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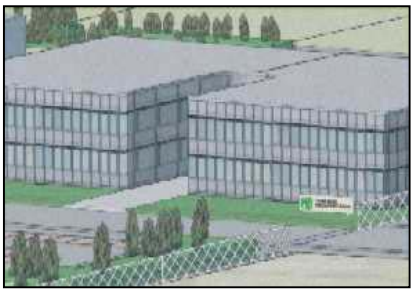
於屯門 38 區發展環保園 -

環境影響評估

行政摘要




環境保護署

2005 年 4 月

引言

背景

1. 現時香港的廢物量比十五年前大幅增加，導致堆填區的填滿速度遠比預期快。在 2003 年，香港回收了 41%的都市廢物，但其中只有 4%在本地循環再造。故此，當局需採取更多措施以改善本地循環再造的成效。其中一項可推動本港環保工業及廢物再造業的措施，是向業界提供可負擔並附有基礎建設的長期土地。

2. 在這方面，特區行政長官在其 2005 年施政報告中宣佈政府將制定政策，透過各項優惠措施以協助本港環保工業之發展。他提出發展專爲循環再造業而設的環保園，並務求環保園之第一期工程將於 2006 年年尾落成。

3. 根據《環境影響評估法例》附表 2 第一部分 G.4(b)項，環保園是一項指定工程項目，故需向環保署申請環境許可證以進行該工程。

評估方法

4. 環保園之環境影響評估(環評)的獨特之處，在於我們無法於現階段確定環保園在運作階段的作業範圍及內容。運作初期的租戶及其相關之處理工序將因應循環再造業之市場需求而轉變，故環保園內將不會有固定的處理工序內容及範圍。故此，本環評報告需證明所有將來循環再造工序所帶來之環境影響已被充分考慮。此外，環保園將來之環境許可證將包括多種處理工序，故在一般情況下，租戶無需再爲其個別工序申請環境許可證。

5. 爲達致以上目的，本環評報告採用了三個主要研究方法：

   - 「雨傘」方法：根據現時擁有的資料，盡量廣泛地包括所有處理工序。
   - 設計審核方法：容許在將來環保園內加入環評報告中沒有提及的處理工序。
   - 持續公眾參與：確保公眾及有關團體已獲得充分諮詢。

其他可選擇地點之審查

6. 近年來，環保署爲環保園的選址進行了廣泛研究，以尋找最適合之興建位置。有關的選址研究主要集中在本港一些已修復的關閉堆填區。當中的考慮因素包括每個選址的地理位置、修復工程的時間表、任何已落實的重用計劃、土地用途構思及實施計劃之進度、可供再造業運作之可用面積及與附近土地用途之相容性等。

7. 選址研究結果顯示，望后石谷堆填區、馬游塘中堆填區、將軍澳第二/三期堆填區及小冷水堆填區均有可能爲再造業提供所需之用地。然而，當政府將計劃中的第四個工業邨的選址遷調到將軍澳後，原來位於屯門 38 區預備作該用途的 20 公頃土地便因此而空置。這幅土地正好爲環保園提供了一個更佳的位置，並最終成爲了最可取的方案。

最可取的位置 – 屯門38 區

8. 建議中的環保園位於屯門區市郊，與數座工業用處所爲鄰(見圖一) 。 該址距離現有之住宅區超過 2 公里，故它與易受噪音影響的地方相距甚遠。

9. 上址在剛通過並於 2005 年 1 月 21 日刊憲的編號 S/TM/20 屯門分區計劃大綱草圖中，被規劃爲「其他指定用途」(OU)註明「特別工業地區」(SIA)。由於「環保園」不屬該計劃大綱草圖的欄 1 或欄 2 之內所列的任何項目，故需對區域劃分作出修改。有關上述事項之討論已在另一份按照城市規劃條例呈交至鄉郊及新市鎮規劃委員會的《環保園更改區域劃分報告》內詳述。

10. 屯門 38 區內之現有土地用途包括紹榮鋼鐵廠、內河碼頭及由土木工程拓展署運作的建造及拆卸廢物設施。計劃中的用途包括有在環保園西北面的永久性飛機燃料設施及另一所建築廢物設施。在環保園北面山邊亦有一個渡假營地在構思階段。圖一展示了屯門 38 區所有現時及計劃中的土地用途。

環保園

性質

11. 環保園是專爲環保工業劃分出來的地方，在園內租戶可用合理的價錢獲得一幅適合他們進行再造及環保處理工序的土地。該幅土地的租用年期一般會較長，好讓租戶能從建築物及機器所作的投資上獲得合理回報，並在有效率及可持續的情況下運作。

12. 環保園的詳細設計及基礎建設將以「設計及建造」形式交由顧問公司負責研究，並由工程承辦商負責興建。建成後之環保園將交由一管理承辦商負責替環保署管理。故此，租戶只需投入因應其個別需要所用的資金，及支付使用公共設施的費用。

13. 這種方法可令業界之成本開支減至最低，增加環保園在財政上的吸引力，從而使更多本地環保工業在環保園設廠投資。

實行

14. 由工程承辦商負責的環保園建造部分包括以下項目：

- 基礎建設(包括道路、雨水渠、污水渠、公用設施等)的建造
- 爲合資格租戶提供已鋪設各種基礎設備之用地，以供他們發展之用
- 興建包括管理辦公室及訪客中心等在內的行政大樓，及管理沿海地段所需的設施
- 興建污水處理設施及廢物收集設施
- 在環保園內 460 米長的沿海地段興建停泊設施(如繫船柱及護舷墊等)

15. 由營運者負責的運作部分包括下列項目：

- 展開推廣及宣傳活動
- 籌備與個別租戶的合約及租務安排，並爲租戶分配合適的地段作興建循環再造及環保設施之用
- 籌劃並實行管理程序及應急步驟
- 管理環保園沿海地段之分配事宜
- 維修及保養共用之基礎建設、設備、行政大樓等

16. 工程承辦商及營運者須共同執行根據環境許可證要求而設的環境監察及審核計劃(EM&A)及所需的緩解措施。

設計理念

17. 有鑑於在屯門 38 區現有及計劃中的土地用途，環保園之發展將受一定程度的限制。故此，環保園的發展將會分爲兩個階段，環保園第一期(即從 2006 年尾開始)須發展成爲一座設備齊全、包含所有必需配件、且能獨立運作的設施。該設施亦須能夠在 2009 年後作第二期擴建。圖二爲環保園的概念規劃。

18. 環保園概念設計背後之理念可被概括爲「靈活性」三字。環保園以至本地再造業的成功與否取決於環保園能否靈活地配合不同規模的公司(從單一經營者以至大型企業)及不同處理工序之需要。

可再造物料之範圍

19. 初步建議以下之物料種類可於環保園內進行循環再造：

- 電池
- 電子零件
- 玻璃
- 有機食物廢物
- 含鐵金屬
- 有色金屬
- 紙類
- 塑膠
- 紡織品
- 橡膠輪胎
- 木類
- 廢銅侵蝕劑

20. 其他未被初步考慮之物料種類及/或處理工序可透過以後的「設計審核程序」被加以考慮。

環境評估

範疇

21. 根據研究概要所定的要求，本環評研究包括下列範疇：

- 空氣質素
- 水質
- 廢物管理
- 預防土地污染
- 堆填區氣體風險評估
- 生命危害

22. 以上各項評估均以「雨傘」方法進行，即廣泛地包括各種再造處理工序，並以最高處理量作爲「最差情況」之假設。此外，環境監察及審核計劃將包括在運作前爲每種處理工序進行之檢討，以確定在環保園內運作的每項處理工序在環境上均達可接受水平。

空氣質素

23. 本研究就項目的建造階段進行了量化空氣質素評估，並確認出累積塵埃影響爲空氣污染的主要因素。透過在《空氣污染管制條例》下強制執行的塵埃控制措施，建築塵埃可被控制至可接受的水平，並且不會對環境造成重大影響。

24. 就營運階段進行的量化空氣質素評估顯示，物料再造過程中所釋放的氣體是本研究的主要考慮項目。

25. 本研究就所提議之處理工序進行了初步篩選，以剔除導致嚴重空氣污染、並且無法以現有之設備有效控制污染的個別處理工序。

26. 初步篩選結果顯示，使用超低硫燃料能有效減少因燃燒而釋放的二氧化硫。而某些有機廢物的提煉過程(如提煉豬油)卻會產生大量不能緩解至可接受程度的氣味。

27. 此外，含鐵金屬的加熱過程所需之燃料比加熱同等分量之有色金屬所需的爲高。換言之，若加熱同等分量之金屬，含鐵金屬比有色金屬在加熱過程中會釋放更多因燃燒化石燃料而產生的污染物。研究亦知悉有色金屬之加工及紙漿製造工序均需消耗大量燃料。

28. 根據初步篩選結果，本研究認爲應在環保園內強制使用超低硫燃料，並建議把提煉豬油工序從評估中刪除。

29. 爲減少因使用化石燃料所造成的空氣污染，本研究亦認爲應把含鐵金屬之熱力加工從評估中剔除，惟非加熱之含鐵金屬加工工序則可保留。使用非化石燃料的熱力加工工序亦可被繼續考慮。

30. 空氣質素模型模擬了在三種情況下空氣質素所受之影響。這三種情況代表了不同的再造物料處理量對空氣質素之影響。

31. 模擬結果顯示，我們需特別留意在大量處理多種不同再造物料的情況下空氣質素所受的影響。嚴謹地控制再造物料的種類及數量能有效地把對空氣質素的影響降至可接受之水平。

32. 總括之言，本研究選取了在可接受之空氣質素影響的情況下，處理最大量及最多物料種類的情況爲「基本方案」，並以之作將來(在設計審核階段)比較之用。餘下的環境評估亦會以此爲基礎。

水質

33. 根據建造階段之水質評估結果，若在施工期間實行良好的工地管理，水質將不會受嚴重影響至不可接受之水平。良好的工地管理，包括防止未受控制的污水排放至附近水體及爲工人提供流動公廁設施等。

34. 營運階段的水質評估主要是針對負責把由租戶產生的工業廢水處理至達可排放標準的廢水處理設施。經該設施處理過的廢水將被輸往鄰近的污水處理廠(即望后石污水處理廠)。本研究認爲環保園用戶的生活廢水應由獨立污水系統分別收集，然後直接輸往望后石污水處理廠處理。

35. 工業廢水處理設施的設計處理量乃根據流入物之變化(因應不同的再造工序)及高化學需氧量及重金屬含量而計算。若個別租戶所排放之工業廢水未能符合廢水處理設施的流入物要求，則租戶需自行安裝預先處理設施以處理其廢水。

36. 其他針對水質控制的主要設計特點包括在表面水收集系統設置截流裝置，以防止溢出之工業廢水進入表面水系統。在環保園內一些沿海地段亦應加設此類裝置以防止海水污染。

37. 總括而言，減少水質污染的主要做法是在環保園內提供廢水處理設施，並定期進行監察，以確保所排放的污水符合根據《水污染控制條例》發出之牌照內的要求。

廢物管理

38. 就建造階段的廢物評估顯示，環保園之設計能達至「挖填平衡」，換言之不會有多餘的建造及拆卸物料產生及無需爲剩餘之物料尋找棄置地方。此外，工地亦會輸入建築廢料作建造景觀佈置之用。此舉亦可減少現時在附近填料庫的堆存量。

39. 營運階段的廢物管理評估主要針對四大廢物源頭，包括由各項再造工序產生的廢物、由保養設備及用具產生的化學廢物、由廢水處理設施產生的污泥及由環保園日常運作產生的一般廢物。

40. 總括而言，雖然再造的過程將產生一些廢物需在環保園以外另覓地方棄置，但有更多數量原運往堆填區的廢物轉移到環保園作加工處理。故此，環保園實際上能協助延長現有各堆填區之壽命。此外，整體廢物量之減少亦有助政府節省在廢物處置方面的大量開支。故此，在廢物管理層面上，環保園確實能爲環境帶來極大的正面效益，並且是推動可持續發展的更適當方法。

預防土地污染

41. 爲防止土地在環保園營運期間受污染，本研究建議在可能產生土地污染之處理工序的範圍內鋪設穩固的混凝土基座，以防止一旦發生意外時有害物質滲進泥土而造成污染。

42. 本研究亦針對化學廢物之管理提出了一系列良好運作建議，以防止在營運期間出現土地污染的情況。

堆填區氣體風險評估

43. 由於環保園位於小冷水堆填區的 250 米範圍之內，故本工程項目需進行堆填區氣體風險評估。本研究以「源頭-目標-途徑」方法進行了量化評估。評估結果顯示，環保園所處之位置受堆填區氣體影響只屬低風險。基於以上評估結果，本研究提出了一系列針對設計、建造及營運各方面的預防措施。

生命危害

44. 在環保園內進行之處理工序中，某些物質可能會在儲存期間或運送過程中引起危險。

45. 本研究仔細審查了上述物質或液體燃料的危險性，並就它們對外界影響之風險作出評估。若能配以足夠的安全及緩解措施，上述物質對生命的危害性則相對極少。

46. 由於環保園與位於它西北面的永久性飛機燃料設施相當接近，一旦永久性飛機燃料設施發生火警，環保園內各幢在該設施邊界附近的多層建築物亦可能受波及。爲解決以上問題，本研究建議限制環保園內接近永久性飛機燃料設施邊界的建築物高度，以保障在內工作工人的安全。

環境監察及審核計劃

47. 本研究建議實行環境監察及審核計劃以審核環保園內的各項活動。

48. 環境監察及審核計劃內需包含一份環境管理大綱，並由工程承辦商及營運者共同負責執行。計劃內亦需包括一份由營運者制定的緊急應變大綱。

49. 在施工期間，負責人需定期進行工地巡查及匯報，以確保工程承辦商能符合推行時間表及環境許可證內的要求。

50. 在營運期間，除定期匯報外，「處理工序檢討」程序可確保所有在環保園內運作的再造工序均合符環境標準，以及其環境影響並沒有超出環評報告所評估的程度。

設計審核

51. 設計審核的目的主要是確保所有在環保園內運作的新處理工序均能符合環境許可證內的指定要求，並已切實執行本環評報告提出的所有建議。

52. 透過把提議之處理工序及環評報告所評估之處理工序的環境影響作比較，便可得知提議之新處理工序能否符合指定的要求。若提議之處理工序的環境影響比在環評報告內評估的處理工序爲低，該項處理工序便可獲批准在環保園內運作。相反，若該處理工序之環境影響比環評報告所評估的處理工序爲大，營運者的環境小組便需進行下列工作：

- 就提議之處理工序提出修改，以避免環境影響/風險，例如採用較少污染的技術及避免使用化學品等
- 提供可令影響/風險降低至不高於環評報告所評估之程度的緩減措施。例如採用更好的空氣污染控制設備、進行廢水預先處理、提供穩固的基座及遮蔽保護、改善物料的安全及處理過程等

53. 若上述實行之措施均不能向獨立環境查核人及環保署證明處理工序的影響/風險達可接受之程度，該處理工序便不可在環保園內運作。

54. 此外，營運者應對每項處理工序的環境影響作全面性的考慮。在設計審核過程中，營運者應把環保園視爲一座單一的綜合設施，而非一系列獨立的再造工序，從而對這些操作的累積影響作全面評估。

整體結論

55. 在爲環保園尋求環保設計以減少環保園本身對環境之影響的過程中，本環評報告充分展示了環評法例之下環境評估程序爲發展項目帶來之好處。本項環境評估的結果及其過程中與相關團體諮詢，亦令環保園之設計得以改良。

56. 環保園能爲環境帶來四大好處。首先，透過把所有原來分散在各處的回收再造工業集中在環保園內，有助即時改善處理工序原有位置附近的環境及減少附近居民所受之影響。

57. 第二，基於環境考慮，所有超出可接受空氣污染水平的處理工序將不能在環保園內運作。園內提供的主要基建(如於雨水渠系統設置的截流裝置及工業廢水處理設施)能確保環保園排出的廢水不會導致不可接受的水質污染。

58. 第三，環保園內的環境將受到妥善的控制，以確保所有處理工序符合空氣及水質要求。與以往分散各處，雜亂無章的回收再造業運作模式相比，環保園的發展有助減低香港整體的環境污染情況。這成效可在以後批核新處理工序的設計審核階段被再次證明及肯定。

59. 最後，透過各個租戶及其相關處理工序間的互相協力，租戶能減少廢物產生量，並加強廢物回收作現場/非現場再造之成效。

60. 總括而言，在屯門 38 區發展環保園可充分體現 2005 年施政報告的抱負 – 爲本地回收再造及環保工業提供年期較長、經濟上又能負擔的用地，鼓勵回收業發展，從而改善環境。如此一來，不但廢物管理可朝著可持續的方向發展，本港經濟可亦因就業職位增加而受惠。

Figure 1 : Location of the Proposed EcoPark and Other Users in Tuen Mun Area 38
圖一: 位於屯門 38 區建議中的環保園及其他使用者位置

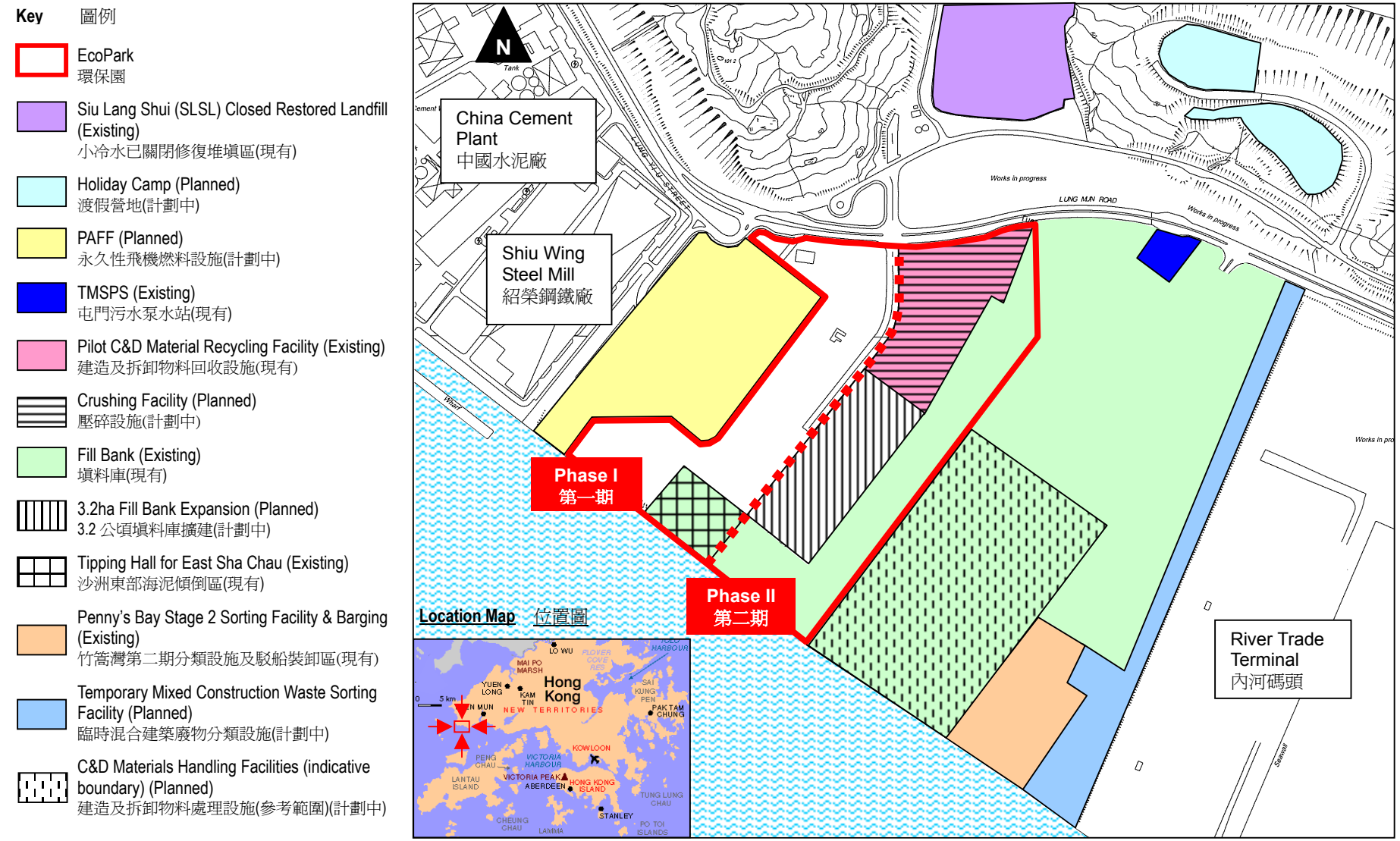
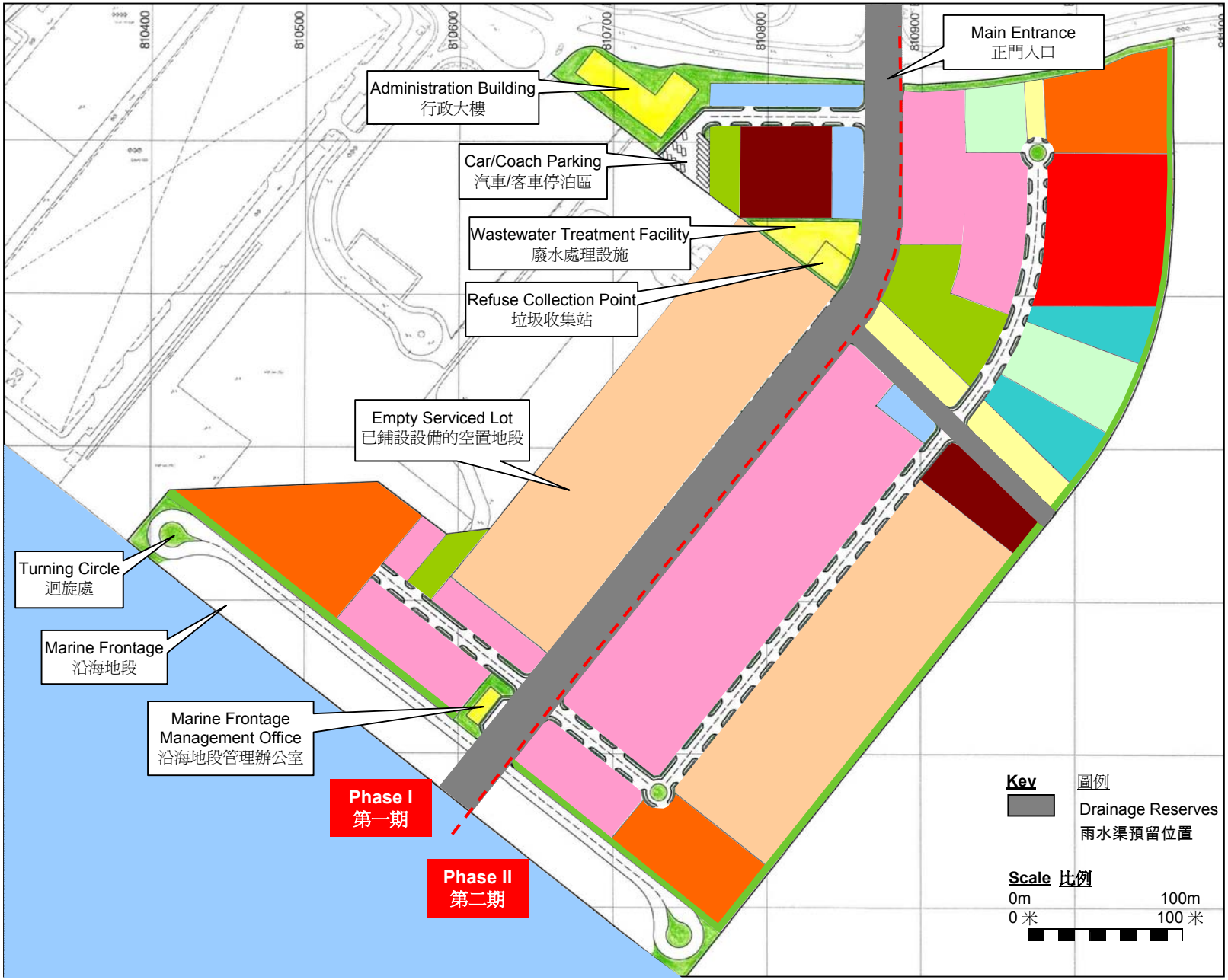


Figure 2 : Conceptual Design of EcoPark
圖二 ： 環保園的概念規劃



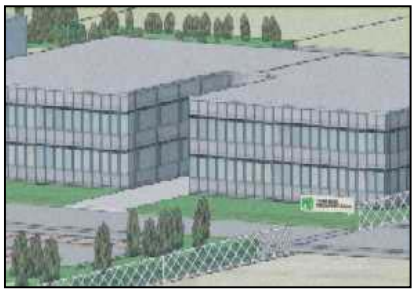
偉信 Scott Wilson

in association with

BMT

Environmental Impact Assessment for Development of an EcoPark in Tuen Mun Area 38

Executive Summary




Environmental Protection Department

April 2005

INTRODUCTION

1. Hong Kong's landfills are filling up faster than expected and much more waste is being produced now than 15 years ago, when the landfills were being planned. By the end of 2003, although Hong Kong was recycling 41% of municipal waste, less than 4% was being recycled locally. Thus, further measures need to be taken to improve the level of local recycling. The long-term availability of affordable land provided with basic infrastructure has been identified as one such measure to promote the growth of the environmental and waste recycling industries in Hong Kong.

2. To this end, the Chief Executive announced in his 2005 Policy Address that the Government will formulate a policy to provide concessions to assist the development of the environmental industry. He has pledged to build an EcoPark for exclusive use by recycling industries and committed to the first phase of EcoPark being commissioned in late-2006.

3. The EcoPark is a Designated Project (DP) under G.4(b) of Part 1, Schedule 2 of the EIAO. As a DP under Schedule 2, an Environmental Permit (EP) is required.

Approach to Assessment

4. The EIA for EcoPark is unique in that the future scope of operation of EcoPark cannot be determined at this stage. The initial mix of tenants (and corresponding processes) identified will not remain static but will change in response to the market demands of the recycling industry. Thus, the EIA will need to demonstrate that the environmental impacts of all future recycling processes have been fully considered. Furthermore, it is intended that the EP for EcoPark should encompass a large range of processes such that tenants will not normally need their own EP.

5. To achieve this, three key approaches have been incorporated into this EIA :

   - The **Umbrella Approach** to include as wide a range of processes as possible, based on the best available information available at this time.
   - The **Design Audit Approach** to allow for inclusion within EcoPark any future processes not covered by this EIA.
   - **Continuous Public Involvement** to ensure that the community and stakeholders are fully consulted.

Examination of Alternative Locations

6. In recent years, the Environmental Protection Department (EPD) have carried out extensive site searches for the preferred location for an EcoPark and these focused on utilising the restored closed landfill sites in Hong Kong. The factors considered in the searches included location of each site, programme of the restoration works, any committed afteruse, progress in determining the afteruse and implementation programme, potential usable area for recycling activities and compatibility with neighbouring land uses.

7. The results of the site search indicated that Pillar Point Valley Landfill, Ma Yau Tong Central Landfill, Tseung Kwan O Stage II/III Landfill and Siu Lang Shui Landfill all had potential for accommodating materials recycling activities. However, when a 20ha piece of land in Tuen Mun Area 38 became available (because the previously proposed Fourth Industrial Estate was relocated to Tseung Kwan O), this proved to be a better location for EcoPark and became the preferred location.

Preferred Location – Tuen Mun Area 38

8. The proposed EcoPark is situated on the outskirts of Tuen Mun, adjacent to a number of industrial premises and existing industrial uses (see Figure 1). The site is more than 2km from existing residential developments, and therefore considered to be remote from sensitive receivers.

9. The site is currently zoned “Other Specified Uses” (“OU”) and annotated “Special Industries Area” (“SIA”) on the latest approved Tuen Mun OZP No. S/TM/20. As “EcoPark” is neither a Column 1 or Column 2 use on the OZP, an amendment to the zoning is required, and this is being addressed in a parallel *EcoPark Zoning Amendment Report* to be submitted to the Rural and New Town Planning Committee for consideration under the Town Planning Ordinance.

10. Current uses of Tuen Mun Area 38 include Shiu Wing Steel Mill, River Trade Terminal and Construction and Demolition (C&D) Material facilities operated by the Civil Engineering and Development Department. Planned uses include the Permanent Aviation Fuel Facility (PAFF), adjacent to the northwest boundary of EcoPark, and additional C&D Material facilities. A “holiday camp” on the hillside to the north of EcoPark is also planned. All existing and planned uses are also shown on Figure 1.

THE ECOPARK

Nature

11. An EcoPark is an area of land set aside for use by the environmental industry within which individual tenants can acquire a lot of land suitable for their particular recycling and environmental operation at an affordable price. The length of tenure would be sufficient to fully justify their investment in the buildings, plant and machinery necessary for their operations to be carried out in an efficient and sustainable manner.

12. A follow-on Design-and-Construct (D&C) consultancy will develop the detailed design of EcoPark and its infrastructure and this will be constructed as a Public Works project (by the Works Contractor). A Management Contractor (the Operator) will then take possession of EcoPark and manage the facility for EPD. Thus, each individual tenant will need capital investment only for the provision of his own particular requirements, although each will need to pay for use of common facilities.

13. This approach will ensure that costs are kept to a minimum and should make EcoPark more financially attractive to the local environmental industry.

Implementation

14. Construction of EcoPark (by the Works Contractor) will likely involve the following:
    - Construction of basic infrastructure, including roads, drainage, sewers, utilities, etc.
    - Provision of empty, serviced lots (initially grassed, open ground) to be developed by qualifying tenants for their own use.
    - Construction of an Administration Building containing management offices, a visitor centre, etc., and facilities for management of the marine frontage.
    - On-site Wastewater Treatment Facility (WTF) and a waste collection facility.
    - Berthing facilities (e.g. bollards, fenders) for loading/unloading at the 460m of marine frontage within the EcoPark site.

15. Operation of EcoPark (by the Operator) will likely include the following activities :
    - Development of promotional and advertising materials.
    - Preparation of contractual/leasing arrangements with individual tenants and allocation of lots to tenants for their construction of recycling and environmental facilities.
    - Preparation and implementation of management procedures/emergency procedures.
    - Management of the marine frontage allocated to EcoPark.
    - Maintenance of common infrastructure, plant, Administration Building, etc.

16. Environmental Monitoring and Audit (EM&A) and implementation of necessary mitigation measures to meet any EP conditions will be carried out by both the Works Contractor and the Operator.

Design Rationale

17. There are a number of constraints (from existing and planned users in Area 38) to developing EcoPark and so it is intended that EcoPark will be developed in two phases. As such, Phase I must be able to operate as a self-contained facility, including all necessary components, from late-2006. It must also allow expansion into Phase II after 2009. A conceptual layout for EcoPark has been developed and is shown in Figure 2.

18. The rationale behind the conceptual design of EcoPark can be summarised in one word – “flexibility”. It is considered that flexibility in providing for a wide range of tenants, ranging from sole-proprietor operations to large companies and a wide range of processes will be paramount to the success of EcoPark and the local recycling industry.

Range of Materials to be Recycled

19. The following material types were initially suggested for recycling within EcoPark :
    - Batteries
    - Electronics
    - Glass
    - Organic Food Waste
    - Ferrous Metals
    - Non-ferrous Metals
    - Paper
    - Plastics
    - Textiles
    - Rubber Tyres
    - Wood
    - Spent Copper Etchant

20. Other material types and/or processes not initially considered in the EIA can nevertheless be considered for inclusion in EcoPark through the Design Audit process.

ENVIRONMENTAL ASSESSMENTS

Scope

21. The EIA study followed the requirements of the Study Brief, which specified assessments of :

- Air Quality.
- Water Quality.
- Waste Management.
- Prevention of Land Contamination.
- Landfill Gas Hazard Assessment
- Hazard to Life.

22. Assessments were carried out under the umbrella approach, in that a wide range of recycling processes for each material type were assumed at maximum throughputs to be the "worst case". Furthermore, under the EM&A programme, a review of each proposed process will be carried out to confirm environmental acceptability prior to the process being operated within EcoPark.

Air Quality

23. Quantitative air quality assessments were carried out for the construction phase, and cumulative dust impacts were identified as a key issue. Through mandatory implementation of dust control measures as required under the Air Pollution Control (Construction Dust) Regulation, it was concluded that construction dust can be controlled to within acceptable limits, and no significant impacts were anticipated.

24. Quantitative air quality assessments were also carried out for the operation phase during which emissions from recycling activities were of concern.

25. Those processes that would result in significant levels of air pollution, even when using the best available air pollution control equipment not entailing excessive cost, were identified during an initial screening of the suggested processes.

26. This initial screening identified that the use of Ultra-low Sulphur Fuel would significantly reduce sulphur dioxide emissions from fuel usage. It was also identified that inedible rendering of organic food waste (such as lard boiling) would generate very high levels of odour that could not be mitigated to acceptable levels.

27. It was further identified that the thermal processing of ferrous metals would require significantly more fuel than an equivalent quantity of non-ferrous metals, or that for the same quantity of thermal processing, ferrous metals would generate significantly more pollutants from fossil fuel burning. High fuel usage requirements for non-ferrous metal processing and paper pulping were also noted.

28. As a result of the initial screening, it was decided to mandate that Ultra-low Sulphur Fuel should be used in EcoPark and that lard boiling should be excluded from assessment.

29. It was further decided that to minimise air pollution from fossil fuel usage, thermal processing of ferrous metals should be excluded from assessment, although non-thermal processes would remain. Also, thermal processes using non-fossil fuels could be considered.

30. Three scenarios were then developed to allow modelling of the air quality impacts. These three scenario provided for a range of material throughputs to be examined.

31. The results of the modelling showed that where a wide range of materials and throughputs were allowed, there were concerns regarding air quality impacts. With a more restricted range of materials and throughputs, the air quality impacts would be reduced to acceptable levels.

32. It was concluded that the scenario that allowed the greatest range of materials and throughputs to be processed, while not causing unacceptable air quality impacts was preferred as the "base case" for future comparisons (under the Design Audit) and formed the basis for the remaining environmental assessments.

Water Quality

33. The construction phase water quality assessment concluded that no unacceptable impacts would arise provided that recommendations for good site practice were implemented. This included preventing uncontrolled discharges into adjacent marine waters and provision of portable toilet facilities for workers.

34. The operation phase assessment focused on the provision of the WTF to treat all industrial wastewater generated by tenants to the standard required for discharge into a sewer leading to a treatment works – in this case, Pillar Point Sewage Treatment Works (STW). It was proposed that "domestic" wastewater should be collected in a separate sewerage system and sent to Pillar Point STW directly for treatment.

35. The design capacity of the WTF was estimated with a variable quality of influent (depending on recycling processes being carried out) and with high chemical oxygen demand and heavy metals. It was further noted that some tenants may need to install their own pre-treatment plants if their process wastewater could not meet the influent limits of the WTF.

36. Other key water quality design features are the provision of stop-logs/interceptors in the surface water drainage system to prevent any spilled materials from entering the surface water system. These features were also recommended for the marine frontage area to minimise contamination of the sea during loading and unloading of materials.

37. Overall, it was concluded that the provision of the WTF would be a key factor in reducing water pollution to an acceptable level, and that regular monitoring would ensure compliance with conditions of the WTF Discharge Licence issued under the Water Pollution Control Ordinance.

Waste Management

38. The construction phase waste assessment concluded that the EcoPark design could achieve, as a minimum, a balanced "cut and fill", i.e., there would be no surplus C&D Materials requiring off-site disposal. Furthermore, EcoPark could be designed to be a net importer of C&D materials through the construction of landscape features, thereby reducing the stockpiles of C&D Materials, e.g. at the adjacent Fill Bank.

39. The operation phase waste assessment focused on the four main sources of waste that would arise, namely, waste from recycling activities, chemical waste arising from maintenance of plant and equipment, sewage sludge (from the WTF) and general daily waste from EcoPark operations.

40. It was concluded that while recycling activities would generate some solid waste requiring off-site treatment, much more waste would be diverted from landfill to EcoPark for processing. As such, the operation of EcoPark can help to extend the operational life of the existing landfills. Furthermore, this net reduction in waste disposal translates into a significant cost saving to Government through reduced disposal costs. Overall, therefore, EcoPark provides a very positive environmental benefit in waste management terms and is also a more sustainable approach.

Prevention of Land Contamination

41. To ensure that land does not become contaminated during the operation of EcoPark, a number of design features were proposed, such as the use of concrete hardstanding in those areas where activities considered to be potentially contaminating (in the event of an accident) would be carried out.

42. Furthermore, a series of good practice recommendations were made, particularly for chemical wastes, to prevent land contamination during operations.

Landfill Gas (LFG) Hazard Assessment

43. The EcoPark site lies within 250m of Siu Lang Shui Landfill and so a LFG Hazard assessment is required. A qualitative source-target-pathway approach was used and concluded that the risk to EcoPark from LFG was low. As such, a number of precautionary measures were suggested for the design, construction and operation.

Hazard to Life

44. Based on the range of processes to be carried out, a number of substances were identified that may pose a potential risk during storage or transportation.

45. The hazards posed by each of these substances, and also by liquid fuels, were examined and an assessment of the likely off-site risks was made. Given the safety and mitigation measures suggested, the off-site risk for each substance was determined to be negligible.

46. It was noted that there was the potential for risk from a fire at the adjacent PAFF to any multi-storey EcoPark buildings close to the PAFF boundary. To address this issue, it was proposed to limit building heights (and thereby risks to workers) within EcoPark along the boundary with the PAFF.

Environmental Monitoring and Audit (EM&A) Programme

47. An EM&A programme has been proposed that relies heavily on auditing of activities within EcoPark.

48. The EM&A programme also requires an Environmental Management Plan to be implemented by the Works Contractor and Operator and for an Emergency Response Plan to be developed by the Operator.

49. During construction, regular site inspections and reporting provide the means to ensure that the Works Contractor is meeting the

environmental conditions specified in the Implementation Schedule and any conditions specified in the EP.

50. During operation, and in addition to regular reporting, the Process Review approach (including the Design Audit where required) has been adopted to ensure that all recycling processes within EcoPark have been individually confirmed to be acceptable, with environmental impacts/risks no greater than those assessed in this EIA.

Design Audit

51. The purpose of the Design Audit is to confirm that all new processes to be operated within EcoPark comply with the conditions of the EP and to ensure that the recommendations of the EIA are met in full.

52. This is achieved by comparison of impacts from the proposed process with those assessed in the EIA. Where environmental impacts/risks from proposed processes are not greater than those assessed in the EIA, the process is approved for operation within EcoPark. If impacts/risks are greater than those assessed under the EIA, then the Operator's ET shall :

- Propose modifications to the intended process such that the impacts/risks are avoided, e.g. through adoption of cleaner technology, not using chemicals, etc.
- Propose mitigation to reduce impacts/ risks to a level no greater than that assessed in the EIA. Such mitigation may include better air pollution control equipment, wastewater pre-treatment, provision of hardstanding and/or shelters, improved material safety/handling, etc.

53. If none of the above options can satisfy the IEC or EPD that the impacts/risks from the process are acceptable, then that process will not be allowed in EcoPark.

54. Furthermore, by considering environmental impacts/risks of each process in this holistic manner, through the design audit, the Operator shall develop EcoPark as a single, integrated facility, rather than simply as a collection of disparate recycling operations, and in so doing will assess the cumulative impact of operations.

OVERALL CONCLUSIONS

55. In seeking to develop environmentally friendly designs for EcoPark, and thereby minimising the environmental impacts of EcoPark itself, the EIA has demonstrated the benefits of applying the EIA process under the EIAO. This is shown in the modifications to the design resulting from the environmental assessment and from the consultations held throughout the EIA preparation with key stakeholders.

56. The environmental benefits of EcoPark are fourfold. Firstly, where operators have relocated to EcoPark there will be an immediate benefit experienced by the local population and the immediate environment at former sites of informal waste recycling.

57. Secondly, within EcoPark, processes that would result in the generation of unacceptable levels of air pollutants have been excluded on environmental grounds. The provision of key infrastructure, such as the stop-logs within perimeter lot drainage and the WTF, will also ensure no unacceptable levels of water pollution from wastewater generated within EcoPark.

58. Thirdly, within the controlled environment of EcoPark, all processes will comply with air quality and water quality objectives, thereby resulting in an overall net reduction in environmental pollution, compared to that generated by the existing uncontrolled recycling activities carried out elsewhere in Hong Kong. This will be further demonstrated and confirmed in the Design Audit to be carried out for new processes.

59. Finally, the synergy between the operations of the various tenants will result in waste reduction and the enhanced recovery of materials for on-site/off-site re-manufacture.

60. In conclusion, the development of the EcoPark in Area 38 will fulfill the vision made in the 2005 Policy Address in that long-term land at an affordable price will be provided to encourage the recycling and environmental industry in Hong Kong. The waste will be managed in a more sustainable way and, as a result, not only will the environment be protected, but the local economy will also be stimulated through job creation.