CONSTRUCTION AND DEMOLITION MATERIAL MANAGEMENT PLAN (C&DMMP)

1 PURPOSE OF C&DMMP

1.1 The Construction & Demolition Material Management Plan (C&DMMP) has been prepared according to the guidelines and requirements under Environment, Transport and Works Bureau Technical Circular (Works) ETWB TC(W) No. 33/2002 Management of Construction and Demolition Material including Rock. Its purposes are:

- To encourage the proper methods of reuse, reduction, recycling, handling, storage, transportation and disposal of construction and demolition (C&D) material generated from the project as far as possible;
- To estimate the quantities of C&D material generated and their time of generation;
- To clarify the waste management requirements specified under the Environmental Impact Assessment for this Project; and
- To provide the Contractor with information in order to facilitate them in the preparation of a Waste Management Plan

2 BACKGROUND

2.1 The Stormwater Drainage Master Plan (DMP) Study in Northern Hong Kong Island commissioned by DSD indicated that drainage systems in Northern Hong Kong Island were not adequate to meet current flood protection standards. The DMP recommend a series of drainage improvement works including the “Drainage improvement in Northern Hong Kong Island - Hong Kong West drainage tunnel”.

2.2 A Preliminary Project Feasibly Study (PPFS) for “Drainage improvement in Northern Hong Kong Island - Hong Kong West drainage tunnel” was undertaken and completed in March 1999. The PPFS concluded that the construction of the tunnel should be implemented to alleviate the flooding risk in Northern Hong Kong Island.

2.3 In October 2002, DSD commissioned Black & Veatch Hong Kong Ltd. (BV) to undertake the Drainage Improvement in Northern Hong Kong Island - Hong Kong West and Lower Catchment Improvement - Investigation Study to review and develop the previous work. This requires a review of the extent, alignment, profile and sections of the lower catchment drainage improvement works and drainage tunnels, as well as the number and locations of intake shafts, emergency exits and the associated drainage structures. Site investigations, property and damage assessment surveys, physical-modelling tests, environmental impact assessments, and development of preliminary designs are also undertaken as part of the Assignment.

3 SCOPE OF PROJECT

3.1 Surface water falling within the northern catchment of Hong Kong Island is intercepted by a series of drainage culverts running through the urban area that ultimately discharge into Victoria Harbour. The system is overloaded and flooding can occur in extreme conditions. However, much of the catchment[1] is outside the urban area and the objective of the drainage improvement scheme studied here is to intercept surface water before it enters the urban area and direct it to an outfall on the west-side of Hong Kong Island. This will reduce the flows in the lower catchment and reduce flooding frequency in the urban area.

3.2 The Project is located at the fringe of the urban areas at the midlevels of the western Hong Kong Island. While the underground tunnel alignment traverses the Tai Tam, Aberdeen, Pok Fu Lam and Lung Fu Shan Country Parks, the tunnel portals and intake shafts are outside of these Parks.

3.3 This Project comprises the following elements:

- 2 sections of main drainage tunnel; a tunnel of about 4.36 kilometers in length and 6.25 meters in diameter from Tai Hang Road to Wan Chai Gap, and a tunnel of about 6.14 kilometers in length and 7.25 meters in diameter from Wan Chai Gap to Sandy Bay;

- Adits of about 7.5 kilometers in length and 2.3 meters in diameter connecting various intakes and the main drainage tunnel;

- 35 inlet structures that will intercept existing flows and divert them via up to 35 dropshafts to the drainage tunnel. The dropshafts will include maintenance platform, inlet chamber, bar screen, grit trap, low flow bypass and vortex;

- Two tunnel portals at the east and west end of the tunnel alignment, including an energy dissipating structure at the western portal and vehicle accesses for maintenance purposes for both the eastern and western portals.

The layout plans showing the tunnel/adit alignments are enclosed in **Annex 1**.

3.4 The project is classified as “designated” project under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO).

4 IMPLEMENTATION PROGRAMME

4.1 The construction of proposed tunnel is scheduled to commence in May 2007, and is expected to be completed by November 2011. The construction period is expected to take approximately 55 months. A copy of construction programme with critical paths shown is enclosed in **Annex 2**.

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[1] The catchment is enclosed by the ridgelines running between Jardines Lookout in the east through Mount Butler, Mount Cameron, Mount Gough and the Peak.

5 DEVELOPMENT CONSTRAINTS

5.1 The major development constraints are as follows:

(a) Traffic impact,
(b) Existing buildings, structures and other land constraints;
(c) Utilities and services including watermains tunnels, gas main tunnels, WSD's plants, electricity, telecommunication, drainage and sewerage,
(d) Environmental considerations including air pollution impact, noise pollution impact, ecology, water quality, visual impact, and cultural heritage,
(e) Aberdeen Tunnel, and
(f) Disused Air Raid Precaution Tunnel underneath Kennedy Road.
(g) Possible interface with other Projects including :

(i) Adaptive Reuse Development Project of Haw Par Mansion (Leisure and Cultural Services Department / Antiquities & Monuments Office);
(ii) Route 4 (formerly Route 7) – Section between Kennedy Town and Aberdeen (Highways Department / Major Works);
(iii) Queen Mary Hospital Redevelopment (Queen Mary Hospital);
(iv) Option A of Agreement No. 42/2001 – Environmental and Engineering Feasibility Assessment Studies in relation to the Way Forward of the Harbour Area Treatment Scheme (Environmental Protection Department);
(v) West Island Line & South Island Line (MTRC);
(vi) Shatin-Central Link (KCRC)
(vii) Development of Victoria Barracks (Asia Society);
(viii) Proposed pedestrian connection linking the Cyberport development and the coastline areas;
(ix) PWP Item No. 9043WS – Upgrading of Wan Chai salt water supply system ;
(x) Contract No. 4/WSD/03 - Construction of Magazine Gap Road No. 3 Fresh Water Service Reservoir and Associated Mainlaying (Water Supplies Department);
(xi) PWP Item No. 9076WC Improvement to Hong Kong Central Mid Level and High Level areas Water Supply – Remaining Works (Water Supplies Department);
(xii) Cyberport Development at Telegraphy Bay;
(xiii) PWP Item No. 559 TH/B – Stubbs Road Widening and Improvement (Highways Department);
(xiv) PWP No. Item 200 TH/B – Kennedy Road Improvements and Queen's Lines Link (Highways Department);
(xv) PWP No. Item 693 TH/B – Improvement to Junction of Magazine Gap Road and May Road (Highways Department);
(xvi) Millennium Master Plan for the Western Expansion to University Campus (The University of Hong Kong);
(xvii) PWP Item 4104CD/B - Drainage improvement in Northern Hong Kong Island - Lower Catchment (Drainage Services Department);

(xviii) PWP Item No. 4127CD/B - Drainage improvement in Northern Hong Kong Island – Sheung Wan Stormwater Pumping Station (Drainage Services Department);

(xix) CE16/2000(DS) Stormwater Drainage Master Plan Study in Southern Hong Kong Island (Drainage Services Department); and

(xx) Agreement No. CE 28/2004 (GE) - Landslide Preventive Works at Po Shan, Mid-levels - Design and Construction (Civil Engineering and Development Department).

5.2 The alignments of drainage tunnel and lower catchment drainage improvement works have been carefully designed to minimize traffic disruption and environmental impact, and to avoid utility conflicts and encroachment of private lots. So the constraints in (a) to (f) above can be overcome. Regarding the possible interfaces with the aforesaid or other Projects (g)(i) to (g)(xx) above, close liaison with concerned authorities would be maintained and it is considered that these constraints can be resolved.

6 DEVELOPMENT OPTIONS

Strategic Options

6.1 A number of alternative strategic options have been considered for providing the recommended flood protection standard to the study area. The investigated options which have been identified based on the need to control runoff and flooding within the urbanized environment of the study area are:-

1. Reduce flows entering the drainage system (runoff control)
2. Attenuate stormwater flow (retention)
3. Increase conveyance capacity of existing drainage systems
4. Flow diversion
5. Overland flow control
6. Mechanical pumping
7. Flood proofing

6.2 Runoff control is used to reduce the peak runoff generated from a rainfall event through increased vegetation cover, storage in surface depressions, infiltration into the soil, etc. This method is most effective at controlling the peak runoff generated during smaller rainstorm event. Within Hong Kong Island, the availability of land for implementing runoff control measures is extremely limited.

6.3 Attenuation refers to the temporary storage of water such that the peak outflow is less than the peak inflow. Methods of retention storage include construction basins (impounding reservoirs, cavern storage), roof top storage, ditch, dry and wet ponds, etc. The volumes of water associated with extreme rainfall events are very large and accordingly, the volume of storage required for effective flood control would be large. Within the Study Area, there are no areas suitable for large storage basins.

6.4 Conveyance capacity improvement refers to increasing the size of the existing system so as to enable the design flows to safely pass. This is the most common method for increasing the capacity of urban drainage systems. Increasing the size of the existing drainage pipes would necessarily cause considerable disruption as existing drainage systems are dug up and replaced. In addition, there are a number of other utilities and underground obstructions which could make construction in these urban areas very expensive and disruptive. This option can therefore be considered for limited areas but not as a solution for the entire Study Area.

6.5 Flow diversion involves interception of the flows and channelling them through a new route to the sea. This option would require substantial engineering works. For urban areas like Northern Hong Kong Island, flow diversion would require the new route to be constructed within an underground tunnel to minimize the impact of construction.

6.6 Overland flow control is essentially controlled flooding. For this option, flooding would be allowed to occur but the flood waters would be channelled at surface level along specially designed flood routes. Currently there is a lack of space within Hong Kong to construct such flood routes and the suddenness of flooding means that public safety could not be guaranteed.

6.7 Mechanical pumping could be used for increasing the rate of discharge to the sea. This is effective for local areas where the flooding is due to limited discharge rates rather than the capacity of the existing system; as is generally the case for the Study Area. However, there is lack of space within Hong Kong from Causeway Bay via Central to Western to build the pumping stations and the associated pipework.

6.8 The flood proofing techniques involve relocating existing structures from flood plain to a flood-free area, raising the existing building levels above the maximum expected flood level, constructing small bunds and walls to enclose individual buildings or small clusters from flooding, installing watertight barrier or closures at the access or exterior doors as dry flood proofing measure or simply altering and re-organizing space for most susceptible items at a less damageable locations to reduce flood damage. However, safety could only be assured for a certain shallow depth and clean up cost would be presented for this option. Hence this option will not be adopted in the Study Area.

6.9 Assessment of the options for Hong Kong Island has demonstrated that diversion of the flood flows through a tunnel is the preferred option as it effectively deals with the large volumes of water whilst minimizing the impact on the property, people and the environment. Limited improvements to urban drainage have been recommended to deal with the most problematic flood prone areas.

6.10 Having regard that the minimum hydraulic capacity requirement of the drainage tunnel will vary along the section of tunnel, the optimum size of the tunnel is selected. The upstream section of the tunnel is 6.25m in diameter from Tai Hang Road to Wan Chai Gap while the downstream section is 7.25m in diameter from Wan Chai Gap to Sandy Bay. This will substantially reduce the amount of C&D materials generated from the excavation of tunnel.

Options of Construction Techniques

Main Tunnel Construction

6.11 Tunnel boring machines (TBM) will operate from the Eastern and Western portals to form the tunnel. Spoil will be removed from the portals and temporarily stored in works areas at the portals prior to disposal off-site. There will be intermediate construction sites in the urban area where inlet structures will be constructed. The resultant size of the excavated rock is around $40cm^3$. Since there will be no significant amount of ground improvement works, the content of foaming agent, if any, in the excavated rock should be minimal.

6.12 TBM is commonly used for the excavation of longer tunnels. The advantages of excavation by TBM, compared with alternative methods for rock excavation, are high production rates, a controlled excavation profile, low vibration and noise generated. Given the length of the main tunnel, the unit cost for excavation using a TBM is comparatively favorable over other methods of excavation. TBM construction is therefore proposed for the main tunnel excavation.

6.13 A number of other construction methods have been considered including drill and blast, chemical blasting, and mechanical and non-explosive systems.

6.14 Excavation by blasting is not a continuous operation and consequently has lower production rates than TBM excavation. Moreover, blasting results in greater vibration, dust and noise than TBM excavation. In view of the above, drilling and blasting will not be adopted for excavation of main tunnel.

6.15 Using chemical explosives is subject to the same restrictions as conventional blasting. The cost of the chemical explosives is greater and the blast cycle takes longer than that for conventional blasting. For the above reasons, the use of chemical blasting for the construction of tunnel is considered not suitable.

6.16 Mechanical and non-explosive systems are generally more expensive than TBM excavation. Production rates are also lower than blasting. Hence, it is unlikely to employ these methods for excavation of main tunnel.

Adit Tunnel Construction

6.17 Drill and blast is commonly used for excavation of hard rock tunnels which is small in size and short in length. It is relative cheap method of construction when compared with TBM excavation. This method is also less restricted by site condition for equipment set-up. Drill and blast is therefore proposed for the adit excavation.

6.18 As mentioned above, given the short length of adit (within hundreds of meters), the adit construction by TBM would be comparatively more expensive. In addition, the restricted site condition render difficult set-up arrangements and long time required for assembly. It is therefore considered unlikely that these will be constructed using TBMs.

6.19 Mechanical and non-explosive systems are more expensive and time consuming than drill and blast method. Hence, it is unlikely to employ these methods for excavation of adit.

Options of Tunnel Alignments

6.20 In choosing the most suitable tunnel alignment, seven tunnel alignments (i.e. Options 1, 3, 9, 11, 21, 23 and 29) running from a tunnel portal close to the site of the Haw Par Mansion in Tai Hang and following a westward route beneath Hong Kong Island to a discharge portal at the west end of Hong Kong Island were identified. Intakes were identified on drainage paths that intersect with the alignment where flows are intercepted and directed to the tunnel. The layout of the seven tunnel alignments are shown in **Annex 3**.

6.21 Option 1 is based on the alignment recommended in the PPFS but with the sharp bends removed and replaced with smooth curves feasible for tunneling using TBM.

6.22 The alignment for Option 3 is similar to that for Option 1 except the outlet is situated at the headland between south of Sandy Bay and north of Telegraph Bay next to Cyberport.

6.23 The horizontal alignment of Option 9 has been aligned to avoid encroachment into private lots and with allowance for construction tolerance.

6.24 The alignment of Option 11 is similar to that for Option 9 except the segment of alignment near Queen Mary Hospital in the Pok Fu Lam area which has a larger radius bends.

6.25 The horizontal alignment of Option 21 has been aligned to avoid encroachment into private lots and with allowance for minimal protection zone of one tunnel diameter from private lots wherever possible at either side of the tunnel 3.

6.26 The alignment of Option 23 is similar to that for Option 21 except the segment of alignment near Queen Mary Hospital in the Pok Fu Lam which has a larger radius bends.

6.27 The horizontal alignment of Option 29 is aligned to avoid encroachment into private lots and with allowance for maximal protection zone of 100m from the tunnel center line to private lots wherever possible.

6.28 The seven options were compared and evaluated in the following aspects:

- Drainage performance
- Engineering

- Planning and Land Matters
- Environmental Issues
- Implementation Programme
- Cost
- Public Views
- Overall Project Risk

6.29 The estimated volume of C&D materials to be excavated for the 7 alignments is listed in Table E1.

Table E1
Estimated Quantities of C&D Material Generated

	Option 1	Option 3	Option 9	Option 11	Option 21	Option 23	Option 29
Generated Volume (m^3)							
Rock	624,373	640,379	557,568	526,404	560,551	532,898	520,549
Soft Material	2,295	2,454	1,393	1,410	1,393	1,415	1,491
Total	626,668	642,833	558,961	527,814	561,944	534,313	**522,040**

6.30 Option 29 is adopted because of the following reasons:

- Better ground conditions with favourable permeability would be encountered
- Access available for outlet at Cyberport (at grade from an existing DSD access road)
- No major existing utilities and facilities conflict with the proposed tunnel and intake shafts.
- No encroachment into private lots with the largest protection zone
- No need for creation of Drainage Tunnel (Statutory Easements) Ordinance
- Less interface with the planned projects
- Minimum potential construction noise and fugitive dust impacts to the residential units.
- Can be built in compliance with the timeframe mentioned in the Brief
- Attract least public comment and objections
- Least overall project risk
- Least amount of C&D materials generated

7 MANAGEMENT OF C&D MATERIAL

7.1 Construction activities include excavation with spoil generated and site formation at proposed drainage tunnel. An initial estimate of total volume of excavated material likely to be generated from the construction works is given in Table E2.

Table E2
Estimated Total Quantity of C&D Material Generated during the Construction of TBM Tunnel, Intake Shafts and Adits

Works Item	Expected Main Excavation Period	Non-Inert C&D Materials A (m^3)	Inert C&D Material			Total, A+B+C+D	Material per month
			Soft Materials B (m^3)	Grade II or above rock, C (m^3)	Grade III or below rock, D (m^3)		
TBM Tunnel	Early Jun 08 to Mid Aug 10 (26.5 Months)	2,035	0	476,382	0	478,417	18,053
Intake Shafts and adits	End Aug 08 to Early June 11 (33 months)	700	1,491	38,667	5,500	46,358	1,405
TOTAL		2,735	1,491	515,049	5,500	**524,775**	

Note : (B+C+D=522,040) equals to the inert C&D materials generated as presented in Table E1 under Option 29

7.2 Approximate 1,300m³ inert C&D material will be reused for landscaping works of the drainage tunnel project and approximate 520,740 (=524,775-1,300-2,735) m³ will be transported off site for public fill or reuse on other projects.

7.3 Ways to minimize the generation of C&D material on site

- Well defined programming of works,
- Good site management to minimize over ordering and cross contamination,
- Use of metal formwork,
- Use of excavated material for earthfilling as far as possible,
- Use of excavated soft material for landscaping works as far as possible,
- Use precast units formed off-site to minimise the amount of C&D materials generated on site,
- Examine and approve the types of chemicals to be used to ensure the generation of chemical wastes would be minimized, and

7.4 Ways to maximize the reuse of inert C&D material including soil or rock on site

- Excavated soil and rock generated from site should be reused within the site as far as possible.
- Sorting should be carried out on site and separate into C&D material into public fill and C&D waste and sorting of C&D material by category to facilitate reuse/recycling/return.
- Good condition timber should be reused for several times
- Remaining reusable wooden material shall be sorted and used at other construction sites by the same contractor or sold to other construction sites
- Contractor should reuse or recycle construction/demolition waste with recyclable values such as reinforcement bars, steel mesh etc. These wastes should either be

reused on site or collected by outside licensed waste recycling agents.

7.5 Ways to maximize the use of recycled C&D material

- Dry concrete waste will be sorted out from other wastes and recycled at recycling plant at Tuen Mun Area 38 to form aggregates for road sub-base.
- Paper/cardboard, metal, others (e.g. plastic, foam board etc) should be collected and delivered to local recycling factories.

7.6 Hong Kong Government is actively discussing with the State Administration of the PRC the implementation details of beneficial reuse of public fill from Hong Kong in Mainland reclamation projects. These discussions are presently ongoing.

7.7 Under the contract, the contractor will be required to minimize the generation of C&D material and reuse it on site through the following:-

(a) to plan in the design and construction, methods to minimize the generation of C&D material;
(b) to submit a Waste Management Plan (WMP) in accordance with Environment Transport and Works Bureau Technical Circular (ETWBTC) No. 15/2003 or any superseding circular(s);
(c) to reuse recycled aggregates in accordance with ETWBTC No. 12/2002 or any superseding circular(s);
(d) to observe the requirements of the Trip-Ticket System, stipulated in ETWBTC No. 12/2004 or any superseding circular(s), for disposal of C&D material;
(e) to incorporate a Waste Management System into the WMP for effective management and control of C&D materials to avoid/reduce/minimize the generation of C&D material during construction.

7.8 For C&D waste, the contractor will be required to properly sort into inert C&D materials, metals, timber and other non-inert C&D waste in the workplace to prevent cross-contamination. To meet the proposed Construction Waste Disposal Charging Scheme (being studied by the HKSAR), each load of construction waste delivered to landfill for disposal must not contain more than 50% by weight of inert construction waste and each load of construction waste delivered to a public fill reception facility for disposal must consist entirely of inert construction waste.

7.9 In addition, DSD will conduct site inspection to monitor the contractors' performance in the implementation of the WMP and other relevant specified requirements.

8 CONCLUSION

8.1 The selected tunnel size and alignment will generate the minimum excavated material in comparison with other option alignments.

8.2 It is estimated that about 524,775 m^3 of C&D material will be generated by the project as follows:-

Table E3
Estimated Disposal Locations

Type		Reuse on site (m^3)	Dispose at land fill (m^3)	Dispose at public fill outlet facility (m^3)	Total generated (m^3)
Non-Inert C&D Materials		0	2,735	0	2,735
Inert C&D Materials	Soft Material	1,300	0	191	1,491
	Grade II or above rock	0	0	515,049	515,049
	Grade III or below rock	0	0	5,500	5,500
Total		**1,300**	**2,735**	**520,740**	**524,775**

8.3 If appropriate management measures are implemented properly during the handling, collection and disposal of C&D material, the residual environmental impacts would be reduced to acceptable levels.

8.4 This C&DMMP summarize the expected quantities of gross and surplus wastes likely to arise from the implementation of the Project and feasible ways to minimize, re-use, recycle and appropriately dispose surplus C&D materials.

8.5 The management measures to be adopted for C&D materials can be enforced by incorporating them into a waste management plan as part of the contract document. Environmental monitoring and audit will be necessary to ensure the proper implementation of proposed measures during the construction phase of the Project.

9 RECOMMENDATION

9.1 In accordance with the requirements stipulated in the ETWB TCW No. 33/2002, it is recommended that Project Office and the supervising Consultant of this Project should monitor the implementation of this C&DMMP and prepare half yearly status report and submit to Public Fill committee (PFC) for their information. The requirements of the status report are detailed in the Technical Circular.

9.2 It is recommended that this C&DMMP should be reviewed regularly by both the Project Office, the supervising Consultant, and the Contractor(s) of the Project, and any necessary amendment and updates should be recorded properly.

9.3 The Contractor will be provided with information from the C&DMMP in order to facilitate them in the preparation of the Waste Management Plan, which is required under the *Environmental, Transport and Works Bureau Technical Circular (Works)* No. 15/2003 – *Waste Management on Construction Sites*. As part of the Waste Management Plan, the Contractor shall establish a mechanism to record the quantities of C&D

materials generated each month and report the quantities to the Project Office. In addition, the Contractor shall provide estimated quantities of C&D materials that will be generated each year from the site. The Contractor is also required to set up disposal recording system as part of the Waster Management Plan by adopting the trip-ticket system as stipulated in ETWB TCW No. 12/2004, in order to ensure proper disposal of C&D materials at designated outlets.

- End -

Annex 1

Layout Plan of Tunnel

Plot Date - 06 SEP 2005

CAD Filename = p:\drain-water\common\drain-common\hkwest\sketch\s120a.dgn

LEGEND :

— — — ·	PROPOSED MAIN TUNNEL ALIGNMENT
———	PROPOSED ADITS ALIGNMENT
W3	INTAKE SHAFT

Revision	Date	Description	Initial
A	09/05	INCORPORATED COMMENTS FROM VARIOUS PARTIES	TY

	Designed	Checked	Drawn	Checked
Initial	TY	LMF	JT	LMF
Date	11/04	11/04	11/04	11/04

Approved

Agreement no.

CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

OUTLINE LAYOUT PLAN

Drawing no.

382403/S/120A

Scale

1:12500 A1
1:25000 A3

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THE GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

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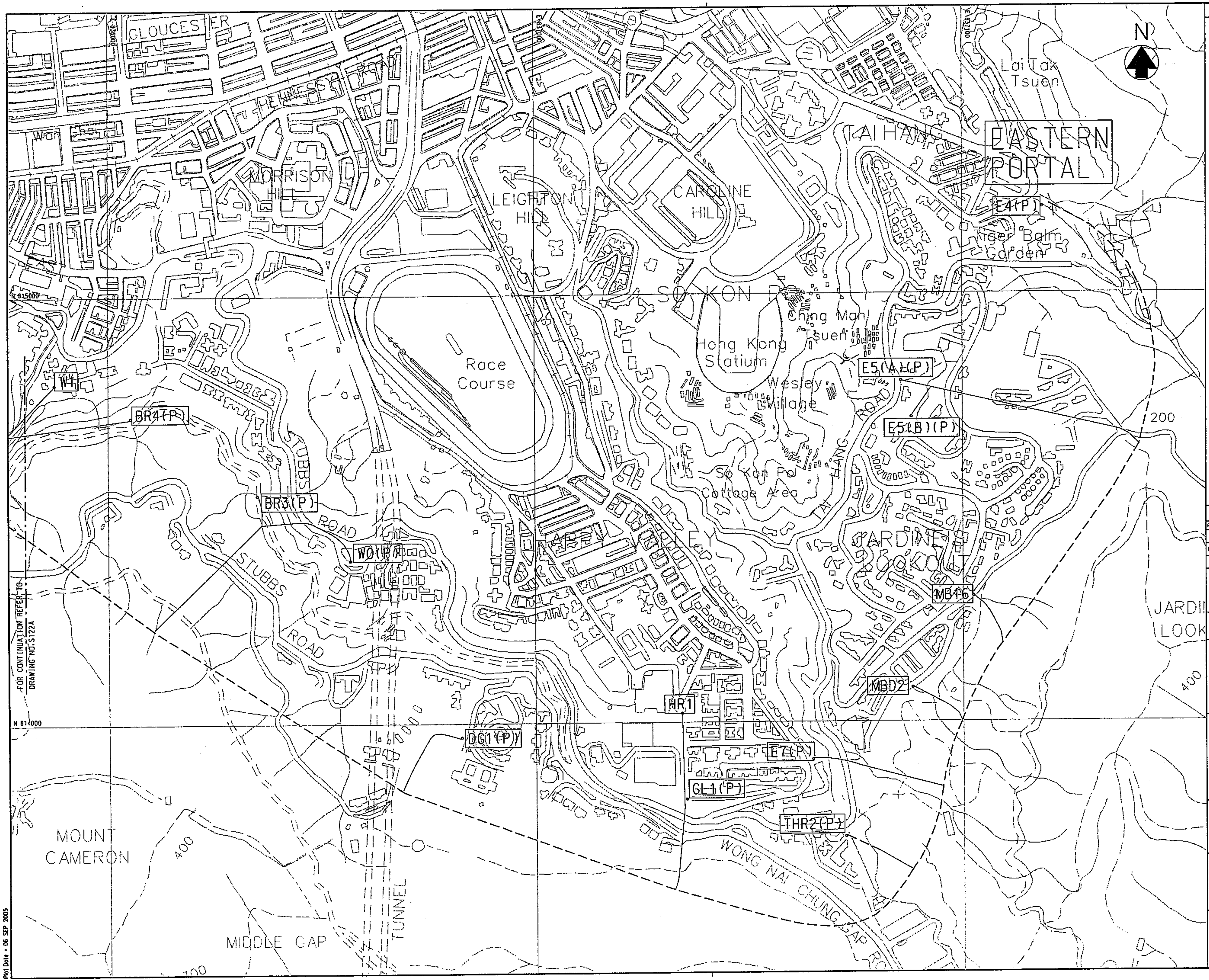

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IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT PLAN OF
HONG KONG WEST
DRAINAGE TUNNEL
(SHEET 1 OF 3)

Drawing no.

382403/S/121A

Scale

1:4000 A1

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DRAINAGE SERVICES DEPARTMENT

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Plot Date - 06 SEP 2005

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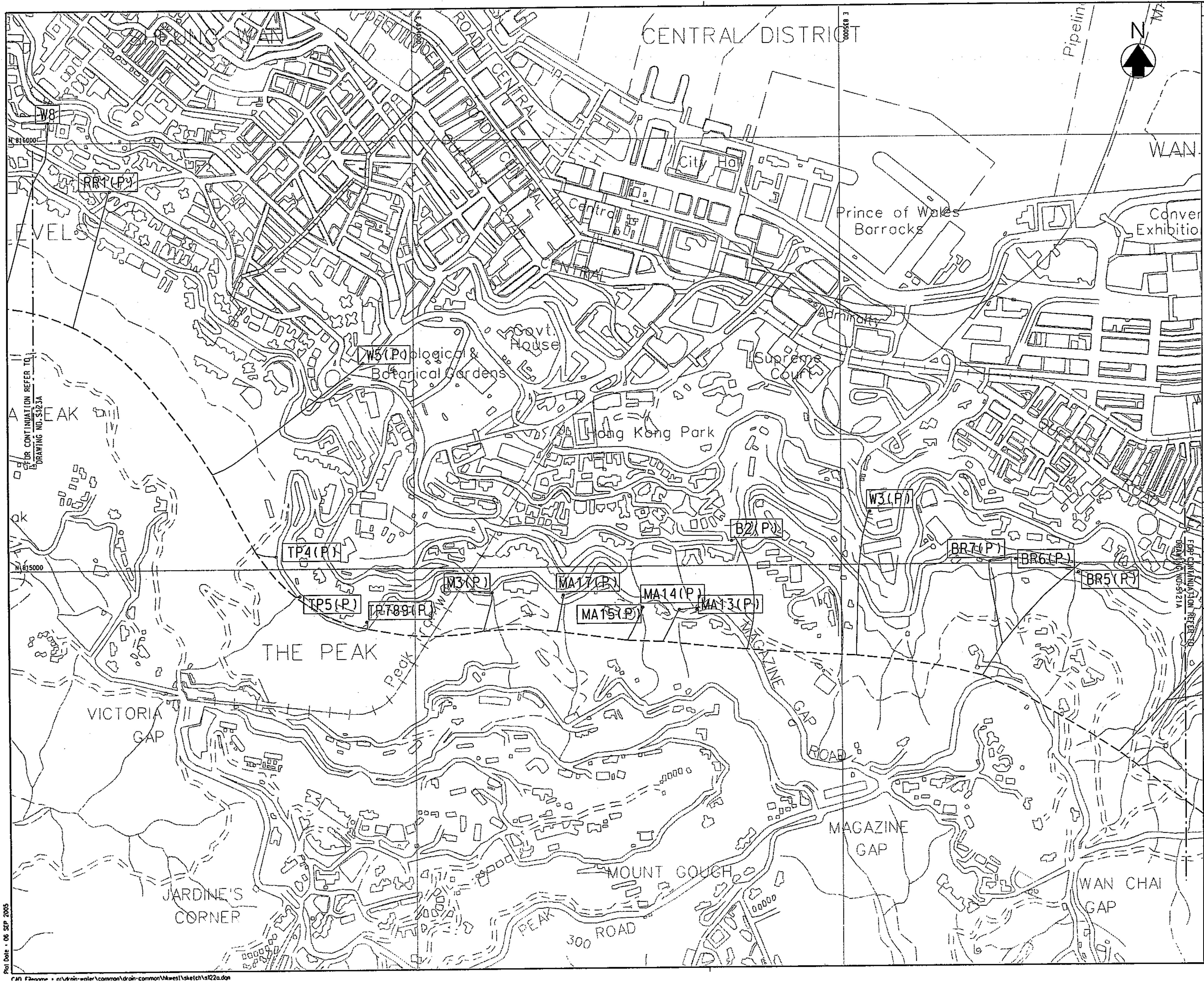

LEGEND :

- — — — · PROPOSED MAIN TUNNEL ALIGNMENT
- ——— PROPOSED ADITS ALIGNMENT
- W3 INTAKE SHAFT

Revision	Date	Description	Initial
A	09/05	INCORPORATED COMMENTS FROM VARIOUS PARTIES	TY

	Designed	Checked	Drawn	Checked
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Date	11/04	11/04	11/04	11/04

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IMPROVEMENT – INVESTIGATION

Drawing title

LAYOUT PLAN OF HONG KONG WEST DRAINAGE TUNNEL (SHEET 2 OF 3)

Drawing no. 382403/S/122A

Scale 1:4000 A1

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博威工程顧問有限公司

Plot Date : 06 SEP 2005

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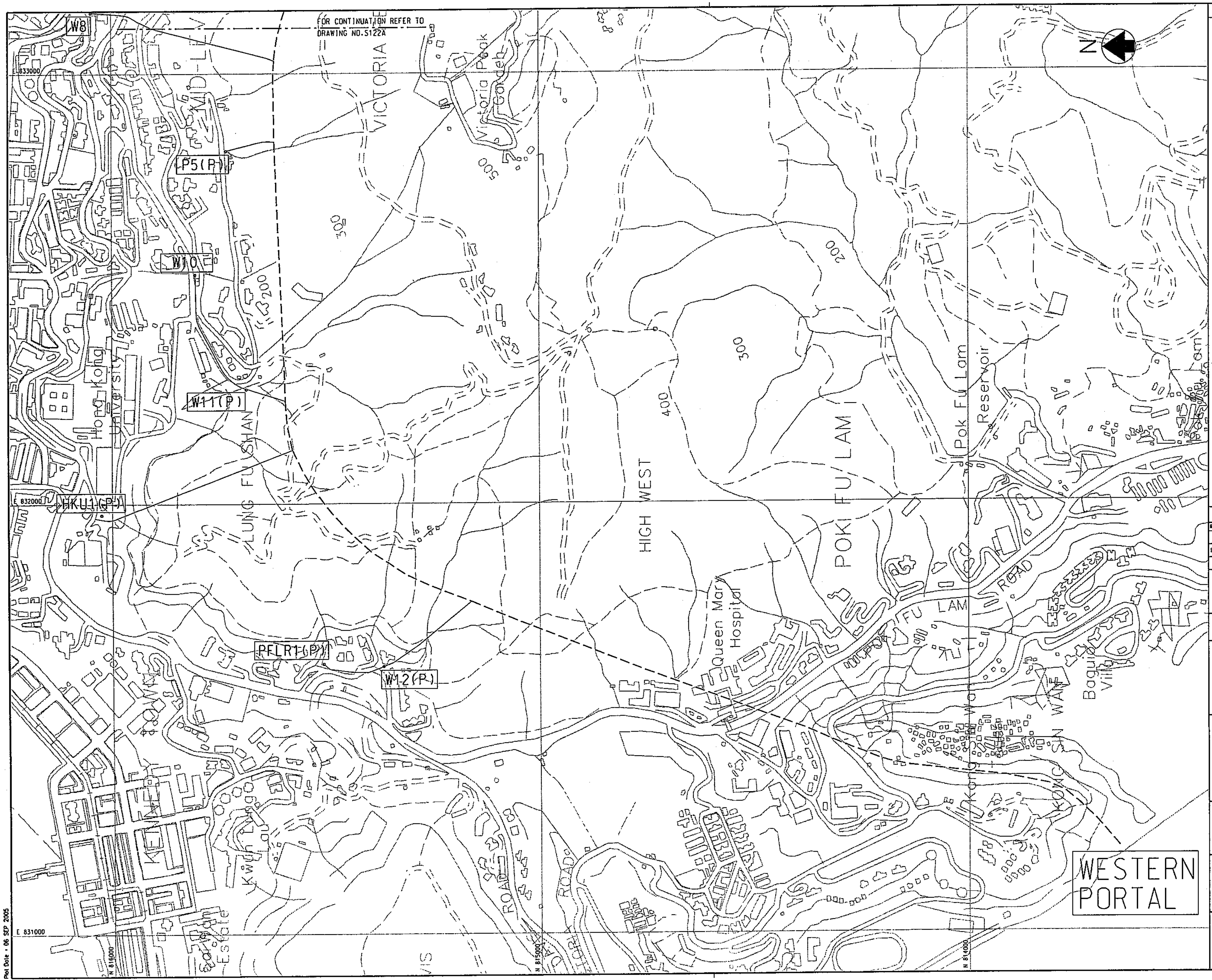

LEGEND :

- — — — · PROPOSED MAIN TUNNEL ALIGNMENT
- ——— PROPOSED ADITS ALIGNMENT
- W3 INTAKE SHAFT

Revision	Date	Description	Initial
A	09/05	INCORPORATED COMMENTS FROM VARIOUS PARTIES	JT

	Designed	Checked	Drawn	Checked
Initial	CHH	LMF	JT	LMF
Date	11 /04	11 /04	11 /04	11 /04

Approved

Agreement no.
CE 25/2002 (DS)

Contract title
DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title
LAYOUT PLAN OF
HONG KONG WEST
DRAINAGE TUNNEL
(SHEET 3 OF 3)

Drawing no.
382403/S/123A

Scale
1:4000 A1

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DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

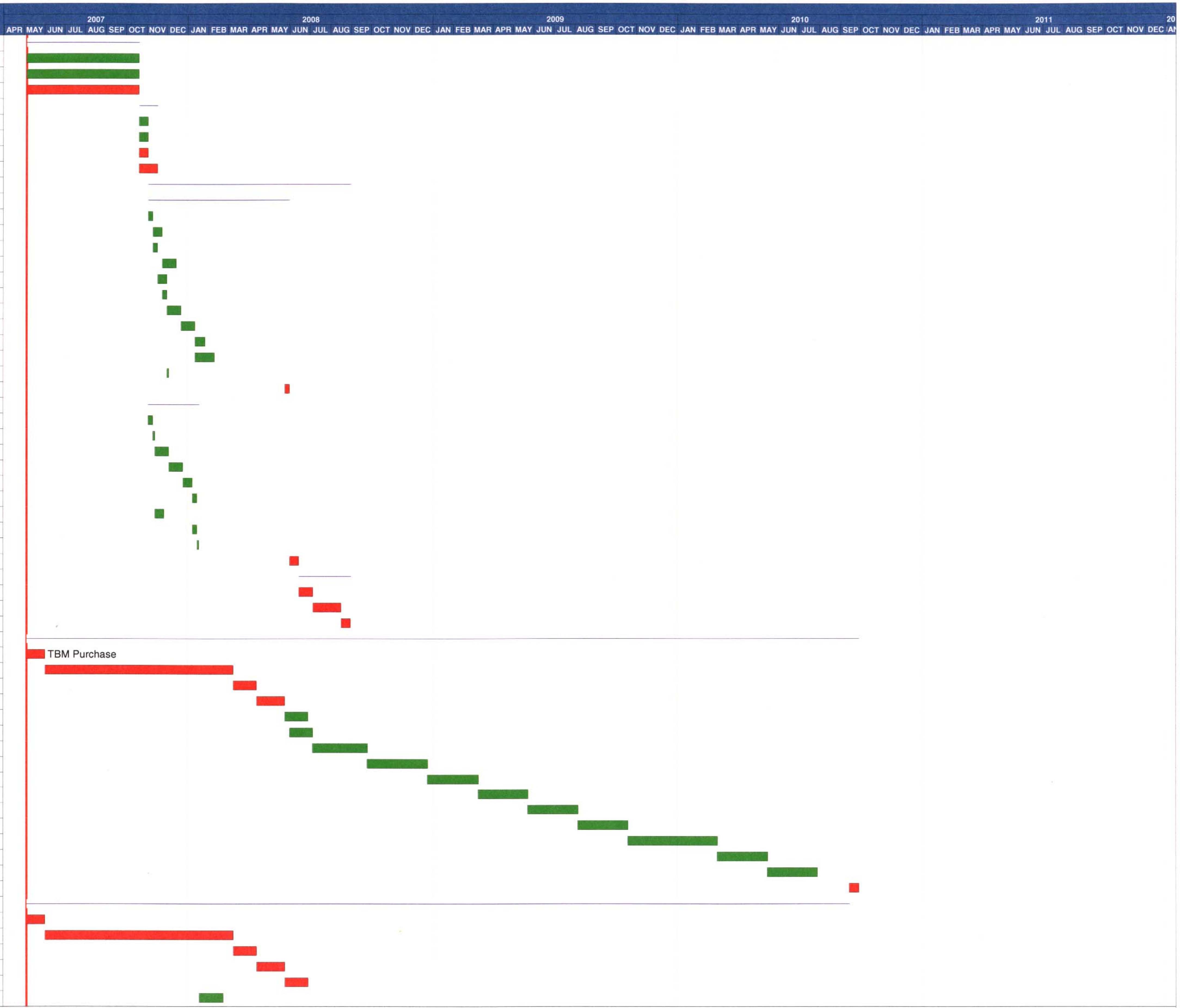
Plot Date - 06 SEP 2005

CAD Filename - o:\drain-water\common\drain-common\hkwest\sketch\s123a.dgn

Annex 2

Construction Program

Activity ID	Description	Rem Dur	Early Start	Early Finish
0001	**Permits**	**168 ***	**05 MAY 07**	**20 OCT 07**
0002	Blasting Permit	168	05 MAY 07	20 OCT 07
0003	Marine Permit	168	05 MAY 07	20 OCT 07
0004	EPD noise, dust and vibration	168	05 MAY 07	20 OCT 07
0005	**Site Possession**	**28 ***	**20 OCT 07**	**17 NOV 07**
0006	Eastern Portal	14	20 OCT 07	03 NOV 07
0007	Western Portal	14	20 OCT 07	03 NOV 07
0008	Site Compound	14	20 OCT 07	03 NOV 07
0009	Intake Locations	28	20 OCT 07	17 NOV 07
0010	**Site Establishment**	**301 ***	**03 NOV 07**	**31 AUG 08**
0011	Eastern Portal	210 *	03 NOV 07	01 JUN 08
0022	Erect hoarding & protect trees	7	03 NOV 07	10 NOV 07
0192	Concrete staging area	14	10 NOV 07	24 NOV 07
0202	Clear Site (vegetation, buildings, etc)	7	10 NOV 07	17 NOV 07
0212	Construct Pile Caps	21	24 NOV 07	15 DEC 07
0222	Slope stabilisation (rock bolts)	14	17 NOV 07	01 DEC 07
0242	Establish cabins	7	24 NOV 07	01 DEC 07
0232	Excavate slope / channel diversion	21	01 DEC 07	22 DEC 07
0252	Drill and blast channel	21	22 DEC 07	12 JAN 08
0262	Drill and blast adit	15	12 JAN 08	26 JAN 08
0272	Construct spillway and stilling basin	28	12 JAN 08	10 FEB 08
0282	Bring in rails	3	01 DEC 07	04 DEC 07
0292	Complete staging area / noise enclosure	7	25 MAY 08	01 JUN 08
0012	Western Portal	76 *	03 NOV 07	18 JAN 08
0263	Erect hoarding	7	03 NOV 07	10 NOV 07
0273	Demolish wall / establish haul road	3	10 NOV 07	13 NOV 07
0283	Construct pier	21	13 NOV 07	04 DEC 07
0293	Excavate site to tunnel formation level	21	04 DEC 07	25 DEC 07
0303	Concrete staging area	14	25 DEC 07	08 JAN 08
0313	Establish cabins	7	08 JAN 08	15 JAN 08
0323	Slope stabilisation (rock bolts)	14	13 NOV 07	27 NOV 07
0333	Complete staging area	7	08 JAN 08	15 JAN 08
0343	Bring in rails	3	15 JAN 08	18 JAN 08
0013	W0, W1, W3, HR1	14	01 JUN 08	15 JUN 08
0014	Intake Shafts	77 *	15 JUN 08	31 AUG 08
0155	Excavate channel	21	15 JUN 08	06 JUL 08
0165	Construct channel	42	06 JUL 08	17 AUG 08
0175	Construct Rack support / control orifice	14	17 AUG 08	31 AUG 08
0015	**TBM - 7m dia**	**1181 ***	**05 MAY 07**	**28 SEP 10**
0016	Place order	28	05 MAY 07	02 JUN 07
0017	Build TBM	280	02 JUN 07	09 MAR 08
0018	Transportation	35	09 MAR 08	13 APR 08
0020	Assemble	42	13 APR 08	25 MAY 08
0021	Commission	35	25 MAY 08	29 JUN 08
0112	Starter Tunnel - Ch 0 - 50m	35	01 JUN 08	05 JUL 08
0153	Construction - Eastern Ch 50 - 500	82	05 JUL 08	25 SEP 08
0113	Construction - Eastern Ch 500 - 1000	91	25 SEP 08	24 DEC 08
0123	Construction - Eastern Ch 1000 - 1500	74	24 DEC 08	10 MAR 09
0133	Construction - Eastern Ch 1500 - 2000	74	10 MAR 09	23 MAY 09
0143	Construction - Eastern Ch 2000 - 2500	74	23 MAY 09	06 AUG 09
0163	Construction - Eastern Ch 2500 - 3000	74	06 AUG 09	19 OCT 09
0173	Construction - Eastern Ch 3000 - 3500	74	19 OCT 09	01 MAR 10
0183	Construction - Eastern Ch 3500 - 4000	74	01 MAR 10	15 MAY 10
0253	Construction - Eastern Ch 4000 - 4500	74	15 MAY 10	28 JUL 10
0023	Removal	14	14 SEP 10	28 SEP 10
0114	**TBM - 8m dia**	**1167 ***	**05 MAY 07**	**14 SEP 10**
0124	Place order	28	05 MAY 07	02 JUN 07
0134	Build TBM	280	02 JUN 07	09 MAR 08
0144	Transport to Site	35	09 MAR 08	13 APR 08
0154	Assemble	42	13 APR 08	25 MAY 08
0164	Commission	35	25 MAY 08	29 JUN 08
0174	Starter Tunnel - Ch 10500 - 10450	35	18 JAN 08	22 FEB 08



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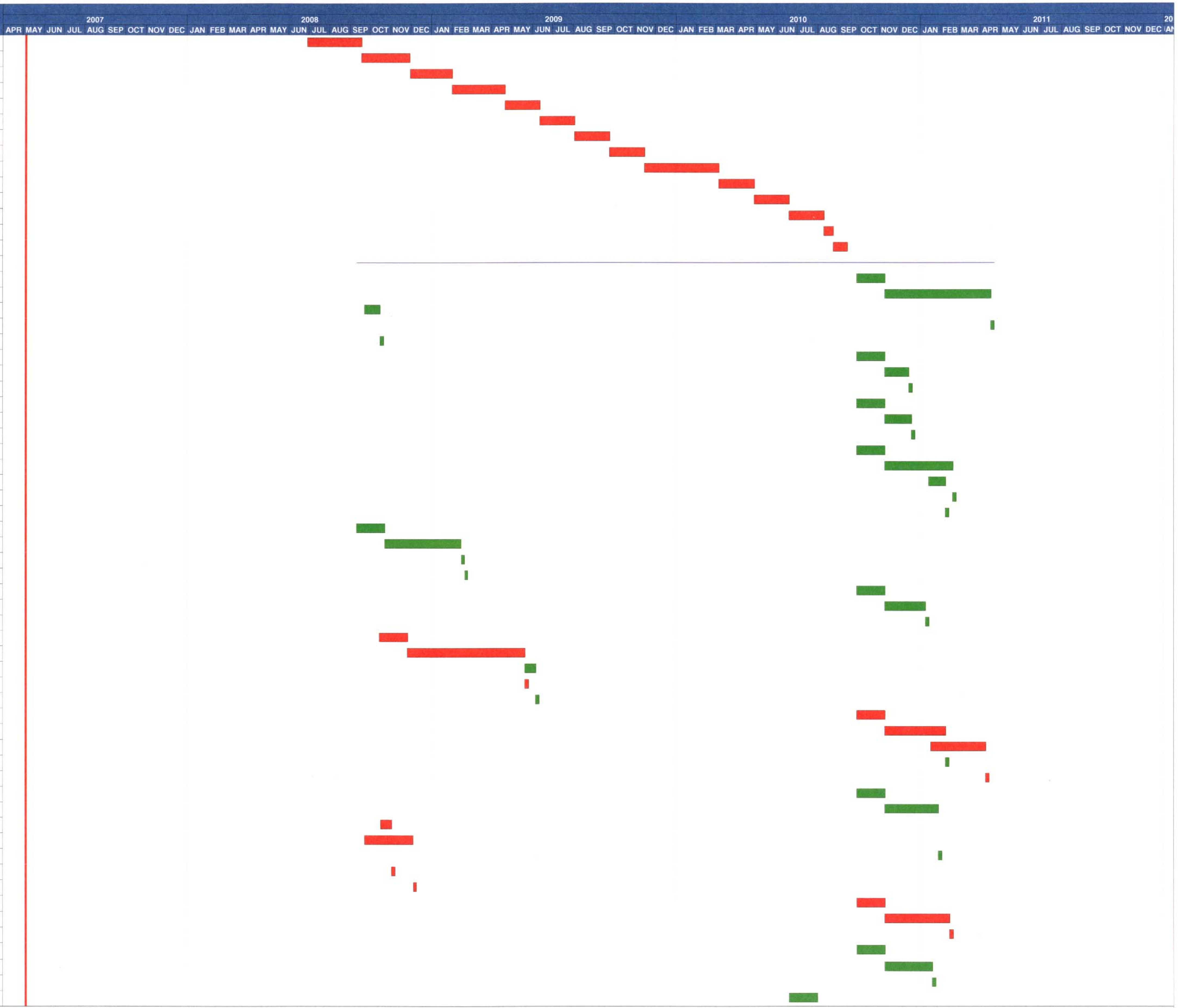
DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND -
HONG KONG WEST DRAINAGE TUNNEL

🟩 Early bar
🟦 Progress bar
🟥 Critical bar
— Summary bar
▲ Progress point
▼ Critical point
▼ Summary point
◆ Start milestone point
◆ Finish milestone point

Activity ID	Description	Rem Dur	Early Start	Early Finish
0184	Construction - Western Ch 10450 - 10000	82	29 JUN 08	18 SEP 08
0194	Construction - Western Ch 10000 - 9600	72	18 SEP 08	30 NOV 08
0204	Construction - Western Ch 9600 - 9250	63	30 NOV 08	01 FEB 09
0214	Construction - Western Ch 9250 - 8500	78	01 FEB 09	21 APR 09
0224	Construction - Western Ch 8500 - 8000	52	21 APR 09	12 JUN 09
0304	Construction - Western Ch 8000 - 7500	52	12 JUN 09	03 AUG 09
0314	Construction - Western Ch 7500 - 7000	52	03 AUG 09	24 SEP 09
0234	Construction - Western Ch 7000 - 6500	52	24 SEP 09	15 NOV 09
0244	Construction - Western Ch 6500 - 6000	52	15 NOV 09	06 MAR 10
0254	Construction - Western Ch 6000 - 5500	52	06 MAR 10	28 APR 10
0264	Construction - Western Ch 5500 - 5000	52	28 APR 10	19 JUN 10
0274	Construction - Western Ch 5000 - 4500	52	19 JUN 10	10 AUG 10
0284	Dis-assemble cutter head	14	10 AUG 10	24 AUG 10
0294	Remove TBM	21	24 AUG 10	14 SEP 10
0024	Adit Construction	892 *	11 SEP 08	22 APR 11
0025	Adit E5 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0116	Adit E5 - drill and blast	158	09 NOV 10	17 APR 11
0126	Adit E5 - branch to E5b	22	23 SEP 08	16 OCT 08
0136	Adit E5a - Construct 5m x 5m vent chamber	5	17 APR 11	22 APR 11
0146	Adit E5b - Construct 5m x 5m vent chamber	5	16 OCT 08	21 OCT 08
0026	Adit MB16 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0117	Adit MB16 - drill and blast	36	09 NOV 10	15 DEC 10
0127	Adit MB16 - Construct 5m x 5m vent	5	15 DEC 10	20 DEC 10
0027	Adit MBD2 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0118	Adit MBD2 - drill and blast	40	09 NOV 10	19 DEC 10
0128	Adit MBD2 - Construct 5m x 5m vent	5	19 DEC 10	24 DEC 10
0028	Adit E7 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0109	Adit E7 - drill and blast	101	09 NOV 10	19 FEB 11
0119	Adit E7 - branch to THR2	24	14 JAN 11	08 FEB 11
0129	Adit E7 - Construct 5m x 5m vent chamber	5	19 FEB 11	24 FEB 11
0139	Adit E7 - THR2 5m x 5m vent chamber	5	08 FEB 11	13 FEB 11
0029	Adit HR1 - mobilisation and heading	42	11 SEP 08	23 OCT 08
0110	Adit HR1 - drill and blast	114	23 OCT 08	15 FEB 09
0120	Adit HR1 - Construct 5m x 5m vent	5	15 FEB 09	20 FEB 09
0130	Adit HR1 - GL1 5m x 5m vent chamber	5	20 FEB 09	25 FEB 09
0030	Adit DG1 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0111	Adit DG1 - drill and blast	61	09 NOV 10	09 JAN 11
0121	Adit DG1 - Construct 5m x 5m vent	5	09 JAN 11	14 JAN 11
0031	Adit W0 - mobilisation and heading	42	15 OCT 08	26 NOV 08
0122	Adit W0 - drill and blast	175	26 NOV 08	21 MAY 09
0132	Adit W0 - Branch to BR3	17	21 MAY 09	06 JUN 09
0142	Adit W0 - Construct 5m x 5m vent chamber	5	21 MAY 09	26 MAY 09
0152	Adit W0 - BR3 5m x 5m vent chamber	5	06 JUN 09	11 JUN 09
0032	Adit W1 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0193	Adit W1 - drill and blast	90	09 NOV 10	08 FEB 11
0203	Adit W1 - Branch to BR4	81	17 JAN 11	09 APR 11
0213	Adit W1 - Construct 5m x 5m vent chamber	5	08 FEB 11	13 FEB 11
0223	Adit W1 - BR4 vent chamber	5	09 APR 11	14 APR 11
0033	Adit BR7 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0324	Adit BR7 - drill and blast	81	09 NOV 10	28 JAN 11
0334	Adit BR7 - branch to BR6	15	17 OCT 08	02 NOV 08
0344	Adit BR7 - branch to BR5	72	23 SEP 08	05 DEC 08
0354	Adit BR7 - Construct 5m x 5m vent	5	28 JAN 11	02 FEB 11
0364	Adit BR7 - BR6 vent chamber	5	02 NOV 08	07 NOV 08
0374	Adit BR7 - BR5 vent chamber	5	05 DEC 08	10 DEC 08
0034	Adit W3 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0115	Adit W3 - drill and blast	96	09 NOV 10	14 FEB 11
0125	Adit W3 - Construct 5m x 5m vent chamber	5	14 FEB 11	19 FEB 11
0035	Adit B2 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0156	Adit B2 - drill and blast	71	09 NOV 10	19 JAN 11
0166	Adit B2 - Construct 5m x 5m vent chamber	5	19 JAN 11	24 JAN 11
0036	Adit MA15 - mobilisation and heading	42	19 JUN 10	31 JUL 10



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DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND - HONG KONG WEST DRAINAGE TUNNEL

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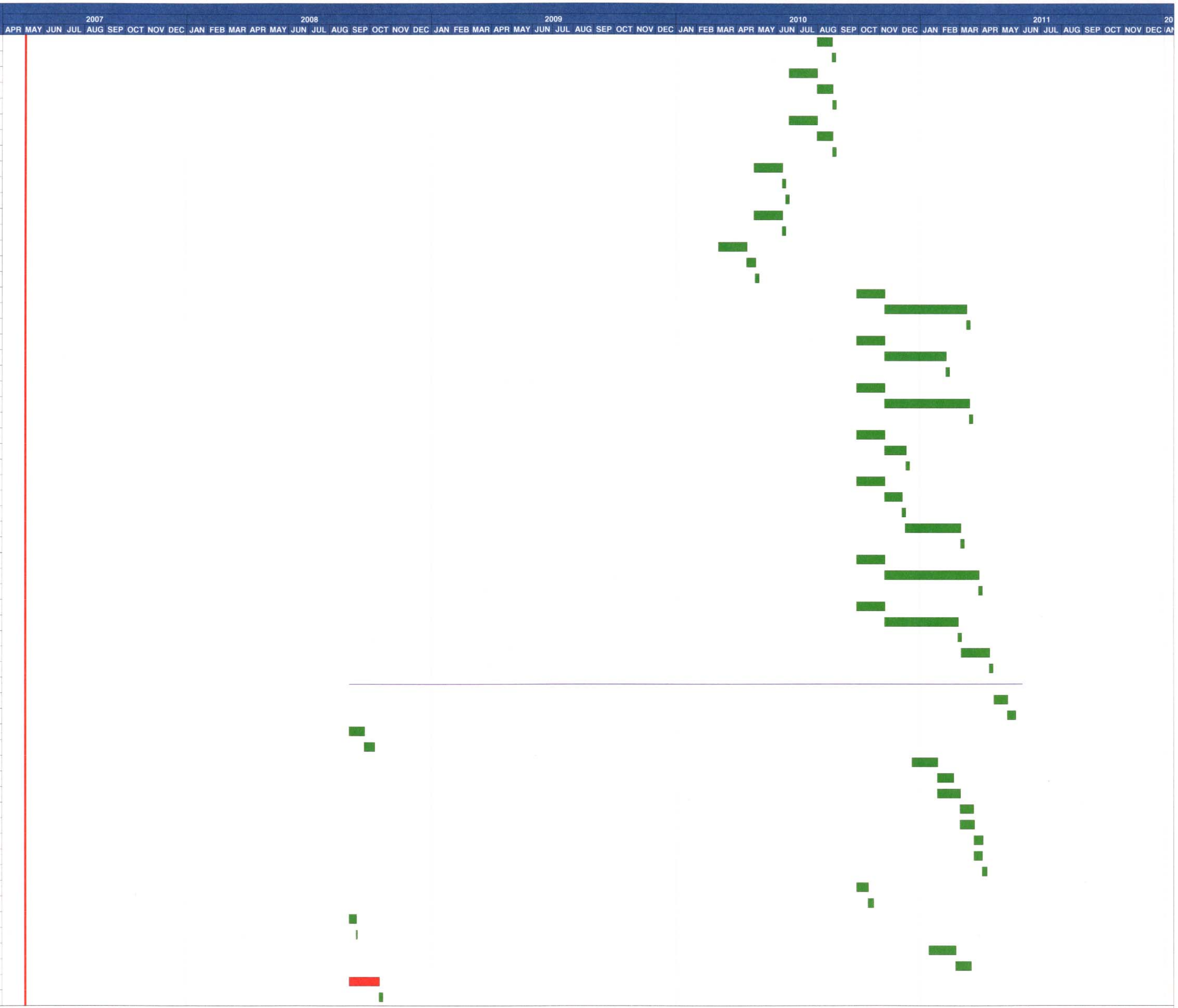
🟦	Progress bar
🟥	Critical bar
—	Summary bar
▲	Progress point
▼	Critical point
▼	Summary point
◆	Start milestone point
◆	Finish milestone point

Activity ID	Description	Rem Dur	Early Start	Early Finish
0137	Adit MA15 - drill and blast	22	31 JUL 10	22 AUG 10
0147	Adit MA15 - construct 5m x 5m vent	5	22 AUG 10	27 AUG 10
0037	Adit MA17 - mobilisation and heading	42	19 JUN 10	31 JUL 10
0138	Adit MA17 - drill and blast	24	31 JUL 10	23 AUG 10
0148	Adit MA17 - construct 5m x 5m vent	5	23 AUG 10	28 AUG 10
0038	Adit M3 - mobilisation and heading	42	19 JUN 10	31 JUL 10
0149	Adit M3 - drill and blast	24	31 JUL 10	23 AUG 10
0159	Adit M3 - construct 5m x 5m vent chamber	5	23 AUG 10	28 AUG 10
0039	Adit TP789 - mobilisation and heading	42	28 APR 10	09 JUN 10
0140	Adit TP789 - drill and blast	6	09 JUN 10	14 JUN 10
0150	Adit TP789 - Construct 5m x 5m vent	5	14 JUN 10	19 JUN 10
0040	Adit TP5 - mobilisation and heading	42	28 APR 10	09 JUN 10
0131	Adit TP5 - Construct 5m x 5m vent chamber	5	09 JUN 10	14 JUN 10
0041	Adit TP4 - mobilisation and heading	42	06 MAR 10	17 APR 10
0172	Adit TP4 - drill and blast	13	17 APR 10	30 APR 10
0182	Adit TP4 - construct 5m x 5m vent chamber	5	30 APR 10	05 MAY 10
0042	Adit W5 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0233	Adit W5 - drill and blast	122	09 NOV 10	12 MAR 11
0243	Adit W5 - construct 5m x 5m vent chamber	5	12 MAR 11	17 MAR 11
0043	Adit RR1 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0384	Adit RR1 - drill and blast	92	09 NOV 10	09 FEB 11
0394	Adit RR1 - construct 5m x 5m vent chamber	5	09 FEB 11	14 FEB 11
0044	Adit W8 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0135	Adit W8 - drill and blast	126	09 NOV 10	16 MAR 11
0145	Adit W8 - construct 5m x 5m vent chamber	5	16 MAR 11	21 MAR 11
0045	Adit P5 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0176	Adit P5 - drill and blast	32	09 NOV 10	11 DEC 10
0186	Adit P5 - construct 5m x 5m vent chamber	5	11 DEC 10	16 DEC 10
0047	Adit W11 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0196	Adit W11 - drill and blast	26	09 NOV 10	05 DEC 10
0206	Adit W11 - Construct 5m x 5m vent	5	05 DEC 10	10 DEC 10
0046	Adit W11 - branch to W10	82	10 DEC 10	03 MAR 11
0157	Adit W11 - W10 vent chamber	5	03 MAR 11	08 MAR 11
0048	Adit HKU1 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0169	Adit HKU1 - drill and blast	140	09 NOV 10	30 MAR 11
0179	Adit HKU1 - construct 5m x 5m vent	5	30 MAR 11	04 APR 11
0049	Adit W12 - mobilisation and heading	42	28 SEP 10	09 NOV 10
0160	Adit W12 - drill and blast	110	09 NOV 10	27 FEB 11
0170	Adit W12 - construct 5m x 5m vent chamber	5	27 FEB 11	04 MAR 11
0180	Adit W12 - branch to PFLR1	42	04 MAR 11	15 APR 11
0190	Adit W12 - PFLR1 vent chamber	5	15 APR 11	20 APR 11
0050	**Shaft Construction**	**945 ***	**31 AUG 08**	**03 JUN 11**
0051	Shaft E5a	20	22 APR 11	12 MAY 11
0162	Shaft E5a lining	12	12 MAY 11	24 MAY 11
0052	Shaft E5b	24	31 AUG 08	23 SEP 08
0353	Shaft E5b lining	15	23 SEP 08	08 OCT 08
0053	Shaft MB16	38	20 DEC 10	27 JAN 11
0404	Shaft MB16 lining	23	27 JAN 11	20 FEB 11
0054	Shaft MBD2	33	27 JAN 11	02 MAR 11
0185	Shaft MBD2 lining	20	02 MAR 11	22 MAR 11
0055	Shaft THR2	21	02 MAR 11	23 MAR 11
0326	Shaft THR2 lining	13	23 MAR 11	05 APR 11
0056	Shaft E7	12	23 MAR 11	04 APR 11
0167	Shaft E7 lining	7	04 APR 11	11 APR 11
0057	Shaft GL1	17	28 SEP 10	15 OCT 10
0168	Shaft GL1 lining	8	15 OCT 10	23 OCT 10
0058	Shaft HR1	11	31 AUG 08	11 SEP 08
0189	Shaft HR1 lining	1	11 SEP 08	12 SEP 08
0059	Shaft DG1	39	14 JAN 11	23 FEB 11
0200	Shaft DG1 lining	24	23 FEB 11	18 MAR 11
0060	Shaft W0	45	31 AUG 08	15 OCT 08
0141	Shaft W0 lining	6	15 OCT 08	21 OCT 08



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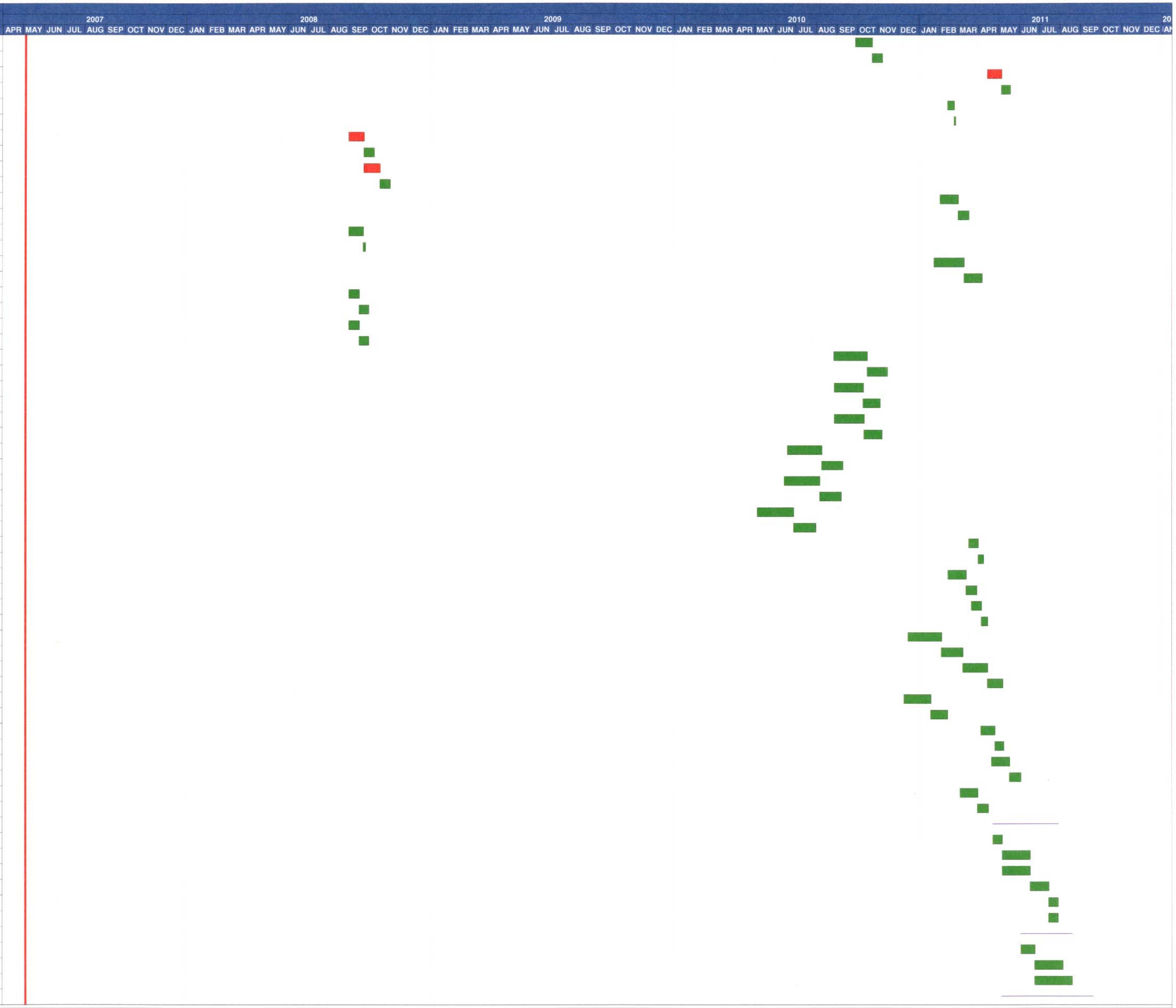
DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND -
HONG KONG WEST DRAINAGE TUNNEL

- 🟩 Early bar
- 🟦 Progress bar
- 🟥 Critical bar
- — Summary bar
- ▲ Progress point
- ▼ Critical point
- ▼ Summary point
- ◆ Start milestone point
- ◆ Finish milestone point

Activity ID	Description	Rem Dur	Early Start	Early Finish
0061	Shaft BR3	25	28 SEP 10	23 OCT 10
0302	Shaft BR3 lining	15	23 OCT 10	07 NOV 10
0062	Shaft BR4	22	14 APR 11	05 MAY 11
0363	Shaft BR4 lining	13	05 MAY 11	18 MAY 11
0063	Shaft W1	10	13 FEB 11	23 FEB 11
0414	Shaft W1 lining	1	23 FEB 11	25 FEB 11
0064	Shaft BR5	24	31 AUG 08	23 SEP 08
0195	Shaft BR5 lining	15	23 SEP 08	08 OCT 08
0065	Shaft BR6	24	23 SEP 08	17 OCT 08
0336	Shaft BR6 lining	15	17 OCT 08	01 NOV 08
0066	Shaft BR7	26	02 FEB 11	01 MAR 11
0177	Shaft BR7 lining	16	01 MAR 11	17 MAR 11
0067	Shaft W3	22	31 AUG 08	22 SEP 08
0178	Shaft W3 lining	3	22 SEP 08	25 SEP 08
0068	Shaft B2	44	24 JAN 11	10 MAR 11
0199	Shaft B2 lining	27	10 MAR 11	06 APR 11
0069	Shaft Ma13	17	31 AUG 08	16 SEP 08
0210	Construct link channel	14	16 SEP 08	30 SEP 08
0070	Shaft Ma14	17	31 AUG 08	16 SEP 08
0151	Construct link channel	14	16 SEP 08	30 SEP 08
0071	Shaft Ma15	50	27 AUG 10	16 OCT 10
0312	Shaft Ma15 lining	30	16 OCT 10	15 NOV 10
0072	Shaft Ma17	42	28 AUG 10	10 OCT 10
0373	Shaft Ma17 lining	26	10 OCT 10	05 NOV 10
0073	Shaft M3	44	28 AUG 10	11 OCT 10
0424	Shaft M3 lining	27	11 OCT 10	07 NOV 10
0074	Shaft TP789	51	19 JUN 10	09 AUG 10
0205	Shaft TP789 lining	31	09 AUG 10	09 SEP 10
0075	Shaft TP5	53	14 JUN 10	06 AUG 10
0346	Shaft TP5 lining	32	06 AUG 10	07 SEP 10
0076	Shaft TP4	54	05 MAY 10	28 JUN 10
0187	Shaft TP4 lining	33	28 JUN 10	31 JUL 10
0077	Shaft W5	14	17 MAR 11	31 MAR 11
0188	Shaft W5 lining	8	31 MAR 11	08 APR 11
0078	Shaft RR1	27	14 FEB 11	13 MAR 11
0209	Shaft RR1 lining	16	13 MAR 11	29 MAR 11
0079	Shaft W8	15	21 MAR 11	05 APR 11
0220	Shaft W8 lining	9	05 APR 11	14 APR 11
0080	Shaft P5	50	16 DEC 10	04 FEB 11
0161	Shaft P5 lining	31	04 FEB 11	08 MAR 11
0081	Shaft W10	37	08 MAR 11	14 APR 11
0322	Shaft W10 lining	23	14 APR 11	07 MAY 11
0082	Shaft W11	40	10 DEC 10	19 JAN 11
0383	Shaft W11 lining	24	19 JAN 11	13 FEB 11
0083	Shaft HKU1	21	04 APR 11	25 APR 11
0434	Shaft HKU1 lining	13	25 APR 11	08 MAY 11
0084	Shaft PFLR1	27	20 APR 11	17 MAY 11
0215	Shaft PFLR1 lining	17	17 MAY 11	03 JUN 11
0085	Shaft W12	26	04 MAR 11	30 MAR 11
0356	Shaft W12 lining	16	30 MAR 11	15 APR 11
0216	Eastern Portal Works	98 *	22 APR 11	29 JUL 11
0226	Remove Staging Area	14	22 APR 11	06 MAY 11
0236	Construct access/portal ramp	42	06 MAY 11	17 JUN 11
0276	Construct emergency spill weir	42	06 MAY 11	17 JUN 11
0246	Construct access to stilling basin	28	17 JUN 11	15 JUL 11
0256	Cladding of walls	14	15 JUL 11	29 JUL 11
0266	Tree planting	14	15 JUL 11	29 JUL 11
0286	Intakes Completion	77 *	03 JUN 11	19 AUG 11
0296	Construct vortex walls	21	03 JUN 11	24 JUN 11
0306	Construct vortex floor	42	24 JUN 11	05 AUG 11
0316	Construct link channel	56	24 JUN 11	19 AUG 11
0086	Western Portal Spillway and Marine	137 *	05 MAY 11	19 SEP 11



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DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND - HONG KONG WEST DRAINAGE TUNNEL

🟩 Early bar
🟦 Progress bar
🟥 Critical bar
— Summary bar
▲ Progress point
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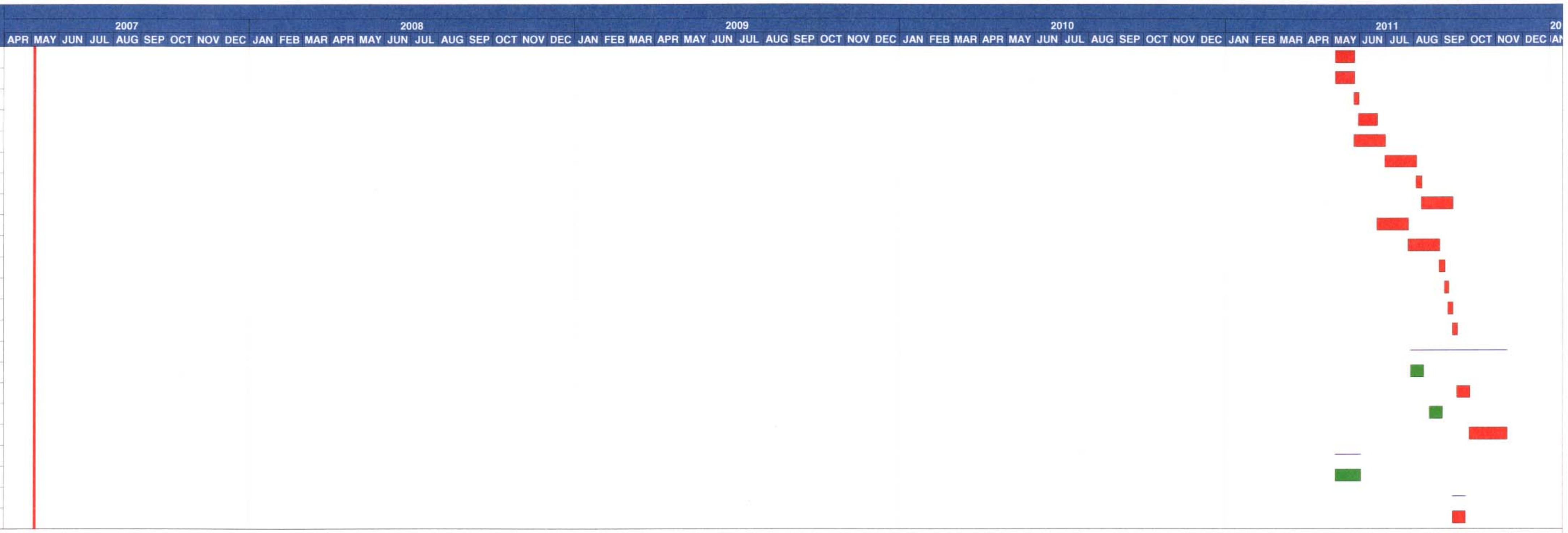
◆ Start milestone point
◆ Finish milestone point

Activity ID	Description	Rem Dur	Early Start	Early Finish
0087	Excavation of Spillway	21	05 MAY 11	26 MAY 11
0158	Remove Temporary Pier	21	05 MAY 11	26 MAY 11
0088	Cofferdam	5	26 MAY 11	31 MAY 11
0089	Excavation of Stilling Basin	21	31 MAY 11	21 JUN 11
0090	Concreting of Spillway Base	35	26 MAY 11	30 JUN 11
0091	Concreting of Spillway Walls	35	30 JUN 11	04 AUG 11
0092	Backfill	6	04 AUG 11	10 AUG 11
0093	Concreting of Spillway Soffit	35	10 AUG 11	14 SEP 11
0094	Concreting of Stilling Basin Base	35	21 JUN 11	26 JUL 11
0095	Concreting of Stillng Basin Walls	35	26 JUL 11	30 AUG 11
0096	Backfilling	6	30 AUG 11	05 SEP 11
0097	Remove Cofferdam	4	05 SEP 11	09 SEP 11
0098	Rock Armour	5	09 SEP 11	14 SEP 11
0099	Construct Roadway	5	14 SEP 11	19 SEP 11
0100	**Landscaping and Defects Correction**	**108 ***	**29 JUL 11**	**14 NOV 11**
0101	Eastern Portal	14	29 JUL 11	12 AUG 11
0102	Western Portal	14	19 SEP 11	03 OCT 11
0103	Intakes	14	19 AUG 11	02 SEP 11
0104	Defects Correction - Civils	42	03 OCT 11	14 NOV 11
0105	**Ancillary Works**	**28 ***	**05 MAY 11**	**02 JUN 11**
0106	Install Communication System	28	05 MAY 11	02 JUN 11
0107	**Commissioning**	**14 ***	**14 SEP 11**	**28 SEP 11**
0108	Tunnel Commissioning	14	14 SEP 11	28 SEP 11



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DRAINAGE IMPROVEMENT IN NORTHERN HONG KONG ISLAND -
HONG KONG WEST DRAINAGE TUNNEL

🟩	Early bar
🟦	Progress bar
🟥	Critical bar
—	Summary bar
▲	Progress point
▼	Critical point
▼	Summary point
◆	Start milestone point
◆	Finish milestone point

Annex 3

Layout of Different Alignments of Tunnel

NOTES :

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 382403/S/101 & 105.

2. MAP DATA REPRODUCED WITH PERMISSION OF THE DIRECTOR OF LANDS (c) HONG KONG.

LEGEND :

▬▬▬	PROPOSED TUNNEL ALIGNMENT
. W3	PROPOSED SHAFT (W3)LOCATION
. W3(P)	PREFERRED SHAFT LOCATION (W3)
. W3(U)	POTENTIAL LOCATION FOR SHAFT (W3 BUT UNLIKELY TO BE ADOPTED
W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.

CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 - OPTION 1
(PREFERRED OPTION A(1))

Drawing no.

382403/S/104

Scale

1:12500

香港特別行政區政府渠務署
THE GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
博威工程顧問有限公司

Plot Date - 06 MAR 2003

CAD Filename = s:\common\hkwest\sketch\s104.dgn

Plot Date : 05 MAR 2003

CAD Filename : s:\common\hkwest\sketch\s106.dgn

NOTES :

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 382403/S/101 & 107.
2. MAP DATA REPRODUCED WITH PERMISSION OF THE DIRECTOR OF LANDS (c) HONG KONG.

LEGEND :

———	PROPOSED TUNNEL ALIGNMENT
. W3	PROPOSED SHAFT (W3)LOCATION
. W3(P)	PREFERRED SHAFT LOCATION (W3)
. W3(u)	POTENTIAL LOCATION FOR SHAFT (W3) BUT UNLIKELY TO BE ADOPTED
W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.

CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND –
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT – INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 – OPTION 3
(PREFERRED OPTION A(2))

Drawing no. 382403/S/106

Scale 1:12500

香港特別行政區政府渠務署
THE GOVERNMENT OF THE
HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

BLACK & VEATCH HONG KONG LIMITED
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NOTES :

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 382403/S/101 & 109.
2. MAP DATA REPRODUCED WITH PERMISSION OF THE DIRECTOR OF LANDS (c) HONG KONG.

LEGEND :

▬	PROPOSED TUNNEL ALIGNMENT
. W3	PROPOSED SHAFT (W3)LOCATION
. W3(P)	PREFERRED SHAFT LOCATION (W3)
. W3(u)	POTENTIAL LOCATION FOR SHAFT (W3) BUT UNLIKELY TO BE ADOPTED
W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.
CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 - OPTION 9
(PREFERRED OPTION B(1))

Drawing no.	Scale
382403/S/108	1:12500

香港特别行政區政府渠務署
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BLACK & VEATCH HONG KONG LIMITED
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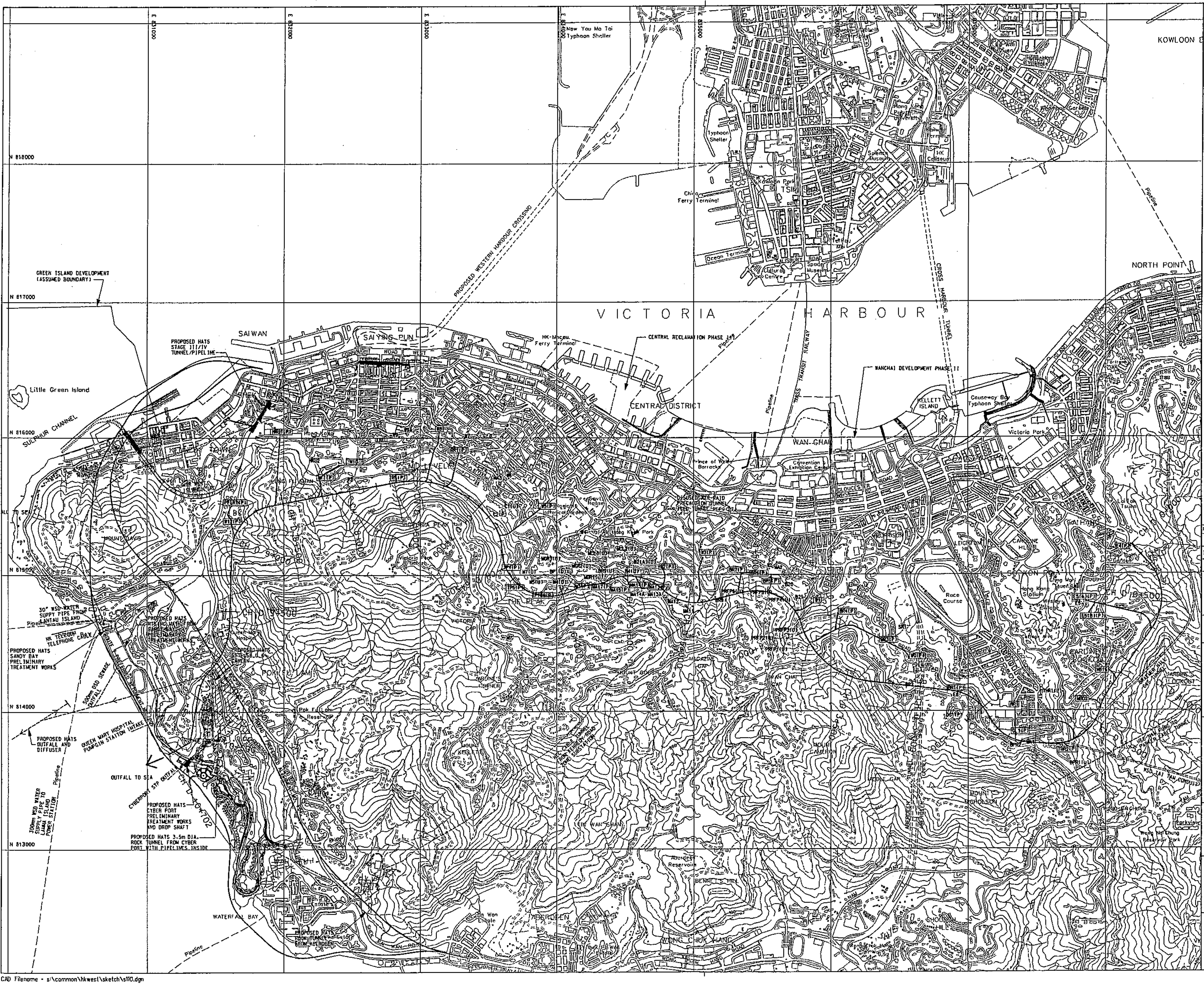
Plot Date - 05 MAR 2003

CAD Filename - s:\common\hkwest\sketch\s108.dgn



NOTES :

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NOS. 382403/S/101 & 111.
2. MAP DATA REPRODUCED WITH PERMISSION OF THE DIRECTOR OF LANDS (c) HONG KONG.

LEGEND :

▬	PROPOSED TUNNEL ALIGNMENT
. W3	PROPOSED SHAFT (W3)LOCATION
. W3(P)	PREFERRED SHAFT LOCATION (W3)
. W3(u)	POTENTIAL LOCATION FOR SHAFT (W3) BUT UNLIKELY TO BE ADOPTED
W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.

CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 - OPTION 11
(PREFERRED OPTION B(2))

Drawing no.

382403/S/110

Scale

1:12500

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Plot Date - 05 MAR 2003

CAD Filename - s:\common\hkwest\sketch\s110.dgn

NOTES :

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2. MAP DATA REPRODUCED WITH PERMISSION OF THE DIRECTOR OF LANDS (c) HONG KONG.

LEGEND :

▬▬	PROPOSED TUNNEL ALIGNMENT
. W3	PROPOSED SHAFT (W3)LOCATION
. W3(P)	PREFERRED SHAFT LOCATION (W3)
. W3(u)	POTENTIAL LOCATION FOR SHAFT (W3) BUT UNLIKELY TO BE ADOPTED
W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.

CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 - OPTION 21
(PREFERRED OPTION C(1))

Drawing no.

382403/S/112

Scale

1:12500

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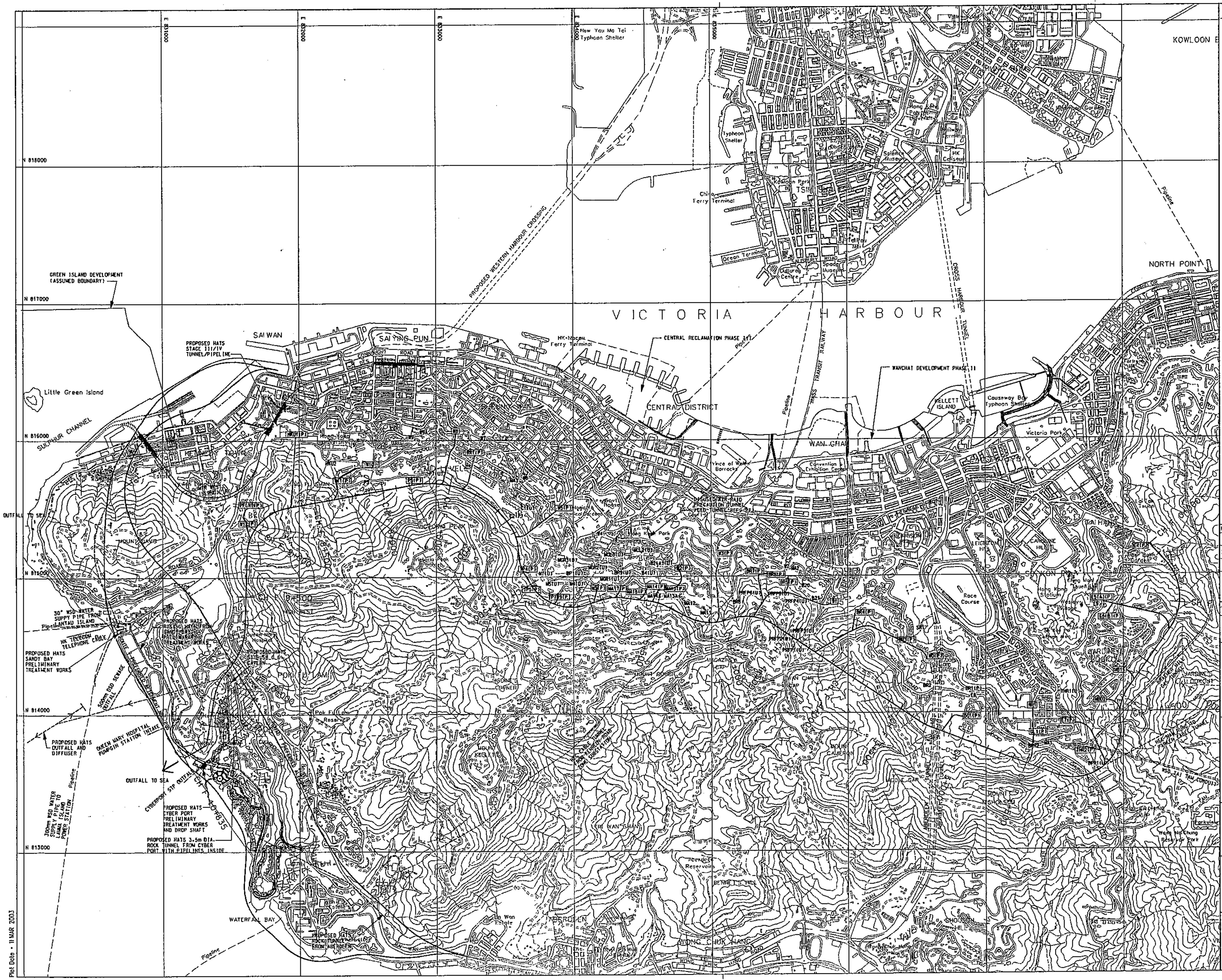
Plot Date - 05 MAR 2003

CAD Filename - s:\common\hkwest\sketch\s112.dgn



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LEGEND :

———	PROPOSED TUNNEL ALIGNMENT
W3	PROPOSED SHAFT (W3)LOCATION
W3(P)	PREFERRED SHAFT LOCATION (W3)
W3(u)	POTENTIAL LOCATION FOR SHAFT (W3) BUT UNLIKELY TO BE ADOPTED
▭ W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.
CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 - OPTION 23
(PREFERRED OPTION C(2))

Drawing no.
382403/S/114

Scale
1:12500

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Plot Date = 11 MAR 2003

CAD Filename = s:\common\hkwest\sketch\s114.dgn

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LEGEND :

———	PROPOSED TUNNEL ALIGNMENT
. W3	PROPOSED SHAFT (W3)LOCATION
. W3(P)	PREFERRED SHAFT LOCATION (W3)
. W3(u)	POTENTIAL LOCATION FOR SHAFT (W3) BUT UNLIKELY TO BE ADOPTED
W3	SHAFT CONNECTION TO TUNNEL

Revision	Date	Description		Initial
	Designed	Checked	Drawn	Checked
Initial	MSF	DCA	JT	MSF
Date	02/03	02/03	02/03	02/03

Approved

Agreement no.

CE 25/2002 (DS)

Contract title

DRAINAGE IMPROVEMENT IN
NORTHERN HONG KONG ISLAND -
HONG KONG WEST
DRAINAGE TUNNEL AND LOWER CATCHMENT
IMPROVEMENT - INVESTIGATION

Drawing title

LAYOUT OF
TUNNEL ALIGNMENT
SCHEME 1 - OPTION 29
(PREFERRED OPTION C(3))

Drawing no.	Scale
382403/S/116	1:12500

香港特别行政區政府渠務署
THE GOVERNMENT OF THE
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Plot Date - 05 MAR 2003

CAD Filename - s:\common\hkwest\sketch\s116.dgn