Annex C - Drainage Impact Assessment (DIA) of Garden Road and Cotton Tree Drive

There are two key components in the DIA of a road. First is to investigate whether there are any additional lateral or upstream inflows to the road and to provide interception roadside channels or inlets to prevent them flowing onto the road. Second is to assess the adequacy of the existing drainage facilities of the road and check them with reference to RD/GN/035. Garden road and Cotton Tree Drive are used as a study case and the steps of analysis are shown below.

For the ease of reference of the readers, some remarks and detailed elaboration of the assessment have been added to this DIA. Further information is shown in the Supplementary Guidelines.

Step 1 Realistic delineation of the actual catchment area for steep road by making use the available topographic survey maps,

Using the topographic information on the 1:1,000 survey maps to:

a) delineate the rural catchments along ridges of hills and edges of slopes; and
b) delineate the urban catchments along road boundaries.

Please refer to plan No. GR & CTD-Stage 1.pdf for the preliminary delineation based on the topographical information on the survey maps.

Remark:
Catchments with boundary highlighted in red are potential additional catchments to the concerned sections of Garden Road and Cotton Tree Drive.

Step 2 Identification of existing drainage provision for interception of stormwater in the catchment area outside the steep road reserve.

Identify the existing drainage provision by reviewing the drainage record plans from DSD and conducting site inspection.

Step 3 Fine tune the actual boundary of the additional catchments outside the road and evaluate the additional stormwater that will eventually flow onto the road pavement.

Based on the identified drainage provision along the boundaries of the adjacent catchments, assess whether they are adequate to intercept the stormwater flow from those catchments and then evaluate additional stormwater runoff will flow from the adjacent catchments to the road pavement under 1 in 50 years rainstorm event.

Please refer to plan No. GR & CTD-Stage 2.pdf and Notes for GR & CTD-Stage 2.pdf for the fine-tuned catchment boundaries.

Remarks:
1) In the evaluation it is assumed that other drainage facilities of other parties (e.g. drainage channels, catch pits, natural watercourses) have adequate intercepting capacities and function properly.
2) Stormwater runoff in the catchments with boundary highlighted in green (i.e. Areas C1, C2, C4, C6, C7 and C9) will unlikely be discharged onto the concerned road section (i.e. road section hatched in yellow in GR & CTD-Stage 1.pdf).
3) Portion of stormwater runoff in the catchment with boundary highlighted in cyan (i.e. Area C8) will likely be discharged onto the concerned road section. As the catchment area is small (just about $600m^2$), it is worth to consider that all the stormwater runoff in the catchment will be discharged onto the revised concerned road section despite presence of intercepting channel at mid-way of Area C8 (i.e. road section hatched in red in GR & CTD -Stage 2.pdf); and
4) For simplicity, it is considered that all the stormwater runoff in the catchments with boundary highlighted in red or cyan (i.e. Areas C3, C5 and C8) will be discharged onto the revised concerned road section (i.e. road section hatched in red in GR & CTD-Stage 2.pdf).

Step 4 Evaluation of the time of concentration for the catchment areas.

Using Brandsby William's Equation, check the time of concentration of Areas C3, C5 and C8:

For Area C3, L ~ 92m, H ~11%, A~1,380 m^2, t_o~ 4.0min
For Area C5, L ~ 111m, H ~14%, A~510 m^2, t_o~ 5.1min
For Area C8, L ~ 36m, H ~34%, A~590 m^2, t_o~ 1.4min

As all the above three areas are suited in mid-way of the roads, (i.e. not at upstream end of the roads), the time of concentration for their flows to the nearest inlets of the carrier drains will be controlled by the time of concentration of the most upstream catchment (i.e. the road section from upstream end of the road section to the concerned drainage inlet nearest to the above three areas), which will be much longer than those of the three areas. In this regard, it is considered sufficiently conservative if the time of concentration of 5 min is used to calculate the stormwater runoff discharging from the three areas and the concerned road sections to the relevant carrier drains.

Steps 5 & 6 Evaluation of the actual stormwater runoff that will flow from the catchments onto the road.

Assuming that Areas C3, C5 and C8 are grass land, therefore using the runoff coefficients for steep grassland (heavy soil) of C = 0.35, and the rainfall intensity of 1 in 50 year 5-min duration design rainstorm stated in Table 1 of RD/GN/035 (= 270mm/hr), the additional runoff from Areas C3, C5 and C8 are calculated to be $0.04m^3/s$, $0.01m^3/s$ and $0.02m^3/s$ respectively.

Step 7 Evaluation of the stormwater interception capacity of the existing drainage provisions at critical locations of the road section.

Based on DSD Drainage Record Plans "Drainage Record-11SW9C3.pdf," "Drainage Record-11SW9C4.pdf", "Drainage Record-11SW13B2.pdf", "Drainage Record-11SW13B3.pdf" and "Drainage Record-11SW14A1.pdf" and using the equation 6 of RD/GN/035, the drainage capacity of the existing drainage facilities are calculated as follow:

<u>Drain 1 (manhole SMH7048886 - junction SGJ7013053)*</u>
The carrier drain is a 300mm diameter pipe. As its downstream invert level is not provided on drainage record plan, its capacity cannot be determined.

<u>Drain 2 (manhole SMH7029358 - manhole SMH7029361)</u>
Length~60m, U/S Invert Level~72.84mPD, DS Invert Level~65.18mPD, Slope~0.13, Size = 0.525m x 0.675m, Capacity C~3.07m^3/s

<u>Drain 3 (manhole SMH7029253 - manhole SMH7029254)</u>
Length~25m, U/S Invert Level~46.01mPD, DS Invert Level~43.42mPD, Slope~0.10, Diameter = 2.4m, Capacity C~83.28m^3/s

<u>Drain 4 (manhole SMH7029308 - manhole SMH7029438)</u>
Length~35m, U/S Invert Level~21.38mPD, DS Invert Level~19.26mPD, Slope~0.06, Diameter = 2.4m, Capacity C~63.66m^3/s

<u>Drain 5 (manhole SMH7029420 - manhole SMH7031104)</u>
Length~25m, U/S Invert Level~8.41mPD, DS Invert Level~7.87mPD, Slope~0.02, Diameter = 0.45m, Capacity C~0.48m^3/s

<u>Drain 6 (junction SGJ7019992 – manhole SMH7055356)</u>
The carrier drain is a 2.4m x 2.4m box culvert. As its downstream invert level is not provided on drainage record plan, its capacity cannot be determined.

<u>Drain 7 (manhole SMH7031357- manhole SMH7031122)</u>
The carrier drain is a twin cell 2.745m x 2.44m box culvert. As both of its upstream and downstream invert levels are not provided on drainage record plan, its capacity cannot be determined.

<u>Drain 8 (manhole SMH7031122 - manhole SMH7031480)</u>
The carrier drain is a twin cell 2.745m x 2.44m box culvert. As both of its upstream and downstream invert levels are not provided on drainage record plan, its capacity cannot be determined.

<u>Drain 9 (manhole SMH7031130 - manhole SMH7031358)</u>
The carrier drain is a 450mm diameter pipe. As its upstream invert is just 2.69mPD, which is below 1 in 10 year tide level (~3.05mPD), the drain capacity will be affected by tide level and cannot be simply determined by using the equation 6 of RD/GN/035.

<u>Drain 10 (manhole SMH7031481 - manhole SMH7031482)</u>
Length~10m, U/S Invert Level~4.80mPD, DS Invert Level~4.65mPD, Slope~0.01, Diameter = 0.225m, Capacity C~0.06m^3/s

Drain 11 (downstream pipe of manhole SMH7029500)
The carrier drain is a 450mm diameter pipe. As both of its upstream and downstream invert levels are not provided on drainage record plan, its capacity cannot be determined.

Drain 12 (manhole SMH7031101 - manhole SMH7031317)
The carrier drain is a 450mm diameter pipe. As its upstream invert level is not provided on drainage record plan, its capacity cannot be determined.

Drain 13 (manhole SMH7031096 - manhole SMH7031091)
The carrier drain is a 450mm diameter pipe. As its downstream invert level is not provided on drainage record plan, its capacity cannot be determined.

Drain 14 (manhole SMH7031316 - manhole SMH7031089)
Length~10m, U/S Invert Level~6.12mPD, DS Invert Level~6.04mPD, Slope~0.01, Diameter = 0.225m, Capacity C~0.05m^3/s

For tentative locations of Drain 1 – Drain 14, please refer to plan No. GR & CTD -Stage 3.pdf. For detailed locations of the drains and manholes, please refer to the above drainage record plans.

Besides, as shown on plan No. GR & CTD-Stage 3.pdf,
Road Area 1, Area ~ 7,800m^2, Q=0.278CiA ~0.59 m^3/s
Road Area 2, Area ~ 3,300m^2, Q=0.278CiA ~0.25 m^3/s
Road Area 3, Area ~ 3,100m^2, Q=0.278CiA ~0.23 m^3/s
Road Area 4, Area ~ 8,400m^2, Q=0.278CiA ~0.63 m^3/s
Road Area 5, Area ~ 7,400m^2, Q=0.278CiA ~0.56 m^3/s
Road Area 6, Area ~ 9,800m^2, Q=0.278CiA ~0.74 m^3/s
Road Area 7, Area ~ 1,100m^2, Q=0.278CiA ~0.08 m^3/s
Road Area 8, Area ~ 1,500m^2, Q=0.278CiA ~0.11 m^3/s
Road Area 9, Area ~ 1,800m^2, Q=0.278CiA ~0.14 m^3/s
Road Area 10, Area ~ 2,600m^2, Q=0.278CiA ~0.20 m^3/s
Road Area 11, Area ~ 1,400m^2, Q=0.278CiA ~0.11 m^3/s
Road Area 12, Area ~ 800m^2, Q=0.278CiA ~0.06 m^3/s
Road Area 13, Area ~ 700m^2, Q=0.278CiA ~0.05 m^3/s

For Drains 1–9 and 11–14, it appears that they may not be exclusively for the concerned road sections and upland catchments but may also convey stormwater runoff from some other catchments. Therefore, it is not certain whether they are adequate to convey the stormwater from the concerned road sections and upland catchments (i.e. Road Areas 1 – 9 & 11 – 13 and Areas C3, C5 and C8) even though their capacities may be larger than the stormwater runoff from the concerned road sections and upland catchments. In such situation, it is recommended to consult DSD to acquire their advice and findings form their relevant drainage studies. For this DIA, DSD has provided their advice on whether Drains 1 – 9 and 11 – 12 are adequate to handle the stormwater runoff under a 1 in 50 year rainfall intensity based on their past Drainage Master Plan study in the Northern Hong Kong Island. (please refer to “Adequacy of Drains 1–9 and 11–14.pdf”).
Based on this information, it is considered that Drains 1, 2, 5, 6, 11 and 12 will be incapable to handle the stormwater runoff from the concerned road sections and upland catchments. However, as Drains 13 and 14 are not included in their

DMP model, it is not certain whether they are adequate to handle the stormwater runoff under a 1 in 50 year rainfall intensity.

For Drain 10, Runoff to be collected by the drain = Runoff from Road Area 10 ~ $0.20m^3/s$ > capacity of Drain 10 ~ $0.06m^3/s$. Therefore, it is considered that the capacity of Drain 10 is inadequate.

To sum up, it is considered that Drains 1, 2, 5, 6, 10, 11 and 12 are incapable to handle the stormwater runoff from the concerned road sections and upland catchments, while the adequacy of Drains 13 and 14 are not known. It is suggested to liaise with DSD to further investigate whether these drains are required to be upgraded.

Remark:
For Drains 1, 6 – 8 and 11– 13, the capacities of these drains cannot be determined due to non-availability of invert levels on the drainage record plans. It is suggested that further site surveys can be conducted to ascertain their invert levels as required.

Step 8 Review of the history and causes of previous flooding incidents (flooding may be due to reasons other from excess stormwater flow such as debris blockage).

Within the study area, seven flooding incidents were reported during the specified period. Four cases occurred on Garden Road and three cases occurred on Cotton Tree Drive.

For the four cases on Garden Road, only two cases were due to heavy raining and the others were due to blockage of gullies or drainage system. The three cases on Cotton Tree Drive road all occurred near at or near the junction of Cotton Tree Drive and Queensway, only one case was due to heavy raining and the other two cases were due to the blockage of main drain.

It is noted that local improvement measures, such as provision of additional gullies at the slip roads outside Cheung Kong Centre and surface channel near the High Courts, have been implemented in recent years. Also, the drainage channel improvement works inside the Hong Kong Park completed several years ago also helped to prevent the overflow of stormwater at the channel inside the Hong Kong Park. The local road drainage situation has been improved since.

Step 9 Identification of improvement measures such as providing optimum crossfall, more effective road gully arrangement, transverse drains, on-site road side flood storage, bypass/excess surface runoff diversion/interception plan at upstream, and the use of porous pavement, etc. at suitable locations.

The following measures could be considered for the drainage improvement of the concerned road section:

1. The outlet of the channel at the amenity area adjoining the slip road outside Hong Kong Park is found to be vulnerable to blockage by debris resulting in minor flooding of the adjacent footway and pedestrian crossing. Therefore regular desilting and maintenance of the said channel and outlet are required.

2. Based on this assessment, it is preliminarily identified that the capacity of Drains 1, 2, 5, 6, 10, 11 and 12 are inadequate to convey the stormwater runoff from the concerned road pavements and additional catchments, while the adequacy of Drains 13 and 14 are not known due to insufficient data. Further detailed assessment should be conducted as required to confirm this finding and investigate the missing invert levels of the concerned drains. If essential, DSD may be consulted to resolve the problem together.
3. To provide additional gullies on the two roads, so far if possible, in order to satisfy the maximum gully spacing as recommended in Section 3.6 of RD/GN/035.

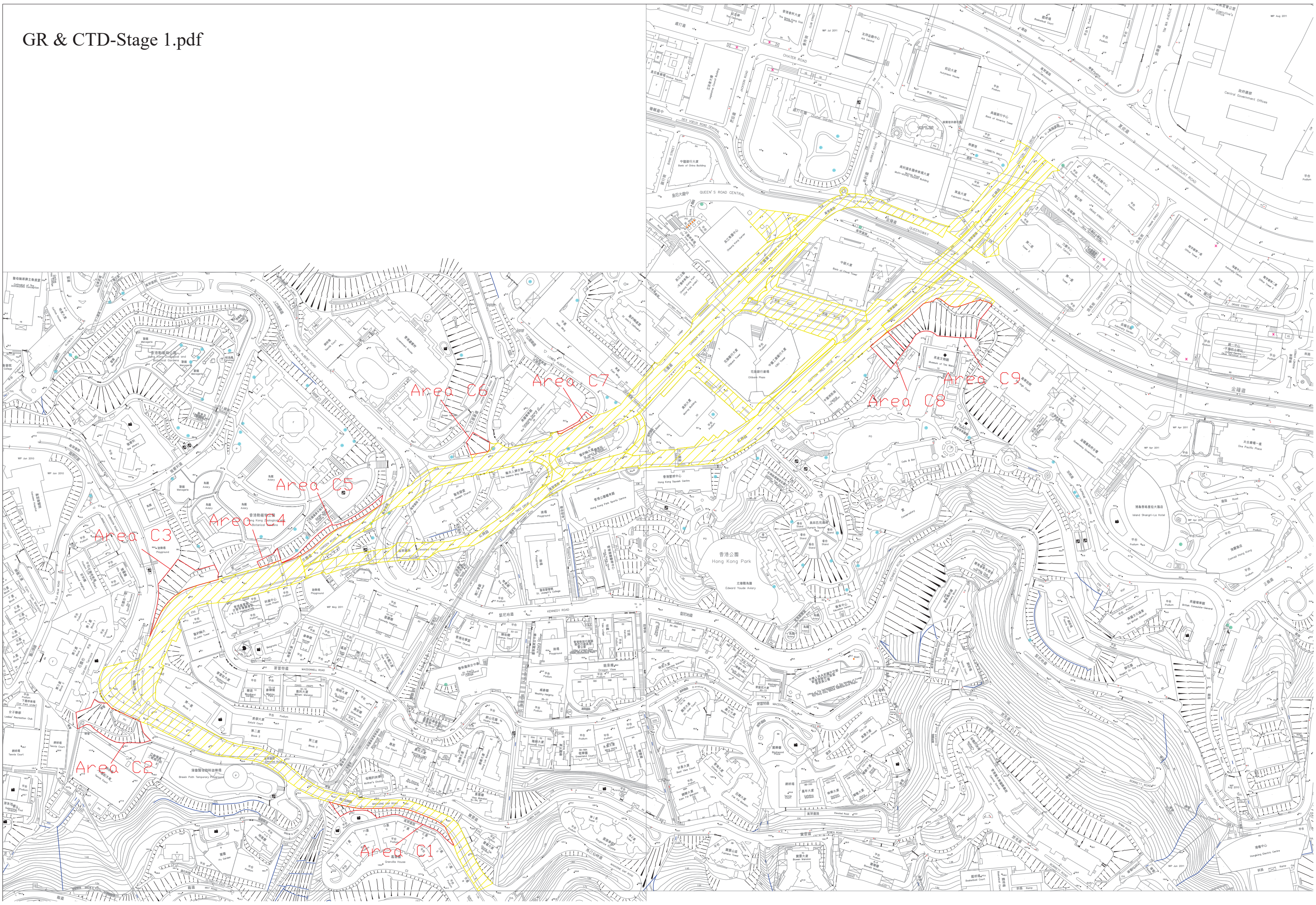
Other Points to Note

The following additional points are suggested for the consideration of the designers on road pavement drainage works with reference to the assessment carried out under this DIA:

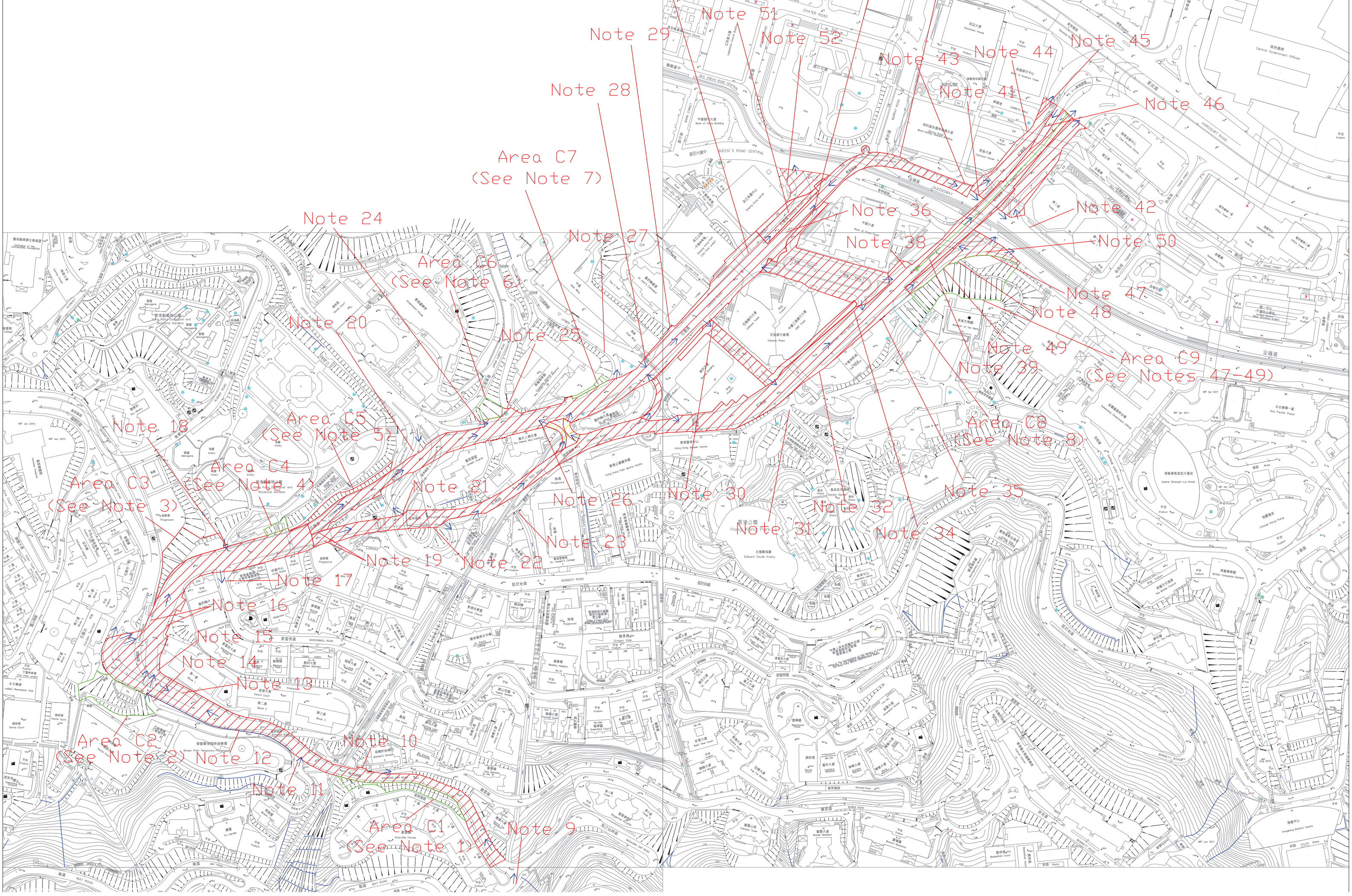
1. For simplicity, the drainage networks are regarded as exclusively only for the concerned road pavements in the above calculation. However, for urban areas (also for this case), the drainage networks are in general not exclusively for road pavements only and they will also be used to convey stormwater runoff from adjacent developments, slopes, other catchments, etc. Therefore, it is suggested to liaise with DSD to determine whether the concerned carrier drains are capable to convey the stormwater runoff from relevant catchments if the carrier drains are not exclusively for road pavements only since relevant computer modelling work should have already been conducted by them.
2. At Road Areas 7, 8 and 9, the invert level of the carrier drains are below 1 in 10 year tide level. Therefore, the drainage capacity of the carrier drains will likely be affected by tide and they cannot be simply calculated using the equation 6 of RD/GN/035 (which has assumed that the flow is uniform and is not affected by backwater). Therefore, it is suggested to liaise with DSD to determine whether the concerned carrier drains are capable to convey the stormwater runoff from relevant catchments if their flow capacities are suspected to be affected by tide.
3. For large watercourses running towards roads, regular desilting and maintenance for the sections of watercourses near the roads is suggested to avoid overflow of stormwater runoff from the watercourses onto the road pavements due to blockage (see Note 23 in “Notes for GR & CTD-Stage 2.pdf”).
4. For gullies, channels, intakes suited next to amenity, regular desilting is suggested to avoid overflow of stormwater runoff from the drainage networks onto the road pavements due to blockage.
5. At low-lying road sections/sag points (such as ground level of about 5mPD or less), stormwater runoff may be difficult or even unable to be conveyed into carrier drains during high tide due to backwater effect. In that case, interception of the stormwater runoff at more upstream road sections is suggested.
6. The gully spacing along Garden Road and Cotton Tree Drive is in general longer than 25m, which exceeds the maximum gully spacing as recommended in Section 3.6 of RD/GN/035 (refer to Note 39 in “Notes for GR & CTD-Stage 2.pdf”), probably due to the reason that these two roads were constructed long time ago. This will increase the flooded width and reduce the interception efficiency of gullies.

- End -

GR & CTD-Stage 1.pdf



GR & CTD-Stage 2.pdf



Note 1

As there is an interception channel along the toe of slope, it is expected that the stormwater runoff in Area C1 will not run onto the road pavement.

Interception channel along slope toe

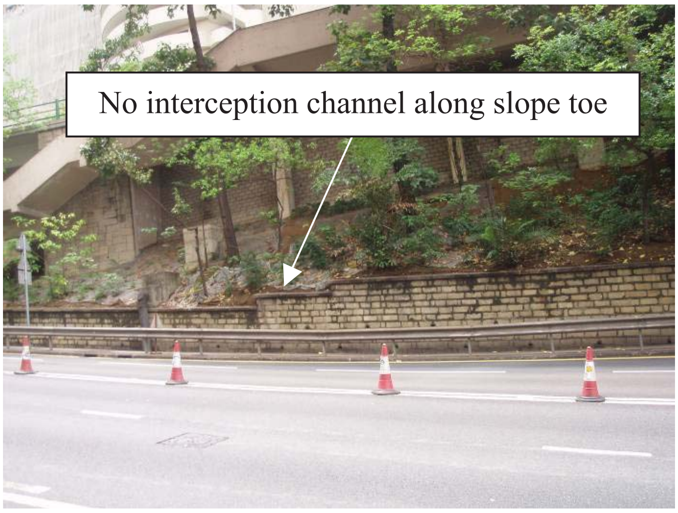
Note 2

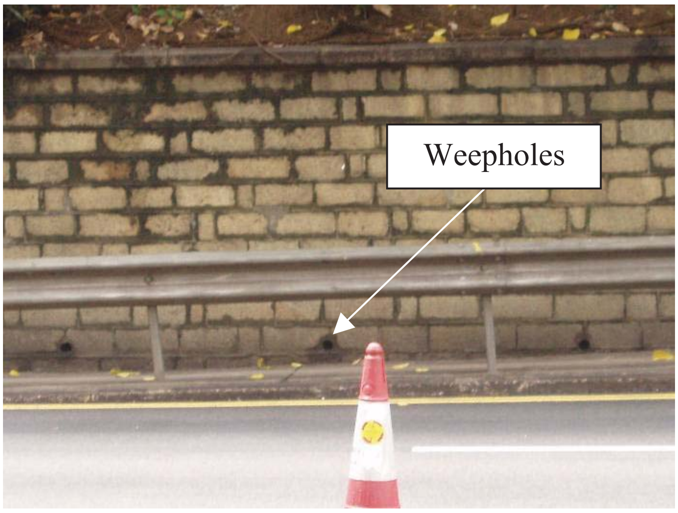
There is a retaining wall at the toe of slope. It is expected that the stormwater runoff in Area C2 will likely be blocked by the retaining wall and will not run onto the road pavement. Besides, there is a sag point at the road section immediately next to the retaining wall and six gullies are provided at there.

Retaining wall and multiple gullies

Note 3

There is no interception channel along the toe of slope but many weepholes on the retaining wall. It is expected that the stormwater runoff in Area C3 will run onto the road pavement.





No interception channel along slope toe but holes on retaining wall

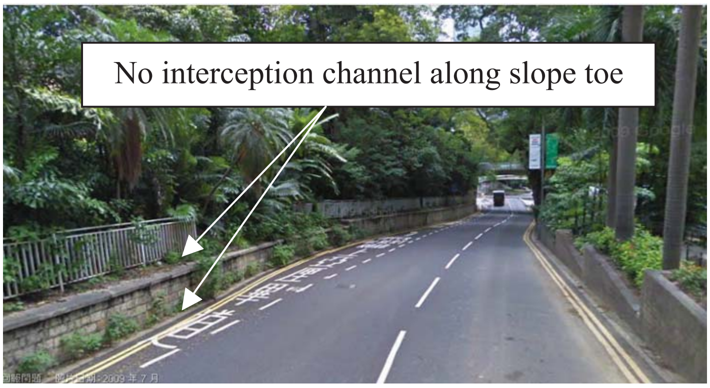
Note 4

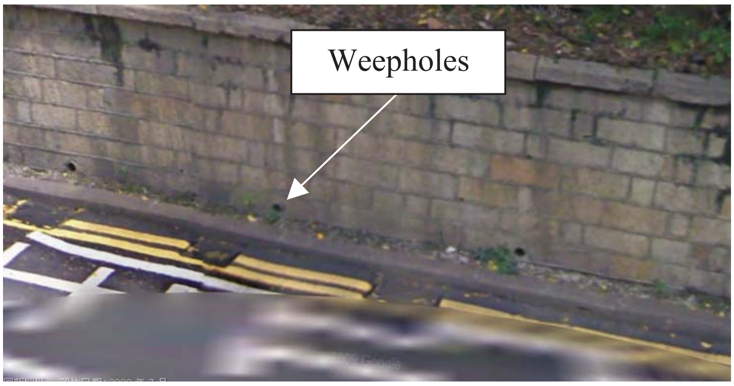
As there is an interception channel along the toe of slope, it is expected that the stormwater runoff in Area C4 will not run onto the road pavement.

Interception channel along slope toe

Note 5

There is no interception channel along the toe of slope or retaining wall but many weepholes on the retaining wall. It is expected that the stormwater runoff in Area C5 will run onto the road pavement.





No interception channel along slope toe but holes on retaining wall

Note 6

As there is an interception channel along the toe of slope, it is expected that the stormwater runoff in Area C6 will not run onto the road pavement.

Interception channel along slope toe

Note 7

There is a retaining wall at the toe of slope. It is expected that the stormwater runoff in Area C7 will likely be blocked by the retaining wall and will not run onto the road pavement.

Retaining wall at slope toe

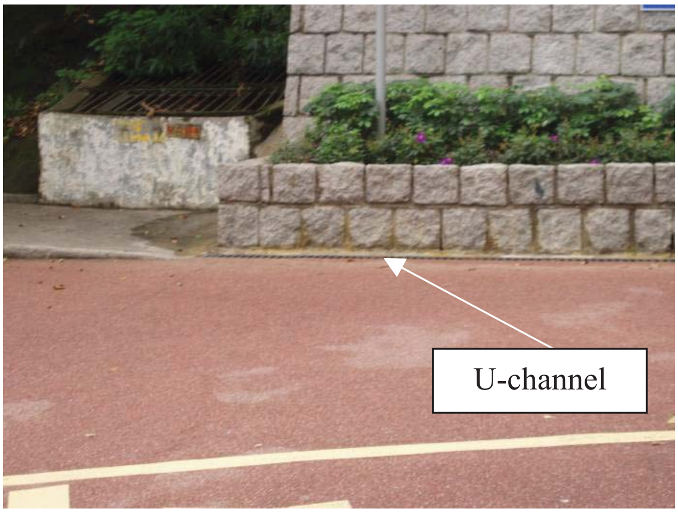
Note 8

There is an interception channel at mid-way of Area C8 but no interception channel along the toe of slope, it is expected that portion of the stormwater runoff on this area will run onto the road pavement.

Interception channel at mid-way but not along slope toe

Note 9

There is an interception channel at the main entrance/exit of the development. It is expected that no stormwater runoff from the development will run onto the pavement through the main entrance/exit.



Interception channel at main entrance/exit

Note 10

There is no gully or channel at the lay-by. Flooding will occur at there.

No gully or channel at lay-by

Note 11

There is no gully near the junction. Stormwater runoff from the branch road (Brewin Path) will run onto the road pavement.

No gully near junction

Note 12

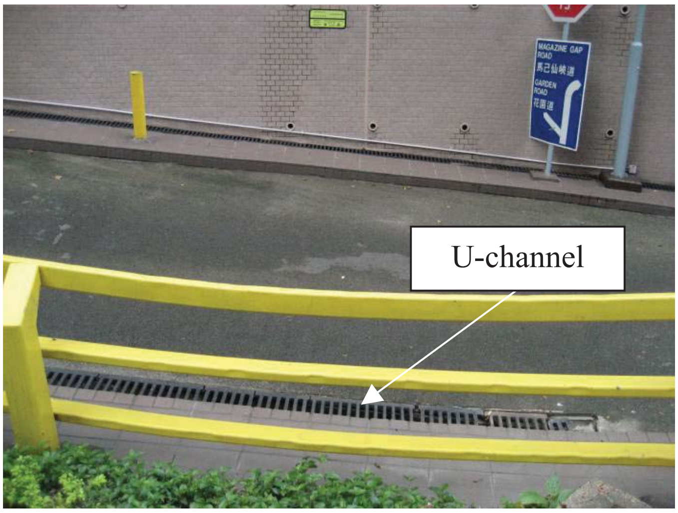
There is an interception channel along the toe of the slope of the playground. It is expected that no stormwater runoff from the slope will run onto the pavement.

Interception channel along slope toe

Note 13
There is a sag point at the road section at the junction with the elevated road and four gullies are provided at there.

Multiple gullies at sag point

Note 14
There is an interception channel at the entrance/exit of the development. It is expected that no stormwater runoff will run from the development onto the pavement through the entrance/exit.



Interception channel at junction

Note 15

There are four gullies at the kerb opposite to junction.

Multiple gullies at kerb opposite to the junction

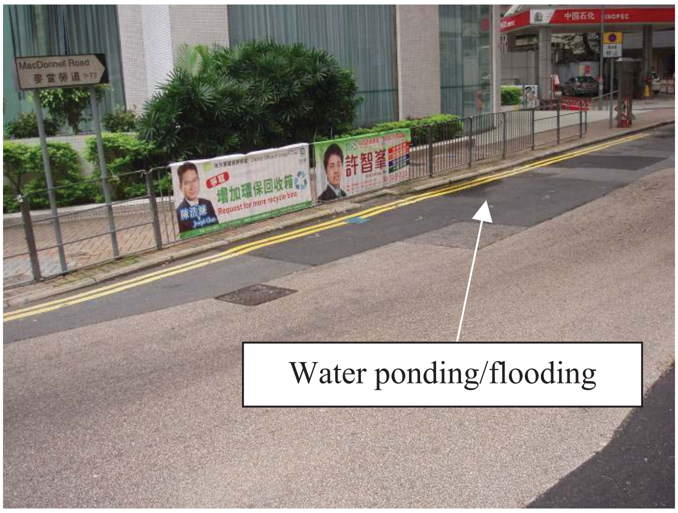
Note 16

There are six gullies near the junction.

Multiple gullies near the junction

Note 17

There is no gully near the junction. Water ponding/flooding may occur.



No gully near the junction

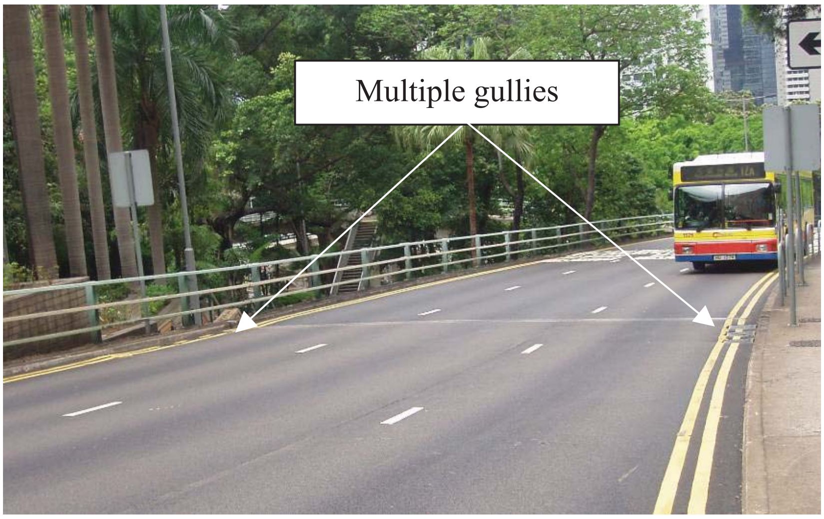
Note 18

There is no interception channel at this entrance/exit of the park. It is expected that portion of stormwater runoff in the park will run onto the pavement through the entrance/exit.

No interception channel at entrance/exit

Note 19

Multiple gullies are provided at both kerbs for the road section with reverse of crossfall direction.



Multiple gullies at reverse of crossfall direction

Note 20

Multiple gullies are provided at sag point/junction with branch road.

Multiple gullies at sag point/junction

Note 21

There is no gully near the junction.

No gully near the junction

Note 22

Gullies are not provided at kerb but at middle of the lane. The interception efficiency may be lowered than that presented in RD/GN/035

Gullies provided at middle of the lane

Note 23

There is a large size watercourse in the vicinity. If the intake is blocked by rubbishes or debris, significant amount of stormwater runoff can overflow from the watercourse and cause serious flooding at downstream road pavement.

Large size watercourse in vicinity

Note 24

There is no gully near the junction.

No gully near the junction

Note 25

The road pavement is blocked by kerb. Stormwater runoff on the road pavement is collected by the gullies adjacent to the kerb.

Kerb blocked road pavement

Adjacent gullies

Note 26

Multiple gullies are provided at junction with branch road.

Multiple gullies at junction

Note 27

Multiple gullies are provided at junction with branch road/sag point.

Multiple gullies at sag point/junction

Note 28

There is no gully near the junction with branch road.

No gully near the junction

Note 29

There are double gullies at entrance/exit of the development.

Double gullies at entrance/exit of the development

Note 30

Multiple gullies are provided at junction with branch road

Multiple gullies at junction

Note 31

There is a U-channel at entrance/exit of the park.

U-channel at entrance/exit of the park

Note 32

There is a U-channel at entrance/exit of the fire station.

U-channel at entrance/exit of the fire station

Note 33
Multiple gullies are provided at entrance/exit of the development.

Multiple gullies at entrance/exit of the development

Note 34
Multiple gullies are provided near the junction with branch road

Multiple gullies near junction

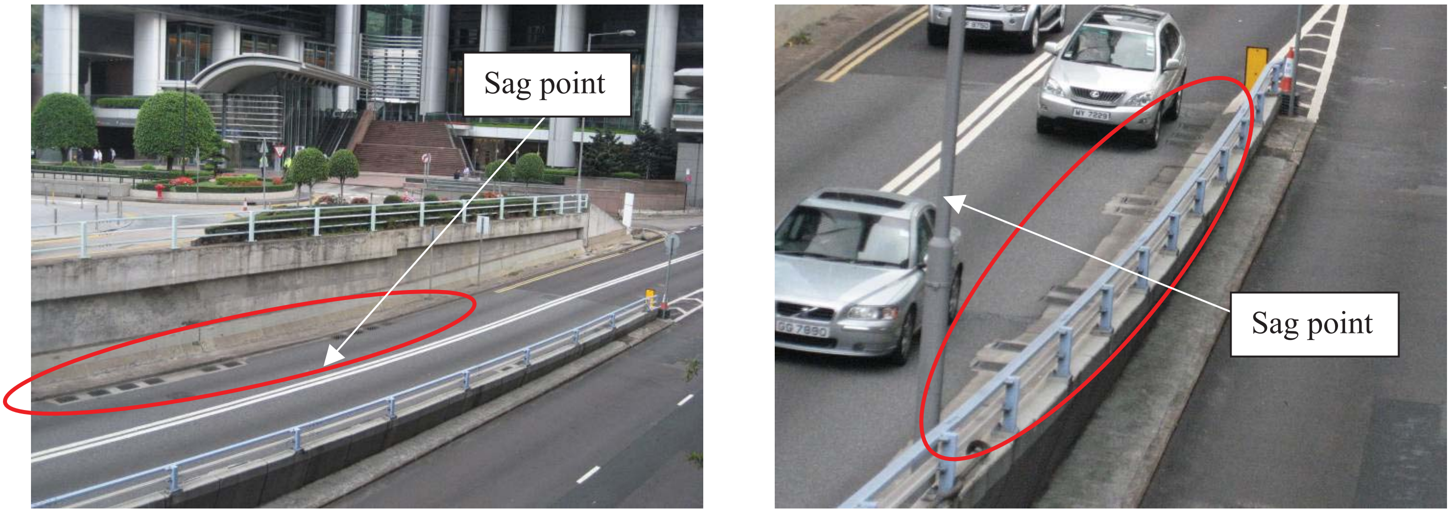
Note 35

There is a U-channel at another entrance/exit of the fire station.

U-channel at another entrance/exit of the fire station

Note 36

Multiple gullies are provided at sag point.



Multiple gullies at sag point

Note 37
Gullies are not provided at kerb but at middle of the lane. The interception efficiency may be lowered than that presented in RD/GN/035.

Gullies provided at middle of the lane

Note 38
Multiple gullies are provided near the junction with branch road.

Multiple gullies near junction

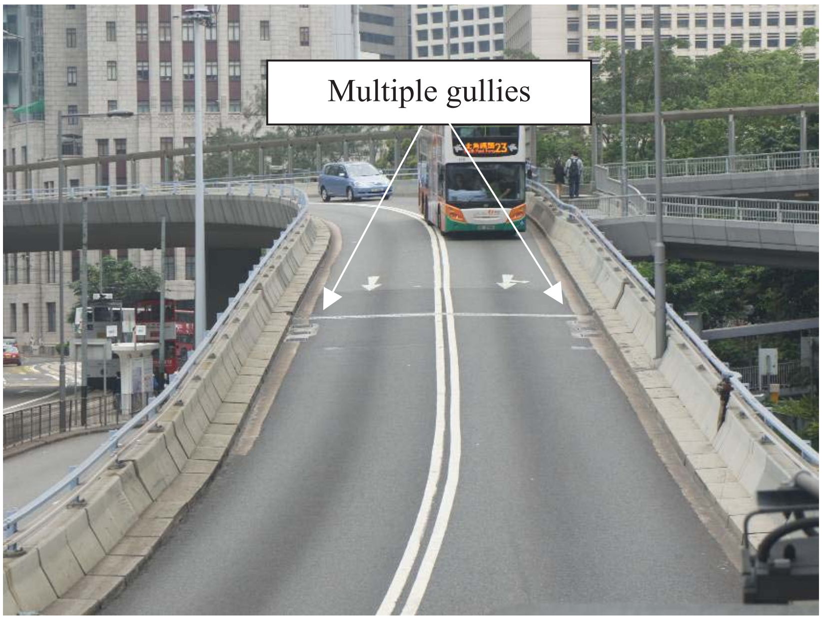
Note 39

There is no gully on a long section of the road pavement.

No gully on a long section of road pavement

Note 40

Multiple gullies are provided at both sides of the elevated road section with reverse of crossfall direction.



Multiple gullies at reverse of crossfall direction

Note 41

Multiple gullies are provided near the junction with elevated road.

Multiple gullies near junction

Note 42

Multiple gullies are provided near the junction with branch road.

Multiple gullies near junction

Note 43

Double gullies are provided at the junction with elevated road.

Double gullies at junction

Note 44

Double gullies are provided at the junction with branch road.

Double gullies at junction

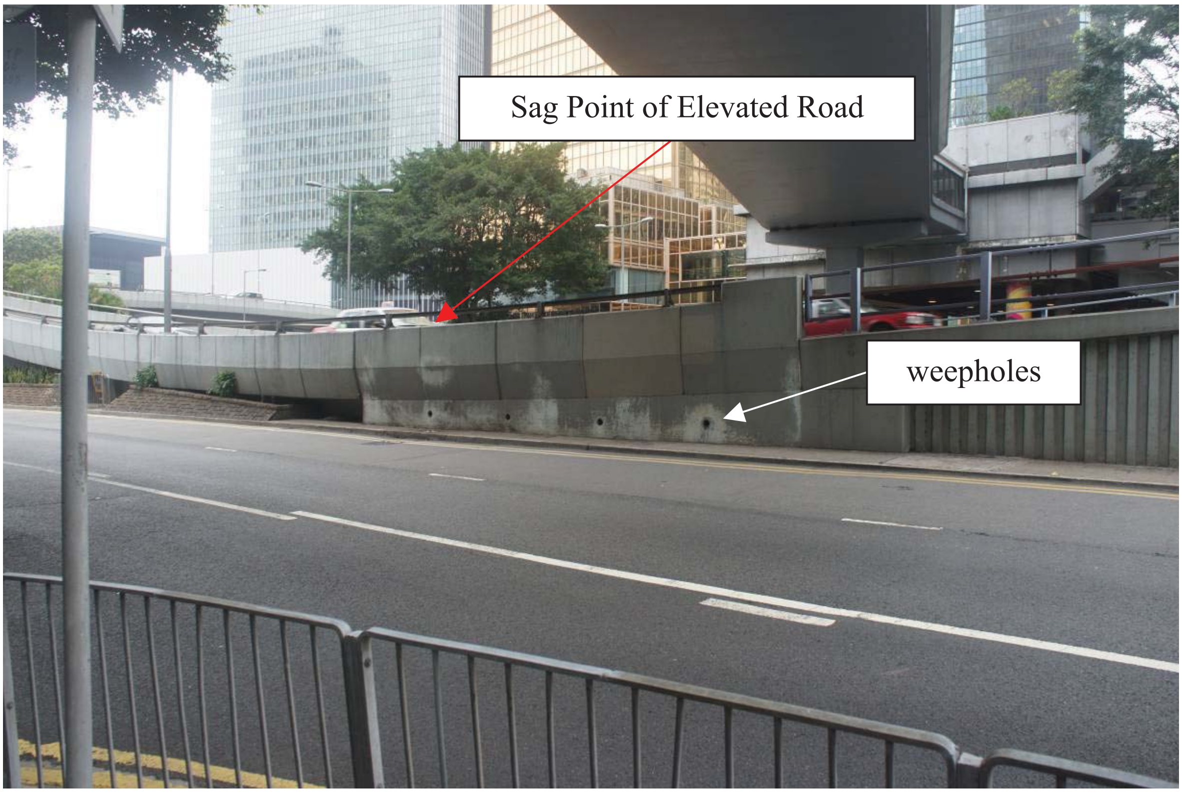
Note 45

Double gullies are provided at the junction with branch road.

Double gullies at junction

Note 46

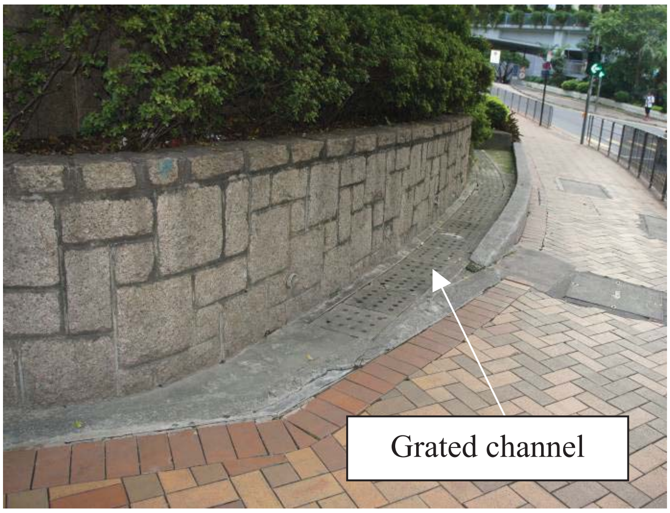
There are a number of weepholes on the abutment wall of the elevated road. After checking with HyD, it is not expected that the stormwater runoff accumulated at the sag point will discharge onto the adjacent road pavement through these weepholes.



Weepholes on side wall of elevated road

Note 47

There is an interception channel along the toe of the slope. It is expected that no stormwater runoff from the slope will run onto the pavement.



Interception channel along slope toe

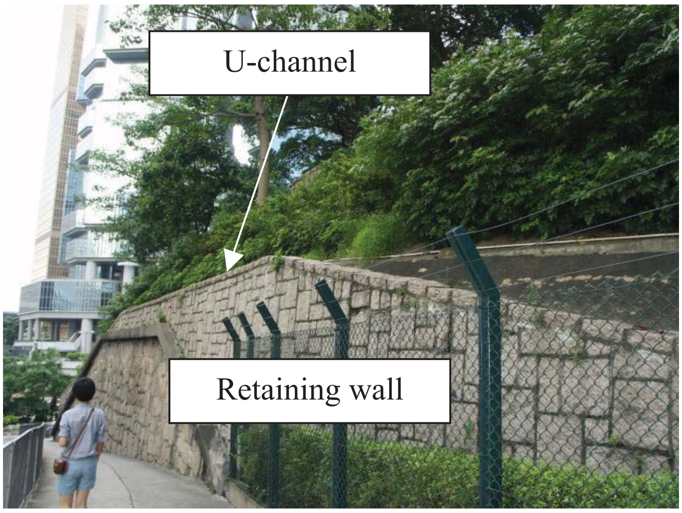
Note 48

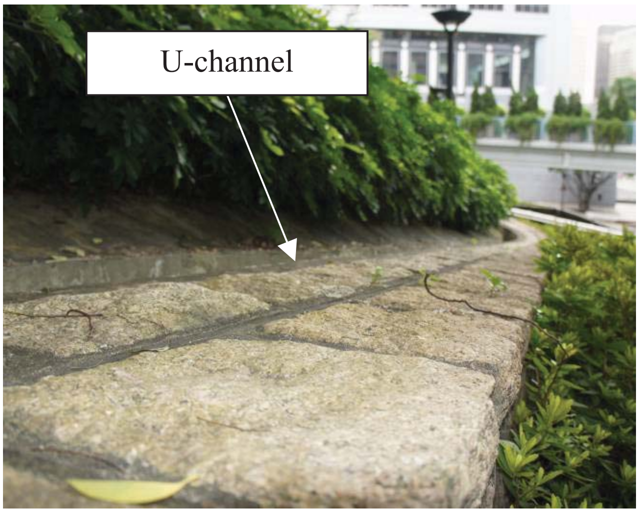
There is an interception channel next to the entrance/exit of the park. It is expected that no stormwater runoff from the park will run onto the pavement.

Interception channel at entrance/exit

Note 49

There is a retaining wall at the toe of the slope and an interception channel at the top of the wall. It is expected that no stormwater runoff from the slope will run onto the pavement.

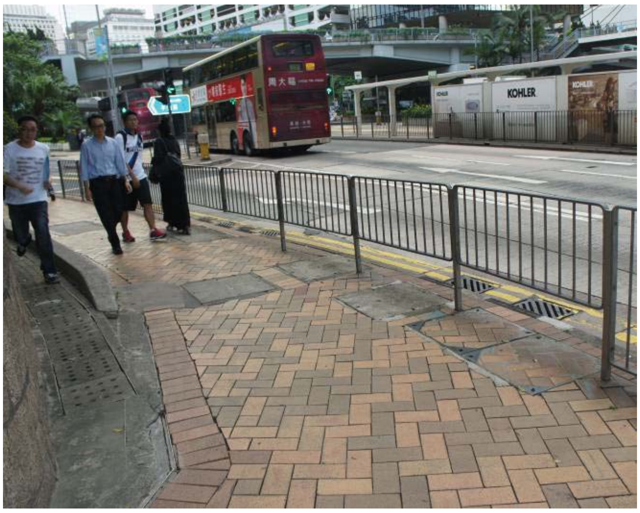




Retaining wall and interception channel

Note 50

Many gullies are provided near the junction with branch road.

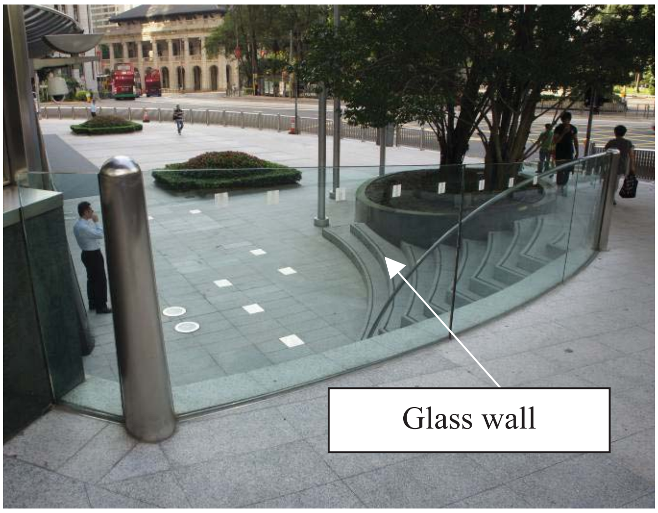


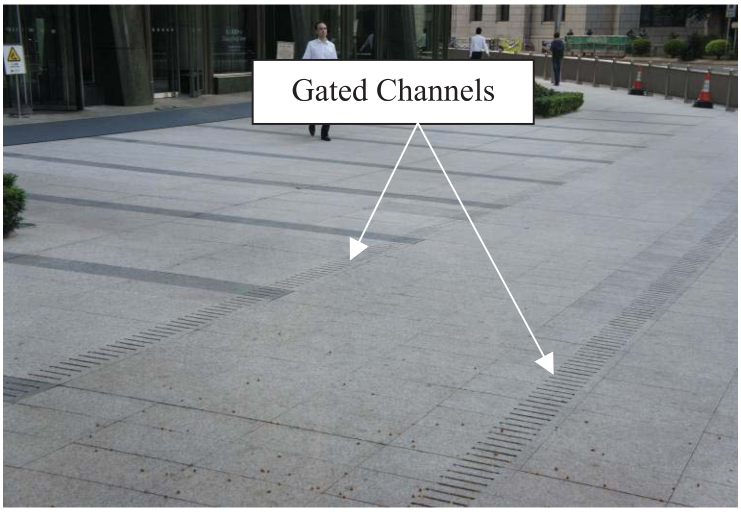
Many gullies near junction

Note 51
Many gullies are provided along the road section.

Many gullies at road section

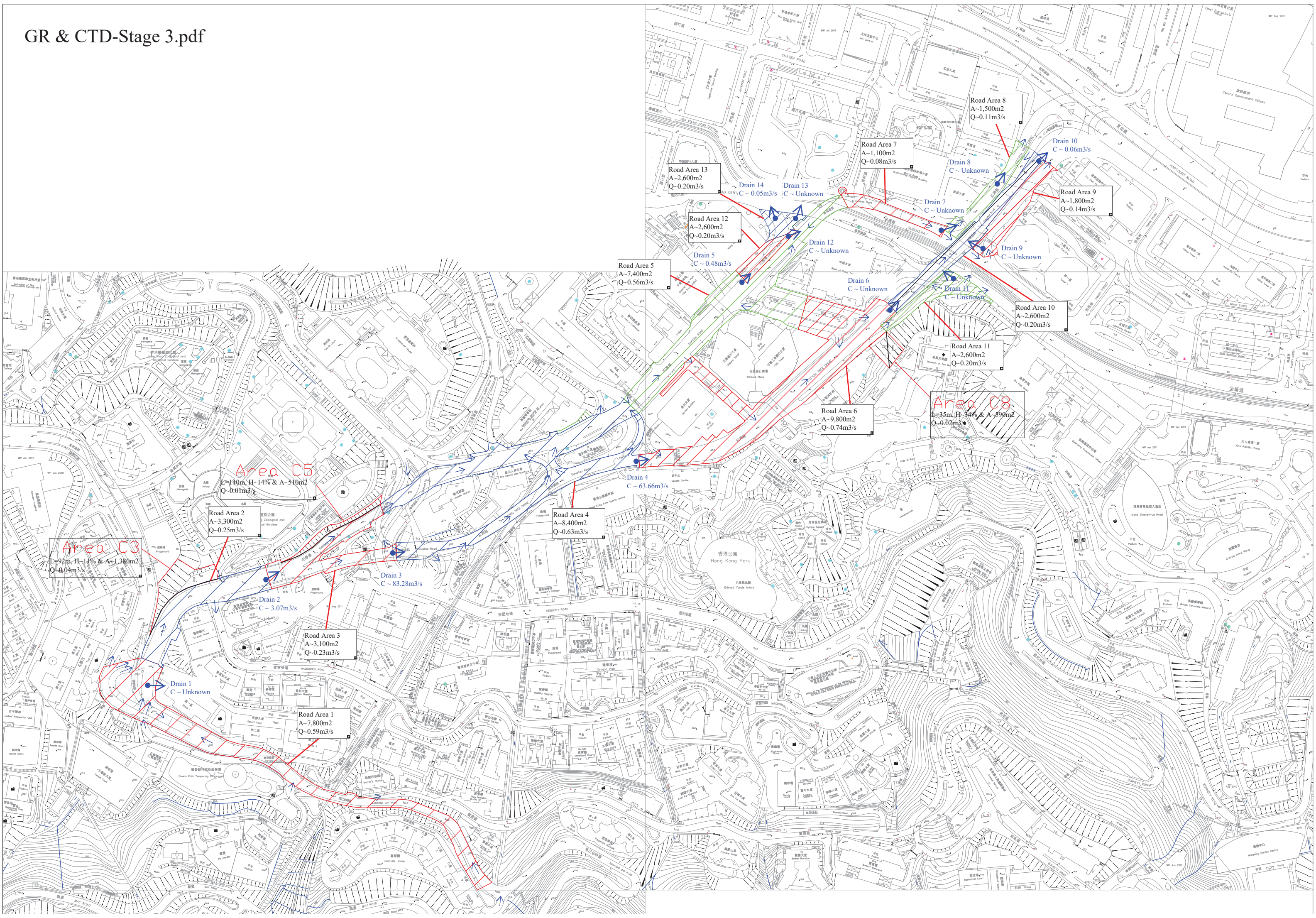
Note 52
There is glass wall along the footpath and there are two grated channels at entrance.exit of the development.





Glass wall and interception channel

GR & CTD-Stage 3.pdf



Note 1

As there is an interception channel along the toe of slope, it is expected that the stormwater runoff in Area C1 will not run onto the road pavement.

Interception channel along slope toe

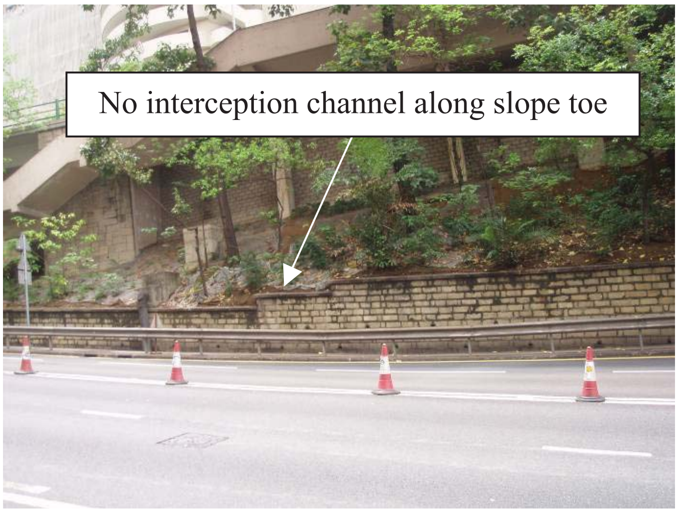
Note 2

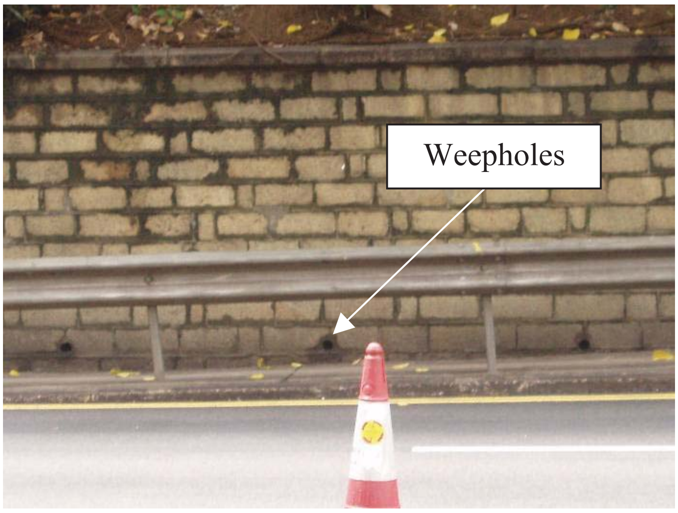
There is a retaining wall at the toe of slope. It is expected that the stormwater runoff in Area C2 will likely be blocked by the retaining wall and will not run onto the road pavement. Besides, there is a sag point at the road section immediately next to the retaining wall and six gullies are provided at there.

Retaining wall and multiple gullies

Note 3

There is no interception channel along the toe of slope but many weepholes on the retaining wall. It is expected that the stormwater runoff in Area C3 will run onto the road pavement.





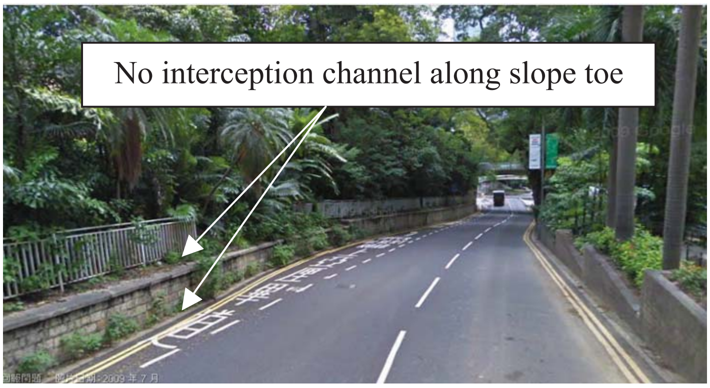
No interception channel along slope toe but holes on retaining wall

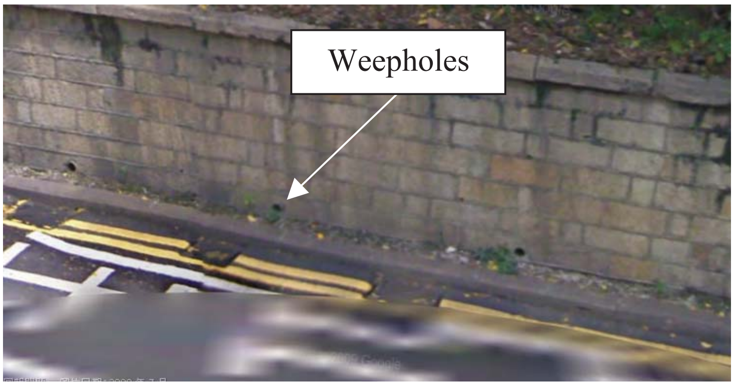
Note 4

As there is an interception channel along the toe of slope, it is expected that the stormwater runoff in Area C4 will not run onto the road pavement.

Interception channel along slope toe

Note 5
There is no interception channel along the toe of slope or retaining wall but many weepholes on the retaining wall. It is expected that the stormwater runoff in Area C5 will run onto the road pavement.



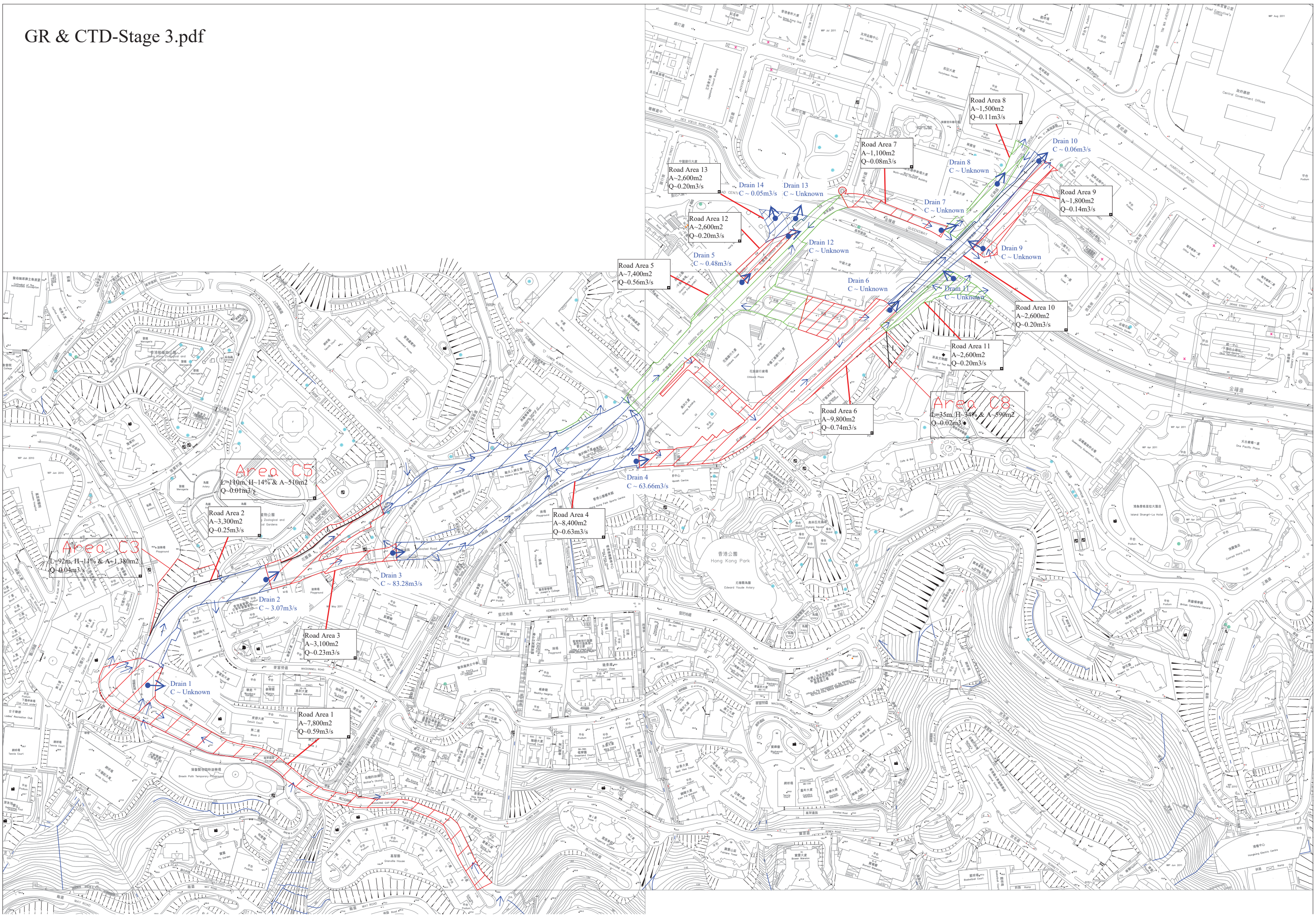


No interception channel along slope toe but holes on retaining wall

Note 6
As there is an interception channel along the toe of slope, it is expected that the stormwater runoff in Area C6 will not run onto the road pavement.

Interception channel along slope toe

GR & CTD-Stage 3.pdf



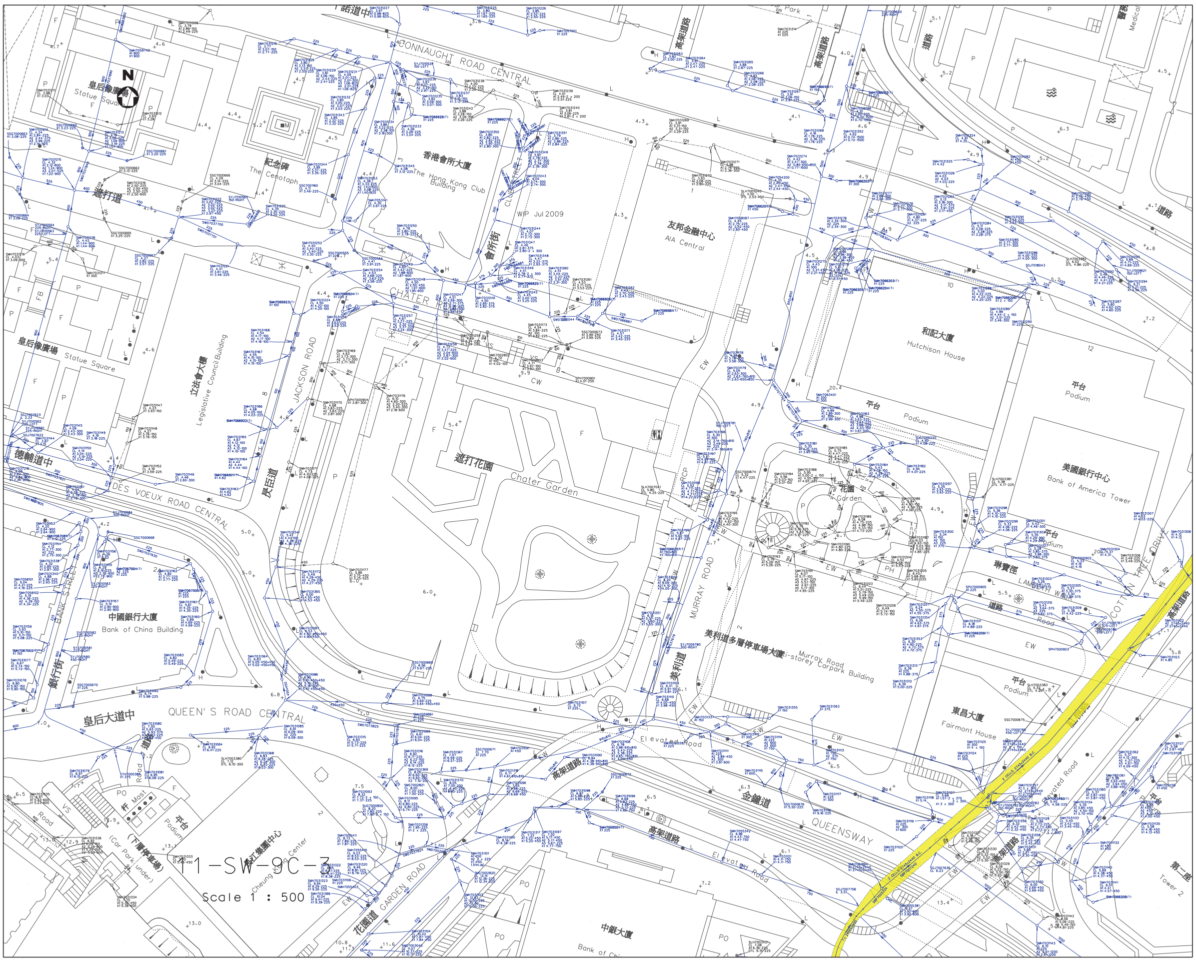
Adequacy of Drains 1 - 9 &11-14

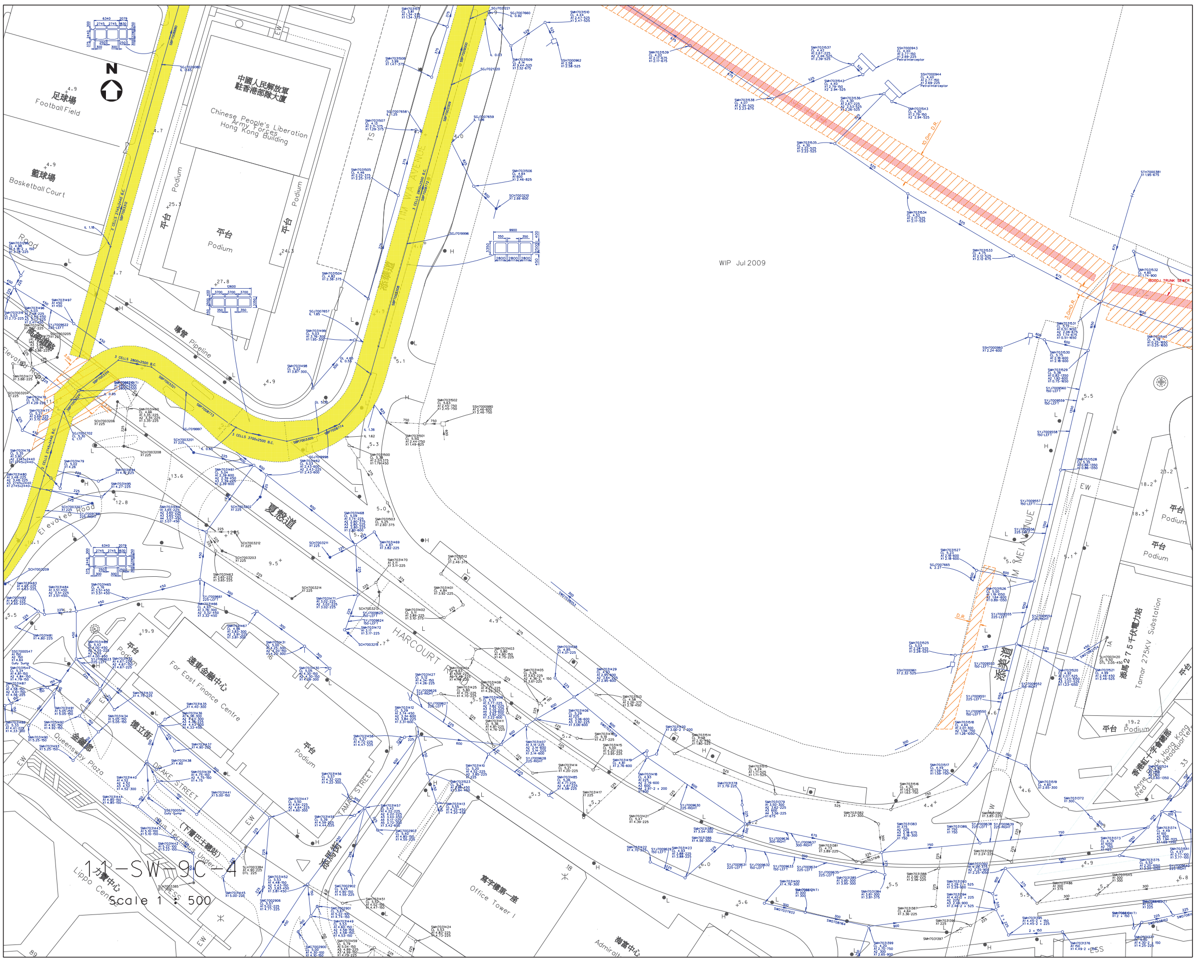
Result of 1 in 50 Yrs Design Period

Location of Pipes

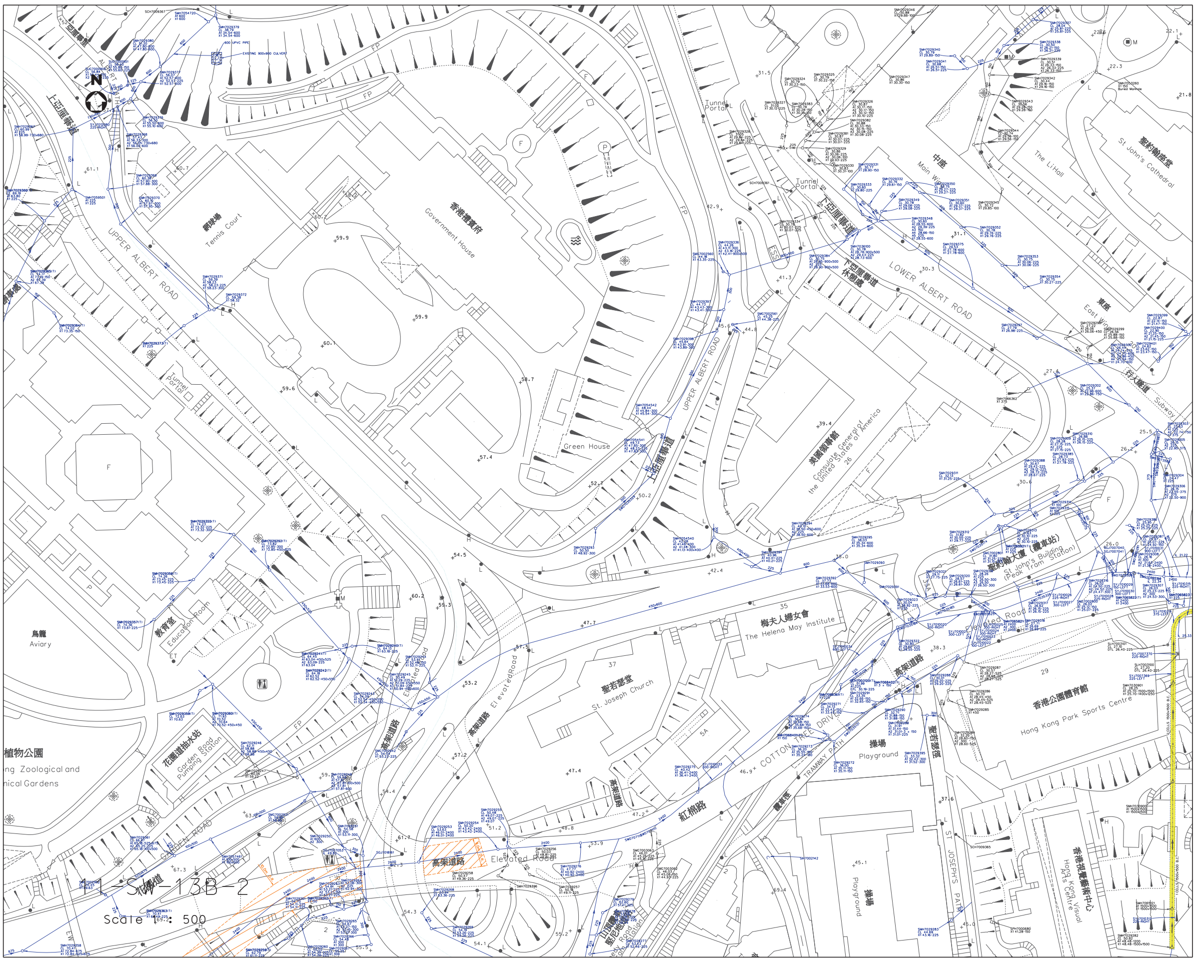
	Node No.	Flood Depth (m)	Node No.	Flood Depth (m)	Pipe Size (mm)	Handle 50 Yrs Design Storm ?
Drain 1	SMH7048886	0.105	SGJ7013053	0	300	No
Drain 2	SMH7029358	0	SMH7029361	0.121	525 x 675	No
Drain 3	SMH7029253	0	SMH7029254	0	2400	Yes
Drain 4	SMH7029308	0	SMH7029438	0	2400	Yes
Drain 5	SMH7029420	0.102	SMH7031104	0.101	450	No
Drain 6	SGJ7019992	0	SMH7055356	0.147	2400 x 2400	No
Drain 7	SMH7031357	0	SMH7031122	0	2745 x 2440	Yes
Drain 8	SMH7031122	0	SMH7031480	0	2745 x 2440	Yes
Drain 9	SMH7031130	0	SMH7031358	0	450	Yes
Drain 11	SMH7029500	0	DownStream	0.134	450	No
Drain 12	SMH7031101	0.101	SMH7031317	0	450	No
Drain 13	SMH7031096	no record *	SMH7031091	no record *	450	-
Drain 14	SMH7031316	no record *	SMH7031089	no record *	225	-

Please note that the above figures are ***for information only*** . All records are extracted from the past DMP Study submitted by Consultants, pipe network in the model may be not updated and not tallied with existing drainage record.

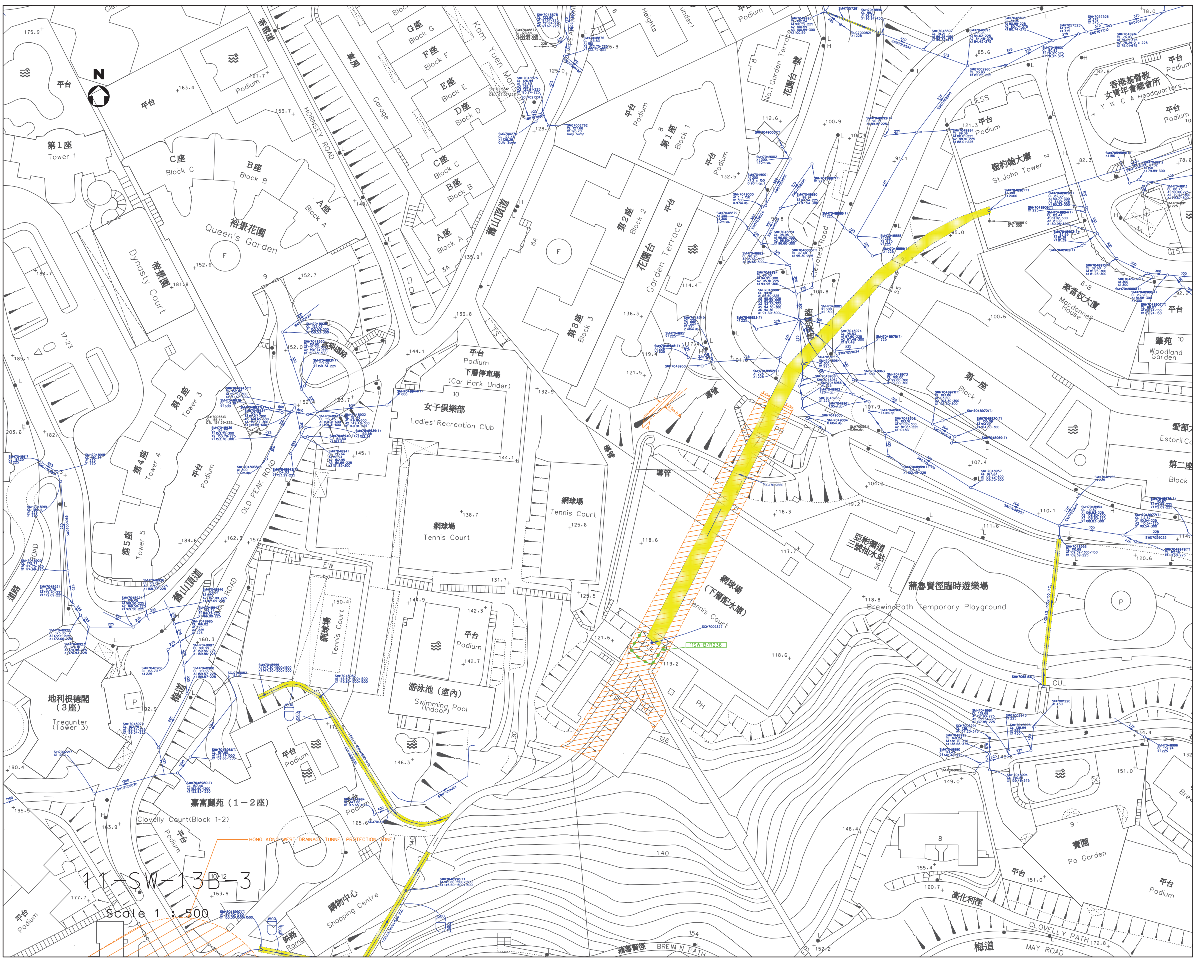

N
皇后像廣場
Statue Square
紀念碑
The Cenotaph
香港會所大廈
The Hong Kong Club Building
遮打道
CHATER
CONNAUGHT ROAD CENTRAL
友邦金融中心
AIA Central
和記大廈
Hutchison House
平台
Podium
美國銀行中心
Bank of America Tower
立法會大樓
Legislative Council Building
JACKSON ROAD
遮打花園
Chater Garden
德輔道中
DES VOEUX ROAD CENTRAL
中國銀行大廈
Bank of China Building
皇后大道中
QUEEN'S ROAD CENTRAL
MURRAY ROAD
美利道
美利道多層停車場大廈
Murray Road Multi-storey Carpark Building
東昌大廈
Fairmont House
金鐘道
QUEENSWAY
Elevated Road
花園道
GARDEN ROAD
中銀大廈
11-SW-9C-3
Scale 1 : 500
WIP Jul 2009

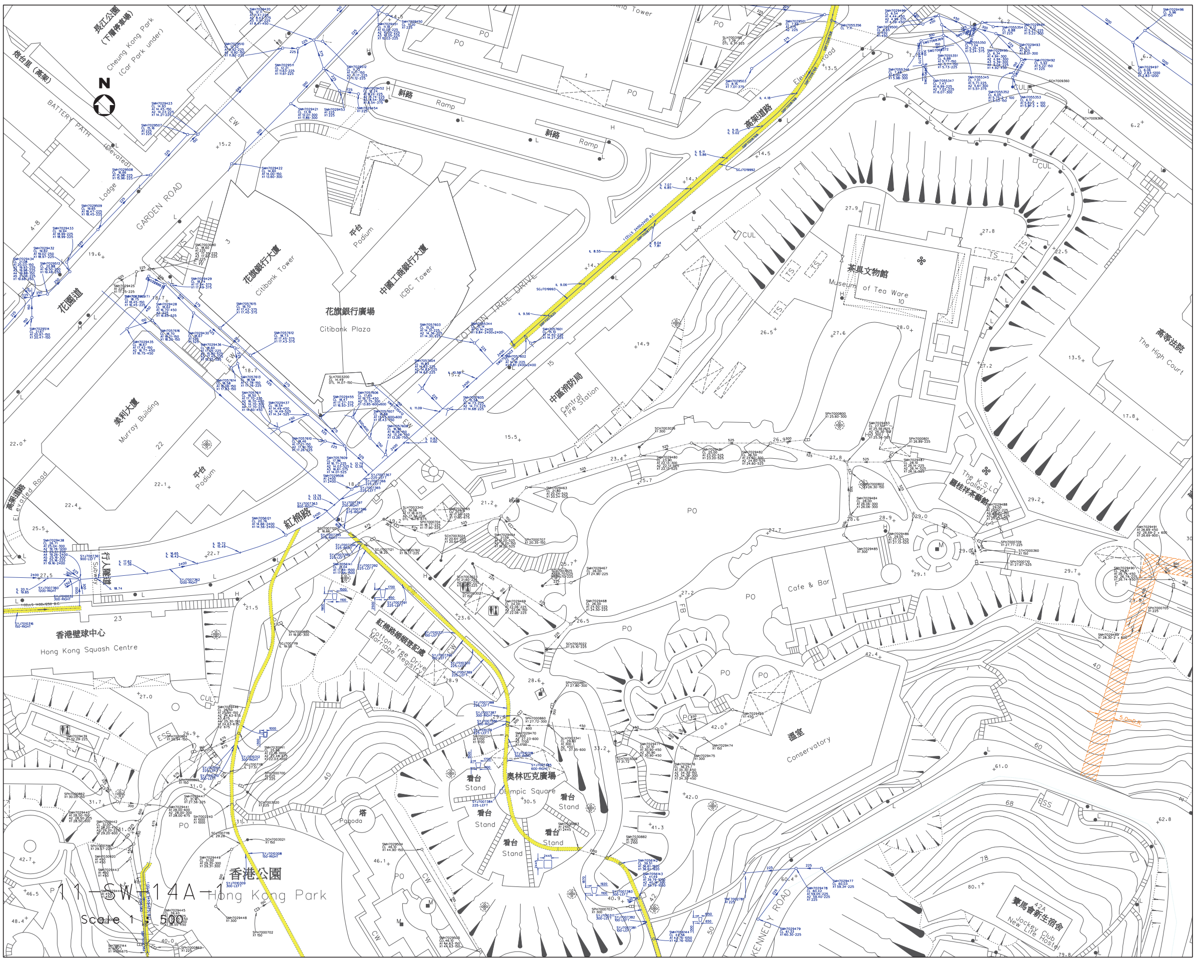


N
足球場
Football Field
籃球場
Basketball Court
中國人民解放軍駐香港部隊大廈
Chinese People's Liberation Army Forces Hong Kong Building
平台
Podium
喉管 Pipeline
WIP Jul 2009
夏慤道
HARCOURT ROAD
遠東金融中心
Far East Finance Centre
添馬艦275千伏電力站
Tamar 275kV Substation
海富中心
Office Tower 1
Lippo Centre
Queensway Plaza
DRAKE STREET
11-SW-9C-4
Scale 1 : 500



Scale 1: 500
香港禮賓府
Government House
網球場
Tennis Court
UPPER ALBERT ROAD
LOWER ALBERT ROAD
Green House
美國領事館
梅夫人婦女會
The Helena May Institute
聖若瑟堂
St. Joseph Church
COTTON TREE DRIVE
紅棉路
香港公園體育館
Hong Kong Park Sports Centre
Playground
操場
Elevated Road
高架道路
鳥籠
Aviary
Education Room
花園道抽水站
Garden Road Pumping Station
Zoological and
Gardens
植物公園
St John's Cathedral
聖約翰座堂
The Li Hall
Main Wing
中座
East
東座
Subway
行人隧道
ST JOSEPH'S PATH
Tunnel Portal


11-SW-13B-3
Scale 1 : 500
N
女子俱樂部
Ladies' Recreation Club
網球場
Tennis Court
游泳池（室內）
Swimming Pool (Indoor)
帝景園
Dynasty Court
裕景花園
Queen's Garden
花園台
Garden Terrace
聖約翰大廈
St.John Tower
麥當奴大廈
Macdonnell House
嘉富麗苑（1－2座）
Clovelly Court(Block 1-2)
地利根德閣（3座）
Tregunter (Tower 3)
購物中心
Shopping Centre
寶園
Po Garden
蒲魯賢徑臨時遊樂場
Brewin Path Temporary Playground
舊山頂道
OLD PEAK ROAD
梅道
MAY ROAD
CLOVELLY PATH
HORNSEY ROAD
平台
Podium



N
長江公園
(下層停車場)
Cheung Kong Park
(Car Park under)
BATTERY PATH
GARDEN ROAD
花園道
斜路
Ramp
花旗銀行大廈
Citibank Tower
中國工商銀行大廈
ICBC Tower
平台
Podium
花旗銀行廣場
Citibank Plaza
COTTON TREE DRIVE
中區消防局
Central Fire Station
美利大廈
Murray Building
紅棉路
茶具文物館
Museum of Tea Ware
高等法院
The High Court
Cafe & Bar
香港壁球中心
Hong Kong Squash Centre
溫室
Conservatory
奧林匹克廣場
Olympic Square
看台
Stand
塔
Pagoda
香港公園
Hong Kong Park
KENNEDY ROAD
賽馬會新生宿舍
Jockey Club New Life Hostel
11-SW-14A-1
Scale 1 : 500