明 愛 陳 震 夏 郊 野 學 園
Caritas Chan Chun Ha Field Studies Centre

Studies of Island Weather

Student Name: _____   **Group Number: _____**

Course Date: _____

OBJECTIVES

Knowledge:
- To understand different weather elements
- To examine the impact of natural factors and human activities affect weather
- To understand the effect of urban planning on urban microclimate

Skill:
- To use different field equipment to collect data of weather elements and the surrounding environment
- To draw graphs to show the data of different weather elements and the distribution of urban climate sensitivity

Value:
- To understand the impacts of changing weather elements and our responsibilitie
- Be aware the challenges to national security imposed by global climate change due to urban development

Relevance to DSE geography curriculum

- Compulsory Module 7: Climate Change – Long-term fluctuation or irreversible trend?
- Elective Module 2: Weather and Climate

STAGE 1   PLANNING & PREPARATION

➤ Prior knowledge

1. List the **weather elements** that you have learnt.

_____

2. List the **locational factors** that would affect the above weather elements.

_____

➤ Enquiry question

According to the map and the photos of field sites on P.12, observe the environment of the field sites and circle your expected results in the table below.

My group will go to _____ *(name of field site)* to collect weather data. What are the characteristics of the environment of this field site compared to other field sites?

_____

Field site	Weather elements (average)			
	Air temperature	Relative humidity	Wind speed	Light intensity
_____ (my group)	Higher / Lower	Higher / Lower	Higher / Lower	Higher / Lower
_____ (other group)	Higher / Lower	Higher / Lower	Higher / Lower	Higher / Lower

Enquiry Question 1:

The major locational factors contributing to the differences of weather elements between two field sites would be _____.

Urban planning would affect microclimate. The higher the urban climate sensitivity (including thermal load and dynamic potential), the greater the chance of urban heat island effect.

Refer to the map on p.13. How would urban climate sensitivity change with increasing distance from city centre?

Enquiry Question 2:

The farther from the city centre, the   higher /   lower   the urban climate sensitivity.

➤ When to collect data?

Date: _____   Season: _____   Time: _____ to _____
1. Any weather warnings & signals issued by the Hong Kong   Observatory in the **past three days**?   ☐ Tropical cyclone warning signals ☐ Rainstorm warnings ☐ Frost warning   ☐ Cold weather warning ☐ Very hot weather warning ☐ Other:_____
2. Is today ideal for fieldwork of this topic? Why?

What factors would you consider in choosing the fieldwork date?

➤ Where to collect data?

Is Cheung Chau an ideal field site of this topic? Why?
Different sampling methods are used in setting the data collection points *(details on P.17)*:   **Enquiry question 1**   Refer to the map on P.12. Your group needs to select two field sites *(Site 1 to 8)* to collect data **for specific learning objectives**.   ➔ _____ sampling is applied.   **Enquiry question 2**   Refer to the map on P.13. Your group needs to collect data at field sites on one of the routes *(A to D or W to Z)*, and **the distance between each field site is the same**.   ➔ _____ sampling is applied.

What factors would you consider when choosing the field site?

➢ What data to collect and how to collect data?

Items		Primary data collection methods [A-I] (see Table 1) (may choose more than one)	Equipment [1-6] (see Table 2) (if needed)	Operational precautions
Enquiry Question 1				
Weather elements	Air temperature			
	Relative humidity			
	Wind direction & wind speed			
	Light intensity			
Locational factors	Surrounding buildings & obstacles (distance & height)			
	Land cover material			
Enquiry Question 2				
Urban climate sensitivity	Aspect ratio (Building height : road width)			
	Dynamic potential			
	Level of vegetation cover			
Other (if applicable):				

Table 1 Primary data collection methods *(details on P.16)*

A) Observation	B) Measurement	C) Counting	D) Category	E) Distribution (mapping)
F) Scoring	G) Field sketching	H) Questionnaire	I) In-depth interview	

Table 2 Equipment for fieldwork *(Make sure you know how to use them correctly before fieldwork.)*

1. light meter	2. compass	3. thermo-hygrometer
4. laser distance meter	5. anemometer	6. colour pencils

STAGE 2   DATA COLLECTION   (Part 1)

1. Weather elements

➢   Each group at different field sites (map on p.12) would measure air temperature, relative humidity, wind direction, wind speed and light intensity at the same time.

➢   Collect data of weather elements in every _____ minutes (_____ minutes in total) (**_SIMULTANEOUSLY_** *for all groups*)

Field site _____					
Weather condition:	❑ sunny ❑ cloudy ❑ rainy ❑ smog ❑ remarks:_____				
	Time	**Weather elements**			
		Air temperature (°C)	Relative humidity (%)	Wind direction	Wind speed (m/s)	Light intensity (Lux)
1.						
2.						
3.						
4.						
5.						
6.						
Average value				-----------		
Average value of another field site _____				-----------		
Is your hypothesis valid? (✓ / ✗)				-----------		

Why should the data of different field sites be collected at the same time (simultaneously)?

What sampling method is applied when data are collected at every 5 minutes?

2. Locational factors

Description of field site

Field site _____

Land cover material: _____

Figure 1: How to measure the height of building/ obstacle (To find H1 by laser distance meter)

Building height = H1 + H2

= (D tanα) + H2

建築物高度 Height of building **=** **垂直距離** Vertical distance **+** **視線高度** Height of eye level

H1

H2

測量距離 measuring distance

垂直距離 vertical distance

水平距離 horizontal distance

D

仰角 angle of elevation

α

視線高度 height of eye level

Distance and height of surrounding building and obstacle (see Figure 1)

➢ Use the **laser distance meter** to measure the distance and

the height of surrounding building and obstacle.

** If there is no building or obstacle in certain direction, record the landscape

of that direction, e.g. sea
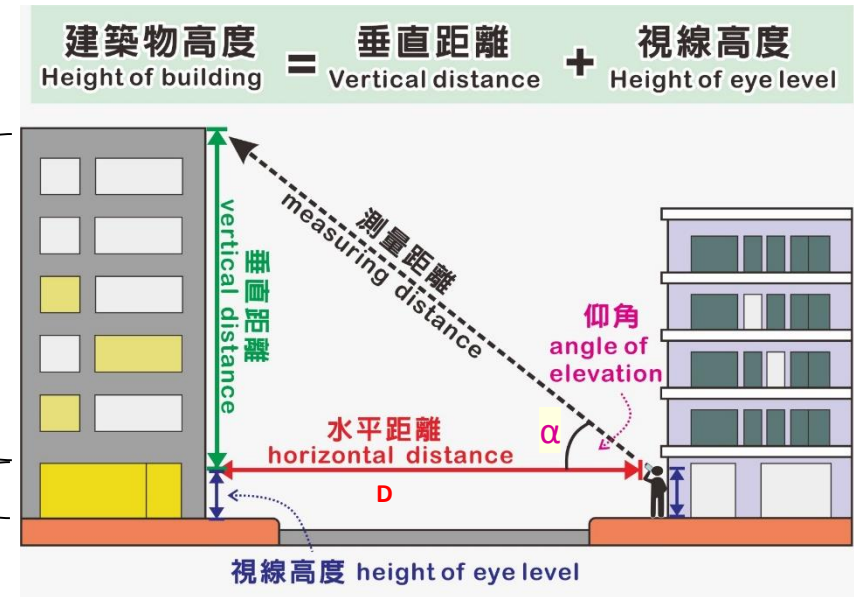
Direction	Type of obstacle	Horizontal distance between building/ obstacle and field site (m)	Height of surrounding building or obstacle		
			Vertical distance between height of eye level and height of building (m) (H1)	**Height of eye level of observer (m) (H2)**	**Total height (m) (H1 + H2)**
N					
NE					
E					
SE					
S					
SW					
W					
NW					

STAGE 2 DATA COLLECTION (Part 2)

3. Urban climate sensitivity

➤ Each group walk through the four field sites along the study route (map on p.13) and assess the **urban climate sensitivity** using observation.

Indicators of assessment

Assessment items	Score and description of urban climate sensitivity			
	Neutral	**Moderate**	**High**	**Very high**
Aspect ratio (building height : width of road)	Less than 1.0	1.0-2.0	2.1-4.0	Larger than 4.0
	(0 mark)	**(2 marks)**	**(4 marks)**	**(6 marks)**
Dynamic potential	High	Moderate	Low	Very low
	(0 mark)	**(2 marks)**	**(4 marks)**	**(6 marks)**
Level of vegetation cover	Many	Moderate	Low	Nil
	(0 mark)	**(1 mark)**	**(2 marks)**	**(3 marks)**

Data record sheet

Assessment items	Assessment points			
	Site _____	Site _____	Site _____	Site _____
Aspect ratio (building height : width of road)	mark(s)	mark(s)	mark(s)	mark(s)
Dynamic potential	mark(s)	mark(s)	mark(s)	mark(s)
Level of vegetation cover	mark(s)	mark(s)	mark(s)	mark(s)
Total score	mark(s)	mark(s)	mark(s)	mark(s)

| Total score	Urban climate sensitivity level	Colour
0-3	Neutral urban climatically sensitive area	Blue
4-7	Moderate urban climatically sensitive area	Green
8-11	Highly urban climatically sensitive area	Orange
12-15	Very highly urban climatically sensitive area	Red

STAGE 3   DATA PROCESSING & PRESENTATION

Choose appropriate graphs/ diagrams to present the following data:	Graph/ diagrams
Data processing for Enquiry Question 1:	
1. **Weather elements** ▪ Compare the temperature data of two field sites over time	_____
▪ Compare the average relative humidity data of each site	_____
2. **Distance and height of surrounding buildings and obstacles**	Use the diagram on P.9 to show the distance and height of the buildings and obstacles around your sites.
Data processing for Enquiry Question 2:	
3. **Urban climate sensitivity** ▪ Show the spatial distribution of urban climate sensitivity within the study area.	_____ Use the above graph/ diagram to show the urban climate sensitivity of each site on the map on P.13 according to the classification scheme.

Mark the surrounding building(s) and obstacle(s) on the dotted line with the scheme below:

Ratio of **distance** to field site:	1 cm = 2 metres			
Height of building and obstacle:	0-3m	>3-9m	>9-12m	>12m
	→	➜	➜	➜
Type of building and obstacle:	Picture or self-determined sign (e.g. tree, building, sea)			

The surrounding buildings and obstacles of Field Site _____

N

NW

NE

W

E

SW

SE

S
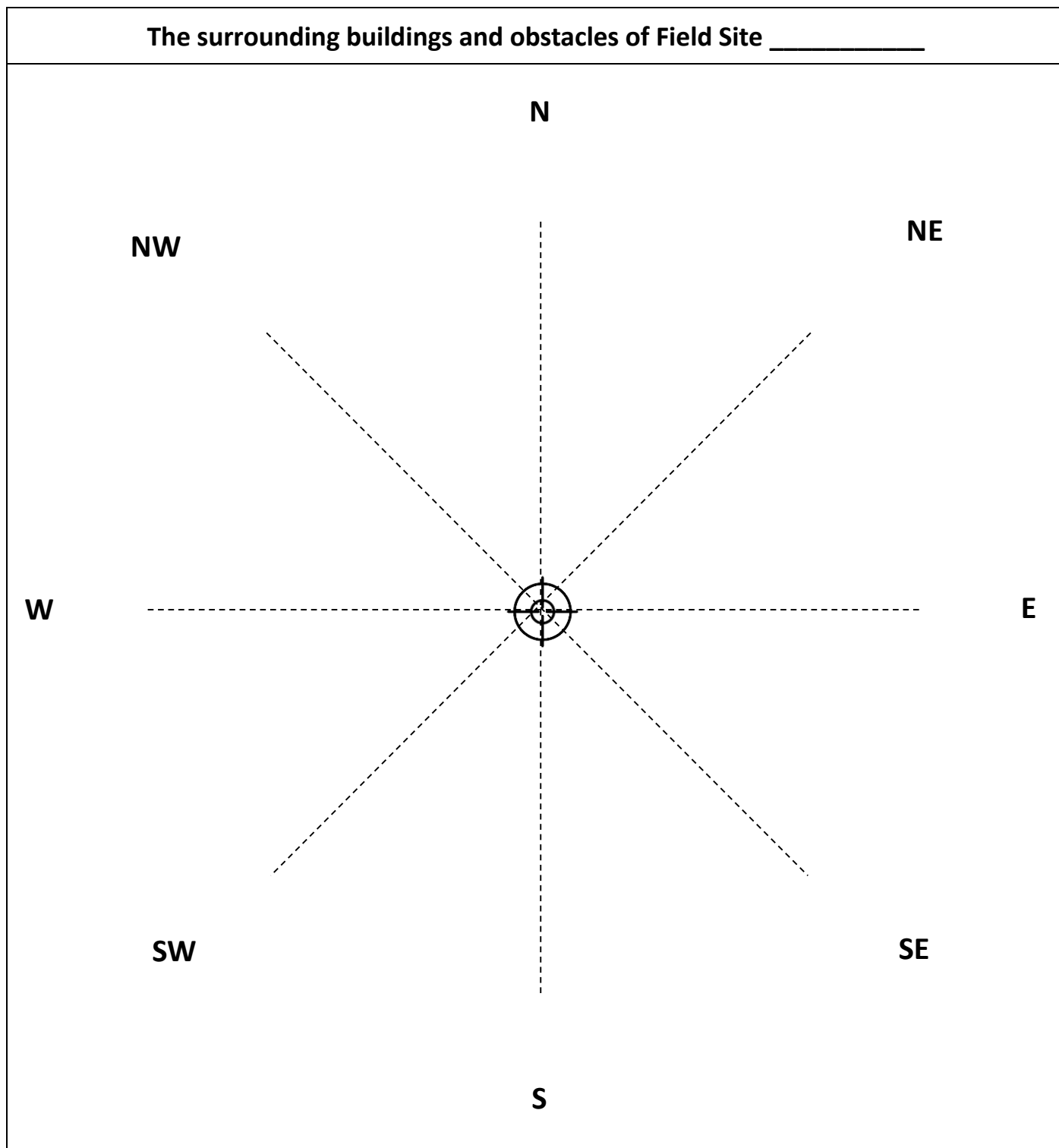
STAGE 4 INTERPRETATION & CONCLUSION

Enquiry question 1

1. Compare the similarities and differences of the data of various weather elements of your two field sites (P.5), discuss whether the hypothesis is valid or not. [Are there any other locational factors?]

	Note:
	I expected that the temperature at Site _____ is <u>higher/lower</u> than that at Site _____. The result is <u>consistent/ inconsistent</u> with my hypothesis.
	Is this related to the actual environment of the field sites?
	Is it related to the fieldwork planning (such as time/ study area)?
	What do you think is the main factor that causes differences in weather factors between the two field sites?

2. *"Heat island effect is a common phenomenon in a populated city, of which the temperature in urban areas is significantly higher than that in rural areas……"*

   Select **a weather station located in the urban area** from the following webpage and compare its temperature data with that of Cheung Chau. Discuss whether the statement above is true.

   Community Weather Information Network (CoWIN) https://cowin.hku.hk/chinese/series.html

   I choose to compare the data from _____ weather station with that of Cheung Chau.

   Does the data reflect the influence of the urban heat island effect? Yes / No

   Why?

Enquiry question 2

3. With reference to the data displayed on P.13, discuss whether the hypothesis of the Enquiry Question 2 is valid or not.

	Note:
	I expect that the further away from the city centre, the <u>higher/ lower</u> the urban climate sensitivity. The result is <u>consistent/ inconsistent</u> with my hypothesis.
	Why would the urban planning of Cheung Chau lead to such a situation?
	Did each group obtain similar results?

4. In recent years, the number of hot nights and very hot days remain high. Refer to the field evidence, suggest urban planning measures to improve the microclimatic environment of Cheung Chau and tackle the heat island effect.

STAGE 5 EVALUATION

1. What sampling methods are used to select the field sites for Enquiry Question 1 and Enquiry Question 2, respectively? Account for the **merits** and **demerits** of these sampling methods.

2. Observation is used for assessing urban climate sensitivity.   State the **advantages** and **limitations** of this method.

3. Reflect on Enquiry Question 1 or Enquiry Question 2. Discuss the factors that might cause data bias in fieldwork planning. What can be done to improve the reliability and validity of data of this fieldwork?

   ❑ **Enquiry Question 1** / ❑ **Enquiry Question 2**

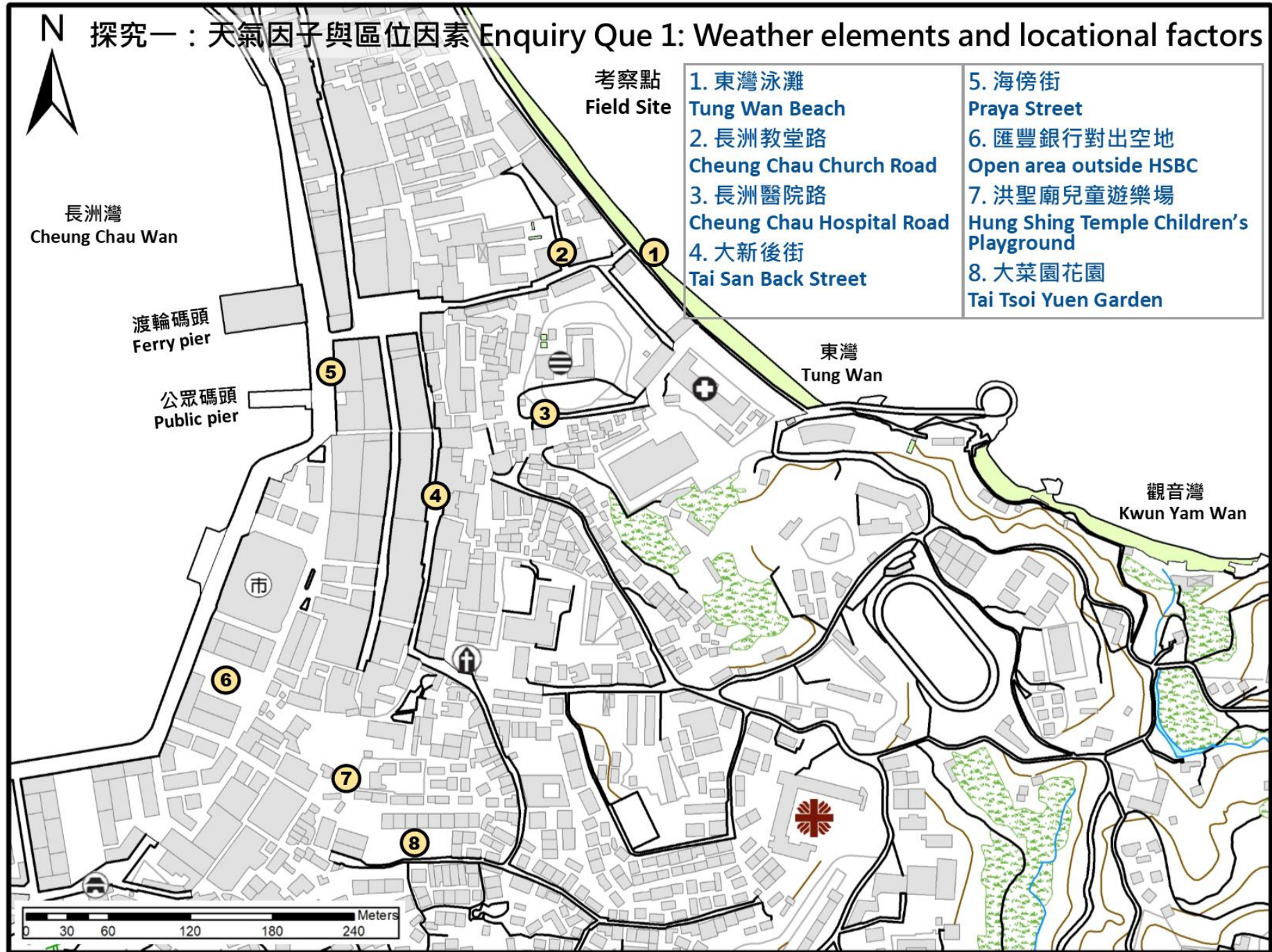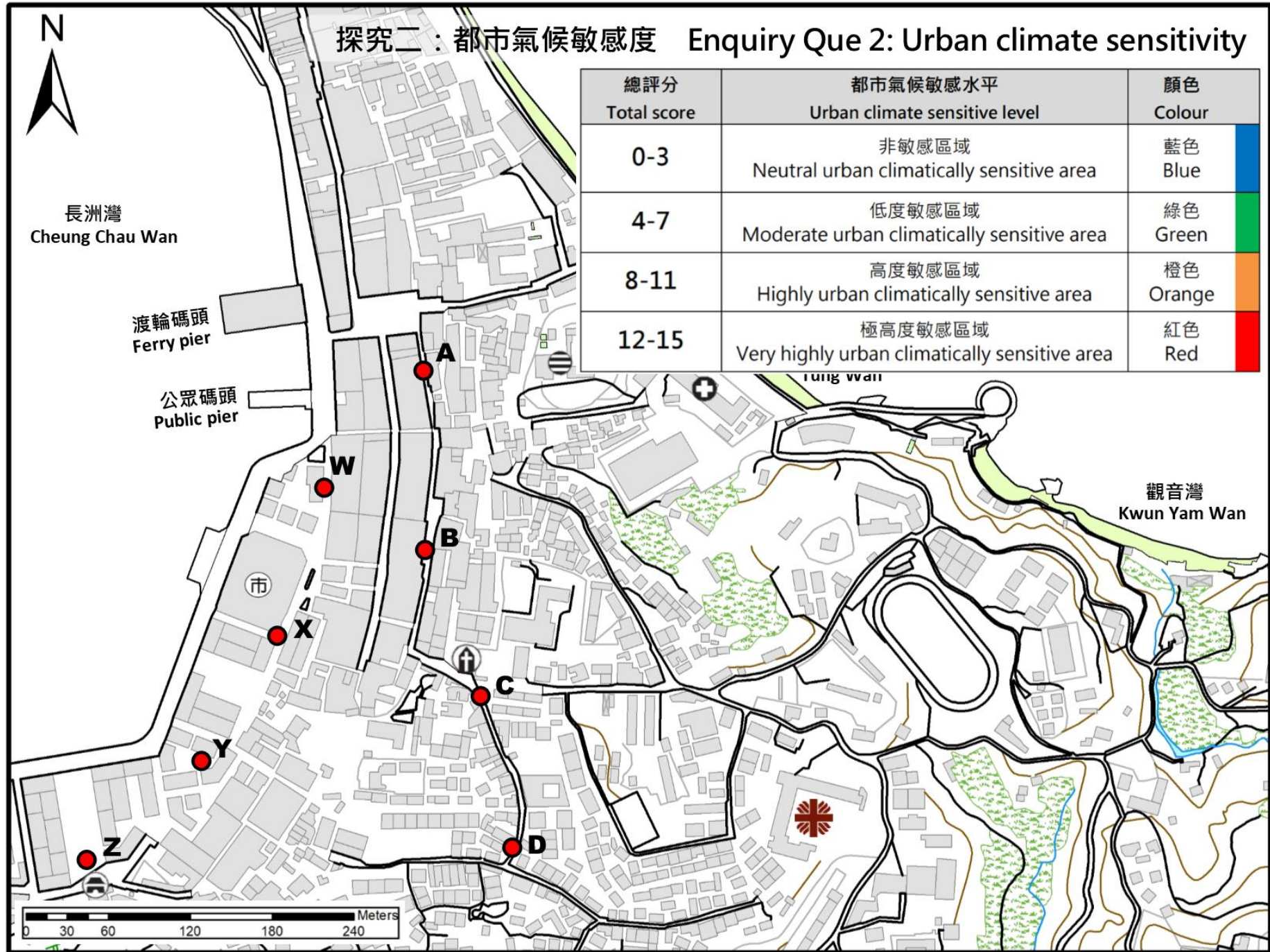| Factors affecting the data reliability and validity		Suggestion for improvement
Fieldwork date/ time ◆ Fieldwork date and time representative? ◆ Any impact by today's weather condition?		
Field site/ study area ◆ Field sites match with research topic? ◆ Field study area adequate?		
Location of data collection (Sampling) ◆ Sampling method in choosing field site appropriate? ◆ Location of measurement representative? ◆ Sample size sufficient?		
Data collection items/ methods ◆ Data collection items adequate to respond the enquiry questions? ◆ Are the data obtained from the data collection method(s) objective and without bias? ◆ Any inadequacy about the equipment/ instruments? ◆ Measurer using the equipment/ instruments correctly?		

4. Further study:

   Set a study area in **the community of your school** and devise a study plan on the topic related to **the microclimate/ urban heat island effect/ wall effect** in the area *(including fieldwork date/ fieldwork time/ field sites/ sampling methods/ data collection items and methods/ equipment required, etc.)*

   ....

   Homework

After the fieldwork, complete the field trip diary (p.14-15) as a means to consolidate this fieldwork experience and reference for revision of field-based question.

Field Studies Courses for SS Geography 2023-24

探究一：天氣因子與區位因素 Enquiry Que 1: Weather elements and locational factors

N

長洲灣
Cheung Chau Wan

渡輪碼頭
Ferry pier

公眾碼頭
Public pier

東灣
Tung Wan

觀音灣
Kwun Yam Wan

市

考察點
Field Site

1. 東灣泳灘
Tung Wan Beach
2. 長洲教堂路
Cheung Chau Church Road
3. 長洲醫院路
Cheung Chau Hospital Road
4. 大新後街
Tai San Back Street

5. 海傍街
Praya Street
6. 匯豐銀行對出空地
Open area outside HSBC
7. 洪聖廟兒童遊樂場
Hung Shing Temple Children's Playground
8. 大菜園花園
Tai Tsoi Yuen Garden

Meters
0 30 60   120   180   240

探究二：都市氣候敏感度　Enquiry Que 2: Urban climate sensitivity

總評分 Total score	都市氣候敏感水平 Urban climate sensitive level	顏色 Colour	
0-3	非敏感區域 Neutral urban climatically sensitive area	藍色 Blue	
4-7	低度敏感區域 Moderate urban climatically sensitive area	綠色 Green	
8-11	高度敏感區域 Highly urban climatically sensitive area	橙色 Orange	
12-15	極高度敏感區域 Very highly urban climatically sensitive area	紅色 Red	

長洲灣
Cheung Chau Wan

渡輪碼頭
Ferry pier

公眾碼頭
Public pier

觀音灣
Kwun Yam Wan

My Field Trip Diary

Studies of Island Weather

➢ Related modules: _____

➢ Key point of fieldwork/topic: _____

▪ Date:_____ (Weekday/ Public holiday)	▪ Weather condition:
▪ Time:_____ ▪ Field site: _____	

Is the above planning appropriate for this fieldwork?

➢ Primary data:

Strategies of data collection	Data collected	Equipment/ Instrument *(if any)*	Merits☺/ Demerits☹ of the data collection strategy *(give examples)*	Suggestion for improvement *(give explanations)*

➢ Secondary data:

Data collected	Use	Obtained from

Apart from the above, what other supplementary information would be necessary to respond to the fieldwork topic?

➢ Sampling method (if any):

Sampling method	Applied during data collection of	Merits☺/ Demerits☹

➢ Data processing and presentation:

Type of graph/ chart	Content and function of graph/chart	Merits☺/ Demerits☹

➢ For deeper learning or further study, I suggest modify the following aspects:

		Suggestion (give examples)
❑	Key point of fieldwork/ topic	
❑	Data to be collected and method of data collection	
❑	Date and time of fieldwork	
❑	Field site	

Primary data collection methods

Data collection methods	Explanations		Examples
A) Observation	• Using sensory observation to explore the details of research subject (people, things or environment) in a purposive and planned way. Data are recorded using text, photos, sketch, map, etc. (Refer to other data collection methods listed below)		• Identification of the surrounding environment of a field site
B) Measurement	• To estimate or measure the physical quantity of the research subject. It usually requires the use of equipment or tools. Data are usually shown in certain standard, weights or measures.		• Measurement of the width of street and the building height
C) Counting	• To record the number of occurrence of a single item.		• Statistics of pedestrian flow at the pier

D) Category	• To classify based on the nature, characteristics and uses:
	  ⬧ to group the same or similar things;
	  ⬧ to separate different things.
			• Types of goods sold in supermarket
			• Customers (serving local residents and tourists) of different shops

E) Distribution (mapping)	• To group similar things according to the research topic (similar to "**D. Category**"); • Only suitable for spatial representation (different from category); • Useful in showing the mode of occurrence of research subject in a complex environment.		• Distribution of shops selling big fish balls in Cheung Chau
F) Scoring	• To quantify abstract or subjective concepts; • To merge various data for easy comparison; • Scoring items should include different aspects.		• Risk index of natural hazards of Cheung Chau • Air Quality Health Index (AQHI)
G) Field sketching	• To make simplified drawing of the field site to show what the data collectors observed. Annotations related to the research subject are added to provide key feature or additional information.		• Draw the characteristics and formation of weathering landforms
H) Questionnaire	• Forms: face-to-face, telephone, written, etc.; • Using questionnaire to understand the opinion of research subject; • Larger sample size than "**I. in-depth interview**"; • Mainly closed questions (with options available).	• To collect information by questioning; • To obtain information which is difficult to be obtained through observations; • To understand the rationales and opinions of interviewees.	• The main reasons for tourists to visit Cheung Chau • The level of satisfaction among residents regarding a revitalization project
I) In-depth Interview	• To obtain information through face-to-face/ telephone interview; • Smaller sample size than "**H.Questionnaire**"; • Mainly open questions and forthcoming questions will change upon the answer of respondents.		• Opinions of District Council members on the future development of that district

Sampling Methods

	Probabilistic sampling methods ➢ *Need to know the size of population;* ➢ *Few differences among individuals;* ➢ *Individual has equal chance of being selected;* ➢ *Representativeness of data depends on sampling percentage.*			Non-probabilistic sampling methods ➢ *Size of population might not be relevant to the research objective;* ➢ *Chance of individual being selected is unknown;* ➢ *Representativeness of the results depends on the judgment of researcher in sample selection (Such as the correlation between samples and research targets).*		
Sampling methods	**Simple random sampling** (簡單隨機抽樣)	**Systematic sampling** (系統抽樣)	**Stratified sampling** (分層抽樣)	**Quota sampling** (配額抽樣/ 定額抽樣)	**Convenience sampling** (便利抽樣/ 方便抽樣)	**Purposive sampling** (立意抽樣)
Explanations	To select sample from the **whole population randomly**. (using computer program, bamboo slip or random number table)	Each member of the whole population is sequentially numbered, then selected according to a **fixed, periodic interval**.	The whole population are classified according to the variable and divided into separate stratum. Then samples are selected randomly by proportion from each stratum.	The whole population are classified according to the variable and divided into separate stratum. Then desired number (quota) of samples are selected from each stratum.	Research subjects are selected due to convenience of recruitment.	Samples are selected according to research objectives and special requirements.
Examples	To choose a certain number of students to conduct questionnaires/ surveys according to the class number.	To measure the noise level of a street in a regular interval.	To group buildings according to their ages (e.g. above or below 50), and select a certain number of buildings in each group randomly.	To select a certain number of male and female customers, then record the amount spent in a shop.	To interview a certain number of relatives who work in mainland China To interview a certain number of passersby on the street	To conduct an in-depth interview with a district councilor about the social problems of that district.
Remarks	Suitable for small population and few variations among samples (for relevant research objectives).	Suitable for large population (hidden cyclic ordering which may affect the representativeness of data).	Effectively show the relationship / effect between variables.	Effectively show the relationship / effect of variables, but the characteristics and size of samples are judged subjectively.	Should not generalize the data to larger population	Suitable for qualitative research (data is easily influenced by the subjective judgment of researcher)