

## **ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE**

### **HEAD 709 – WATERWORKS**

#### **Water Supplies – Fresh water supplies**

#### **333WF – Improvement of fresh water supply to Cheung Chau**

Members are invited to recommend to Finance Committee the upgrading of **333WF** to Category A at an estimated cost of \$254.8 million in money-of-the-day prices.

### **PROBLEM**

There is currently no alternative water main available to serve as backup for supplying fresh water to Cheung Chau in case of emergency repair or regular maintenance of the existing submarine fresh water main.

### **PROPOSAL**

2. The Director of Water Supplies, with the support of the Secretary for Development, proposes to upgrade **333WF** to Category A at an estimated cost of \$254.8 million in money-of-the-day (MOD) prices to lay a new submarine fresh water main across the Adamasta Channel from Lantau Island to Cheung Chau and water mains on land to enhance the reliability of fresh water supply to Cheung Chau.

**/PROJECT .....**

## PROJECT SCOPE AND NATURE

3. The scope of the proposed works comprises –
- (a) laying of about 1.4 kilometres (km) of submarine fresh water main of 500 millimetres (mm) in diameter across the Adamasta Channel from Lantau Island to Cheung Chau by horizontal directional drilling<sup>1</sup> (HDD) method; and
  - (b) laying of about 200 metres (m) of fresh water mains of 450 mm in diameter on Lantau Island and Cheung Chau.

The location of the proposed works and a typical section of the proposed submarine fresh water main are shown on the plans at Enclosure 1.

4. The design for the proposed works mentioned in paragraph 3 above has been completed. Subject to funding approval of the Finance Committee, we plan to commence the proposed works in September 2013 for completion in September 2015.

## JUSTIFICATION

5. Cheung Chau used to receive fresh water supply from the Silver Mine Bay Water Treatment Works on Lantau Island through two submarine water mains across the Adamasta Channel. The two submarine water mains of 250 mm and 500 mm in diameter were laid in 1963 and 1986 respectively. Before 2008, the 500 mm diameter submarine water main was used as the normal fresh water supply to Cheung Chau and the 250 mm diameter submarine water main was used as backup for supplying fresh water in case of emergency repair or regular maintenance of the 500 mm diameter submarine water main.

6. Because of aging and leakage problems, the 250 mm diameter submarine water main became out of service and beyond repair in 2008. The 500 mm diameter submarine main has since become the sole submarine main supplying fresh water to Cheung Chau. In case of failure of the sole submarine main, fresh water supply to Cheung Chau will be disrupted, affecting the entire population of around 23 000 people on the island.

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<sup>1</sup> Laying of submarine main by HDD method involves the use of boring technique to construct underground pipeline, which would not cause any impact to the marine environment or disruption to marine traffic.

7. To enhance the reliability of fresh water supply to Cheung Chau, we need to lay a new submarine main, as described in paragraph 3(a) above, to serve as backup in case of emergency. The proposed water mains on Lantau Island and Cheung Chau as described in paragraph 3(b) above are required for connecting the proposed submarine water main to the existing water supply networks.

## FINANCIAL IMPLICATIONS

8. We estimate the capital cost of the proposed works to be \$254.8 million in MOD prices (please see paragraph 10 below), broken down as follows –

|   | <b>\$ million</b> |                            |
|---|-------------------|----------------------------|
| (a) Laying of submarine water main by HDD method  | 170.5             |                            |
| (b) Laying of water mains on land by conventional open trench method                          | 3.4               |                            |
| (c) Environmental mitigation measures and environmental monitoring and audit (EM&A) programme | 3.0               |                            |
| (d) Consultants' fee for  | 3.9               |                            |
| (i) contract administration   | 1.4               |                            |
| (ii) management of resident site staff  | 1.5               |                            |
| (iii) independent environmental checker service <sup>2</sup>                                  | 1.0               |                            |
| (e) Remuneration of resident site staff   | 25.3              |                            |
| (f) Contingencies   | 20.6              |                            |
| Sub-total   | 226.7             | (in September 2012 prices) |
|   |                   | /(g) .....                 |

<sup>2</sup> As part of the EM&A programme for the proposed works, we will engage a consultant to perform independent environmental checker service to review and audit the environmental monitoring works and results.

|                                    |                              |
|------------------------------------|------------------------------|
|                                    | <b>\$ million</b>            |
| (g) Provision for price adjustment | 28.1                         |
| Total                              | <u>254.8</u> (in MOD prices) |

9. We have engaged consultants to carry out detailed design of the proposed works. Due to insufficient in-house resources, we propose to engage consultants to undertake contract administration, site supervision of the proposed works and to perform independent environmental checker service for the project. A breakdown of the estimates for consultants' fees and resident site staff costs by man-months is at Enclosure 2.

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

| Year        | \$ million<br>(Sept 2012) | Price<br>adjustment<br>factor | \$ million<br>(MOD) |
|-------------|---------------------------|-------------------------------|---------------------|
| 2013 – 2014 | 68.7                      | 1.06250                       | 73.0                |
| 2014 – 2015 | 113.4                     | 1.12625                       | 127.7               |
| 2015 – 2016 | 33.3                      | 1.19383                       | 39.8                |
| 2016 – 2017 | 11.3                      | 1.26545                       | 14.3                |
|             | <u>226.7</u>              |                               | <u>254.8</u>        |

11. We have derived the MOD estimates 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 2013 to 2017. We will deliver the proposed works under a target cost contract<sup>3</sup> with provision for price adjustments.

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<sup>3</sup> We will adopt a target cost contract approach in implementing the proposed works. Target cost contract means that the contractor will tender for a target price. Pursuant to a pre-determined share percentage with the Government, the contractor will share either the cost savings if the actual cost of works is below the target price or the cost in excess if the actual cost of works is above the target price. The Government's share of the cost in excess is capped at 10% above the target price.

12. The proposed works will not give rise to additional recurrent expenditure.

13. The project by itself will lead to an increase in the production cost of water by 0.06% in real terms by 2017<sup>4</sup>.

## **PUBLIC CONSULTATION**

14. We consulted the Cheung Chau Rural Committee and the South Lantau Rural Committee on 5 and 17 October 2012 respectively. Members of both Committees supported the proposed works.

15. We consulted the Tourism, Agriculture, Fisheries and Environmental Hygiene Committee of the Islands District Council on 19 November 2012. Members supported the proposed works.

16. We consulted the Legislative Council Panel on Development on the proposed works on 22 January 2013. Members raised no objection to the proposed works.

## **ENVIRONMENTAL IMPLICATIONS**

17. The project is a designated project under Schedule 2 of the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO) and an environmental permit (EP) is required for the construction and operation of the project. We have completed the Environmental Impact Assessment (EIA) study which concluded that the environmental impacts of the proposed works could be mitigated and controlled to comply with the requirements of the EIAO. The EIA report was approved by the Director of Environmental Protection in May 2010 and the EP for the proposed works was granted in June 2010. We will implement the recommendations of the approved EIA report in the construction and operation stages of the project.

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<sup>4</sup> The increase in production cost of water is calculated at the present price level and on the assumption that the water demand remains static during the period from 2013 to 2017.

18. For short-term impacts during construction, we will minimise impacts to water quality, ecology and fisheries with the adoption of the HDD technique as described in paragraph 3(a) above. We will also control noise, dust and site run-off to levels within established standards and guidelines through the implementation of mitigation measures and good construction practices. These measures include the provision of temporary noise barrier, the use of silenced construction plants for noisy construction activities, frequent cleaning and watering of the site and the provision of wheel-washing facilities to prevent dust nuisance. We will also conduct a comprehensive EM&A programme during the construction stage to ensure compliance with the EP requirements. We have included a sum of \$3.0 million (in September 2012 prices) in the project estimate for the implementation of the environmental mitigation measures and the EM&A programme.

19. At the planning and design stages, we have considered the alignment of the water mains to reduce the generation of construction waste where possible. In addition, we will require the contractor to reuse inert construction waste (e.g. excavated soil) on site or in other suitable construction sites as far as possible, in order to minimise the disposal of inert construction waste at public fill reception facilities<sup>5</sup>. We will encourage the contractor to maximise the use of recycled / recyclable inert construction waste, and the use of non-timber formwork to further reduce the generation of construction waste.

20. At the construction stage, we will require the contractor to submit for approval a plan setting out the waste management measures, which will include appropriate mitigation 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 require the contractor to separate the inert and non-inert construction waste on site for disposal at appropriate facilities. We will control the disposal of inert construction waste and non-inert construction waste at public fill reception facilities and landfills respectively through a trip-ticket system.

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<sup>5</sup> Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of inert construction waste in public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

21. We estimate that the project will generate in total about 8 900 tonnes of construction waste. Of these, we will reuse about 400 tonnes (4.5%) of inert construction waste on site and deliver 5 500 tonnes (61.8%) of inert construction waste to public fill reception facilities for subsequent reuse. We will dispose of the remaining 3 000 tonnes (33.7%) of non-inert construction waste at landfills. The total cost for accommodating construction waste at public fill reception facilities and landfill sites is estimated to be \$523,500 for this project (based on a unit cost of \$27 per tonne for disposal at public fill reception facilities and \$125 per tonne<sup>6</sup> at landfills).

## **HERITAGE IMPLICATIONS**

22. The proposed works 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 ACQUISITION**

23. The proposed works do not require any land acquisition.

## **TRAFFIC IMPLICATIONS**

24. We have completed the traffic impact assessment (TIA) for the proposed water mains on Lantau Island and Cheung Chau. The TIA concluded that laying of the water mains will not cause significant traffic impact through implementation of appropriate temporary traffic management schemes. We will display information boards on site and set up telephone hotlines for public enquiries and complaints.

25. We have completed the marine traffic impact assessment (MTIA) for the proposed submarine main. The MTIA concluded that laying of the submarine main across the Adamasta Channel using HDD method as described in paragraph 3(a) will not cause any significant impact on marine activities.

**/BACKGROUND .....**

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<sup>6</sup> This estimate has taken into account the cost for developing, operating and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at \$90 per m<sup>3</sup>), nor the cost to provide new landfills (which is likely to be more expensive) when the existing ones are filled.

**BACKGROUND INFORMATION**

26. We upgraded **333WF** to Category B in September 2007.
27. In June 2008, we engaged consultants to undertake the investigation study for the proposed works at a cost of 4.9 million in MOD prices under block allocation of **Subhead 9100WX** “Waterworks, studies and investigations for items in Category D of the Public Works Programme”. The investigation study was completed in November 2010.
28. In December 2010, we engaged consultants to undertake the detailed design for the proposed works at a cost of 2.6 million in MOD prices under block allocation of **Subhead 9100WX** “Waterworks, studies and investigations for items in Category D of the Public Works Programme”. We have substantially completed the detailed design of the proposed works mentioned in paragraph 3 above.
29. Of the 162 trees within the project boundary, 74 trees will be preserved. The proposed works will involve the felling of 88 trees, of which two are in poor health or form and 86 are invasive weedy species. All trees to be felled are not important trees<sup>7</sup>. We will incorporate planting proposals as part of the project, including planting of around 20 trees.
30. We estimate that the proposed works will create about 127 jobs

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<sup>7</sup> “Important trees” refers to trees in the Register of Old and Valuable Trees, or any other trees that meet one or more of the following criteria:

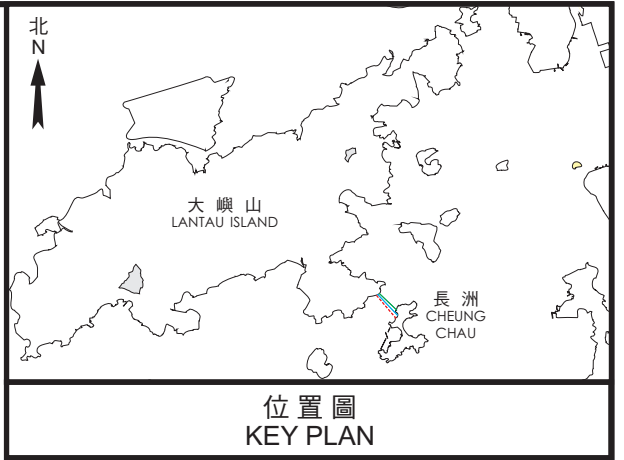
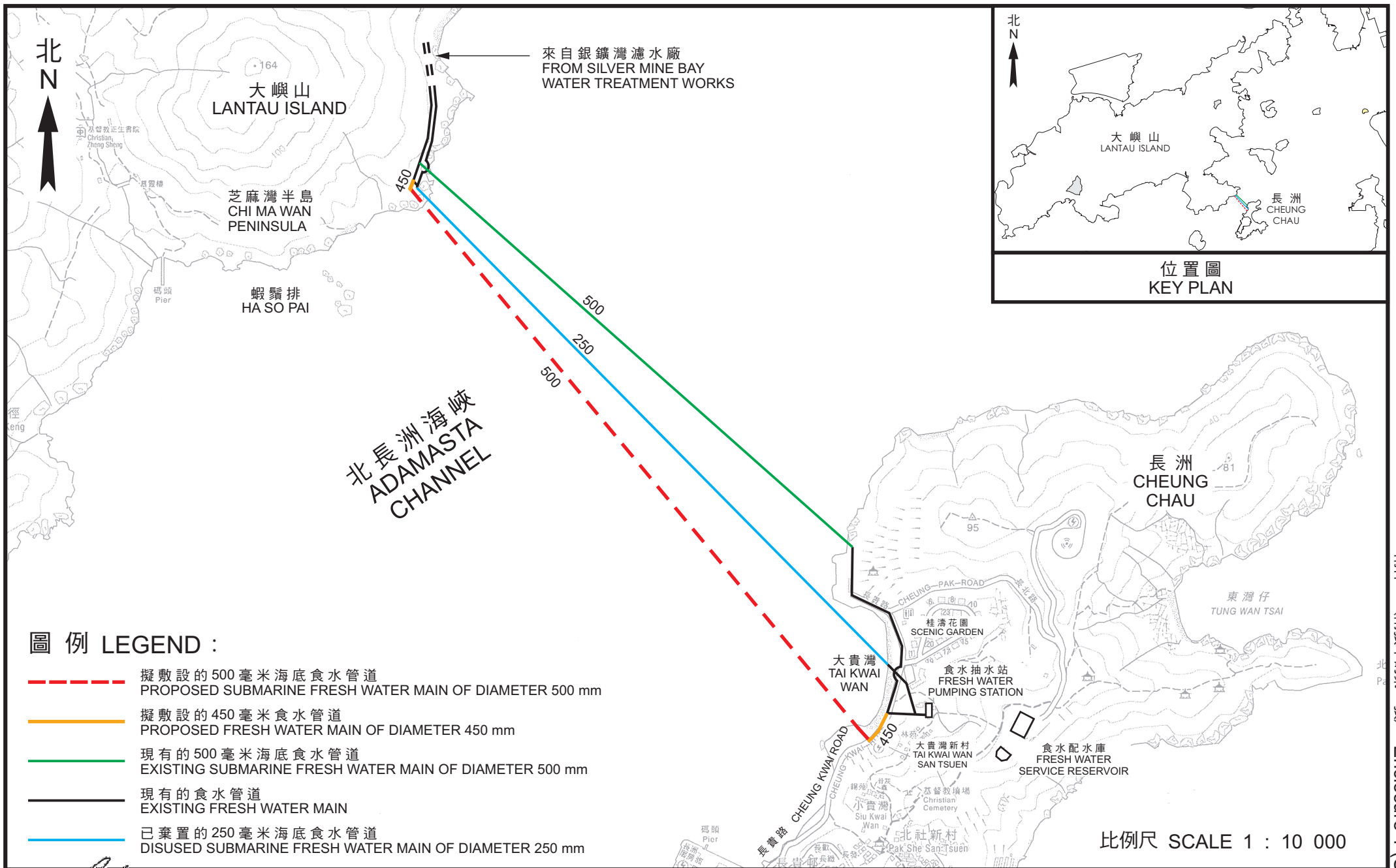
- (a) trees of 100 years old or above;
- (b) trees of cultural, historical or memorable significance e.g. Fung Shui trees, trees as landmark of monastery or heritage monument, and trees in memory of important persons or events;
- (c) trees of precious or rare species;
- (d) trees of outstanding form (taking account of overall tree sizes, shape and any special features) e.g. trees with curtain like aerial roots, trees growing in unusual habitat; or
- (e) trees with trunk diameter equal or exceeding 1.0 metre (m) (measured at 1.3 m above ground level), or with height/canopy spread equal or exceeding 25 m.



(101 for labourers and another 26 for professional/technical staff) providing a total employment of 2 700 man-months.

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Development Bureau  
January 2013



**圖例 LEGEND :**

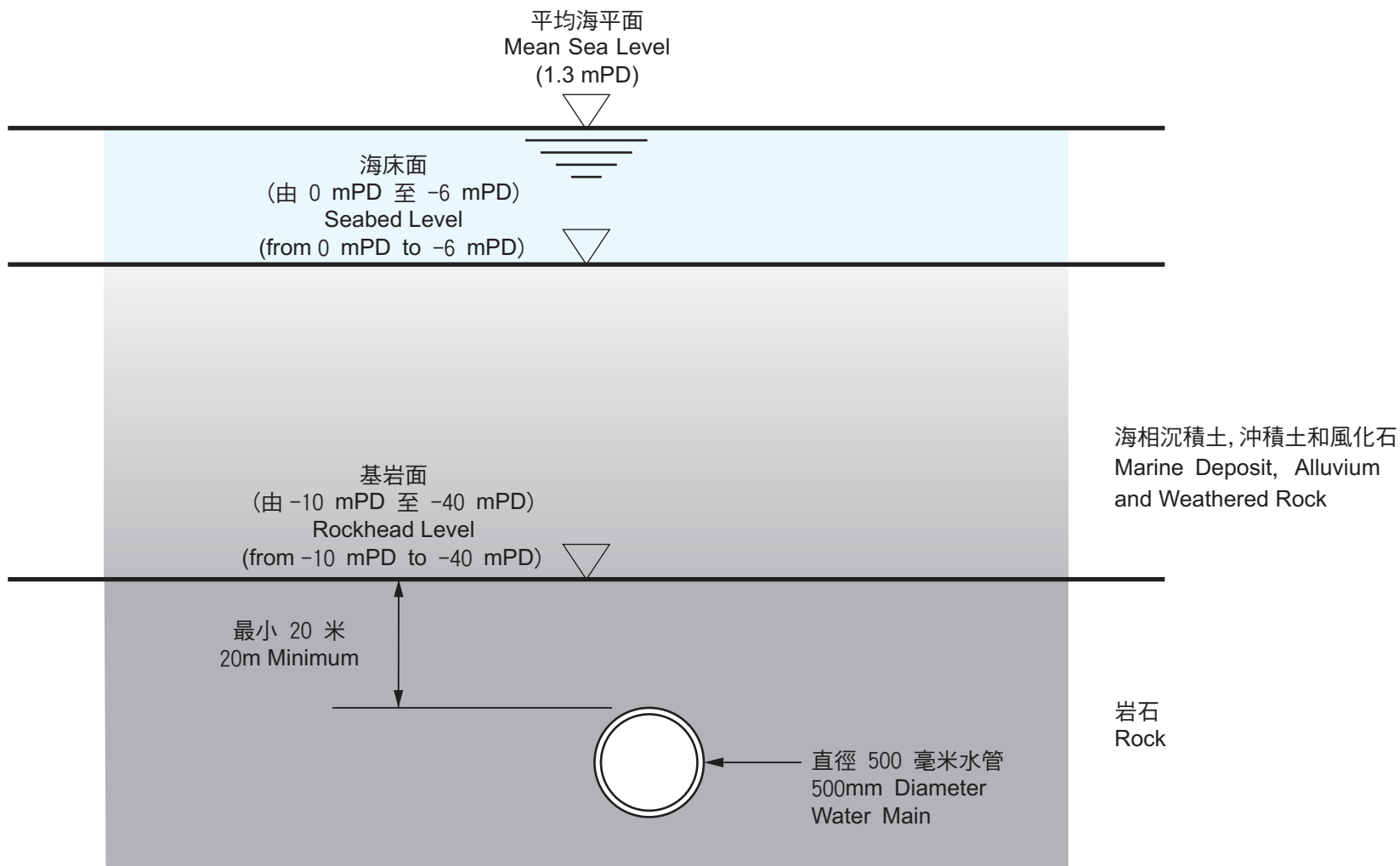
- 擬敷設的 500 毫米海底食水管道  
PROPOSED SUBMARINE FRESH WATER MAIN OF DIAMETER 500 mm
- 擬敷設的 450 毫米食水管道  
PROPOSED FRESH WATER MAIN OF DIAMETER 450 mm
- 現有的 500 毫米海底食水管道  
EXISTING SUBMARINE FRESH WATER MAIN OF DIAMETER 500 mm
- 現有的食水管道  
EXISTING FRESH WATER MAIN
- 已棄置的 250 毫米海底食水管道  
DISUSED SUBMARINE FRESH WATER MAIN OF DIAMETER 250 mm

比例尺 SCALE 1 : 10 000

核准 APPROVED  
  
 總工程師/設計 CE / Des  
 21 / 1 / 2013

工務計劃項目第 333WF 號 — 長洲食水供應改善工程  
 P.W.P. ITEM NO. 333WF — IMPROVEMENT OF FRESH WATER SUPPLY TO CHEUNG CHAU

 水務署  
 WATER SUPPLIES DEPARTMENT  
 草圖編號 SKETCH NO. SK 62012 / 045 / 001



海底水管的典型切面圖  
TYPICAL SECTION OF SUBMARINE PIPELINE

核准 APPROVED  
*[Signature]*  
繪圖工程師/設計 CE / Des

21/1/2013

工務計劃項目第 333WF 號 — 長洲食水供應改善工程  
P.W.P. ITEM NO. 333WF — IMPROVEMENT OF FRESH WATER SUPPLY TO CHEUNG CHAU

水務署  
WATER SUPPLIES DEPARTMENT

草圖編號  
SKETCH NO. SK 62012 / 045 / 002

**333WF – Improvement of fresh water supply to Cheung Chau**

**Breakdown of estimates for consultants' fees and resident site staff costs  
(in September 2012 prices)**

|   |              | <b>Estimated<br/>man-months</b> | <b>Average<br/>MPS*<br/>salary<br/>point</b> | <b>Multiplier<br/>(Note 1)</b> | <b>Estimated fee<br/>(\$million)</b> |
|---|--------------|---------------------------------|--|--------------------------------|--------------------------------------|
| (a) Consultants' fees for<br>contract administration<br>(Note 2)                      | Professional | --                              | --   | --                             | 1.0                                  |
|   | Technical    | --                              | --   | --                             | 0.4                                  |
|   |              |                                 |  | Sub-total                      | <hr/> 1.4                            |
| (b) Resident site staff<br>costs (Note 3)   | Professional | 110                             | 38   | 1.6                            | 11.6                                 |
|   | Technical    | 425                             | 14   | 1.6                            | 15.2                                 |
|   |              |                                 |  | Sub-total                      | <hr/> 26.8                           |
| Comprising –  |              |                                 |  |                                |                                      |
| (i) Consultants' fees<br>for management of<br>resident site staff                     |              |                                 |  |                                | 1.5                                  |
| (ii) Remuneration of<br>resident site staff   |              |                                 |  |                                | 25.3                                 |
| (c) Consultants' fees for<br>independent<br>environmental checker<br>service (Note 4) | Professional | 7                               | 38   | 1.6                            | 0.7                                  |
|   | Technical    | 7                               | 14   | 1.6                            | 0.3                                  |
|   |              |                                 |  | Sub-total                      | <hr/> 1.0                            |
|   |              |                                 |  | Total                          | <hr/> <hr/> 29.2                     |

\* MPS = Master Pay Scale

**Notes**

1. A multiplier of 1.6 is applied to the average MPS salary point to estimate the cost of resident site staff supplied by the consultants (as at now, MPS point 38 = \$65,695 per month and MPS point 14 = \$22,405 per month).
2. The consultants' staff cost for contract administration is calculated in accordance with the existing consultancy agreement for the design and construction of the project. The construction phase of the assignment will only be executed subject to Finance Committee's approval to upgrade the proposed works to Category A.
3. The actual man-months and actual cost will only be known after completion of the construction works.

**Enclosure 2 to PWSC(2012-13)53**

4. The actual man-months and actual cost will only be known after the consultants have been selected through the usual competitive lump-sum bid system.