

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

Head 705 – CIVIL ENGINEERING

Environmental Protection – Refuse Disposal

177DR – Development of integrated waste management facilities phase 1

Members are invited to recommend to the Finance Committee the upgrading of **177DR** to Category A at an estimated cost of \$18,245.7 million in money-of-the-day prices for the design and construction of the integrated waste management facilities phase 1.

PROBLEM

Even with waste reduction measures, there will still be about 10 000 tonnes of waste that require disposal every day in 2017. There is a pressing need to develop modern waste-to-energy facilities to treat Municipal Solid Waste (MSW).

PROPOSAL

2. The Director of Environmental Protection (DEP), with the support of the Secretary for the Environment, proposes to upgrade **177DR** to Category A at an estimated cost of \$18,245.7 million in money-of-the-day (MOD) prices for the design and construction of the integrated waste management facilities (IWMF) phase 1.

/PROJECT

PROJECT SCOPE AND NATURE

3. The proposed scope of works under **177DR** comprises –
- (a) design and construction of reclamation of about 16 hectares (ha) to form an artificial island near Shek Kwu Chau (SKC) and related works;
 - (b) design and construction of an MSW incineration plant of a design capacity of 3 000 tonnes per day;
 - (c) design and construction of associated architectural, building, civil and landscape works;
 - (d) design and installation of the electrical and mechanical works for the waste receiving and sorting facilities, waste incineration, heat recovery, power generation, pollution control and ash treatment systems;
 - (e) design and construction of mechanical and electrical works for utilities services facilities including a desalination plant and wastewater treatment plant etc.;
 - (f) design and construction of power connection and export system; and
 - (g) provision of pollution control and environmental monitoring facilities, and the associated environmental monitoring and audit (EM&A) for construction work.

4. The project site is located near SKC, south of Lantau Island. A plan showing the location of the IWMF phase 1, the conceptual layout plan and basic information of the project are at Enclosures 1 to 3 respectively. Subject to funding approval of the Finance Committee (FC), we would proceed with the tender procedures in the second half of 2014. If the contract can be awarded in 2015-16, we plan to commence the design and construction works in mid-2016 with a view to commissioning the facilities in 2021-22.

/JUSTIFICATION

JUSTIFICATION

Incineration and landfills are essential waste treatment infrastructure

5. To tackle the imminent waste challenge, the Environment Bureau released the “Hong Kong: Blueprint for Sustainable Use of Resources 2013–2022” (the Action Blueprint) on 20 May 2013¹. The Action Blueprint maps out a comprehensive strategy with targets, policies and action plans for waste management for the coming ten years. We have set an aggressive target to reduce the per capita disposal rate of MSW by 40% by 2022. Yet, even if measures and facilities are taken forward as planned, and waste reduction targets are achieved as set, there will still be about 10 000 tonnes of waste that require disposal every day in 2017. For a densely populated city like Hong Kong where land is scarce, relying on landfills as the sole MSW disposal facilities is not sustainable. While we will seek to extend the three existing landfills, in the longer run, our waste management system has to evolve in the direction of reducing direct landfilling of MSW. There is therefore a pressing need to develop modern waste-to-energy facilities to treat MSW, otherwise we cannot maintain the high hygiene standard expected of a modern, world-class city like Hong Kong. Modern incineration technology can be environmental-friendly and effective. Incineration is nowadays commonly used in international cities for proper treatment of MSW. Hong Kong is seriously lagging behind in the application of advanced incineration for waste management.

Proposed IWWMF phase 1

6. Advanced waste incineration facility was first proposed in the Waste Reduction Framework Plan issued by the Government in 1998. It is a facility designed to handle 3 000 tonnes of MSW per day by advanced incineration technology meeting European Union’s (EU) standard. The treatment process can reduce the volume of MSW by 90% before the residual ashes are disposed of at landfills. The Environmental Protection Department completed “The Engineering Investigation and Environmental Studies” for the IWWMF phase 1 in 2009 and reaffirmed that the moving-grate incineration technology is most suitable for the first modern IWWMF in Hong Kong. This technology is capable of treating mixed MSW reliably up to 3 000 tonnes per day. It is a mature mainstream technology with substantial proven track record and is still widely adopted by developed countries in Europe and Asia.

/7.

¹ The Action Blueprint is available at the website of Environmental Protection Department (www.epd.gov.hk).

7. Timely development of the IWWMF phase 1 is crucial as it is an integral part of Hong Kong's waste management strategy as set out in the Action Blueprint. Having considered the Environmental Impact Assessment (EIA) findings of IWWMF phase 1, the spatial distribution of our waste management facilities (including landfills, Sludge Treatment Facilities in Tuen Mun and Chemical Waste Treatment Centre in Tsing Yi), environmental considerations and transport efficiency, the Government has chosen to build the IWWMF phase 1 on an artificial island next to SKC at the southern tip of Hong Kong.

8. In the waste treatment process, the energy recovered will generate electricity for the use of IWWMF phase 1. We plan to export the surplus electricity of about 480 million kWh². The decrease in use of fossil fuel for electricity generation together with the reduced amount of MSW requiring landfilled would prevent the emission of some 440 000 tonnes of greenhouse gas each year.

Judicial Reviews concerning IWWMF phase 1

9. In 2012, four separate applications for Judicial Review (JR) were filed against the project. The JRs mainly challenged the decisions on the approval of the EIA report and issuance of the Environmental Permit (EP) by DEP. Some of them also challenged the decision of the Town Planning Board (TPB) to adopt the draft SKC Outline Zoning Plan (OZP). The Court of First Instance (CFI) on 7 June 2012 granted leave to apply for JR to all four JR applications and ordered one of them³ to proceed to substantive hearing given the JR grounds of the four applications were very similar while the other three cases were stayed pending the outcome of the substantive hearing. The substantive hearing was held from 14 to 16 November 2012. The CFI handed down a judgment on 26 July 2013 rejecting all the grounds in support of the JR and dismissed the application for JR.

10. The JR applicant filed a Notice of Appeal against the judgment on 23 August 2013. The hearing of the appeal is scheduled to be held on 4 and 5 June 2014. There has not been any court order prohibiting the carrying out of the IWWMF phase 1 up to today.

/11.

² We plan to export the surplus electricity to the existing power grid. We have studied and confirmed the technical feasibility and cost-effectiveness of electricity export in the feasibility study. We have also explored with the power companies the viability of connecting IWWMF phase 1 to the existing grid and found it feasible for the Government to pursue this matter further.

³ Leung Hon Wai v Director of Environmental Protection and Town Planning Board HCAL 49/2012.

11. While the appeal is not yet heard, we have reviewed the timetable and consider that it will serve the best interests of Hong Kong to seek funding approval for the project now instead of awaiting the outcome of the JR appeal. IWMF phase 1 requires a lead-time of about seven years for the selection of competent contractor, detailed project design, construction and commissioning. The project has already been held up for two years in view of the JR proceedings. With early funding approval, we could proceed with the tender procedures, which would take around two years, in parallel with the JR appeal proceedings. We would only award the contract to the successful tenderer after the JR appeal proceedings have been determined and the outcome of the JR appeal is in favour of the IWMF phase 1 to proceed.

FINANCIAL IMPLICATIONS

12. We estimate the capital cost of the proposed works to be \$18,245.7 million in MOD prices (please see paragraph 13 below), broken down as follows –

	\$ million
(a) Reclamation and civil works ⁴	2,434.4
(i) Seawall, reclamation and berth	1,081.6
(ii) Breakwaters	904.7
(iii) Civil and foundation works	448.1
(b) Building and architectural works	1,139.1
(i) Incineration plant building	843.7
(ii) Mechanical plant building	125.2
(iii) Associated buildings ⁵	83.7
(iv) Landscaping	86.5
(c) Mechanical and electrical works for incineration	6,407.2
(i) Waste receiving facilities	369.0
(ii) Waste incinerators	932.0
(iii) Boilers of waste heat recovery system	1,171.1
(iv) Steam turbines, generators and condensers of waste heat recovery system	850.9
	/(v)

⁴ Item (a) is for the design and construction of the reclamation for creation of a 16 ha artificial island for accommodation of the IWMF phase 1, a 650-metres' breakwaters enclosing the area and associated civil works.

⁵ Associated buildings include a mechanical sorting and recycling plant, a desalination plant and water supply system and a wastewater treatment plant and collection system etc.

		\$ million	
(v)	Flue gas treatment facilities	948.9	
(vi)	Ash treatment facilities	439.9	
(vii)	Associated electrical works	854.7	
(viii)	Instrumentation and control works	319.9	
(ix)	Miscellaneous installations	520.8	
(d)	Mechanical and electrical works for other associated facilities	311.4	
(e)	Power connection, substation, associated facilities and installations of the power export system	774.3	
(f)	Transportation supporting facilities	277.3	
(g)	Mitigation measures and EM&A for construction work	127.0	
(h)	Consultants' fees for	52.9	
(i)	contract administration	37.4	
(ii)	management of resident site staff	15.5	
(i)	Remuneration of resident site staff	159.1	
(j)	Contingencies	1,052.4	
		<hr/>	
	Sub-total	12,735.1	(in September 2013 prices)
(k)	Provision for price adjustment	<u>5,510.6</u>	
		<hr/>	
	Total	18,245.7	(in MOD prices)
		<hr/>	

We propose to engage consultants to undertake contract administration and site supervision of the project. A detailed breakdown of the estimates for the consultants' fees and resident site staff costs by man-months is at Enclosure 4.

13. Subject to approval, we will phase the expenditure as follows –

Year	\$ million (Sept 2013)	Price adjustment factor	\$ million (MOD)
2015 – 2016	223.8	1.11777	250.2
2016 – 2017	992.4	1.18484	1,175.8
2017 – 2018	1,308.1	1.25593	1,642.9
2018 – 2019	1,263.5	1.33128	1,682.1
2019 – 2020	1,562.1	1.40117	2,188.8
2020 – 2021	1,445.9	1.47123	2,127.3
2021 – 2022	5,900.1	1.54479	9,114.4
2022 – 2023	27.7	1.61624	44.8
2023 – 2024	11.5	1.68897	19.4
	12,735.1		18,245.7

14. We have derived the MOD estimate on the basis of the Government's latest set of assumptions on the trend rate of change in the prices of public sector building and construction output for the period from 2015 to 2024. We plan to implement the proposed works and the follow-on operation of the IWMF phase 1 under a Design-Build-and-Operate (DBO) contract arrangement. The capital cost of \$18,245.7 million will cover the design and build elements of the contract while the operation will be funded under the General Revenue Account. The contractual operation period will be 15 years. The DBO contract will provide for price adjustments for the entire contract period including the operation period.

15. We estimate that the annual recurrent expenditure arising from the IWMF phase 1 to be about \$402 million. The fees and charges implication arising from the project will be considered in the context of waste charging discussion.

/PUBLIC

PUBLIC CONSULTATION

16. We have been actively engaging the public on the development of the project for more than a decade. At district council level, we briefed the Islands District Council (IsDC) on 21 February 2011. Some IsDC members raised objection to the location of IWWMF phase 1. We have responded to members' enquiries at IsDC meeting on 20 February 2012, at which IsDC agreed to follow up the project by setting up a dedicated working group under the IsDC.

17. We presented the latest progress of the first IWWMF project at IsDC's working group meeting on 27 November 2013 and at IsDC's meeting on 16 December 2013. Members acknowledged the imminent challenges brought by the waste problems in Hong Kong and the need for the IWWMF phase 1. In view of residents' concerns about possible health impact, IsDC asked the Administration to commit to the following with concrete actions before proceeding with the project -

- (a) the proposed IWWMF phase 1 should achieve the emission standards of EU with public monitoring on the emission performance during operation;
- (b) EPD should set up liaison committee with participation from locals on matters regarding design and monitoring of the proposed IWWMF phase 1;
- (c) the Administration should provide compensation for the fishery community affected by the reclamation; and
- (d) the Administration should positively address the needs of the community nearby through enhancing community facilities etc.

18. We organized two visits to the Macao Refuse Incineration Plant on 7 December 2013 and 4 January 2014 for IsDC members and the local community to see for themselves the waste-to-energy facility and the development of waste management facilities in Macao. We will follow up on IsDC's request set out in paragraph 17 upon funding approval.

19. A summary of previous consultation and discussion at the Legislative Council (LegCo) Panel on Environmental Affairs (the EA Panel) regarding the project was provided in the EA Panel paper on 26 March 2012 [cf. LegCo Paper No. CB(1) 1369/11-12(01)]. We have further consulted the EA Panel on 24 February 2014. Since February 2011, we met with over 2 500 stakeholders and about 60 groups/organizations, and attended 70 meetings to explain the need of the project and to address their queries on various aspects of the project. A summary of the Administration's response has also been provided to the EA Panel [cf. LegCo Paper No. CB(1)931/13-14(01)]. Some LegCo members have also visited incinerators in Europe between 3 and 7 March 2014. Two deputation meetings were held on 22 and 28 March 2014. At the Special EA Panel meeting on 28 March 2014, the Panel raised no objection to the submission of the funding proposal to the Public Works Subcommittee (PWSC) by the Administration.

20. We gazetted the Dredging and Reclamation to the southwestern coast of SKC for the IWMF phase 1 under the Foreshore and Sea-bed (Reclamations) Ordinance on 21 April and 6 May 2011. During the two-month statutory objection period, a total of 57 objections were received. The objectors raised concerns on the environmental impacts of the project, the incompatibility with the planning requirements for the areas, the site selection and the overall waste management strategy concerns. Despite our efforts in elaborating the findings of the EIA Report and the engineering study, all the objections remained unresolved. After considering the objections, the Chief Executive-in-Council (CE-in-C) authorized the proposed works without modification on 13 March 2012.

21. On 21 April 2011, we gazetted the draft SKC OZP No. S/I-SKC/1 under the Town Planning Ordinance to extend statutory planning control to SKC and include the site required for providing the IWMF phase 1. During the two-month exhibition period ended on 29 June 2011, a total of 33 representations were received. All representations expressed concern about or objected to the proposed IWMF phase 1. The TPB held a hearing of the representations and comments on the draft SKC OZP on 17 January 2012. After the hearing, the TPB decided not to uphold the representations and considered that the OZP should not be amended to meet these representations. On 13 March 2012, the CE-in-C approved the draft SKC OZP.

22. In accordance with one of the conditions of the EP, we will set up community liaison group(s) comprising representatives of local personalities and other stakeholders on the IWMF phase 1 in the district as well as other related issues. We are in the process of incorporating views from the community in the detailed design of the project. For instance, IWMF phase 1 will have an architectural and landscaping design such that the facilities can blend into the surrounding natural and green environment. We will continue to maintain close liaison with IsDC, local community and other relevant stakeholders in taking forward the project.

ENVIRONMENTAL IMPLICATIONS

23. **177DR** is a designated project under the EIA Ordinance and an EP is required for its construction and operation. We carried out an EIA study for the project since November 2008 in accordance with the requirements set out in the EIA Ordinance. According to the findings of the EIA Report, with implementation of appropriate mitigation measures, the potential environmental impacts of the construction and operation of IW MF phase 1 would be controlled within the established standards and guidelines. The EIA report was made available to the public for inspection from November to December 2011 in accordance with the EIA Ordinance. Upon consideration and endorsement by the Advisory Council on the Environment, the EIA report was approved under the EIA Ordinance on 17 January 2012. The EP for developing the IW MF phase 1 at SKC site was issued under the EIA Ordinance on 19 January 2012. We will implement the conditions stipulated in the EP. We estimate the cost of implementing the environmental mitigation measures including the EM&A for construction works to be \$127 million. We have included this cost in the overall project estimate.

24. For short-term impacts during construction, we will control noise, dust and site run-off to levels within established standards and guidelines, through the implementation of mitigation measures such as the use of quiet construction plant to reduce noise generation, water-spraying to reduce dust emission and proper pre-treatment of site run-off. We will also carry out site inspections to ensure that these recommended mitigation measures and good site practices are properly carried out.

25. We will require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate means to avoid, reduce, reuse and recycle inert construction waste. We will ensure that the day-to-day operations on site comply with the approved plan. We will control the disposal of non-inert construction waste to landfills through a trip-ticket system. The inert construction waste will be reused on site for reclamation. We will also encourage the contractor to maximize the use of recycled/recyclable inert construction waste, and the use of non-timber formwork to further reduce the generation of construction waste.

26. In addition, we will require use of public fill for the reclamation works to help relieve the pressure for disposal sites for construction and demolition materials in Hong Kong. We estimate the proposed works will use a total of about 4 million tonnes (Mt) of public fill.

27. We estimate that the project will generate in total about 58 560 tonnes of construction waste. Of these, we will reuse about 52 400 tonnes (89.4%) of inert construction waste on site. We will also collect 1 260 tonnes (2.2%) of non-inert construction materials for recycling and dispose of the remaining 4 900 tonnes (8.4%) of non-inert construction waste at landfills. The total cost for accommodating construction waste at landfill sites is estimated to be \$612,500 for this project (based on a unit charge rate of \$125 per tonne at landfills as stipulated in the Waste Disposal (Charges for Disposal of Construction Waste) Regulation).

28. Upon commissioning, the project could divert some 1.1 Mt of MSW from landfill disposal every year which could help extend the life span of landfills and reduce landfill gas and leachate.

29. The proposed reclamation works will comprise about 16 ha of permanent reclamation area, cofferdam/seawalls, breakwaters and berths. The area enclosed by the breakwaters (including the area of the breakwaters) will be about 31 ha. The reclamation and construction works of the breakwaters and vertical seawall would adopt non-dredging method such as cellular cofferdam approach to minimize dredging works and the reclamation footprint, thereby localizing and minimizing potential impacts on marine water quality, ecology and fisheries. The figure showing the construction details of cellular cofferdam is at Enclosure 5. The proposed submarine cable installation works would be carried out using an environmentally friendly and non-dredging method, which would only take several work weeks and would not damage the South Lantau coast line.

30. The project will incorporate various green design concepts to make it an environmentally friendly facility. The advanced technologies employed will ensure compliance with the most stringent environmental control standards by the EU, and 90% reduction of waste volume and the renewable energy recovered will be put to gainful use. The project will be equipped with a desalination plant to provide fresh water supply and a high level wastewater treatment plant to recycle the wastewater for on-site cleaning and irrigation. No effluent will be discharged to the nearby water body.

HERITAGE IMPLICATIONS

31. The proposed project will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings, sites of archaeological interest and Government historic sites identified by the Antiquities and Monuments Office.

/LAND

LAND ACQUISITION

32. The project does not require any land acquisition.

33. Under the existing policy, ex-gratia allowance (EGA) may be granted to fishermen and mariculturists affected by marine works projects in Hong Kong waters. The estimated amount of EGA payable to fishermen is about \$6.28 million based on the revised EGA package as approved by FC in April 2012, adjusted with fish price index and contingency. Further, a special one-off EGA for mariculturists operating in three Fish Cultural Zones (FCZs) (namely Ma Wan, Cheung Sha Wan and Sok Kwu Wan) affected by marine works in the Western waters was approved by the FC in April 2012. The mariculturists who have opted to receive the special one-off EGA thereby ceased their operations for two years may resume culture in April 2014. If the water quality in a FCZ is adversely affected by the proposed marine works of IWMF phase 1 and the prescribed criteria are met, mariculturists in the affected FCZ may be eligible to further EGA. In this connection, the estimated maximum amount of further EGA payable to mariculturists is about \$15.9 million assuming all affected mariculturists opt to cease operations. We will charge all EGA payable to **Head 701 – Land Acquisition**.

BACKGROUND INFORMATION

34. The “Policy Framework for the Management of Municipal Solid Waste (2005-2014)” published by Environment Bureau in 2005 proposed, and the Action Blueprint reaffirms the development of IWMF with incineration as the core technology to treat MSW.

35. To prepare for the development of the IWMF phase 1, we engaged consultants in October 2011 to carry out the tender preparation works for the project. The total estimated cost is about \$20.2 million. We charged this amount to block allocation **Subhead 5101DX** “Environmental works, studies and investigations for items in Category D of the Public Works Programme”.

36. We upgraded **177DR** to Category B in September 2013.

37. We intend to seek funding approval from the FC for the proposed IWMF phase 1 and the three landfill extension projects. On 2 July 2013, the PWSC supported our proposed full-upgrading of the Northeast New Territories landfill extension and part-upgrading of the West New Territories landfill extension to the FC. The proposed full-upgrading of the Southeast New Territories landfill extension will be discussed at the same PWSC meeting as the proposed IWMF phase 1. We plan to submit the four funding proposals for FC’s approval in May 2014.

38. We estimate that the design and construction of the proposed works will create about 3 950 jobs (3 250 for labourers and 700 for professional/technical staff) providing a total employment of 80 500 man-months. In addition, we estimate that the operation of the project will create about 200 permanent jobs (53 for labourers and 147 for professional / technical staff).⁶

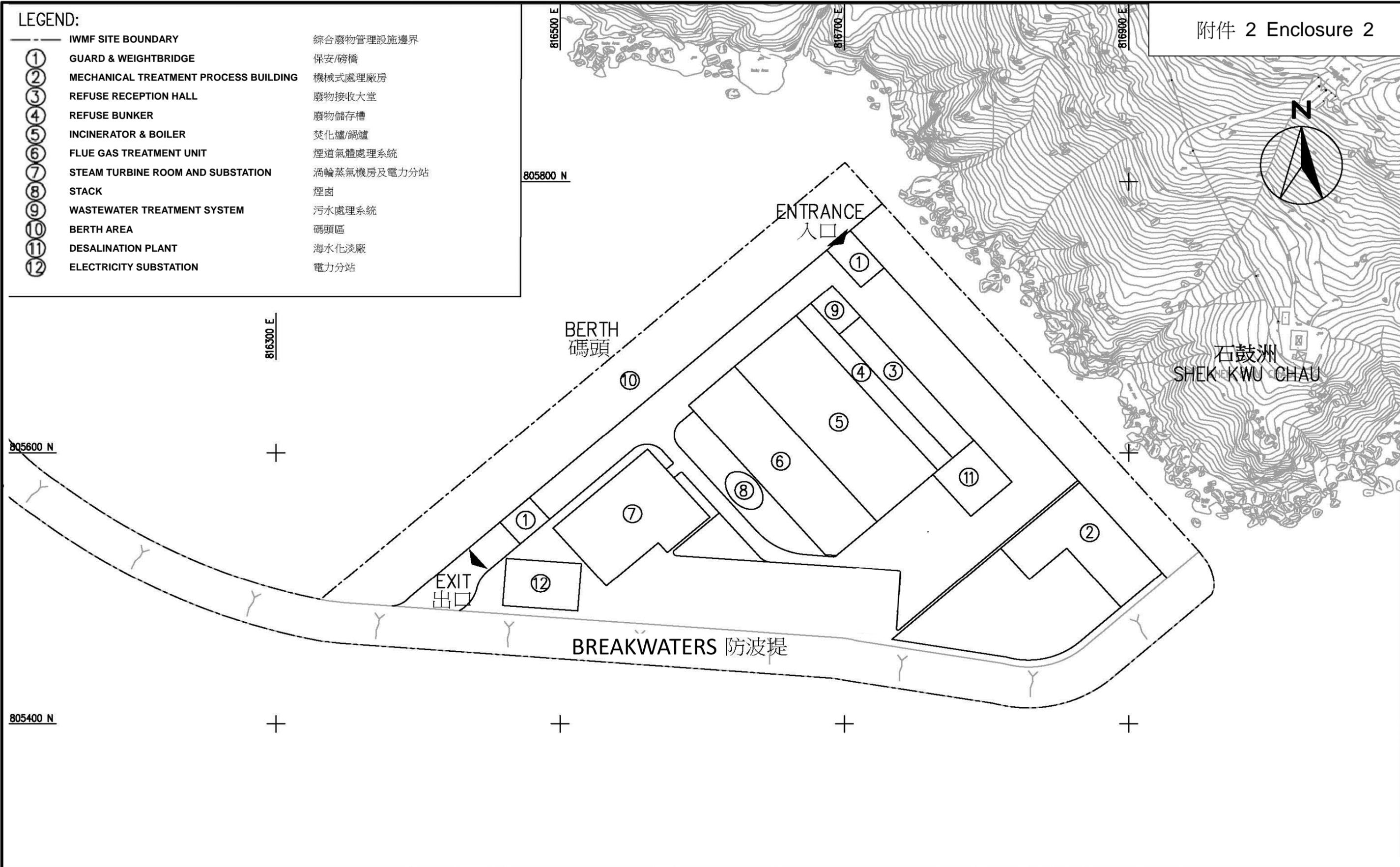
Environment Bureau
April 2014

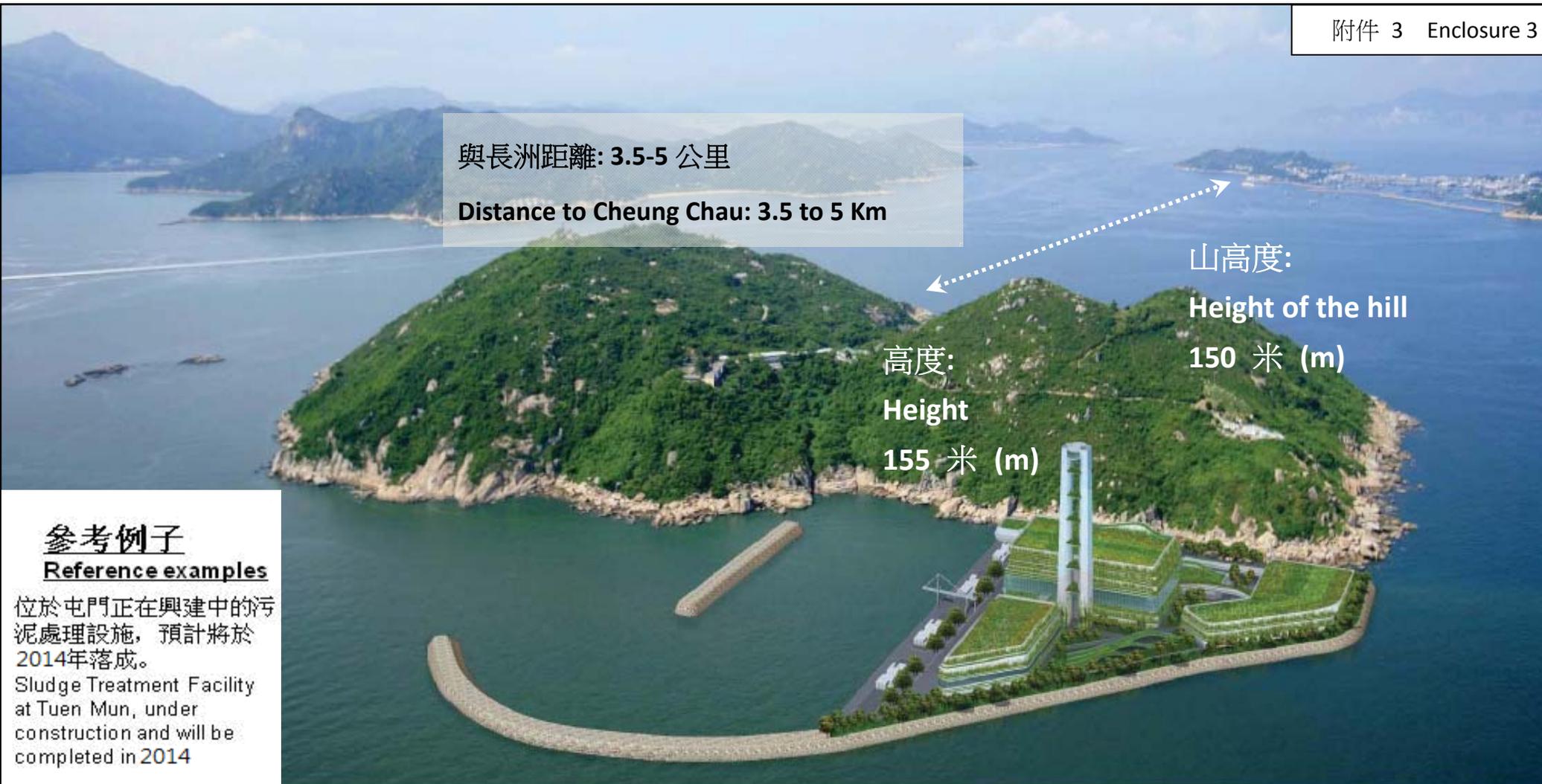
⁶ The estimated manpower figures during operation are based on the result of the “Engineering Investigation and Environmental Studies for IWMF Phase 1 – Feasibility Study”.



LEGEND:

---	IWMF SITE BOUNDARY	綜合廢物管理設施邊界
①	GUARD & WEIGHTBRIDGE	保安/磅橋
②	MECHANICAL TREATMENT PROCESS BUILDING	機械式處理廠房
③	REFUSE RECEPTION HALL	廢物接收大堂
④	REFUSE BUNKER	廢物儲存槽
⑤	INCINERATOR & BOILER	焚化爐/鍋爐
⑥	FLUE GAS TREATMENT UNIT	煙道氣體處理系統
⑦	STEAM TURBINE ROOM AND SUBSTATION	渦輪蒸氣機房及電力分站
⑧	STACK	煙囪
⑨	WASTEWATER TREATMENT SYSTEM	污水處理系統
⑩	BERTH AREA	碼頭區
⑪	DESALINATION PLANT	海水化淡廠
⑫	ELECTRICITY SUBSTATION	電力分站





與長洲距離: 3.5-5 公里

Distance to Cheung Chau: 3.5 to 5 Km

山高度:
Height of the hill
150 米 (m)

高度:
Height
155 米 (m)

參考例子

Reference examples

位於屯門正在興建中的污泥處理設施，預計將於2014年落成。

Sludge Treatment Facility at Tuen Mun, under construction and will be completed in 2014



日本大阪舞州的焚化設施
Incineration Plant in Maishima, Osaka, Japan



位於台北北投的焚化廠，煙囪頂上為旋轉餐廳。
Incineration Plant in Beitou, Taipei, with a revolving restaurant at the top of the chimney



Enclosure 4 to PWSC(2014-15)7

177DR – Development of integrated waste management facilities phase 1

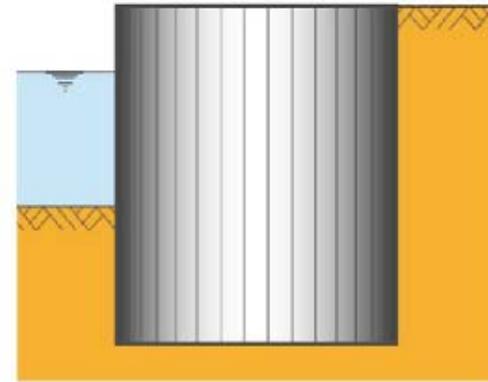
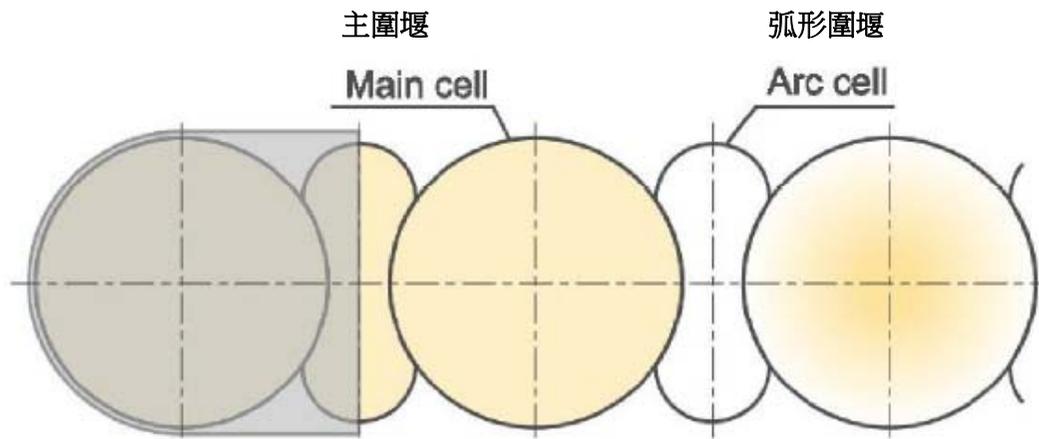
Breakdown of the estimates for consultants' fees and resident site staff costs (in September 2013 prices)

			Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee (\$ million)
(a)	Consultants' fees for contract administration (Note 2)	Professional	264	38	2.0	35.6
		Technical	39	14	2.0	1.8
					Sub-total	37.4
(b)	Resident site staff costs (Note 3)	Professional	790	38	1.6	85.2
		Technical	2,400	14	1.6	89.4
					Sub-total	174.6
Comprising –						
	(i) Consultants' fees for management of resident site staff					15.5
	(ii) Remuneration of resident site staff					159.1
					Total	212.0

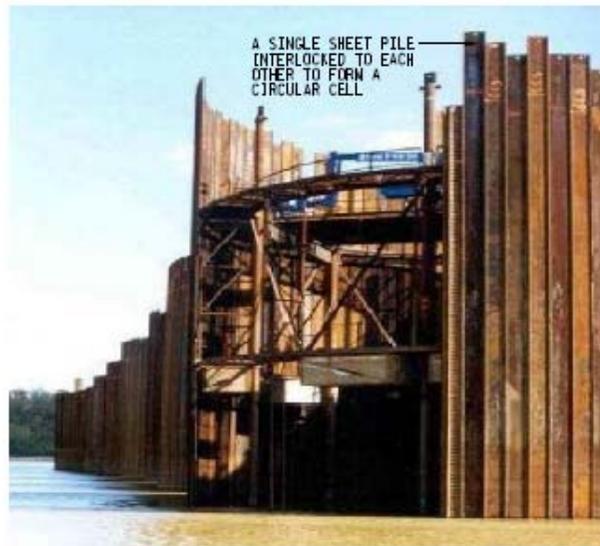
* MPS = Master Pay Scale

Notes

1. A multiplier of 2.0 is applied to the average MPS point to arrive at the full staff costs, including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. A multiplier of 1.6 is applied to the average MPS point to estimate the cost of resident site staff supplied by the consultants. (As at now, MPS point 38 = \$67,370 per month and MPS point 14 = \$23,285 per month)
2. The actual man-months and actual fees will only be known after the selection of consultants through the usual competitive lump sum fee bidding system.
3. The actual man-months and actual costs will only be known after the completion of the construction works.



A. PLAN AND ELEVATION VIEW OF CIRCULAR CELL
圓環式圍堰的設計及立視面



B. CIRCULAR CELL FORMED BY INTERLOCKING STRAIGHT-WEB
由連環型樁柱建立圓環式圍堰



C. CONSTRUCTION OF ARC CELL CONNECTING TWO CIRCULAR CELLS
建造弧形圍堰以連接圓環式圍堰



D. TEMPLATE USED TO STABILIZE CIRCULAR CELL
穩定圓環式圍堰的模板