings along Wan Po Road and Po Hong Road allows air flow to reach the Town Park at northwest. Ventilation impediment to the surrounding facilities is minimized. Since the Tseung Kwan O Sports Ground is not located at a downwind area, there will not be any significant effect imposed to the Tseung Kwan O Sports Ground. In consideration of the wind speed and building form, wind is also not anticipated to bounce back from the Indoor Velodrome-cum-Sports Centre to Tseung Kwan O Sports Ground and cause disruption to sports activities.

#### 4. Conclusions

An Expert Evaluation has been carried out in accordance with ETWB Technical Circular No. 1/06 Air Ventilation Assessments (AVA) and Chapter 11 of the Hong Kong Planning Standards and Guidelines (HKPSG) for the purpose of air ventilation assessment.

The design of the proposed Town Park, Indoor Velodrome-cum-Sports Centre has due consideration on air ventilation impact. With the oval-shaped and low rise building design, it is anticipated that air ventilation impact of the development will be insignificant.



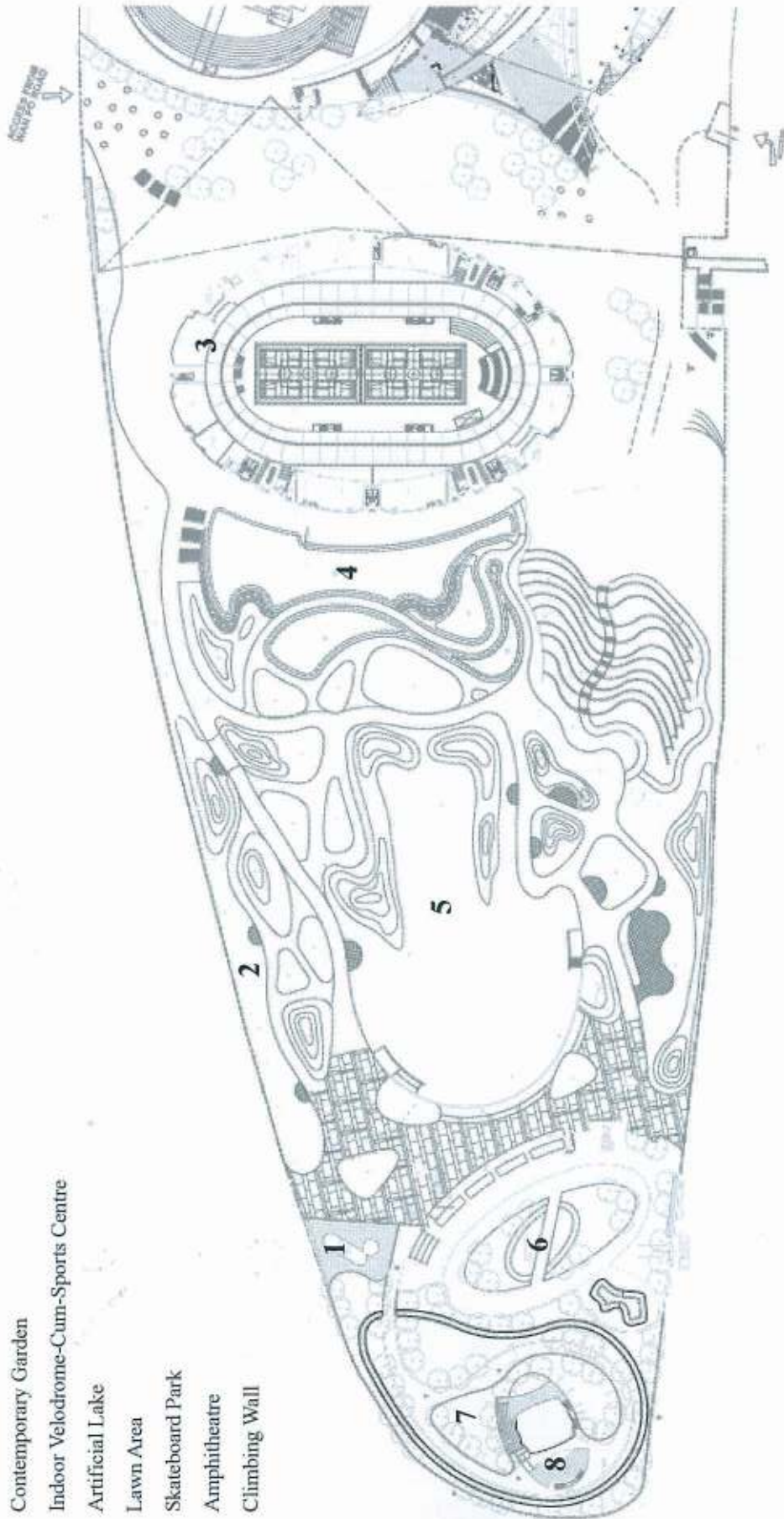
Town Park, Indoor Velodrome-cum-Sports Centre in Area 45, Tseung Kwan O  
Site Location Plan

Figure No.	Rev:
1	0
Scale	Date
NTS	11/08



Legend

- 1. Model Boat Pool
- 2. Contemporary Garden
- 3. Indoor Velodrome-Cum-Sports Centre
- 4. Artificial Lake
- 5. Lawn Area
- 6. Skateboard Park
- 7. Amphitheatre
- 8. Climbing Wall



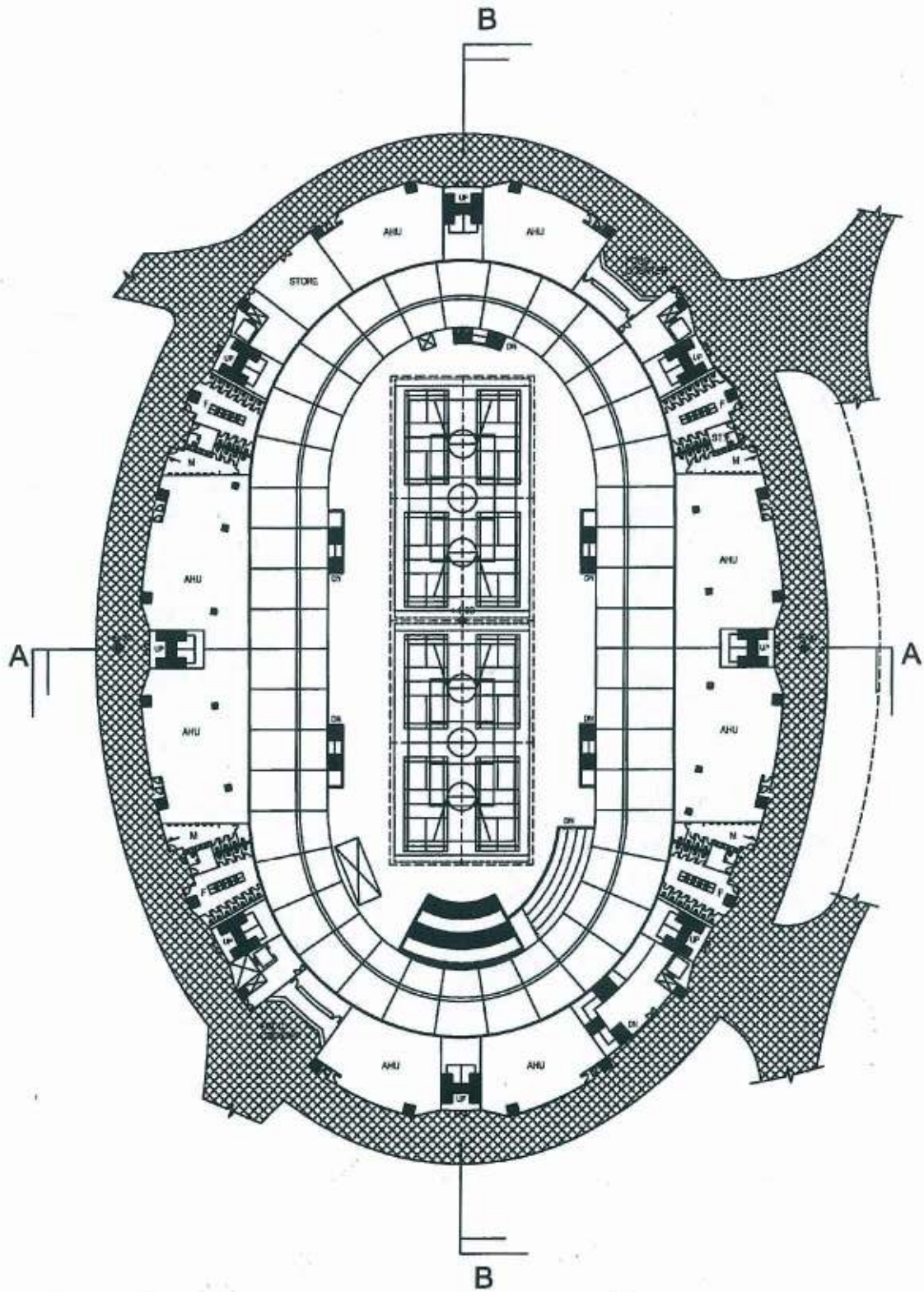
**Town Park, Indoor Velodrome-cum-Sports Centre in Area 45, Tseung Kwan O**  
**Master Layout Plan**

Figure No. 2a	Rev:	0
	Scale	NTS
Date		11/08





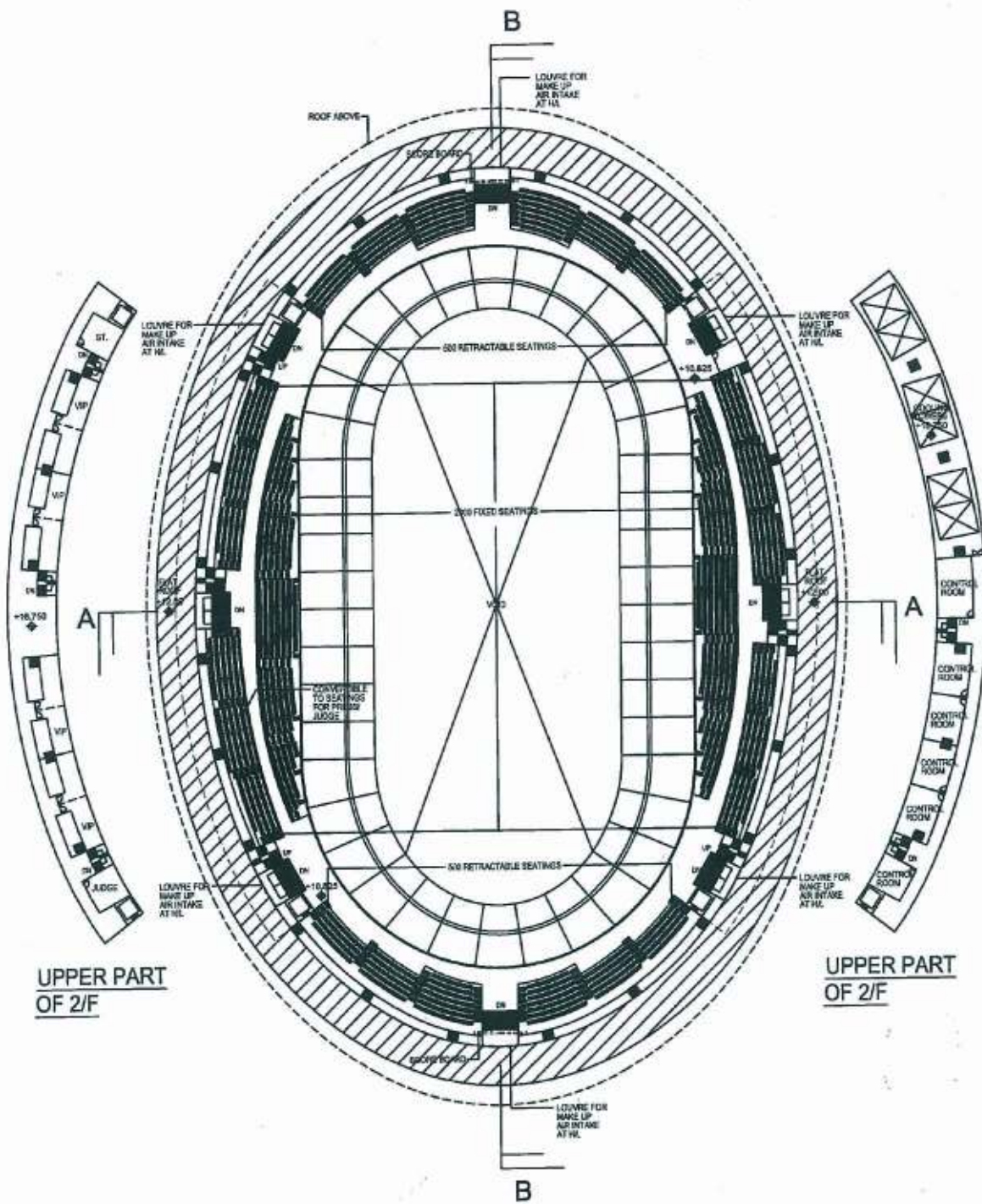




Town Park, Indoor Velodrome-cum-Sports Centre in Area 45, Tseung Kwan O  
 Master Layout Plan 1/F

Figure No.	Rev:
2c	0
Scale	Date
NTS	11/08





UPPER PART  
OF 2/F

UPPER PART  
OF 2/F

TOTAL 3000 SEATS

Town Park, Indoor Velodrome-cum-Sports Centre in Area 45, Tseung Kwan O  
Master Layout Plan 2/F

Figure No.

2d

Rev:

0

Scale

NTS

Date

11/08

