

合約編號 CE 21/2004(WS)  
水管更換及修復工程第 1 階段第 2 期  
香港島及離島水管工程  
設計及施工

1. 目的

- 1.1 水務署曾在 2002 年就上題所述工程(中西區部分)諮詢中西區區議會，並得到各區議員的寶貴意見。現工程的初步設計亦已完成，水務署亦曾在 2005 年 11 月再次諮詢中西區區議會尋求議員對其工程發展和設計的進一步意見。現我們根據當時議會提出的意見提供近進一步的資料供議會參考，及再次諮詢議會的意見，並請議員支持是項工程。

2. 背景

- 2.1 近數十年來，水務署的供水網絡發展迅速，而部份建於三十多年前的水管不但呈現嚴重老化跡象，而且部份水管更已臨近使用年限。老化的水管在維修上困難重重，維修費用亦與日俱增。水管爆裂及漏水的情況在近年越見嚴重，為公眾帶來不便，影響交通和浪費食水。有見及此，水務署計劃在 15 年內有系統地分階段全面更換及修復全港長約 3000 公里的老化水管以改善供水網絡的狀況。由於工程龐大，故有需要分段執行，其次序是考慮水管老化程度、失修後果相對嚴重性、位置分佈及對區內的影響等因素而定。
- 2.2 為應中西區內市民訴求早日改善在區內現有水管狀況，區內第 1 階段第 1 期工程已於 2003 年 10 月開始施工，並預計於 2007 年 12 月完成。工程包括在中西區區內更換及修復長約 16 公里水管。
- 2.3 第 1 階段第 2 期工程(本題工程)中西區部分包括更換及修復長約 48 公里水管，而有關的勘察研究已在 2003 年 6 月完成，過程中曾於 2002 年 5 月諮詢中西區區議會，並得到議會支持。水務署於 2005 年 3 月委任亞特金斯顧問有限公司進行本題工程的設計，現初步設計亦已完成，而詳細設計現正進行中。



- 2.4 此全面更換及修復水管計劃的第 2 階段包括在中西區內更換及修復長約 32 公里的水管，而有關工程的礮查研究及詳細設計現正進行中，有關詳細資料載於會議文件第 2/2006 號。

### 3 中西區的工程簡介

- 3.1 本題工程項目包括更換及修復港島區內大約 66 公里直徑由 25 毫米至 1 米的食水及海水管道。其中的 48 公里直徑由 25 毫米至 1 米的水管位於中西區，水管直徑少於 150 毫米佔大約 23 公里，這些水管大多為鍍鋅鐵管、石棉水泥管和鑄鐵管。有關水管的位置及圖則現詳列於附件甲。圖則同時亦顯示區內第 2 階段工程建議更換及修復的水管以供參考。
- 3.2 水務署數年前在荷里活道曾經進行新水管鋪設工程，由鄰近配水庫接駁至金鐘及中區一帶，目的是為了加強後述區域的供水系統。該工程於 1995 年展開，可惜承建商表現未如理想，引致工程嚴重延誤。因此水務署需於 1998 年重新招標，工程於 1999 年再次展開，並於 2003 年完成。由於在 1995 年前設計這新水管工程時，未有計劃或急切需要更新荷里活道內的舊水管，故設計中沒有一併把舊水管更新。而其後工程進行時，為免增加該工程的複雜性及避免使工程進度再度延誤而延長對居民的不便，所以亦沒有要求承建商一併更新街內的舊水管。同時，這新水管是一條輸水幹管，需配合分區內的分配水管系統方能供水給用戶，而由於荷里活道的現有舊水管是區內分配水管，故不能用此新水管取代其作用而不去更換或復修後者。
- 3.3 水務署過往曾在荷里活道施工而引致區內居民一段頗長時間的不便，就此我們深表歉意。本署就此亦曾在 2002 年中因應議員的要求，承諾將當時建議的荷里活道水管修復工程延後 5 年，以免該處居民短期內再受掘路工程影響。我們現亦因應承諾而計劃在 2008 年後方在荷里活道於本題工程下進行這段工程，施工前亦會再次諮詢議員對施工安排的意見。本署同時亦會吸取以往經驗，採取本文第 5.1.1 段內所述的措施，以盡量減少工程延誤的風險。
- 3.4 本題工程初期包括修復或更新卑路乍街位於士美菲路以東的現有水管。在本年十一月諮詢議會時，得知議員意見，認為此街道近年有大型渠務工程，對居民及商戶已經帶來長期嚴重不便，實不適宜短時間內再進行開路工程。本署就此已再評檢有關水管的狀況，並結論若把此段水管的復修/更換工程延遲數年，雖然期間水管爆破的風險會因此增加，但其程度仍可接受，故本署現已將此段工程從本題工程抽起，並計劃在 2010 年方才施行，以避免區內居民和商戶在數年內再受影響。在此同時，在 2010 年前若情況有變而有實際需要，本署亦可安排把有關部份水管提前修復/更換，屆時有關安排亦會先諮詢議會同意方才進行。



#### 4 水管更換及修復方法

- 4.1 我們為每條水管選擇適合的更換及修復技術時會優先考慮各種無開坑更換及修復技術，以減少對公眾、交通及環境的影響。當無開坑更換及修復水管技術實際上不適用時，我們才會採用傳統的開掘更換方法。
- 4.2 傳統的開掘方法是在原有的舊水管旁，敷設另一新的水管取代原有舊水管。雖然傳統的開掘方法造成的滋擾較大，但其可行性較高，並尤其適用於更換直徑小的水管。無開坑修復方法是透過開掘進管井(約 3 米長 2 米闊)將原來的舊水管加入新的搪層，這技術不需要開掘整條喉坑，對交通和環境的影響都小很多。無開坑修復技術包括有套喉滑進法、內喉緊貼法、原位內搪喉管法。而無開坑更換方法是利用無開坑技術安裝新水管，例如喉管爆破法、定向鑽挖法、微型隧道開掘法等。
- 4.3 當選擇無開坑修復或更換技術時有多個考慮。除非另有水源供應或可安裝臨時供水裝置，否則會需要暫停供水。由於需要開井以接駁支管、閘門及彎管，這技術不適用於有多支管及閘門的水管。附件甲的水管位置圖顯示了中西區初步擬議採用無開坑技術修復的水管。然而最終施工方法的選擇，將取決於各種因素，包括地理環境、施工限制、物料選擇、交通及環境影響等。
- 4.4 在施工期間，我們將實施以下措施，使工程順利展開：
- 在施工前進行一個詳細的地質勘察，避免在施工期間損害水管及其他公共設施；
  - 安裝臨時供水裝置以盡量減少停水時間；
  - 配合用戶用水模式安排停水，每次停水不超過 8 小時；
  - 在施工期間設立諮詢小組，為停水安排進行協調工作；
  - 開發不同的合約管理控制形式，有效地控制施工進度及時間；及
  - 汲取早期更換及修復水管工程的經驗，改善合約形式和施工方法。(詳情見 5.1.1 段)

#### 5 工程管理

- 5.1 總括過往的經驗，新工程合約將會採取一些新的工程管理措施及加強現有措施，以盡量減少工程延誤的風險。例如：

- 5.1.1 採用合約訂單形式，使工程更具彈性，其好處包括：
- a. 配合其他相關工程制定合約訂單及工期，減少延誤。
  - b. 配合路面實際情況，分小段進行復修，減少風險。
  - c. 工程費用劃分成小份，減少延誤而造成之損失。
  - d. 這合約訂單模式已在更換及修復水管第一期工程使用，成效顯著，公眾投訴及承建商的索償亦較少。

5.1.2 加強對承建商的監控，使工程能依期完成；

5.1.3 加強嚴格評審承建商的表現，並在其表現報告中反映，從而影響其將來投標其他工程的機會，以收阻嚇作用。

5.2 正如第 2.1 段所述原因，此項全面更換及修復水管計劃有需要分階段執行。同時，基於財務撥款上的安排及公平和開放競爭的原則，故此水務署安排了公開招標，並且根據招標評審結果分別聘用了不同的顧問公司來執行第 1 階段第 2 期和第 2 階段的設計和監工。這兩次評審都是經過同一套嚴謹的程序，故此所選用的顧問公司皆符合水務署的嚴格要求標準。同時，兩間顧問公司亦需要按照相同標準去設計工程、選用承建商和監察施工。而水務署亦會嚴緊監管及統籌不同顧問公司的工作及安排顧問公司之間的溝通，以確保所有工程皆符合水務署的要求標準。

## 6 協調其他相關工程

6.1 施工時間的制定最主要的是與其他有關部門協調以防止重複開掘道路。工程將會經協調後分階段進行，以應付交通情況和實際需要。

6.2 我們與其他政府部門及公共設施機構對區內的相關工程已進行了詳盡而全面的溝通和複查。根據已搜集的資料顯示，相關工程大部份與渠務及道路工程有關，與本項目施工地點有相同的相關工程主要是渠務署工程合約編號 DC/2002/13。為減少相關工程的影響，我們會考慮分階段進行工程，委託其他政府部門代為施工或在同一時間內用水務承建商和其他地下公用設施一並進行水管鋪設或復修。我們會就所有方案繼續與各有關部門進行協調工作，以尋求最有效的施工安排。

6.3 為了解決相關工程間的衝突及防止重複開掘路面，我們考慮委託該渠務署工程的承建商代為施工，或分階段進行工程避免相關工程在同一時間進行。施工時間表將於工程實施前派發給各議員。

6.4 我們對在其他範圍相連的工程已作出相應協調以免在同一路重覆開掘，已協調的工程包括：



- (i) 海水供應系統改善計劃 - 該工程部分在本工程範圍內的水管敷設工作將會包括在本工程內。
- (ii) 消防栓安裝計劃 - 該工程部分在本工程範圍內的安裝工作將會包括在本工程內。
- (iii) 渠務署合約編號 DC/2002/13 - 中西區及灣仔西部污水收集系統 - 兩項工程在可行情況下同時一併修復。
- (iv) 渠務署興建皇后大道中雨水排放系統 - 協調兩項工程，在可行情況下同時一併修復。
- (v) 土木工程拓展署中環填海第三期 - 協調兩項工程
- (vi) 地鐵公司西港島線 - 協調兩項工程

6.5 如第 5.1.1 段所述，爲了增加施工時間的控制和彈性，本工程將採用按量數付款的訂單合約形式，這合約形式比較適用於需要很多協調工作的工程，亦方便在有需要時因工地實際情況更改設計。在工地確定設計後才發出訂單，可減低工程的風險，施工的進度及時間便可更有效率地控制，從而盡量減小工程對公眾和交通的影響。

## 7 環境檢討

7.1 我們已完成了符合環保條例要求的環境檢討評估報告，主要評估範圍包括噪音、塵埃、廢料及污水。報告辨認出的對噪音敏感地點包括列於附件乙的醫院、診所、康復中心、學校、教會、廟宇及安老院等。

7.2 在施工期間，我們會採取以下措施以盡量減少工程對環境的影響：

- (a) 定期於地盤灑水控制塵埃飛揚。
- (b) 在噪音敏感受體附近如住宅，醫院，學校，教堂，廟宇或安老院附近使用隔音屏障和裝有減音器的設備。當工程於學校附近進行須調節施工時段以免影響學校的教學和考試。
- (c) 避免同時使用多項高噪音設備及盡量將該設備遠離最近的敏感受體。
- (d) 使用無坑開掘更換及修復水管方法。
- (e) 工程項目會產生各種建築廢料包括因挖掘路面而廢棄的泥土，一般工地廢

物及設備保養維修所產生的化學廢料等。此等廢物會根據環保署的要求程序作現場分類再用、儲存、運送及棄置。

- (f) 工地產生的廢水必須經嚴格處理以達致水質污染管制的要求。
- (g) 設定水管定線時盡量遠離現有的樹木和具文化古蹟價值的建築物。

7.3 我們已完成全面的樹木勘察報告，預計工程將不涉及樹木砍伐和移植。這報告已獲得漁農自然護理署和康樂及文化事務署批核。

7.4 我們在設定水管定線時會盡量遠離現有的樹木和具文化古蹟價值的建築物，其中包括中環警署，域多利監獄，中環亞畢諾道前中央裁判司署，上環堅巷舊病理學院及舊上環街市。若部分工程必需於具文化古蹟價值的建築物附近施工，我們會諮詢康樂及文化事務署古物古蹟辦事處的意見，並實施適當的措施來保護有關的建築物。

## 8 交通影響評估

8.1 我們已完成了工程的交通影響評估。根據評估，部分工程乃位於交通敏感的道路，其中包括干諾道中、德輔道中、皇后大道中、堅道、干諾道西、德輔道西和卑路乍街。為了減低工程帶來的交通影響，我們在這些地點將會在情況許可下採用無開坑技術。有些地點因地理和交通等不同因素的限制，不能使用無開坑技術，而需採用傳統的開掘更換方法。在這些地點，承建商在施工期間將實施臨時交通管制措施，令工程對交通的影響維持在可接受水平以下。附件丙(附圖紙編號: 3848/PC/C/0011~13; 0042)的交通改道圖顯示了經常採用的臨時交通管制安排的例子。

8.2 為減少對公眾引致的不便，工程將會分段進行。而在每一段施工之前，承建商將會就施工細節及臨時交通措施安排，提交建議予包括各有關政府部門及有關公共設施機構代表的交通管理聯絡小組（其中包括運輸署、警察交通部、路政署及民政事務署等）進行討論，在議定同意後方會進行。而當時區內若有其他掘路工程，其對整區交通的合併影響亦會作為考慮的因素。

## 9 公眾聯絡

9.1 為加強與公眾的溝通和確保工程順利進行，我們將會推行公眾聯絡活動。這些活動將提供是項工程及其影響地區的詳細資料，了解及回應公眾關注的事項，駐地盤工程師辦事處會設有專職人員負責聆聽公眾的意見和處理有關投訴，以確保有需要時能夠盡快作出改善。



## 10. 土地事宜

- 10.1 建議之工程將不需要徵收私人土地，水管的更換工程將會在私人土地範圍外停止。然而有小部分政府水管會經過私人土地範圍，在一般情況下，我們會根據有關土地契約的條款或在取得土地業主的同意後，進行更換及修復該段水管工程。

## 11. 施工時間表

- 11.1 此工程項目將於 2006 年初呈交立法會財務委員會批核，若獲得財務委員會撥款，我們便會展開招標程序，預計於 2006 年中至 2010 年期間施工。在工程開展後，水務署將與承建商共同制訂詳細施工時間表，並提交中西區區議會參考。在施工期間，水務署將會向中西區區議會定期匯報工程進度和最新的施工時間表。

附件

水務署

2005 年 12 月

附件甲

工程覆蓋範圍

街道名稱	擬更換及修復水管長度 (米)	擬更換及修復水管直徑(毫 米)
西區		
北街	546	80 ~ 150
吉席街	808	80 ~ 100
堅尼地城新海旁	187	150
朝光街	318	80 ~ 150
高陞街	761	40 ~ 150
威利麻街	324	80 ~ 150
文咸東街	340	100
山市街	360	150 ~ 1000
堅尼地城海旁	203	80 ~ 150
城西道	494	1000
山道	150	100
薄扶林道	300	80 ~ 450
第三街	260	150 ~ 300
第二街	220	100 ~ 150
高街	220	450
皇后大道西	1,260	20 ~ 150
德輔道西	1,772	50 ~ 300
干諾道西	3,565	80 ~ 1000
士美菲路	375	80 ~ 150
荷蘭街	140	150
西祥街	140	150
屈地街	305	25 ~ 200
正街	337	50 ~ 150
西邊街	94	80 ~ 100
東邊街	351	80 ~ 150
修打蘭街	450	80 ~ 200
皇后街	131	40 ~ 100
新街市街	2,808	80 ~ 100
摩利神街	177	40 ~ 250
永樂街	1,675	80 ~ 200
西安里	150	80



街道名稱	擬更換及修復水管長度 (米)	擬更換及修復水管直徑(毫 米)
荔安里	50	80
水街	112	150
西區後巷	5,058	40 ~ 150
中區		
必列者士街	1,148	40 ~ 150
干諾道中	1,840	25 ~ 1000
德輔道中	2,369	40 ~ 200
域多利皇后街	449	80 ~ 150
堅道	2,866	40 ~ 300
卑利街	1,102	80 ~ 200
荷李活道	1,819	40 ~ 300
城皇街	347	80 ~ 150
士丹頓街	627	80 ~ 150
嘉咸街	130	50 ~ 100
昭隆街	105	100
伊利近街	457	50 ~ 300
西摩道	50	100
衛城道	95	100
擺花街	71	250
禧利街	149	80 ~ 400
孖沙街	100	200
威靈頓街	720	80 ~ 300
砵典乍街	20	25
皇后大道中	331	75 ~ 300
機利文街	224	150
畢打街	30	200 ~ 250
雲咸街	468	80 ~ 200
鴨巴甸街	393	40 ~ 80
安泰街	150	40 ~ 100
統一碼頭路	228	50 ~ 100
租庇利街	94	100 ~ 150
些利街	448	80 ~ 100
奧卑利街	337	50 ~ 150
亞畢諾道	110	80 ~ 100
己連拿利	200	50 ~ 80
下亞厘畢道	75	150

街道名稱	擬更換及修復水管長度 (米)	擬更換及修復水管直徑(毫 米)
民光街	720	1000
民耀街	210	1000
康樂廣場	370	1000
中區後巷	6,138	25 ~ 150

#### 圖列

圖紙編號	名稱
3848/PC/C/0050	擬更換及修復水管概覽 - 中西區
3848/PC/C/0051	擬更換及修復水管位置圖 - 中西區
3848/PC/C/0052	擬更換及修復水管位置圖 - 中西區
3848/PC/C/0053	擬更換及修復水管位置圖 - 中西區
3848/PC/C/0054	擬更換及修復水管位置圖 - 中西區
3848/PC/C/0055	擬更換及修復水管位置圖 - 中西區



## 附件乙

### 在中西區『對噪音敏感』的地點

街道名稱	『對噪音敏感』的類別
堅尼地城	
士美菲路	住宅 / 安老院
吉席街	住宅 / 安老院
北街	住宅 / 安老院
山市街	住宅 / 安老院
堅尼地城新海旁	住宅 / 安老院
皇后大道西	住宅 / 安老院
西區	
皇后大道西	住宅
屈地街	住宅
薄扶林道	住宅
西營盤	
德輔道西	住宅
皇后大道西	住宅 / 學校 / 醫院
薄扶林道	住宅 / 學校
第一街	住宅 / 學校
第二街	住宅 / 學校
第三街	住宅 / 學校
高街	住宅 / 學校
般咸道	住宅 / 學校
醫院道	住宅 / 學校 / 醫院
上環	
永樂街	住宅
孖沙街	住宅 / 學校
威靈頓街	住宅 / 學校
卑利街	住宅 / 教堂 / 診所 / 學校
士丹頓街	住宅 / 教堂 / 診所 / 學校
堅道	住宅 / 教堂 / 診所 / 學校
荷里活道	住宅 / 教堂 / 診所 / 學校
半山	
樓梯街	住宅 / 教堂 / 學校 / 廟宇
堅道	住宅 / 教堂 / 學校 / 廟宇
衛城道	住宅 / 教堂 / 學校

西摩道	住宅 / 教堂 / 學校
中區	
德輔道中	住宅
威靈頓街	住宅
擺花街	住宅
亞畢諾道	住宅 / 教堂 / 學校
己連拿利	住宅 / 教堂 / 學校
堅道	住宅 / 教堂 / 學校
皇后大道西	法院 / 教堂
愛丁堡廣場	住宅 / 圖書館



附件丙

臨時交通管制措施的例子

(附圖紙編號 : 3848/PC/C/0011 - 0013; 0042)

## **Central & Western District Council**

### **Agreement No. CE21/2004(WS)**

### **Replacement and Rehabilitation of Water Mains, Stage 1 Phase 2, Mains on Hong Kong and Islands – Design and Construction**

#### **1 PURPOSE**

- 1.1 In 2002, Water Supplies Department (WSD) consulted Central and Western District Council regarding the captioned project (on Central and Western District areas) and had obtained Members' valuable comment and support. The preliminary design of the Project has been completed, WSD consulted Central and Western District Council in November 2005 to seek the Members' advice for the project development and subsequent detailed design. Based on the concern raised by the Members, further information was given in this paper for Members' reference. The purpose of this consultation is to seek the Members' further advice for subsequent detailed design and seek Members' continual support for the proposed works.

#### **2 BACKGROUND**

- 2.1 In recent decades, WSD's water supplies network develops rapidly. Many water mains were laid some 30 years ago. They are approaching the end of the service life and have become increasingly difficult and costly to maintain. Frequency of water bursts and leaks have been increasing, resulting in inconvenience to public, disruption to traffic and wastage of water. To resolve this problem, WSD has planned a 15-year comprehensive programme to systemically replace and rehabilitate about 3,000 km of aged water mains to prevent their further deterioration, to improve the condition of the water supply network, and to maintain quality of services to consumers.
- 2.2 In order to expeditiously improve the condition of water mains, the first stage - Stage 1 Phase 1 project commenced in October 2003 and will be completed in December 2008. The project covers approximate 16km of water mains in Central and Western District.
- 2.3 Stage 1 Phase 2 project (this project) includes the replacement and rehabilitation of about 48km of water mains in Central and Western District. The related investigation study was completed on June 2003. In the course of the study, we consulted Central & Western District Council in May 2002 and received the Council's support. In March 2005, WSD commissioned Atkins China Limited to undertake the design and construction assignment of the works on Hong Kong Island under this Stage 1 Phase 2 project. The preliminary design has been completed and the detailed design is currently in progress.



- 2.4 While for the Stage 2 project which includes the replacement and rehabilitation of about 32km of water mains in Central and Western District, the related investigation study and detailed design is currently in progress. Detailed information for the Stage 2 works is enclosed in the Central & Western District Council Paper No. 2/2006.

### 3 SCOPE OF WORKS IN CENTRAL & WESTERN DISTRICT

- 3.1 The scope of works is to replace or rehabilitate about 66 km of fresh and saltwater water mains ranging from 25 mm to 1000 mm in diameter. Of these water mains, approximately 48 km are in Central & Western District. Approximately 23km of these water mains diameter are less than 150mm. These water mains are mainly made of galvanized iron, asbestos cement, or cast iron. A location summary and location plans of the water mains are given in **Appendix A**. The drawings also show the proposed water mains alignment of Stage 2 works for reference.
- 3.2 Few years ago, WSD had laid a new water main along Hollywood Road connecting from nearby service reservoir to Admiralty and Central District, aiming to strengthen the supplies networks in those areas. This project started in 1995, however, due to poor performance of the Contractor, the project suffered serious delay. As a result, WSD re-entered the Contract in 1998. The project resumed again in 1999 and completed in 2003. There was no planning or urgent requirement to replace/ rehabilitate the existing water main along Hollywood Road during design of this new water main in 1995. Thus, replacement of the existing water mains was not included in the design. To minimize the complexity and to avoid further delay and inconvenient to the public, the Contractor had not been requested to replace or rehabilitate the existing water main at the same time. Moreover, this new water main is to connect the distribution system for supplying water to the consumers in different regions. Whilst the existing water mains along Hollywood road are distribution mains, both are serving different function. Therefore, the new mains cannot replace the existing mains and thus replacement is required.
- 3.3 We apologize for the inconvenient caused because of prolonged construction period along Hollywood Road. As requested by the Members in 2002, WSD promised to extend the proposed replacement works along Hollywood Road 5 years to avoid inconvenient caused due to road opening works within a short period of time. We planned to reschedule the works along Hollywood Road after 2008 and would seek for the Members' comments on the construction arrangement. WSD gained experience from pervious project and would implement control measures as detailed in section 5.1.1 to avoid the risk of project delay.
- 3.4 Initially, this Project included the replacement and rehabilitation of existing water mains along Belcher's Street to Smithfield Road. As discussed in the Central and Western District Council Meeting in November 2005, the recent DSD project already caused substantial inconvenient to public. It is not suitable to carry out road opening works within a short period of time. WSD reviewed the condition of the water mains and decided to defer the works by few years later. Although the risk of water main burst could be higher, the condition is acceptable. Therefore, WSD decided to exclude the works in this Project and reschedule the works in 2010. In the mean time, if situation changes before 2010, WSD would re-prioritize the works earlier. We would further seek for the Members' advice prior construction.



## **4 METHODOLOGY OF REPLACEMENT AND REHABILITATION**

- 4.1 In the selection of the best replacement or rehabilitation methods for each situation, we would firstly explore the suitability of various trenchless techniques to minimize disruption to public, traffic and environment. Open cut method will be adopted only when trenchless techniques are shown to be impracticable.
- 4.2 The traditional open cut replacement method is to replace an existing water main by open trench excavation and laying a new water main alongside the existing mains. Although it will cause more disturbance, the open cut method is more practicable particularly for small diameter water mains. Trenchless rehabilitation method is to insert a new liner into an existing water main via a launching pit and a receiving pit (pit size being about 3m long by 2m wide). As it involves limited excavation, there is less impact to traffic and environment. The typical trenchless techniques are slip-lining, close fit lining, and cured-in-place pipe. Trenchless replacement technique is to install a new pipe without open trench excavation. Some examples are pipe bursting, pipe jacking, horizontal directional drilling or micro-tunneling.
- 4.3 There are, however, some considerations before choosing trenchless rehabilitation or replacement methods. Suspension of water supply is required unless there is an alternative supply source or when supply can be maintained by a temporary by-pass main. Trenchless technique is not suitable for water mains with many tee branches, valves and bends. The location plan in Appendix A shows the locations of the water mains preliminarily proposed to adopt the trenchless rehabilitation/ replacement method. However, the determination of the method of construction depends on many factors such as site condition, construction constraints, choice of material, traffic and environmental impact, etc.
- 4.4 We will adopt the following measures to ensure smooth implementation of the works:
- conduct a detailed pre-construction survey to investigate underground condition to avoid damaging water mains and other utilities during construction;
  - provide temporary by-pass main to minimize the time of water suspension;
  - arrange water supply suspensions by matching with the user consumption patterns and limiting the supply suspensions to 8 hours;
  - set up a liaison team during construction to liaise with the public to coordinate supply suspension activities;
  - evaluate different forms of contract management to control the programme and duration of works effectively; and
  - improve construction method and contract management based on the experiences gained in previous similar projects. (as detailed on section 5.1.1)

## **5 PROJECT MANAGEMENT**

- 5.1 Summarizing experiences gained in previous similar projects, we will adopt a new project management measures and strengthen the existing measures, so as to minimize the risk of project delay. For example:
- 5.1.1 Adopt term contract to allow more flexibility to the project. The advantage of term contract includes:



- a. Delay can be minimized by issuing works order. Construction period can be revised to suit the interfacing project.
- b. Risk can be minimized by issuing works order which cover sections of replacement works to suit the actual site condition.
- c. Construction cost can be divided into small sections so as to minimize lost caused by project delay.
- d. The term contract had been applied in the current Stage 1 Phase 1 project. Public complaints and contractor claims have been reduced significantly.

5.1.2 Strengthen project supervision to ensure the project completion on time;

5.1.3 Strengthen the standard for contractor performance review, results would be reflected by the contractor performance report. This result can affect the tendering opportunity of other project.

5.2 As mentioned in section 2.1, the replacement and rehabilitation of water main project is required to implement in different phase. Based on the funding arrangement and the principle of fair and open competition, WSD carried out open tendering. The design and construction supervision of Stage 1 Phase 2 and Stage 2 projects were awarded to two difference consultants based on the result of tender elevations. These two elevations ran through a strict procedure and the awarded consultants meet WSD's required standard. In additions, these two consultants would base on the same standard to carry out design, select contractor and carry out site supervision. WSD would close monitor and carry out the overall management of different consultants. WSD would also act as a communication channel between different consultants to ensure all projects meeting WSD's standard.

## **6 PROGRAMME AND PROJECT INTERFACE**

- 6.1 The major concern in term of the programme is the coordination with various parties to avoid repetitive road openings. Road opening will be carried out section by section in a coordinated manner to suit the traffic conditions and actual needs.
- 6.2 We have conducted detailed and comprehensive reviews on project interface with other government departments and utilities undertakers. From the information gathered, the majority of the interfacing projects are related to drainage, sewerage and highways works. The main project interface is DSD Contract No. DC/2002/13. To avoid impacts arising from these projects, we will consider carrying out the works in sections, entrusting part of the works to other departments or carrying out the works concurrently in common trench with other underground utilities. We will continue to further discuss these options with the relevant parties with a view to arriving at the most effective construction arrangement.
- 6.3 To resolve the conflicts due to project interfaces and to avoid repeated road opening, the options of entrusting the concerned water mains to DSD's contractor, or carrying out the works in phases to avoid crashing of programmes have been considered. Detailed project programmes will be submitted to the Council Members before the commencement of the project works.
- 6.4 In order to avoid repeated road opening, we have coordinated the following interface works:



- (i) Upgrading of Salt Water Supply System – Some saltwater mains upgrading works within the project area will be incorporated into the subject project.
- (ii) Installation of Fire Hydrant Project – Some installation works within the project area will be incorporated into the subject project.
- (iii) DSD Contract No. DC/2002/13 – Central and Western Interceptor and Reticulation Sewers – carry out replacement in the same trench if situation is feasible.
- (iv) DSD Construction of Interception Drains at Queens Road Central – Carry out project coordination and carry out replacement in the same trench if situation is feasible.
- (v) Civil Engineering and Development Department Central Reclamation Phase III – Carry out project coordination.
- (vi) MTRC West Island Line – Carry out project coordination.

6.5 As mentioned in section 5.1.1, to allow flexibility for programming of works, term contract type re-measurement contracts will be adopted in this project. This form of contract is particularly suitable for works which require considerable coordination with others. It can facilitate necessary amendment to suit actual site conditions. By issuing Works Orders after confirming the design on site, risks can be minimized. The programme and duration of the Works can also be controlled effectively and disruption to the public and traffic can be minimized.

## 7 ENVIRONMENTAL REVIEW

- 7.1 We have conducted an environmental review in compliance with all the relevant environmental regulations/ requirements. The major aspects of review include the effect on noise, air, waste, and water. The review has identified the noise sensitive receivers (NSRs) as listed in **Appendix B** which include hospitals, schools, and residential blocks in the proximity of the proposed construction activities.
- 7.2 We would apply the following mitigation measures to minimize the impact to the environment during construction:
- (a) Dust generated from excavation could be controlled by water spraying or enclosure.
  - (b) Use of noise barrier and silencer near the NSRs such as residential blocks, hospitals, schools, church, temple and home for the elderly. Restriction of working hours in the vicinity of school during examination periods.
  - (c) Avoidance of using several noisy plants simultaneously; locate the noisy plants as far from the NSRs as possible.
  - (d) Use of trenchless replacement or rehabilitation method.
  - (e) All construction waste generated from the site including excavated materials, other wastes and chemical waste generated from facilitates maintenance works etc. should be sorted, stored, transported and disposed in accordance with EPD's requirement.
  - (f) All wastewater generated from the site must be treated in accordance with the Water Pollution Control Ordinance prior discharge.
  - (g) Align water mains away from the existing trees and buildings of cultural heritage interest.
- 7.3 A comprehensive tree survey has been conducted. The assessment concluded that no tree felling or tree transplanting is envisaged in this project. Endorsement from Agriculture,



Fisheries and Conservation Department and Leisure and Cultural Services Department had also been obtained.

- 7.4 The water mains will be aligned away from the existing trees and buildings of cultural heritage interests, such as Central District Police Station, Victoria Prison, Former Central Magistracy at Arbuthnot Road, the Catholic Cathedral of Immaculate Conception Roman Catholic Cathedral at Caine Road, and Western Market at Des Voeux Road Central as far as possible. It part of the works must be carried out near buildings of cultural heritage interest, we will consult the Antiquities and Monuments Office (AMO) of Leisure and Cultural Services Department and will implement appropriate measures to protect these historical buildings.

## **8 TRAFFIC IMPACT ASSESSMENT**

- 8.1 We have conducted a Traffic Impact Assessment for this project. The findings indicate that some of the works are located in the traffic sensitive routes, such as Connaught Road Central, Des Voeux Road, Queens Road Central, Caine Road, Connaught Road West, and Des Voeux West. To minimize traffic disruption during construction, trenchless techniques will be adopted in these locations as far as practicable. If this is not practicable due to site and traffic constraints, the Contractor will adopt open trench method and implement temporary traffic management measures to keep the disruption to traffic to acceptable levels. Examples of temporary traffic management schemes at the critical junctions are given in drawing nos. 3848/PC/C/0011~013, 0042 in **Appendix C**.
- 8.2 The works will be carried out in sections to reduce disruption to the public. Before the commencement of each section of works, the Contractor will submit the construction details and the temporary traffic management measures to the Traffic Management Liaison Group consist of relevant government departments and utilities undertakers (which comprises representatives from Transport Department, Road Management Office of Hong Kong Police Force, Highways Department etc.) for assessment and agreement. If there were other road opening works within the same region, the effect of that road opening works to the traffic would also be considered.

## **9 PUBLIC CONSULTATION**

- 9.1 We will launch various public liaison activities to ensure smooth implementation of the construction works and to enhance communication with the public. These activities include providing details of our works and the areas affected, the appreciation and responding to public concerns, and listening to and addressing public suggestion and complaints for making timely improvements.

## **10 LAND MATTER**

- 10.1 The extent of the proposed works will not require private land acquisition. The replacement of water mains will be terminated outside private lot boundary. However,

some small number of Government mains might be located within private land. Under normal situation, we will carry out the works on these mains in accordance with the relevant land lease conditions or after we have obtained the consent of the land owners.

## **11 CONSTRUCTION PROGRAMME**

- 11.1 This project will submit to the Finance Committee of Legislative Council in early 2006 for approval. Subject to the funding being made available, we will start the tender invitation process. Construction works are anticipated to commence in mid 2006 for completion in 2010. During the construction stage of the project, WSD will report the progress and the latest programme of the works regularly to the Central & Western District Council.

**Water Supplies Department  
December 2005**



## Appendix A

### Covered Area

Road Name	Proposed length of replace or rehabilitate water mains (m)	Proposed diameter of replace or rehabilitate water mains (mm)
<b>Western District</b>		
North Street	546	80 ~ 150
Catchik Street	808	80 ~ 100
Kennedy Town New Praya	187	150
Chiu Kwong Street	318	80 ~ 150
Ko Shing Street	761	40 ~ 150
Wilmer Street	324	80 ~ 150
Bonham Strand	340	100
Sands Street	360	150 ~ 1000
Kennedy Town Praya	203	80 ~ 150
Shing Sai Road	494	1000
Hill Road	150	100
Pokfulam Road	300	80 ~ 450
Third Road	260	150 ~ 300
Second Street	220	100 ~ 150
High Street	220	450
Queen's Road West	1,260	20 ~ 150
Des Voeux Road West	1,772	50 ~ 300
Connaught Road West	3,565	80 ~ 1000
Smithfield Street	375	80 ~ 150
Holland Street	140	150
Sai Cheung Street	140	150
Whitty Street	305	25 ~ 200
Centre Street	337	50 ~ 150
Western Street	94	80 ~ 100
Eastern Street	351	80 ~ 150
Sutherland Street	450	80 ~ 200
Queen Street	131	40 ~ 100
New Market Street	2,808	80 ~ 100

Road Name	Proposed length of replace or rehabilitate water mains (m)	Proposed diameter of replace or rehabilitate water mains (mm)
Morrison Street	177	40 ~ 250
Wing Lok Street	1,675	80 ~ 200
Sai On Lane	150	80
Lai On Lane	50	80
Water Street	112	150
Backlane in Western District	5,058	40 ~ 150
<b>Central District</b>		
Bridges Street	1,148	40 ~ 150
Connaught Road Central	1,840	25 ~ 1000
Des Voeux Road Central	2,369	40 ~ 200
Queen Victoria Street	449	80 ~ 150
Caine Road	2,866	40 ~ 300
Peel Street	1,102	80 ~ 200
Hollywood Road	1,819	40 ~ 300
Shing Wong Street	347	80 ~ 150
Staunton Street	627	80 ~ 150
Graham Street	130	50 ~ 100
Chiu Lung Street	105	100
Elgin Street	457	50 ~ 300
Seymour Road	50	100
Castle Road	95	100
Lyndhurst Terrace	71	250
Hillier Street	149	80 ~ 400
Mercer Street	100	200
Wellington Street	720	80 ~ 300
Pottinger Street	20	25
Queen's Road Central	331	75 ~ 300
Gilman Street	224	150
Pedder Street	30	200 ~ 250
Wyndham Street	468	80 ~ 200
Aberdeen Street	393	40 ~ 80
On Tai Street	150	40 ~ 100
Pier Road	228	50 ~ 100



Road Name	Proposed length of replace or rehabilitate water mains (m)	Proposed diameter of replace or rehabilitate water mains (mm)
Jubilee Street	94	100 ~ 150
Shelley Street	448	80 ~ 100
Old Bailey Street	337	50 ~ 150
Arbuthnot Road	110	80 ~ 100
Gleneady	200	50 ~ 80
Lower Albert Road	75	150
Man Kwong Street	720	1000
Man Yiu Street	210	1000
Connaught Place	370	1000
Backlanes in Central District	6,138	25 ~ 150

#### List of Figures

Drawing No.	Drawing Title
3848/PC/C/0050	Key Plan - Hong Kong North and West
3848/PC/C/0051	Location Plan Hong Kong North and West
3848/PC/C/0052	Location Plan Hong Kong North and West
3848/PC/C/0053	Location Plan Hong Kong North and West
3848/PC/C/0054	Location Plan Hong Kong North and West
3848/PC/C/0055	Location Plan Hong Kong North and West

## Appendix B

### Location of Noise Sensitive Receiver (NSR)

Location (Street /Areas)	Nature of NSR
<u>Kennedy Town</u>	
Smithfield Road	Residential / Home for the aged
Catchick Street	Residential / Home for the aged
North Street	Residential / Home for the aged
Sands Street	Residential / Home for the aged
Kennedy Town New Praya	Residential / Home for the aged
Queen's Road West	Residential / Home for the aged
<u>Western</u>	
Queen's Road West	Residential
Whitty Street	Residential
Pok Fu Lam Road	Residential
<u>Sai Ying Pun</u>	
Des Voeux Road West	Residential
Queen's Road West	Residential / school / clinic
Pok Fu Lam Road,	Residential / school
First Street	Residential / school
Second Street	Residential / school
Third Street	Residential / school
High Street	Residential / school
Bonham Road	Residential / school
Hospital Road	Residential / school / clinic
<u>Sheung Wan</u>	
Wing Lok Street	Residential
Mercer Street	Residential / school
Wellington Street	Residential / school
Peel Street	Residential / church / clinic / school
Staunton Street	Residential / church / clinic / school
Caine Road	Residential / church / clinic / school
Hollywood Road	Residential / church / clinic / school
<u>Mid Level</u>	
Ladder Street	Residential / school / temple / church
Caine Road	Residential / school / temple / church



Location (Street /Areas)	Nature of NSR
Castle Road	Residential / school / church
Seymour Road	Residential / school / church
<u>Central</u>	
Des Voeux Road Central	Residential
Wellington Street	Residential
Lyndhurst Terrace	Residential
Arbuthnot Road	Residential / school / church
Glenealy	Residential / school / church
Caine Road	Residential / school / church
Queen's Road Central	Law Court / church
Edinburgh Place	Residential / library

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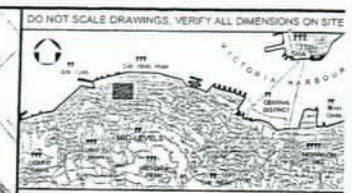
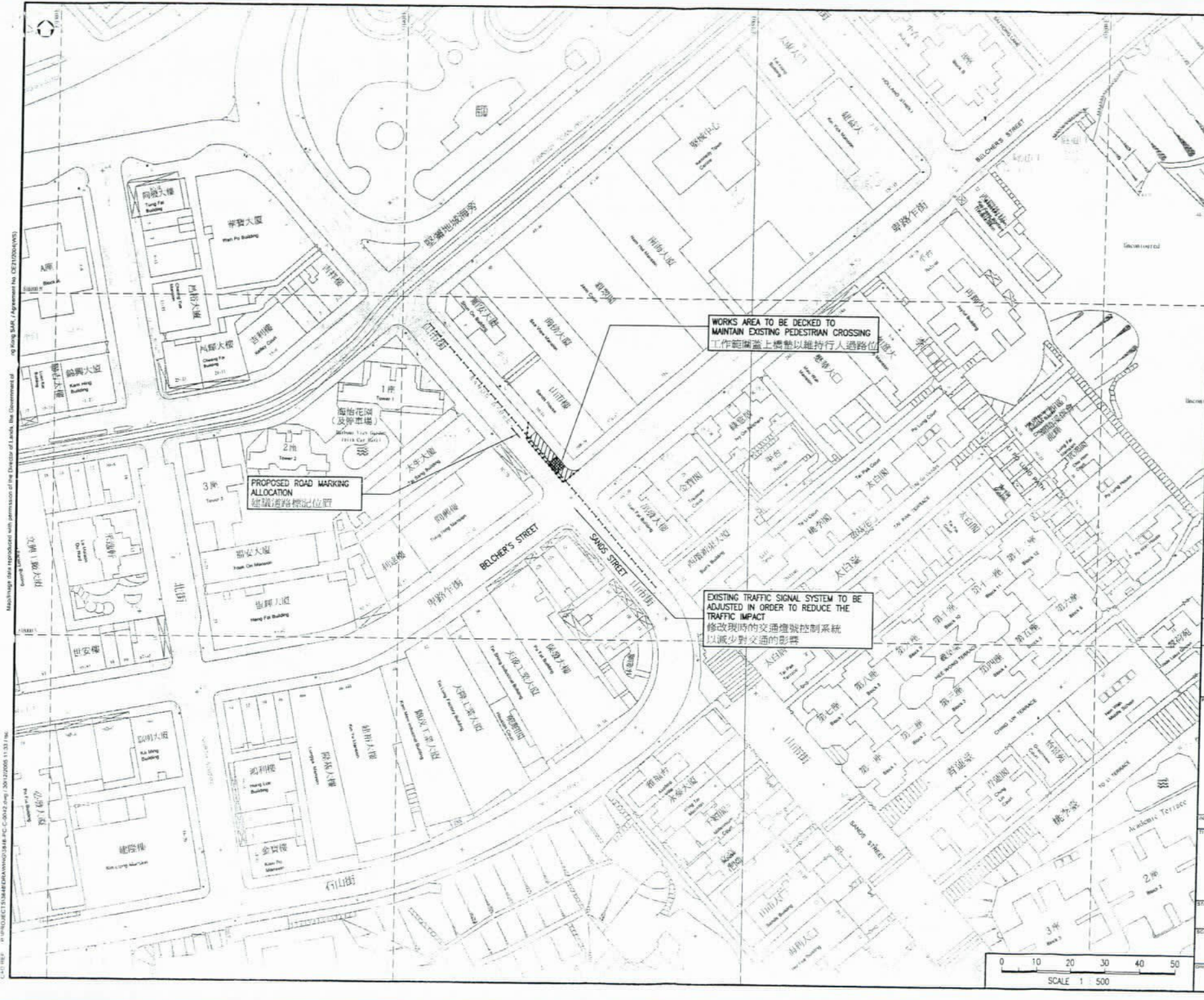
## **Appendix C**

### **Examples of Traffic Mitigation Measures**

(Attachment: Drawing Nos. 3848/PC/C/0011 ~ 0013; 0042)



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- KEY PLAN**  
概覽圖
- LEGEND**  
圖例
- WORK AREA  
工地範圍
  - TRAFFIC BARRIER CONES  
交通圍錐及錐桶
  - PROPOSED ALIGNMENT  
擬更換及修復的水管

B	SECOND ISSUE	WY	12/05	TC	KL
A	FIRST ISSUE	WY	10/05	TC	KL
REV	DESCRIPTION	BY	DATE	CHKD	ALTD

**水務署**  
WATER SUPPLIES DEPARTMENT  
顧問工程管理部  
CONSULTANTS MANAGEMENT DIVISION

**ATKINS** 阿特金斯顧問有限公司  
Atkins China Ltd

PROJECT  
REPLACEMENT AND REHABILITATION OF WATER MAINS  
STAGE 1 PHASE 2  
MAINS ON HONG KONG AND ISLANDS  
DESIGN AND CONSTRUCTION  
水管更換及修復工程  
第1階段第2期  
香港島區水管  
設計及施工

PROJECENT NO  
CE 21 / 2004 (WS)

TITLE  
PROPOSED TRAFFIC ARRANGEMENT AT  
SANDS STREET

STATUS  
山市街  
建議的交通改道措施

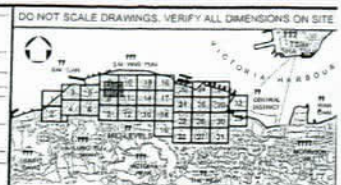
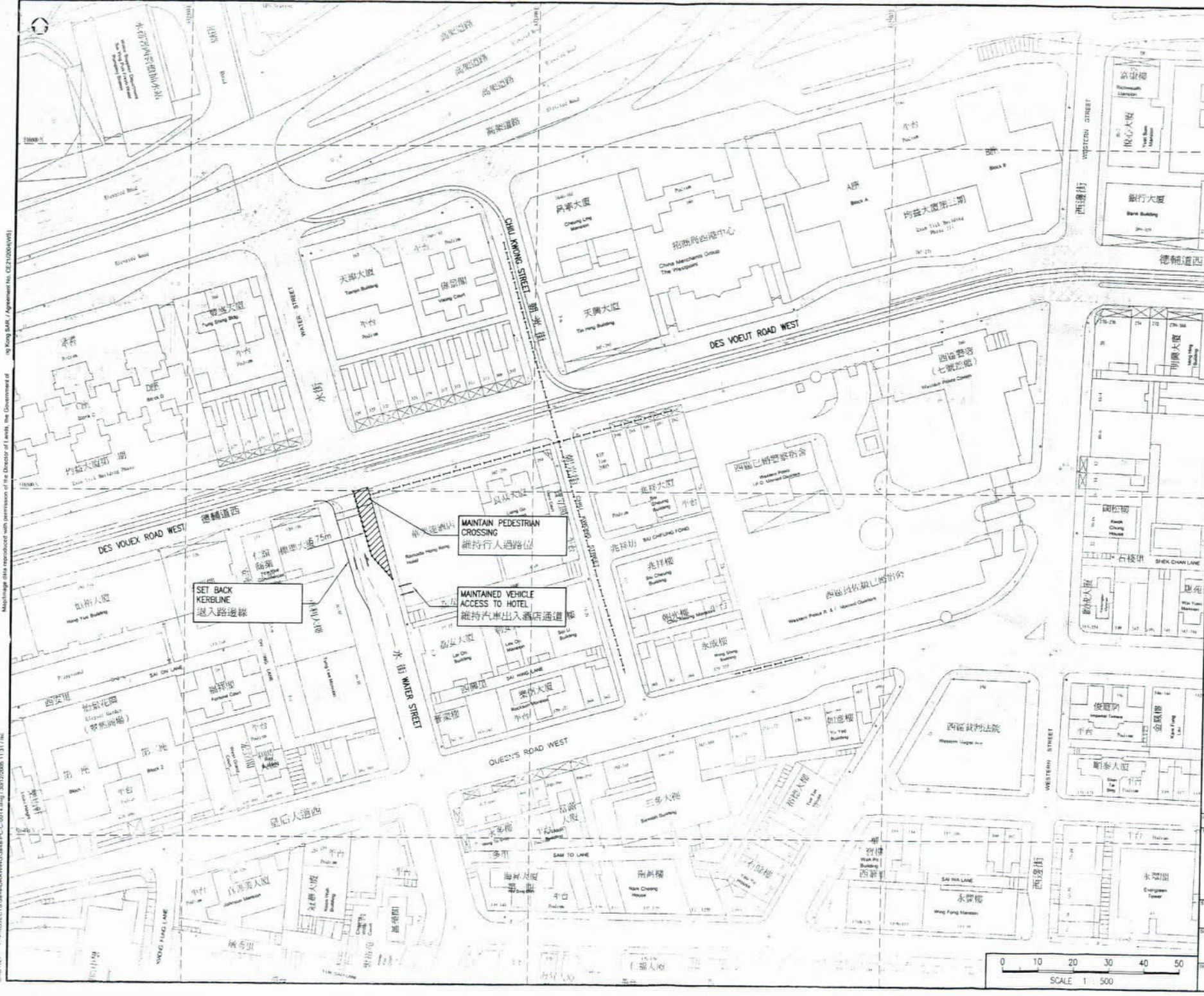
DESIGN  
設計階段

SCALE AT 1:500	DESIGN WY 15-11-05	DRAWN CSL 19-11-05	CHECKED TC 10-11-05	AUTHORISED KL 10-11-05
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3848/PC/C/0042  
B



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- KEY PLAN**  
概覽圖
- 圖例
- WORK AREA  
工地範圍
  - TRAFFIC BARRIER CONES  
交通圍錐及擋欄
  - PROPOSED ALIGNMENT  
擬更換及修復的水管

A FIRST ISSUE		WT	TC	KL
REV	DESCRIPTION	BY	DATE	CHKD AUTH
<b>水務署</b> WATER SUPPLIES DEPARTMENT				
顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION				

**ATKINS** 阿特金斯顧問有限公司  
Atkins China Ltd

PROJECT  
REPLACEMENT AND REHABILITATION OF WATER MAINS  
STAGE 1 PHASE 2  
MAINS ON HONG KONG AND ISLANDS  
DESIGN AND CONSTRUCTION  
水管更換及修復工程  
第1階段第2期  
香港島區水管  
設計及施工

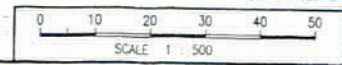
REFERENCE NO. CE 21 / 2004 (WS)

TITLE  
PROPOSED TRAFFIC ARRANGEMENT AT  
DES VOEUX ROAD WEST/  
WATER STREET/CHUI KWONG STREET  
德輔道西/水街/朝光街交界  
建議的交通改道措施

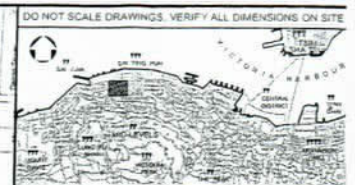
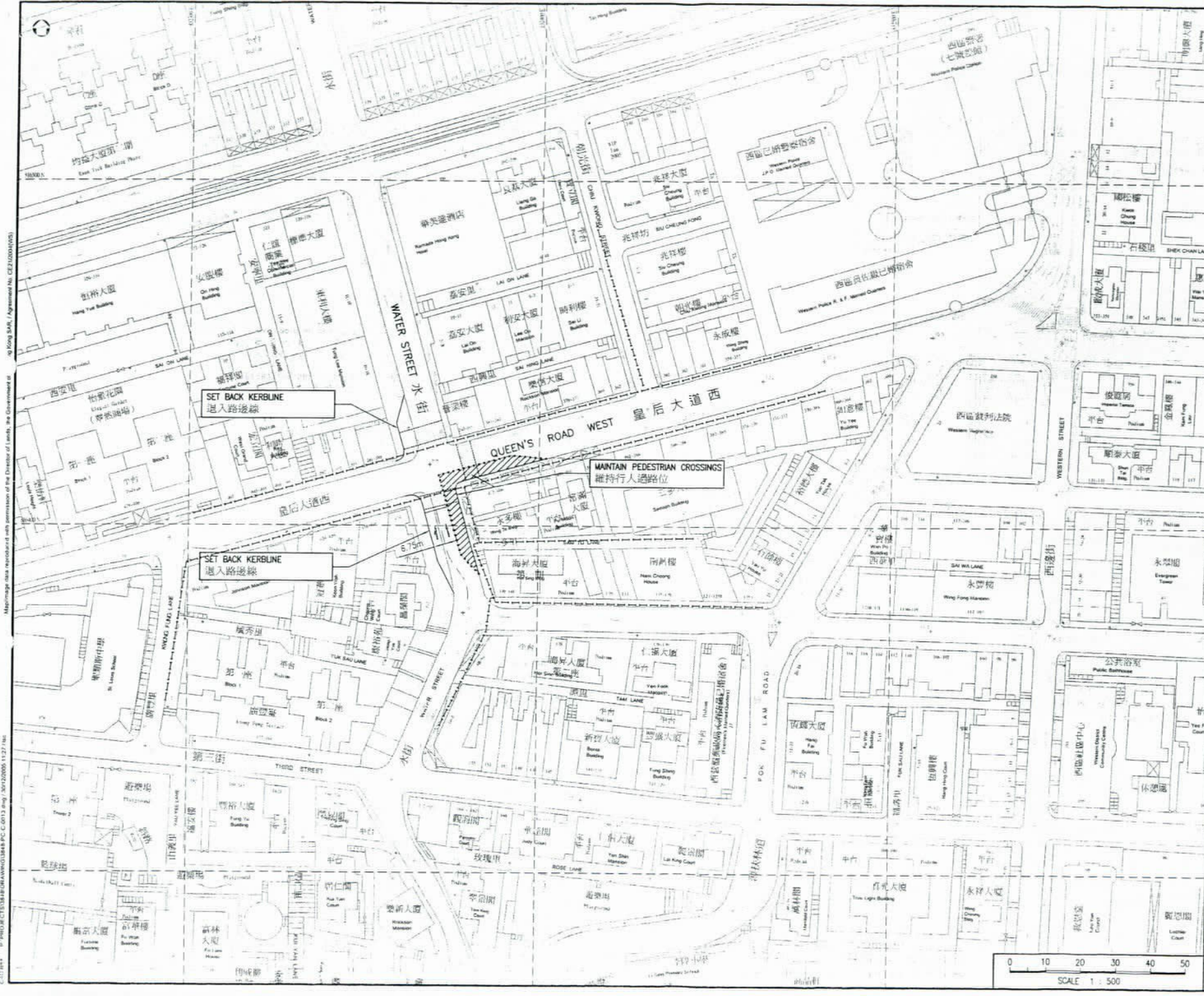
STATUS  
DESIGN  
設計階段

SCALE 1:1	DESIGN	CHKD	REVISED
1:500	WW	CEL	TC
DATE	DATE	DATE	DATE
07-09-05	07-09-05	07-09-05	07-09-05

3848/PC/C/0014 A







- LEGEND :-  
圖例 :-
- WORK AREA  
工地範圍
  - TRAFFIC BARRIER CONES  
交通錐筒及路欄
  - PROPOSED WATER MAINS ALIGNMENT  
擬更換及修復的水管

**水務署**  
WATER SUPPLIES DEPARTMENT

顧問工程管理部  
CONSULTANTS MANAGEMENT DIVISION

**ATKINS** 阿特金斯顧問有限公司  
Atkins China Ltd

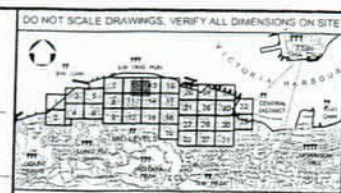
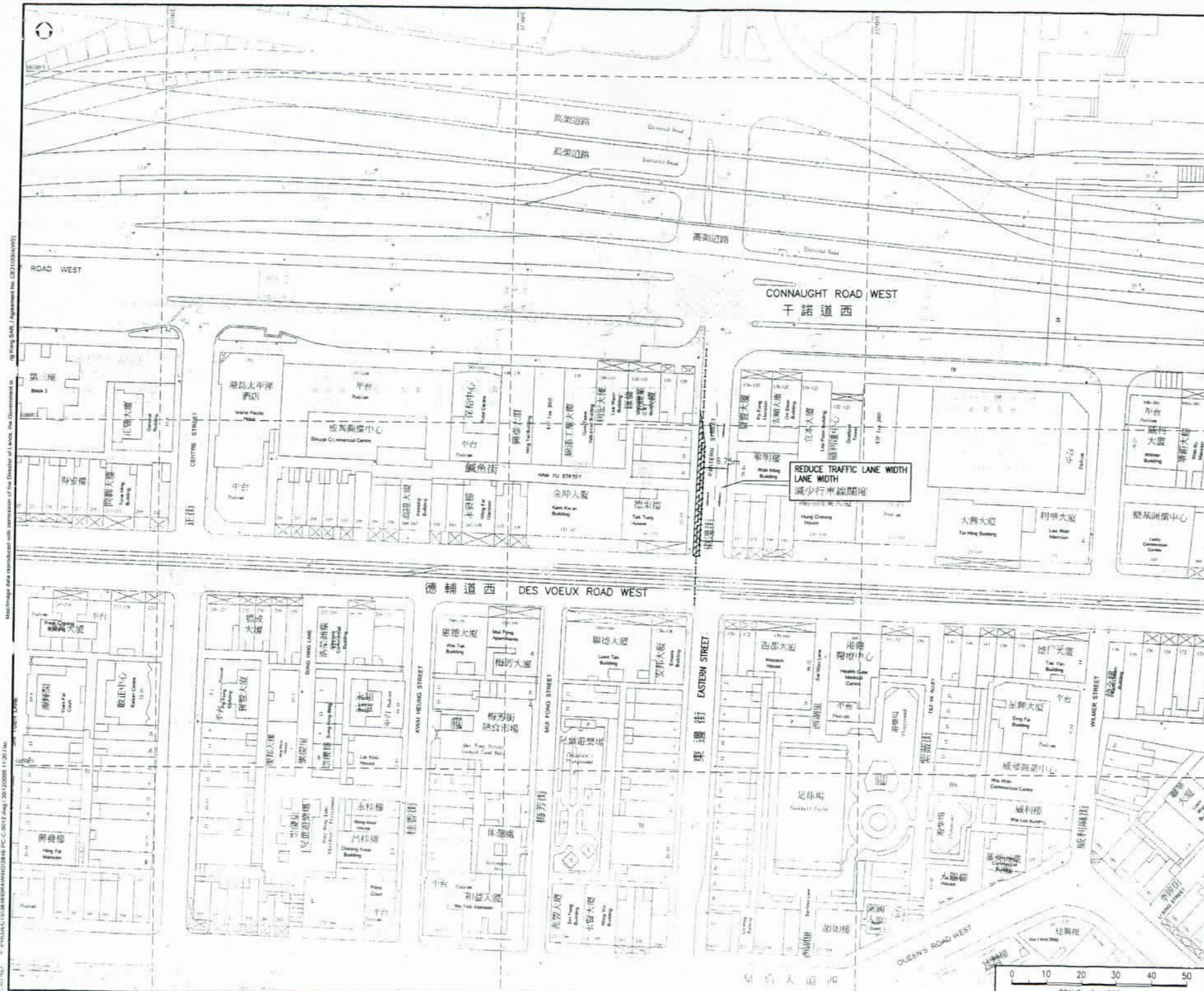
PROJECT  
REPLACEMENT AND REHABILITATION OF WATER MAINS  
STAGE 1 PHASE 2  
MAINS ON HONG KONG AND ISLANDS  
DESIGN AND CONSTRUCTION  
水管更換及修復工程  
第1階段第2期  
香港島區水管  
設計及施工

PROJECT NO.	CE 21 / 2004 (WS)			
TITLE	PROPOSED TRAFFIC ARRANGEMENT AT QUEEN'S ROAD WEST/WATER STREET 皇后大道西/水街交界 建議的交通改道措施			
STATUS	DESIGN 設計階段			
SCALE AT 1:500	DESIGN DATE: 07-09-05	DRAWN DATE: 07-09-05	CHECKED DATE: 07-09-05	NOTED DATE: 07-09-05
PROJECT NO.	3848/PC/C/0013			


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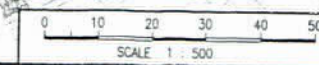


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- KEY PLAN**  
概覽圖
- LEGEND**  
圖例:
- WORK AREA 工地範圍
  - TRAFFIC BARRIER CONES 交通錐筒及護欄
  - PROPOSED WATER MAINS ALIGNMENT 擬更換及修復的水管

A FIRST ISSUE		WT		16/05	TC	KL
REV	DESCRIPTION	BY	DATE	CHECK	AUTH	
 <b>水務署</b> WATER SUPPLIES DEPARTMENT						
顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION						
<b>ATKINS</b> 阿特金斯顧問有限公司 Atkins China Ltd						
PROJECT REPLACEMENT AND REHABILITATION OF WATER MAINS STAGE 1 PHASE 2 MAINS ON HONG KONG AND ISLANDS DESIGN AND CONSTRUCTION 水管更換及修復工程 第1階段第2期 香港島區水管 設計及施工						
ALIGNMENT NO. CE 21 / 2004 (WS)						
TITLE PROPOSED TRAFFIC ARRANGEMENT AT DES VOEUX ROAD WEST/EASTERN STREET 德輔道西 / 東邊街交界 建議的交通改道措施						
STATUS DESIGN 設計階段						
SCALE AT A1	DESIGN	WT	DESIGN	CBL	CHECKED	AUTHORISED
1:500	DATE	07-09-05	DATE	07-09-05	DATE	07-09-05
3848/PC/C/0012						

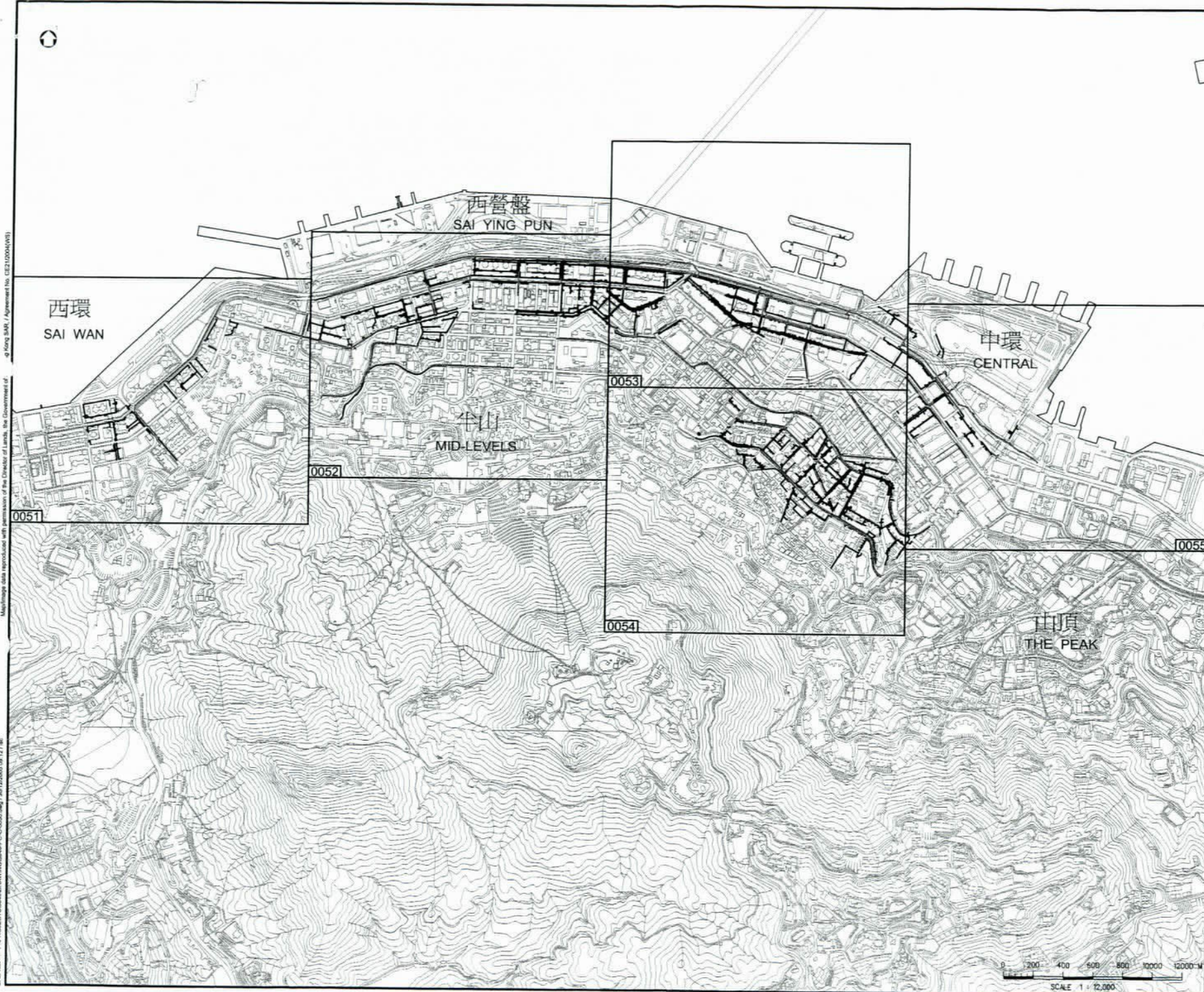








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Legend :-  
圖例 :-

- Proposed Water Main Replacement by Open Trench Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用開掘法更換水管
- Proposed Water Main Replacement / Rehabilitation by Trenchless Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用無坑掘掘法更換或修復水管
- Proposed Water Main Under Stage 2  
第二階段工程擬要更換或修復水管

A	FIRST ISSUE	WY 12/05	TC	KL	
REV	DESCRIPTION	BY	DATE	CHECKED	AUTHN

WATER SUPPLIES DEPARTMENT  
顧問工程管理部  
CONSULTANTS MANAGEMENT DIVISION

**ATKINS** 阿特金斯顧問有限公司  
Atkins China Ltd

PROJECT  
REPLACEMENT AND REHABILITATION OF WATER MAINS  
STAGE 1 PHASE 2  
MAINS ON HONG KONG AND ISLANDS  
DESIGN AND CONSTRUCTION  
水管更換及修復工程  
第1階段第2期  
香港島區水管  
設計及施工

REFERENCE NO: CE 21 / 2004 (WS)

TITLE  
LOCATION PLAN  
HONG KONG NORTH AND WEST  
擬更換及修復水管位置圖  
中西區

STATUS  
DESIGN  
設計階段

SCALE AS AT	DESIGN	DRAWN	CHECKED	AUTHORISED
As Shown	WY	CSL	TC	KL
DATE	DATE	DATE	DATE	DATE
12-12-05	12-12-05	12-12-05	12-12-05	12-12-05

DRAWING NO: 3848/PC/C/0050

SCALE 1 : 12,000

0 200 400 600 800 1000 12000 M





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Legend :-

- Proposed Water Main Replacement by Open Trench Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用開掘法更換水管
- Proposed Water Main Replacement / Rehabilitation by Trenchless Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用無坑掘掘法更換或修復水管
- Proposed Water Main Under Stage 2  
第二階段工程擬要更換或修復水管
- Cultural Heritage  
歷史文物古蹟

A	FIRST ISSUE	WY	12/05	TC	KL
REV	DESCRIPTION	BY	DATE	CHKD	ALTH

  
**WATER SUPPLIES DEPARTMENT**  
 顧問工程管理部  
**CONSULTANTS MANAGEMENT DIVISION**  
**ATKINS** 阿特金斯顧問有限公司  
 Atkins China Ltd

PROJECT  
**REPLACEMENT AND REHABILITATION OF WATER MAINS**  
**STAGE 1 PHASE 2**  
**MAINS ON HONG KONG AND ISLANDS**  
**DESIGN AND CONSTRUCTION**  
 水管更換及修復工程  
 第1階段第2期  
 香港島區水管  
 設計及施工

REPRESENT NO. **CE 21 / 2004 (WS)**  
 TITLE

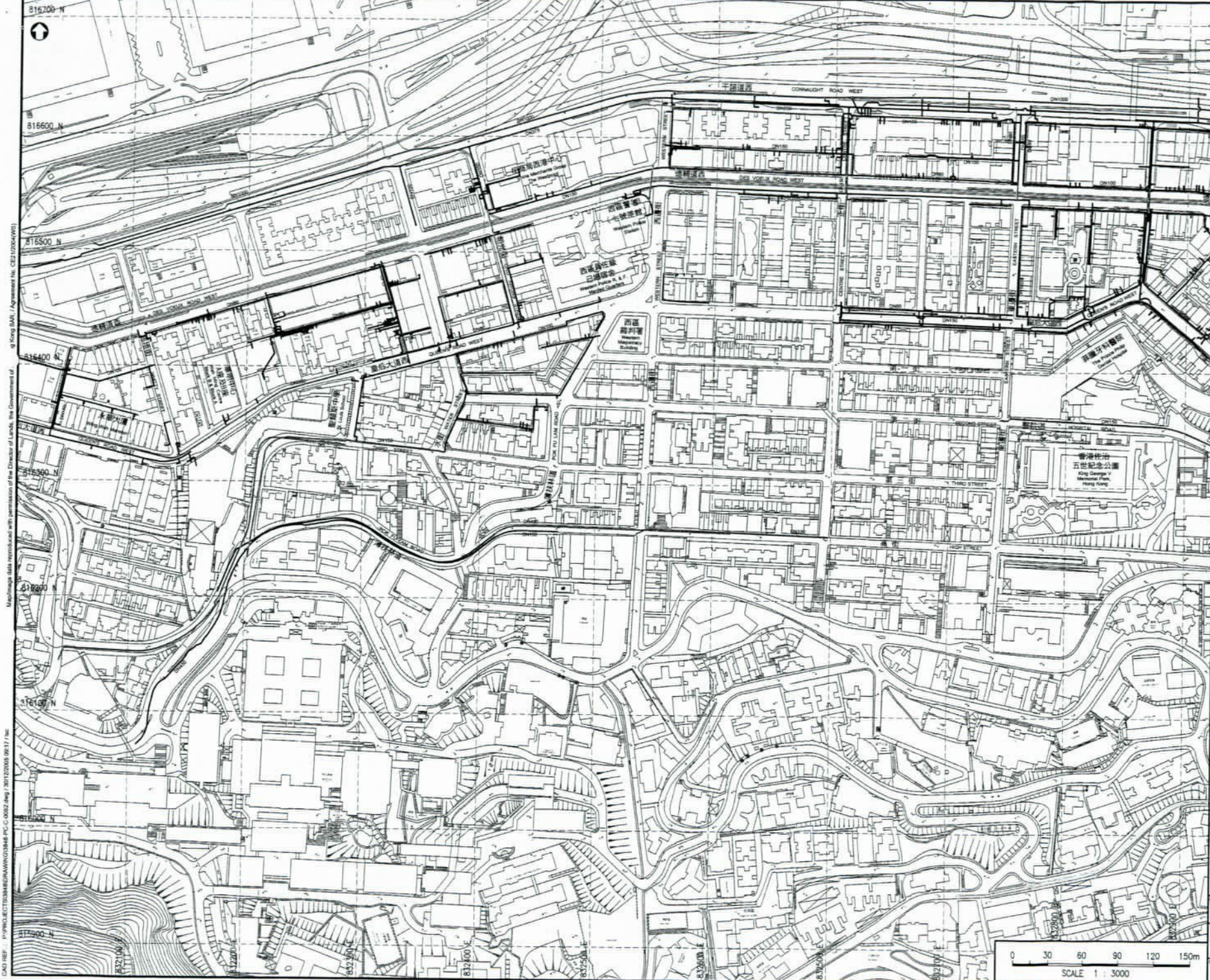
**LOCATION PLAN**  
**HONG KONG NORTH AND WEST**  
**擬更換及修復水管位置圖**  
**中西區**

STATUS  
**DESIGN**  
**設計階段**

DESIGN	DRAWN	CHECKED	AUTHORIZED
DATE	DATE	DATE	DATE
12-12-05	12-12-05	12-12-05	12-12-05


DRAWING NO. **3848/PC/C/0051**  
 REVISION **A**

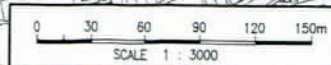




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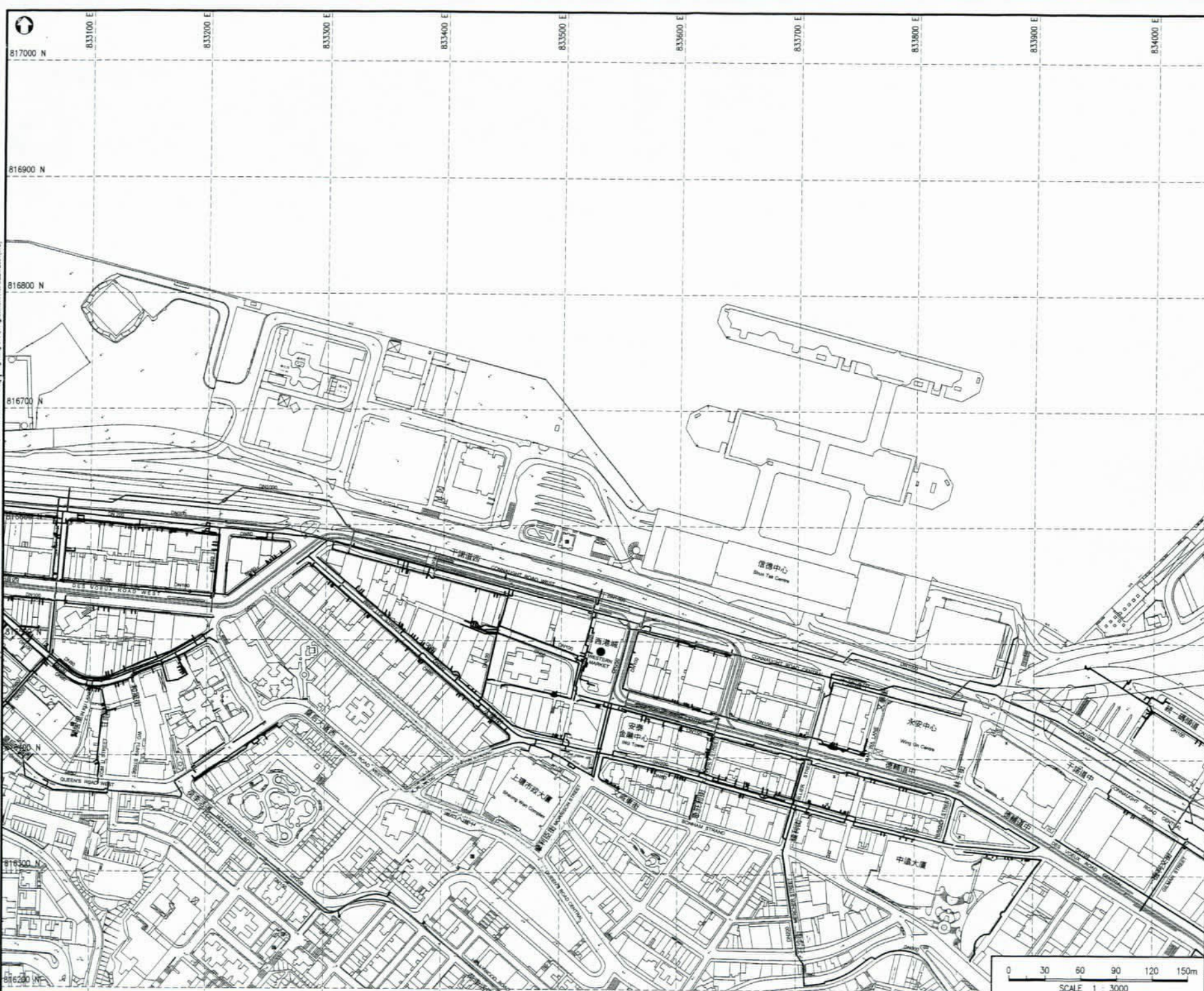
- Legend :-**
- Proposed Water Main Replacement by Open Trench Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用開掘法更換水管
  - Proposed Water Main Replacement / Rehabilitation by Trenchless Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用無坑掘法更換或修復水管
  - Proposed Water Main Under Stage 2  
第二階段工程擬要更換或修復水管
  - Cultural Heritage  
歷史文物古蹟

A FIRST ISSUE		WY 12/05	TC	KL	
REV	DESCRIPTION	BY	DATE	CHKD	AUTH
 <b>WATER SUPPLIES DEPARTMENT</b> 顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION					
<b>ATKINS</b> 阿特金斯顧問有限公司 Atkins China Ltd					
PROJECT REPLACEMENT AND REHABILITATION OF WATER MAINS STAGE 1 PHASE 2 MAINS ON HONG KONG NORTH AND ISLANDS DESIGN AND CONSTRUCTION 水管更換及修復工程 第1階段第2期 香港島區水管 設計及施工					
DRAWING NO. CE 21 / 2004 (WS)					
LOCATION PLAN HONG KONG NORTH AND WEST 擬更換及修復水管位置圖 中西區					
DESIGN 設計階段					
1:3000	DESIGN WY	DRAWN CSL	CHECKED TC	AUTHORISED KL	
	DATE 12-12-05	DATE 12-12-05	DATE 12-12-05	DATE 12-12-05	
DRAWING NO. 3848/PC/C/0052					REVISION A




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PROJECT: 3848/PC/C/0052  
DRAWING NO. 3848/PC/C/0052  
DATE: 12-12-05  
SCALE: 1:3000  
REVISION: A

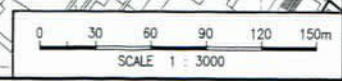




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- Legend**
- Proposed Water Main Replacement by Open Trench Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用開掘法更換水管
  - Proposed Water Main Replacement / Rehabilitation by Trenchless Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用無坑掘法更換或修復水管
  - Proposed Water Main Under Stage 2  
第二階段工程擬要更換或修復水管
  - Cultural Heritage  
歷史文物古蹟

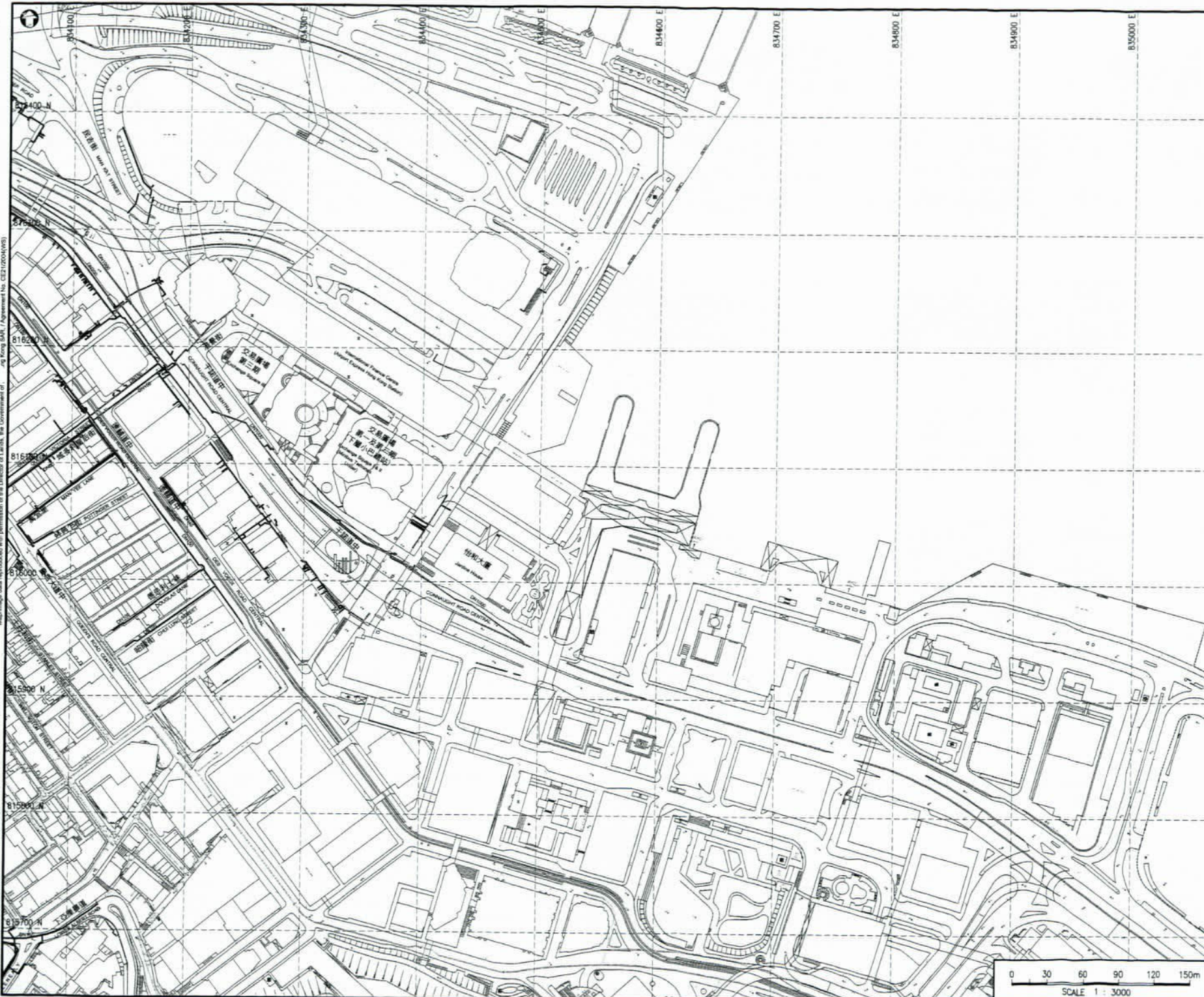
A FIRST ISSUE		WT	12/05	TC	KL
REV	DESCRIPTION	BY	DATE	CHKD	AUTH
 <b>WATER SUPPLIES DEPARTMENT</b> 顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION					
<b>ATKINS</b> 阿特金斯顧問有限公司 Atkins China Ltd					
PROJECT REPLACEMENT AND REHABILITATION OF WATER MAINS STAGE 1 PHASE 2 MAINS ON HONG KONG AND ISLANDS DESIGN AND CONSTRUCTION 水管更換及修復工程 第1階段第2期 香港島區水管 設計及施工					
DRAWING NO. CE 21 / 2004 (WS)					
TITLE LOCATION PLAN HONG KONG NORTH AND WEST 擬更換及修復水管位置圖 中西區					
STATUS DESIGN 設計階段					
DESIGN	CHKD	CHKD	CHKD	CHKD	CHKD
WT	CSL	TC	TC	TC	KL
DATE	DATE	DATE	DATE	DATE	DATE
12-12-05	12-12-05	12-12-05	12-12-05	12-12-05	12-12-05
DRAWING NO. 3848/PC/C/0053					
REVISION A					











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- Legend :-**
- Proposed Water Main Replacement by Open Trench Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用開掘法更換水管
  - Proposed Water Main Replacement / Rehabilitation by Trenchless Method Under Stage 1 Phase 2  
第一階段第二期工程擬使用無坑掘掘法更換或修復水管
  - Proposed Water Main Under Stage 2  
第二階段工程擬更換或修復水管
  - Cultural Heritage  
歷史文物古蹟

A	FIRST ISSUE	WY	12/05	TC	KL
REV	DESCRIPTION	BY	DATE	CHKD	AUTH

WATER SUPPLIES DEPARTMENT  
顧問工程管理部  
CONSULTANTS MANAGEMENT DIVISION

**ATKINS** 阿特金斯顧問有限公司  
Atkins China Ltd

PROJECT  
REPLACEMENT AND REHABILITATION OF WATER MAINS  
STAGE 1 PHASE 2  
MAINS ON HONG KONG AND ISLANDS  
DESIGN AND CONSTRUCTION  
水管更換及修復工程  
第1階段第2期  
香港島區水管  
設計及施工

AGREEMENT NO. CE 21 / 2004 (WS)

TITLE  
LOCATION PLAN  
HONG KONG NORTH AND WEST  
擬更換及修復水管位置圖  
中西區

STATUS  
DESIGN  
設計階段

DESIGN	WY	DRAWN	CSL	CHECKED	TC	AUTHORISED	KL
DATE	12-12-05	DATE	12-12-05	DATE	12-12-05	DATE	12-12-05

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