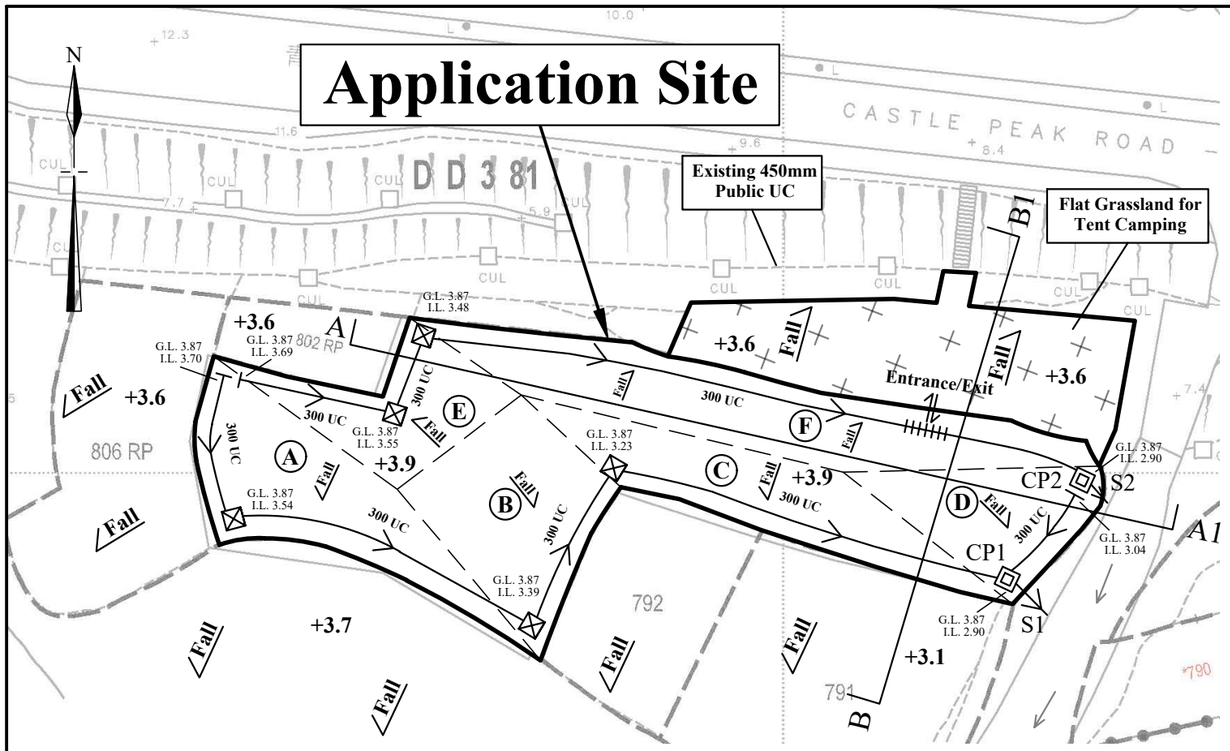
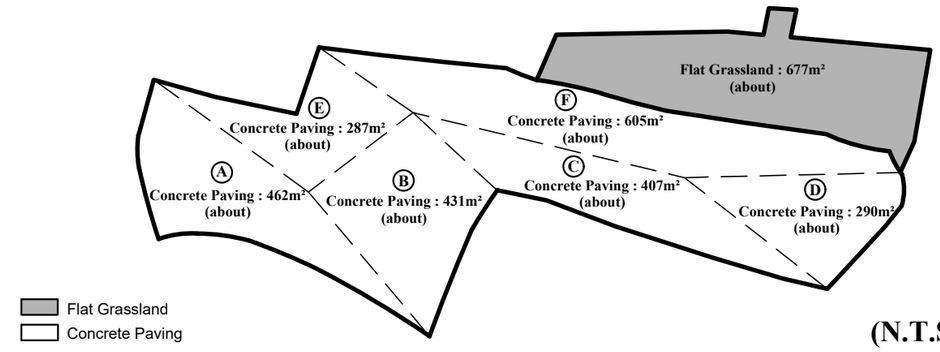
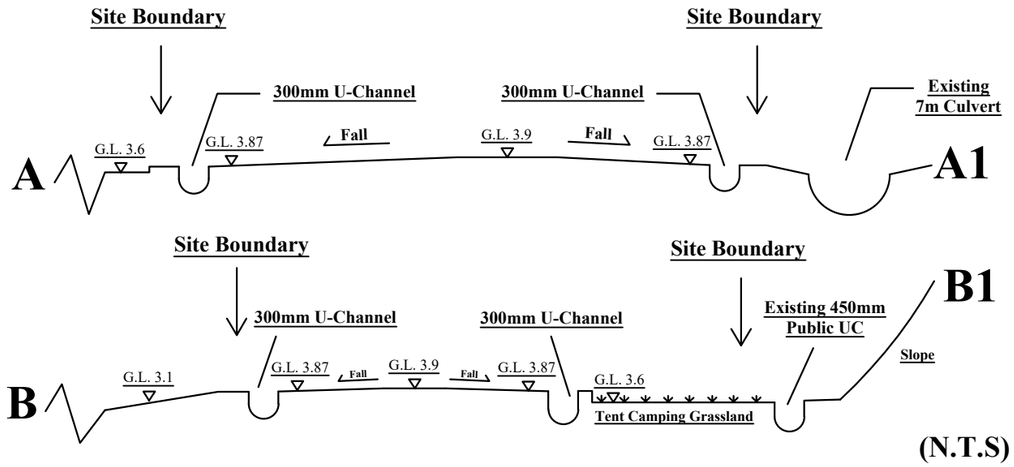


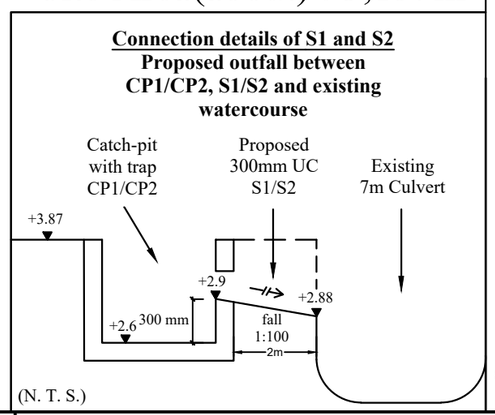



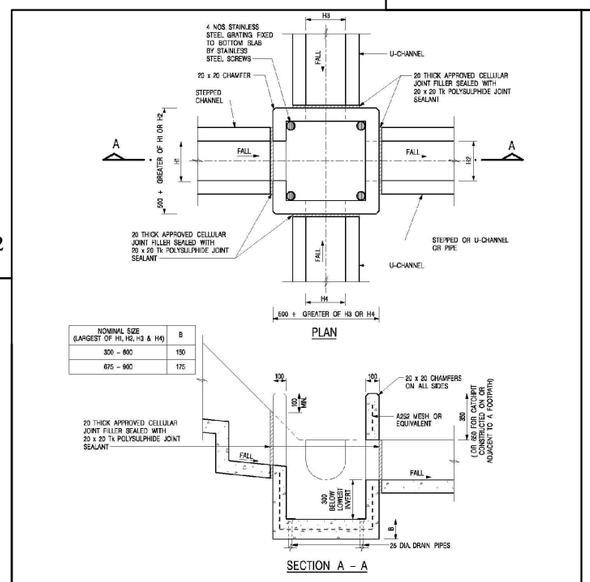




## Legend:

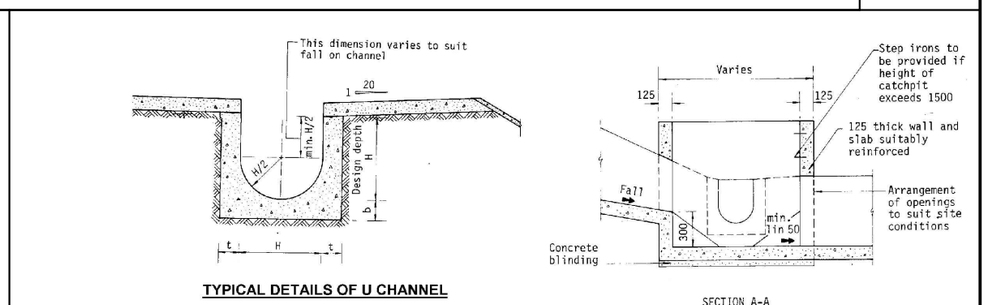
- Proposed Catch-pit
- Proposed Catch-pit with trap
- Proposed 300mm U-Channel
- Proposed UC with C.I cover
- Boundary of Catchment Area
- Flat Grassland

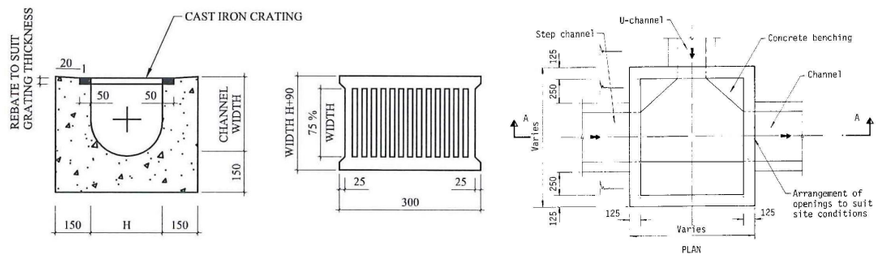
Site Area(about) : 3,159m²




DETAILS OF CATCHPIT WITH TRAP
(REFER TO CEDD'S STANDARD DWG. C2406/1)




1:750 (A3)

February 2023

# Drainage Proposal

Lot 788(part), 790(part), 793, 794 & 801 RP in D.D. 381
and Adjoining Government Land
Tuen Mun, New Territories

**Goldrich Planners & Surveyors Ltd.**

**Plan 5**
**( P 22015 )**

1. For Catchment Area A

Ref.

Area, A = 462 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 19.5 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (19.5) / (0.1^0.2*462^0.1) — SDM 7.5.2 (d)
= 2.4 min

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 3.70 | 3.39 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 46.8 m
Depth of vertical part of u-channel, d = 330 mm
Gradient of u-channel, $S_f$ = (3.7-3.39)/46.8 = 0.007

Cross-Section Area, a = $0.5 \pi r^2 + w d$ = 0.5 x 3.14 x 150^2 + 300 x 330
= 0.134 $m^2$
Wetted Perimeter, p = $\pi r + 2 d$ = 3.14 x 150 + 2 x 330
= 1.131 m
Hydralic radius, R = a / p — SDM 8.2.1
= 0.119 m

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.119)^1/6 x (0.119 x 0.007)^1/2 / 0.016 — SDM Table 12
= 1.23 m/s
Time of flow, $t_f$ = 0.6 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (2.4+0.6+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 299

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 462.0 | 438.9 |
| | | SUM = | 438.9 |

— SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 299 x 438.9 / 1000000 + 0
= 0.036 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.134 x 1.23
= 0.165 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

| | | |
|---|---|---|
| Scale: NA | **Drainage Calculation** | Goldrich Planners & Surveyors Ltd. |
| June 2023 | Lots 793, 794 and 801 RP in D.D. 381 and Adjoining Government Land, Tuen Mun, New Territories | Page 1 (P22015) |

1 For Catchment Area B

Ref.

Area, A = 431 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 24 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (24) / (0.1^0.2*431^0.1) — SDM 7.5.2 (d)
= 3.0 min

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 3.39 | 3.23 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 23.4 m
Depth of vertical part of u-channel, d = 490 mm
Gradient of u-channel, $S_f$ = (3.39-3.23)/23.4 = 0.007

Cross-Section Area, a = $0.5 \pi r^2 + w d$ = 0.5 x 3.14 x 150^2 + 300 x 490
= 0.182 $m^2$
Wetted Perimeter, p = $\pi r + 2 d$ = 3.14 x 150 + 2 x 490
= 1.451 m
Hydralic radius, R = a / p — SDM 8.2.1
= 0.126 m

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.126)^1/6 x (0.126 x 0.007)^1/2 / 0.016 — SDM Table 12
= 1.30 m/s
Time of flow, $t_f$ = 0.3 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (3+0.3+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 295

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 431.0 | 409.5 |
| | | SUM = | 409.5 |

— SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0.036 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 295 x 409.45 / 1000000 + 0.036
= 0.070 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.182 x 1.3
= 0.236 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

1 For Catchment Area C

Ref.

Area, A = 407 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 16.5 m

Time of concentraction, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (16.5) / (0.1^0.2*407^0.1) — SDM 7.5.2 (d)
= 2.1 min

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 3.23 | 2.90 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 50.1 m
Depth of vertical part of u-channel, d = 820 mm
Gradient of u-channel, $S_f$ = 3.23-2.9)/50.1 = 0.007

Cross-Section Area, a = $0.5\ \pi r^2 + w\ d$ = 0.5 x 3.14 x 150^2 + 300 x 820
= 0.281 $m^2$
Wetted Perimeter, p = $\pi\ r + 2\ d$ = 3.14 x 150 + 2 x 820
= 2.111 m
Hydralic radius, R = a / p — SDM 8.2.1
= 0.133 m

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.133)^1/6 x (0.133 x 0.007)^1/2 / 0.016 — SDM Table 12
= 1.32 m/s
Time of flow, $t_f$ = 0.6 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (2.1+0.6+4.2)^0.4; for return period T = 50 years — SDM Table 3
= 305

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 407.0 | 386.7 |
| | | SUM = | 386.7 |

— SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0.07 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 305 x 386.65 / 1000000 + 0.07
= 0.103 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.281 x 1.32
= 0.372 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

1 For Catchment Area D

Ref.

Area, A = 290 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 27.8 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (27.8) / (0.1^0.2*290^0.1) — SDM 7.5.2 (d)
= 3.6 min

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 3.04 | 2.90 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 20.7 m
Depth of vertical part of u-channel, d = 820 mm
Gradient of u-channel, $S_f$ = (3.04-2.9)/20.7 = 0.007

Cross-Section Area, a = $0.5\ \pi r^2 + w\,d$ = 0.5 x 3.14 x 150^2 + 300 x 820
= 0.281 $m^2$
Wetted Perimeter, p = $\pi\ r + 2\,d$ = 3.14 x 150 + 2 x 820
= 2.111 m
Hydralic radius, R = a / p — SDM 8.2.1
= 0.133 m

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.133)^1/6 x (0.133 x 0.007)^1/2 / 0.016 — SDM Table 12
= 1.34 m/s
Time of flow, $t_f$ = 0.3 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (3.6+0.3+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 286

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 290.0 | 275.5 |
| | | SUM = | 275.5 |

— SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0 $m^3/s$

Design flow, $Q_d$ = $0.278i\ \Sigma\ C_jA_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 286 x 275.5 / 1000000 + 0
= 0.022 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.281 x 1.34
= 0.377 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

1 For Channel Section S1

Ref.

Area, A = 0 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 0 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (0) / (0.1^0.2*0^0.1) — SDM 7.5.2 (d)
= 0.0 min

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 2.90 | 2.88 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 2 m
Depth of vertical part of u-channel, d = 840 mm
Gradient of u-channel, $S_f$ = (2.9-2.88)/2 = 0.010

Cross-Section Area, a = $0.5 \pi r^2 + w d$ = 0.5 x 3.14 x 150^2 + 300 x 840
= 0.287 $m^2$
Wetted Perimeter, p = $\pi r + 2 d$ = 3.14 x 150 + 2 x 840
= 2.151 m
Hydralic radius, R = a / p — SDM 8.2.1
= 0.134 m

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.134)^1/6 x (0.134 x 0.01)^1/2 / 0.016 — SDM Table 12
= 1.63 m/s
Time of flow, $t_f$ = 0.02 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (0+0.02+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 375

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 0.0 | 0.0 |
| | | SUM = | 0.0 |

SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0.125 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 375 x 0 / 1000000 + 0.125
= 0.125 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.287 x 1.63
= 0.469 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

1. For Catchment Area E

Ref.

Area, A = 287 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 15.8 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (15.8) / (0.1^0.2*287^0.1) — SDM 7.5.2 (d)
= 2.1 min

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 3.69 | 3.48 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 31.5 m
Depth of vertical part of u-channel, d = 240 mm
Gradient of u-channel, $S_f$ = 3.69-3.48)/31.5 = 0.007

Cross-Section Area, a = $0.5 \pi r^2 + w d$ = 0.5 x 3.14 x 150^2 + 300 x 240
= 0.107 $m^2$
Wetted Perimeter, p = $\pi r + 2 d$ = 3.14 x 150 + 2 x 240
= 0.951 m
Hydralic radius, R = a / p — SDM 8.2.1
= 0.113 m

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.113)^1/6 x (0.113 x 0.007)^1/2 / 0.016 — SDM Table 12
= 1.19 m/s
Time of flow, $t_f$ = 0.4 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (2.1+0.4+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 309

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 287.0 | 272.7 |
| | | SUM = | 272.7 |

SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 309 x 272.65 / 1000000 + 0
= 0.023 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.107 x 1.19
= 0.128 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

1. For Catchment Area F

Ref.

Area, A = 605 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 9 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (9) / (0.1^0.2*605^0.1) = 1.1 min — SDM 7.5.2 (d)

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 3.48 | 2.90 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 88.3 m
Depth of vertical part of u-channel, d = 820 mm
Gradient of u-channel, $S_f$ = (3.48-2.9)/88.3 = 0.007

Cross-Section Area, a = $0.5 \pi r^2 + w d$ = 0.5 x 3.14 x 150^2 + 300 x 820 = 0.281 $m^2$
Wetted Perimeter, p = $\pi r + 2 d$ = 3.14 x 150 + 2 x 820 = 2.111 m
Hydralic radius, R = a / p = 0.133 m — SDM 8.2.1

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.133)^1/6 x (0.133 x 0.007)^1/2 / 0.016 = 1.32 m/s — SDM Table 12
Time of flow, $t_f$ = 1.1 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (1.1+1.1+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 315

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 605.0 | 574.8 |
| | | SUM = | 574.8 |

— SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0.023 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 315 x 574.75 / 1000000 + 0.023
= 0.073 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.281 x 1.32
= 0.372 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD

1 For Channel Section S2

Ref.

Area, A = 0 $m^2$
Average slope, H = 0.1 m per 100m
Distance on the line of natural flow, L = 0 m

Time of concentration, $t_o$ = $0.14465L / (H^{0.2}A^{0.1})$ = 0.14465 (0) / (0.1^0.2*0^0.1) = 0.0 min — SDM 7.5.2 (d)

2 For Existing U-Channel in catchment area A1

| | From | To |
|---|---|---|
| Ground level (mPD) | 3.87 | 3.87 |
| Invert level (mPD) | 2.90 | 2.88 |

Width of u-channel, w = 300 mm
Length of u-channel, $L_c$ = 2 m
Depth of vertical part of u-channel, d = 840 mm
Gradient of u-channel, $S_f$ = (2.9-2.88)/2 = 0.010

Cross-Section Area, a = $0.5 \pi r^2 + w d$ = 0.5 x 3.14 x 150^2 + 300 x 840 = 0.287 $m^2$
Wetted Perimeter, p = $\pi r + 2 d$ = 3.14 x 150 + 2 x 840 = 2.151 m
Hydralic radius, R = a / p = 0.134 m — SDM 8.2.1

3 Use Manning Equation for estimating velocity of stormwater

Take n = 0.016 for concrete lined channels:- — SDM Table 13
Allowable velocity, v = $R^{1/6} x (RS_f)^{1/2}/n$ = (0.134)^1/6 x (0.134 x 0.01)^1/2 / 0.016 = 1.63 m/s — SDM Table 12
Time of flow, $t_f$ = 0.02 min

4 Use "Rational Method" for calculation of design flow

Design intensity, i = $a / (t_o + t_f + b)^c$ — SDM 4.3.2
= 687 / (0+0.02+4.2)^0.42 for return period T = 50 years — SDM Table 3
= 375

| Type of surface | Runoff Coefficient C | Catchment Area A ($m^2$) | C x A |
|---|---|---|---|
| Flat Glassland(heavy soil) | 0.25 | 0.0 | 0.0 |
| Concrete Paving | 0.95 | 0.0 | 0.0 |
| | | SUM = | 0.0 |

SDM 7.5.2 (b)

Upstream flow, $Q_u$ = 0.073 $m^3/s$

Design flow, $Q_d$ = $0.278i \Sigma C_j A_j + Q_u$ where $A_j$ is in $km^2$ — SDM 7.5.2 (a)
= 0.278 x 375 x 0 / 1000000 + 0.073
= 0.073 $m^3/s$

Allowable flow, $Q_a$ = a x v
= 0.287 x 1.63
= 0.469 $m^3/s$

> $Q_d$ (O.K.)

Reference was made to Stormwater Drainage Manual (SDM) by DSD