

泳灘水質監測

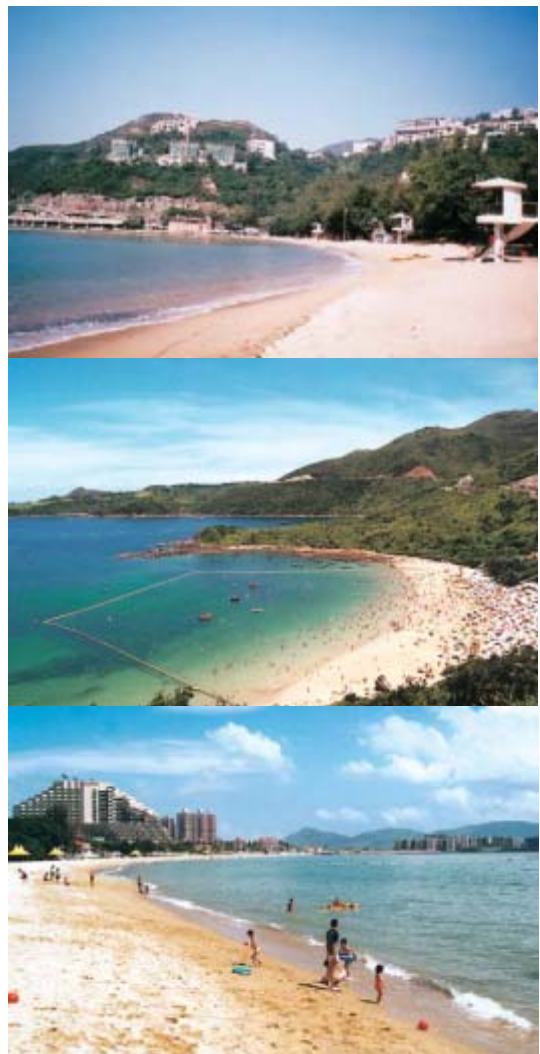
Beach Water Quality Monitoring

2.1 環保署自一九八六年起推行泳灘水質監測計劃。計劃經常予以檢討及修訂，務求為公眾提供更準確的水質資料。目前，計劃涵蓋的泳灘共有 50 個，包括 41 個憲報公布泳灘和 9 個非刊憲泳灘。上述所有泳灘全年均受監測。

2.2 所有憲報公布泳灘分布於本港五個不同地區(見圖 2.1)。開放的憲報公布泳灘是由康樂及文化事務署(康文署)管理，設有各項泳灘設施，並提供拯溺服務及負責清理泳灘上的垃圾。

2.1 The beach water quality monitoring programme has been run by EPD since 1986. It has been frequently reviewed and revised in order to provide better water quality information to the public. The current programme covers 50 beaches, including 41 gazetted beaches and 9 non-gazetted beaches. All of them are monitored throughout the whole year.

2.2 All gazetted beaches are located in five districts of Hong Kong (Figure 2.1). The opened gazetted beaches are managed by the Leisure and Cultural Services Department (LCSD), which provides beach facilities, life-saving services and is responsible for



自二零零一年全年開放的三個泳灘 — 深水灣 (上)、清水第二灣 (中) 及黃金泳灘 (下)
 Since 2001, Deep Water Bay (top), Clear Water Bay Second (middle) and Golden Beach (bottom) are opened throughout the whole year

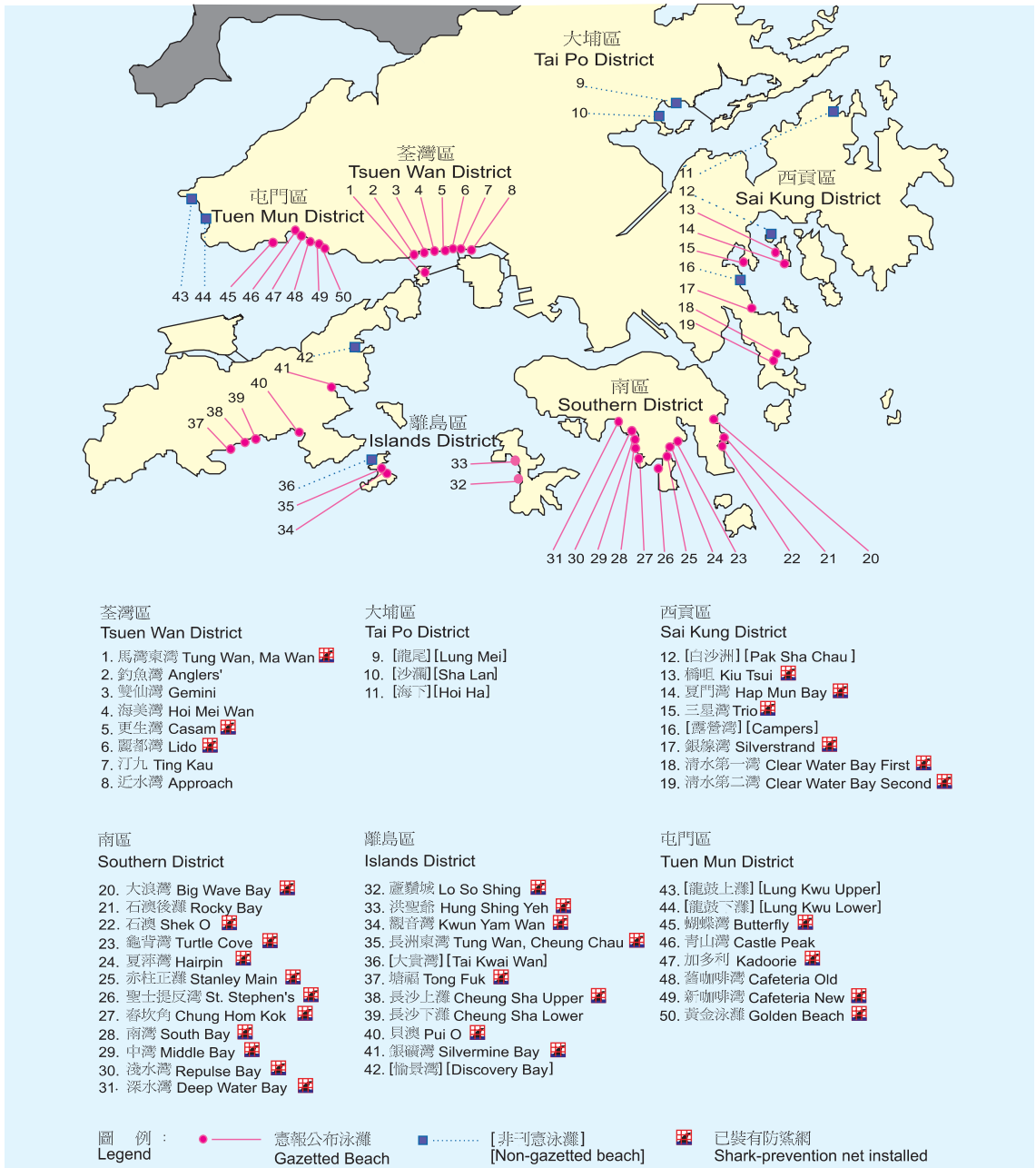


圖 2.1 香港泳灘位置圖
Figure 2.1 Location of beaches monitored

自二零零一年起，有三個泳灘，即深水灣、清水第二灣及黃金泳灘全年開放。由二零零二年冬季起，銀線灣泳灘亦全年開放給市民。其餘泳灘只在泳季期間開放。

2.3 香港有不少非刊憲泳灘，其中九個受環保署監測（見圖2.1）。由於這些泳灘泳客眾多（例如愉景灣泳灘）或日後有機會成為憲報公布泳灘（例如龍尾泳灘），所以亦由環保署監測。這九個泳灘的監測結果見於附錄 2。



其中一個受環保署監測的非刊憲泳灘 — 龍鼓下灘
One of the non-gazetted beaches monitored by the EPD -
Lung Kwu Lower Beach

水質指標

2.4 為保障泳客健康，環保署於一九九二年根據《水污染管制條例》制訂泳灘水質指標。水質指標是根據環保署與本地學術界人士於八十年代後期進行的本地流行病學研究的結果釐定。研究確定

collecting floating refuse at the beaches. Three beaches, namely Deep Water Bay, Clear Water Bay Second and Golden Beach are opened throughout the whole year since 2001. Commencing from winter 2002, Silverstrand is also opened all year round to the public. Other beaches are only opened during the bathing season.

2.3. Hong Kong has many non-gazetted beaches. Among them, the EPD monitors nine selected ones (Figure 2.1). They are monitored because of their popularity (e.g. Discovery Bay Beach) or their potential to be gazetted in the longer term (e.g. Lung Mei Beach). Monitoring results of these nine beaches are shown in Appendix 2.

Water Quality Objective

2.4 To safeguard the health of bathers, the Water Quality Objective (WQO) for bathing water has been established under the Water Pollution Control Ordinance in 1992. The WQO is established on the basis of the results of the local epidemiological studies conducted in the late 1980s by the EPD and local academics. The relationships between the level of faecal

糞便中含有的指示性細菌與游泳所引致的發病率相關。結果顯示，在所有糞便指示性細菌中，以大腸桿菌與游泳所引致的發病率關係最為密切，因此是最適宜用作評估在本港泳灘游泳的健康風險。

2.5 根據水質指標，在三月至十月底泳季期間採集的所有樣本中，大腸桿菌含量的幾何平均值每百毫升不得超過 180 個，而每月須採集樣本最少三次，每次相隔大約三至十四天。這項水質指標適用於本港各水質管制區內的泳灘水質附屬區。

indicators in water and the swimming-associated illness rates were established in these studies. The faecal indicator, *E. coli*, had been found to have the best correlation with the swimming-associated illness rates and is the best faecal indicator to estimate the health risk of swimming at beaches of Hong Kong.

2.5 The WQO states that the level of *E. coli* should not exceed 180 per 100mL calculated as the geometric mean of all samples collected during the bathing season from March to end October. Samples should be taken at least three times a month at intervals of between 3 and 14 days. This WQO applies to the bathing beach subzones of all Water Control Zones in Hong Kong.



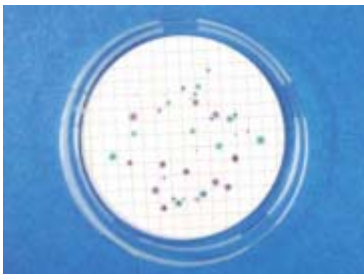
計劃的功用

2.6 除了評估水質符合指標的程度，泳灘水質監測計劃亦為達到下列目的而設：

- 監測泳灘的水質變化：泳灘如受到污染，監測結果可起示警作用，俾能及早處理可能出現的水質污染情況，以便在問題惡化前，能夠較容易解決。
- 識別水質有待改善的受污染泳灘：根據監測結果，當局可識別受污染的泳灘，以便按優先次序，採取補救措施，改善泳灘水質。
- 評估消滅污染計劃：監測提供所需的資料，可用以衡量泳灘水質改善措施的成效，例如提供排污渠或執行有關法例的成效。



點算大腸桿菌菌落數目
Counting of *E. coli* colonies



大腸桿菌菌落(藍綠色的菌落)
E. coli colonies (greenish blue colonies)

Functions of the programme

2.6 Besides assessment of compliance with the WQO, the beach monitoring programme has been designed to achieve the following functions:

- **To detect any change in beach water quality:** Monitoring results can provide early warning of beach water pollution so that any potential pollution problem can be resolved more easily at an early stage.
- **To identify polluted beaches that need remedial actions:** Based on the monitoring results, the Authority can identify polluted beaches and set priorities to take remedial actions to improve the beach water quality.
- **To evaluate pollution abatement programmes:** Monitoring provides the information needed to determine the efficacy of beach-related improvement measures such as provision of sewerage or enforcement of relevant legislation.

- 決定是否開放泳灘：監測提供憲報公布泳灘的水質趨勢資料，以便康文署決定是否開放泳灘。
- 讓市民了解泳灘的水質情況：根據監測結果，市民可作出明智的決定，是否適宜在某個泳灘游泳。

採樣工作

2.7 為了達成這些目的，在泳季期間，環保署每星期在各憲報公布泳灘最少進行一次水質監測，而在非泳季期間則每月監測最少一次。至於在冬季月份仍然開放的泳灘，每星期仍會由環保署監測。環保署會隨機選出不同周日，包括周末和公眾假期進行採樣工作，以確保收集的水質資料更為全面。



以便攜式分析儀在現場量度一些物理參數
Some physical parameters were measured on site with portable analyzer

- **To decide on the opening of beaches:** Monitoring provides the information on water quality trends so that LCSD can decide on the opening of beaches.
- **To advise the public on the beach water quality status:** Based on the monitoring results, the public will be able to make an informed decision on whether to swim at a particular beach.

Sampling protocol

2.7 In order to fulfil these functions, the water quality of all gazetted beaches is monitored by the EPD at least once per week during the bathing season and at least once per month during the non-bathing season (Table 2.1). Those gazetted beaches that are opened during winter months are still monitored weekly. Water samples are collected on random days including weekends and public holidays so that non-biased information on water quality is collected.



採集泳灘水樣本
Beach water sampling

表 2.1 泳灘監測次數
Table 2.1 Beach monitoring frequencies

泳灘 Beach	監測次數 Monitoring frequency	
	泳季 Bathing season	非泳季 Non-bathing season
全年開放的憲報公布泳灘* Gazetted beaches opened all year round*	每月四至六次 4-6 times per month	每月四至六次 4-6 times per month
其他憲報公布泳灘 Other gazetted beaches	每月四至六次 4-6 times per month	每月最少一次 At least once per month
非刊憲泳灘 Non-gazetted beaches	每月二至三次 2-3 times per month	每月一次 Once per month

* 深水灣、黃金泳灘、清水第二灣及銀線灣

* Deep Water Bay, Golden, Clear Water Bay Second and Silverstrand Beaches

2.8 每次在泳灘進行水質監測，均會在水深至大腿及腰之間的位置採集水樣本，以分析大腸桿菌含量及量度酸鹼值、含鹽量及混濁度。環保署人員亦會採用便攜式分析儀即場量度水溫及含氧量，同時記錄即日的天氣和現場觀察的泳灘狀況。除了泳灘範圍，環保署人員亦會在附近的溪澗及雨水渠採集樣本，以便監測其對泳灘水質有否影響。泳灘監測的工作程序見於圖 2.2。

2.8 Water samples are collected from each beach at thigh to waist water depth for *E. coli* analysis and measurement of pH, salinity and turbidity. Water temperature and the dissolved oxygen content are measured on site using portable analyzer. Weather information and on site observations are also recorded. In addition to sampling within the bathing area, samples are also collected from streams and storm drains in the vicinity to monitor their impact on beach water quality, if any. The operational procedures of the monitoring programme are depicted in Figure 2.2.

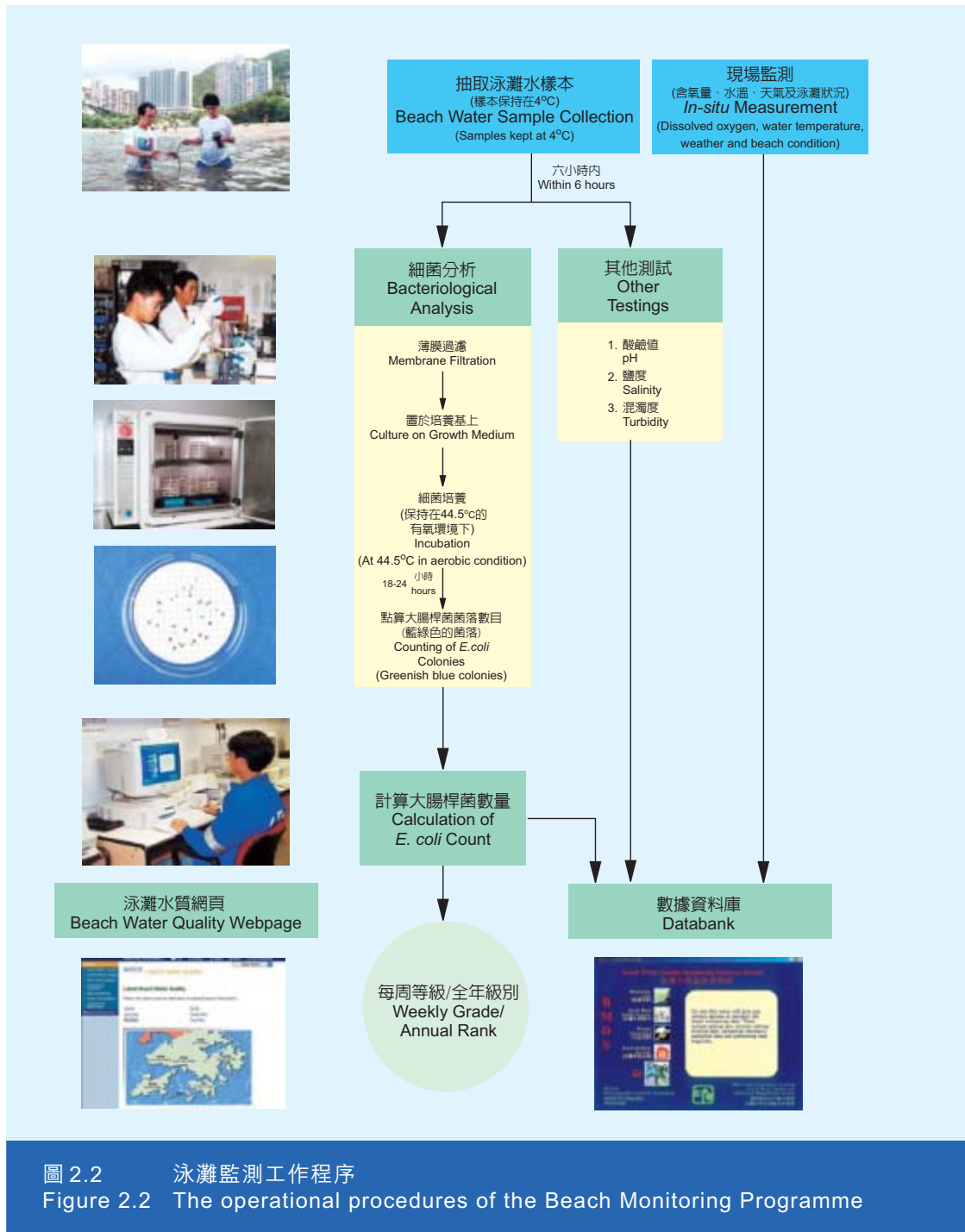


圖 2.2 泳灘監測工作程序
Figure 2.2 The operational procedures of the Beach Monitoring Programme

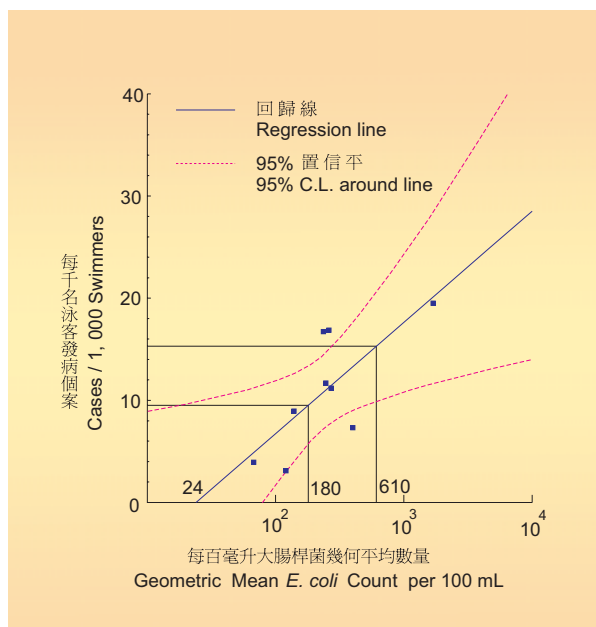


圖 2.3 泳灘水中大腸桿菌數量和游泳相關所得發病率的關係
Figure 2.3 Relationship between *E. coli* count in beach water and swimming-associated illness rate

泳灘評級制度

2.9 環保署會根據在泳區範圍內蒐集的水樣本中大腸桿菌含量，按泳灘等級制及全年級別制把泳灘評級。泳灘的等級顯示泳季期間泳灘最新的水質情況，而泳灘的全年級別則反映泳灘於整個泳季的平均水質。兩套制度均與健康風險有關，並根據海水的細菌含量，把泳灘分為四個類別。

全年級別制度

2.10 泳灘每年所獲的級別反映它的長期水質。級別是按三月至十月泳季期間採樣錄得的大腸桿菌含量的幾何平均值評定。全年級別制度簡列於表2.2。四個全年級別亦與於流行病學研究所得的與游泳有關的發病率相符(見圖2.3)。泳灘屬「良好」及「一般」級別，表示水質達到指標。

Beach Rating Systems

2.9 The *E. coli* levels of water samples collected within the bathing area are used for rating a beach according to our beach grading and ranking systems. The grade of a beach indicates the latest water quality of the beach while the rank of a beach denotes its average water quality through the whole bathing season. Both systems are health risk related and beaches are classified into four categories according to their *E. coli* levels.

Annual Ranking System

2.10 The rank of a beach reflects its long-term water quality. It is determined by calculating the geometric mean *E. coli* level of all samples collected within the bathing area during the

表 2.2 全年級別制度
Table 2.2 Annual ranking system

級別 Rank	每百毫升大腸桿菌數量 * <i>E. coli</i> count per 100mL*	輕微疾病率 ** (每千名泳客感染個案) Minor illness rate** (Cases per 1000 swimmers)	符合水質指標 WQO Compliance
良好 Good	<=24	UD	符合 Complied
一般 Fair	25-180	<=10	
欠佳 Poor	181-610	11-15	不符合 Not complied
極差 Very Poor	>610	>15	

- * 以泳季期間收集到的所有數據算出的大腸桿菌幾何平均數量。
Geometric mean *E. coli* count calculated based on all data collected during the bathing season.
- ** 皮膚及腸胃病
Skin and gastrointestinal illnesses
- UD 不能驗出
Undetectable

泳灘等級制度

2.11 泳灘等級制度簡列於表2.3。只有開放的泳灘會獲評級，讓市民知道最新的泳灘水質情況。泳灘等級是以最近五次採樣錄得的大腸桿菌含量的幾何平均值評定。為進一步保障市民的健康，

bathing season from March to October. The annual ranking system is summarized in Table 2.2. The four annual ranks correspond to the respective swimming-associated illness rates established in the epidemiological studies (Figure 2.3). Both ‘Good’ and ‘Fair’ ranks meet the WQO for bathing water.

Beach Grading System

2.11 The grading system is summarized in Table 2.3. Only opened beaches are graded to inform the public of its latest water quality status. A beach grade is calculated on the basis of the geometric mean *E. coli* level of the 5 most recent sampling occasions. To further safeguard bathers’ health, the worst grade, i.e. Grade 4, is also given to a beach when a high *E. coli* level

表 2.3 泳灘等級制度
Table 2.3 Beach grading system

等級 Grade	泳灘水質 Beach Water Quality	每百毫升大腸桿菌數量 * <i>E. coli</i> count per 100mL*	輕微疾病率 ** (每千名泳客感染個案) Minor illness rate** (Cases per 1000 swimmers)
1	良好 Good	<=24	UD
2	一般 Fair	25-180	<=10
3	欠佳 Poor	181-610	11-15
4	極差 Very Poor	>610 或最近一次讀數 >1,600 or last reading >1,600	>15

* 除另有闡釋外，大腸桿菌數量是最近五次採樣的大腸桿菌幾何平均數。
Except otherwise indicated, the *E. coli* level is the geometric mean of the 5 most recent sampling occasions.

** 皮膚及腸胃病
Skin and gastrointestinal illnesses

UD 不能驗出
Undetectable

如最近一次採樣錄得的大腸桿菌含量超逾每百毫升 1600 個的高水平，則不論其幾何平均值如何，泳灘均會評定為第四級，屬最差的等級。因此，泳灘等級可反映泳灘在過去數周的短期水質變化趨勢或顯示最近水質出現惡化。

exceeding 1600 per 100mL is detected on the last sampling occasion, regardless of the geometric mean. Hence the grade of a beach reflects the short-term water quality in the past few weeks, and provides the information on recent deterioration of water quality.

泳灘資料的發布

2.12 為向市民提供最新的泳灘水質資料，環保署透過不同途徑公布泳灘的等級。環保署每星期會在周末之前發布新聞稿，公布各泳灘的等級，以便泳客決定前往哪個泳灘游泳。而環保署網頁(網址：<http://www.epd.gov.hk>)上的泳灘等級及泳灘辦事處的泳灘等級告示板上的資料亦會在周內不時更新。市民亦可致電泳灘水質熱線(2511 6666)，查詢這些最新資料。

2.13 游泳人士在下水前，可於泳灘辦事處的告示板上查看最新的泳灘等級。然而，泳灘水質在大雨後可能出現變化或較預測的等級為差，因此，在特別容易受雨水影響的泳灘，經已豎立雨天效應警告牌，以提醒泳客水質可能出現短暫惡化(見附錄3)。



游泳人士可在下水前查看告示板上的最新泳灘等級
Bathers could check the beach grades at the notice boards before entering the water

Dissemination of beach information

2.12 In order to provide the public with the most updated information on beach water quality, the beach grades are disseminated through various channels. A summary of beach grades is released through the press media before weekend so as to facilitate the weekend beach goers to decide on where to swim. During the week, beach grades are also updated on the beach water quality webpage at EPD's website (<http://www.epd.gov.hk>) and at the grading notice boards of the beach offices whenever new information is available. The public can also access such updated information through the beach water quality hotline (2511 6666).

2.13 Bathers could check the beach grades at the notice boards of the beach offices before deciding to enter the water. Nevertheless, as the water quality may fluctuate after heavy rain and may be worse than the grades suggest, rainfall warning signs have been erected at those beaches particularly susceptible to the effect of rain to alert bathers of the possible transient deterioration in water quality (Appendix 3).