Appendix 5 Flow Calculation of Sewer Network

Hydraulic Calculation for Design of Sewers

| :0.00028453 m²/s·ha | Remarks | | | | | | | | | | | | | | | | |
|---------------------|-----------------------------|---------------|-----------------|----------|--------|----------------|----------------|--|----------------|--------------|------------|---------------------------------------|--------------|---|--------------|----------------|---|
| · | Earth Cover | E | 55.53 | <u> </u> | 150 | 150 | 228 | | 205 | 228 | 150 | 150 | 150 | | 150 | 150 | - |
| | Invert Level | × | \$2528 80331 | | 81327 | 80331 74231 | 80331 79556 | | 80331 79781 | 79551 | 78329 | 74231 | 74228 | | 76328 | 71175 | 1 |
| Sewers | noisevala | × | 9420 8200 | | 8 200 | 8200 7590 | 8200 8200 | | 8200 8200 | 8200 7900 | 79:00 | 7590 | 7590 7290 | | 78C0 72S0 | 72.90 65.80 | |
| g of S | WO | m³/sec | 88200 | | 0.00 | 0.0266 | 0.0108 | | . 8010:0 | 0.0321 | 00133 | 00135 | 0:0322 | | 0:0240 | 0000 | |
| Designing of Sewers | Velocity | 1 | 1318 | | 1110 | 1505 | 6090 | | 0.609 | 1816 | 0751 | 1104 (| 1822 | | 1357 | 1919 | |
| 8 | adol2 | 36 | 23.40 | | 1660 | 3050 | 200 | | 200 | 44.40 | 760 | 1640 | 4470 | | 24.80 | 3380 | |
| | neter | E E | 150 | | 150 | 150 | 150 | | 150 | 150 | 150 | 1.50 | 150 | | 150 | 500 | |
| - 1 | 7 ngiseO | 33, | 0.003 | | 000010 | 000450 | 00000 | | O 6000 | 000130 | 000020 | 00024 ⊙ | 00000 | | 000000 | 000000 | |
| 3= | Total Tot brishal | m³/sec m³ | | | 0 | | 0 | | 8 | 8 | 6 | | | | 0 | | |
| Other W. | 10401 | - | | | | | | | | | | | | | | | - |
| 8 | Sewer | c m3/sec | | | === | | g | | - 5 | - 6 | 22 | 2.4 | 0, | | 92 | 0 | - |
| Mo_ | ngisa0 wol7 | m³/sœ | 00039 | | 10000 | 0:0045 | 60000 | | 50000 | 00018 | 0000 | 00024 | 0.00070 | | 00000 | 08000 | |
| Wastewater Flow | Population Sewer Total | Person | | | | | | | | | | | | | | | - |
| Wast | Valenty | Peyha | <u> </u> | | | <u>-,</u> | | <u> </u> | | | | | | | | | - |
| | Rainfall ,qo9 | ag >ss/t™ | | | | | | | | | | | | | | | |
| | <u></u> | | | | | · | | | | | | | | | | | |
| Run-off Storm | Arranged Area Area Total | ha | | | | | | | | | | | | | | | - |
| -Jo-nf | Arrai Area | ha | | | | - | | | | | | | | - | | | |
| | IslaisA Tio-nuA | т³/зес∙па | | | | | | | | | | | | | | | |
| | Soncentra SmiT | min m³/ | | | | | | | | | | · · · · · · · · · · · · · · · · · · · | | | | | |
| | IstoT | E | 520 | | 60 | 720 | 155 | | 110 | 20.5 | 130 | 393 | 787 | | 205 | 997 | |
| Length | կյեսթյ | E | 520 | | 90 | 002 | 155 | | 110 | 20 | 130 | 188 | 67 | | 202 | 210 | |
| e Area | lstoī | ha | 1368 | | 0:37 | 15:91 | 3.19 | | 332 | 651 | 080 | 827 | 2453 | | 1.59 | 28:04 | |
| Drainage Area | 691A | ha | 1368 | | 037 | 186 | 313 | | 3:22 | 000 | 080 | 960 | 035 | | 159 | 1.92 | |
| | омлаттевш оМ глэжэ | | 89 | ~~~ | | Or | 40 | | | æ | | | 11 | | | 13 | |
| នរ | ewe2 lo . | ON . | 7 | | د، | က | 44 | • | 5 | 3 | | د | CF9 | | 10 | . 11 | |

| .00028453m²/s | | Remarks | • | | | | | - NATIONAL - | | | | *************************************** | | | | | | | |
|---------------|------------|----------------------------|-------------------------|----|--------|------------------------|----|------------------------|---|---------|--------------|---|---------|----------------|----------------|---|------------------------|----------------|----------|
| :0. | | Earth Cover | E | | 150 | 150 | | 1550 | | 150 | 182 | | 15.0 | 150 | 150 | | 150 | 150 | . Y. |
| • | , | tavert level | Z | | 70227 | 54075 150 58975 150 | | 79326 151 71231 150 | | 71231 | 70907 | | 74228 | 72727 58131 | 68129 63631 | | 65130 150 63631 150 | 53630 59031 | 583075 |
| | Severs | noiteval | 3 % | - | 7190 | 65.80 | | 8100 7290 | | 7290 | 7290 6980 | | 7590 | 7440 | 6530 6530 | | 6580 | 6530 | |
| | ्रे | wo] ⁻] | m³/sec | ļ, | 000386 | 000518 | | 0.0247 | | 00108 | 0.0275 | <u> </u> | 00141 | 0.0254 | 00361 | | 000223 | 0.0319 | |
| | Designing | Yfiool9 | 52 | | 2242 0 | 1647 | | 1385 | | 0.609.0 | 1556 0 | | 0.799 0 | 1437 0 | 2043 0 | | 1261 | 1804 0 | - |
| | ۵ | adol2 | 3.6 | | 67.70 | 24.90 | | 2620 | | မ္တိ | 3260 | | 8.60 | 2780 | 5620 | | 2140 | 4380 | . |
| | | 1⊖jemsį(|) E | | 150 | 200 | |) 150 | |) 150 |) 150 | |) 150 |) 150 |) 150 | | 150 |) 150 | |
| | İ | olbns10 IngiaeO r——— | m³/sec | | 000020 | 000880 | | 090000 | | 000010 | 080000 | | 00004 | 00000 | 000170 | | 0000 | 0,00210 | ļ |
| | W. W | latoT | 305/cm | | | | | | | | | | | | | | | | |
| | Other | 19\\\9\\ | m ² /300 r | | | | | , | | | | | | | | | | | |
| | | Design Wol7 | m³/sec 1 | | 00000 | 00088 | | 90000 | | 00001 | 60000 | | 0:0004 | 00000 | 00017 | | 00000 | 00021 | |
| | ter Flow | | 1 | | | 3 | | | | | 0 | | 0 | 0 | 0 | | - | 0 | - |
| | Wastewater | Popul | Person | | | | | | | | | | | | | | | | |
| | 3 ⊏ | ,qoq YtiansQ | Pe | ļ | | _ | | | | | | | | | | | | | - |
| | | Lleinie? | æς/ _ε μι | | | | | | | | | | | | | | | | |
| | torm | sed Area Total | Па | | | | | | , | | | | | | ********** | | | | ļ |
| | Run-off St | Arrang | الة الا | | | | | | | | | | - | | | | | | |
| | R | Nun-off Goeffi. | | | | | | | | | | | | | | | | | |
| | | l le înie? | т/sec·ha | | | | | | | | | | | | | | | | |
| | | Thosonol SmiT | = | | | | | | | | | | | . 1 | | - | | | |
| | Length | Total | Е | | 08 | 5 1202 | ٠. | 308 | | 5 65 | 393 | | 3 173 | 338 | (73 | | 0, 10 | 578 | |
| | | геидцу | E. | | 06 | 205 | | 308 | | 65 | 85 | | 173 | 165 | 80 | | 7.0 | 105 | |
| | ge Area | IsfoT | hz | | 0.85 | 3089 | | 2.19 | | 0:20 | 33. | | 141 | 245 | 6.02 | | 0.73 | 7.22 | |
| | Drainage | Area | ha | | 0.85 | 200 | | 2.19 | | 050 | 0.54 | | 17: | 104 | 034 | | 0.73 | 0.47 | |
| | | owistrea owers No | | | | 22 | | 18 | | | 13 | | | | 21 | | | | |
| İ | | was to | | | 12 | 13 | | 16 | | 17 | 18 | | 7 | 15 | 19 | | 20 | 21 | |

| ⊕ | :0.00028453 m³/s-ha | | Renarks | | | | 77. | | | | | | | The second secon | 77.7.7.7.7. | | | | |
|-------------|---------------------|---------------|---------------------------|----------------------|----------------------|---|------------------|----------------------|----------|----------------------|------------------|----|------------------|--|-------------|-----------|------------|------------|--------|
| · [| | | Level Earth Tover | E | 27 150 31 150 | | 31 150 | 75 150 75 150 | | 30 150 31 150 | 28 150 31 150 | | 30 150 31 150 | 28 150 31 150 | | 31 150 | 30 150 | 28 150 | |
| | | rs. | 119Vn | × | 90 742 80 691 | | 90 742 80 691 | 80 59075 30 63575 | | 00 81330 00 80331 | 30 77631 | | 803 | 30 776. 90 752 | | 7.83 | 7.522 | 30 75228 | - |
| | • | of Sever | noiteval∃ | | 31 7530 | | 335 7080 | 7080 | | 8300 | 19 7930 | ļ. | 44 7930 | 7930 | | 32.00 | 8000 | 30 72:90 | - |
| | | gning | Velocity Wold | m/sec m3/sec | 1310 00231 | | 1398 003 | 1412 00444 | | 1284 00227 | 1240 00219 | | 1382 00244 | 1554 00282 | | 124 00305 | 1147 00203 | 1358 00330 | |
| | | SaQ | Slope | } 3€ | 2310 13 | | 4850 18 | 1830 | | 22.20 12 | 20.70 1.2 | | 2570 13 | 3420 15 | | 4000 17 | 1770 | 4700 13 | - |
| | | | Diameter | E U | 150 | - | 150 | 200 | | 150 | 150 | | 150 | 150 | | 150 | 150 | 150 | |
| (| | | oTbnsı∂ Ingiae0 | 29S/ _{LIII} | 000023 | | 000450 | 000750 | | 00000 | 00003 | | 00000 | 00000 | | 00003 | 090000 | 00014 | |
| , | | ≱= 3= | Total | æs/ _ε μι | | | 00042 | 000042 | | | | | | | | | | | -{ |
| 3 | | Other | 19мэС | m³/sæ | | | 0:0042 | | | | | | | | | | ********** | | |
| 6 | | Flow | ngisə(l wol-] | 30S/μ μ | 00023 | | 0,0003 | 0,0033 | | 00001 | 0,0003 | | 00005 | 0000 | | 0.0003 | 00000 | 00014 | |
| į. | | Wastewater F | Population Sewer Total | Person | | | | | | | | | | | | | | | |
| A | | Waste | Pop, Series | Реула F | | | | | <u>.</u> | | | | | | | | | | |
|) | | | Istnis8 | m³/sec P | | | | •••• | | | | | | | | | | | |
| Siek | | E | d Area Total | ha | | | | | | | | | | | | | | | |
| of Sel | | off Storm | Arranged Area To | | | | | | | | | | | | | | | | |
| Design (| | Run-off | fio-muA illocol | | | | | | | | | | | | | | | | |
| for Des | | | lstnisA | m³∕sec-ba | | | | | | | | | | | | | | | |
| 2 | | atec | tneonoo emiT | min | | | | | | | | | | | | | | | |
| at | | Length | lstoT | В | 220 | | 105 | 520 | | 45 | 175 | | 105 | 245 | | 20 | 225 | 330 | |
| Calculation | Ļ | | րերց Մեր | E | 220 | | 105 | 300 | | 45 | 130 | | 105 | 70 | | 20 | 175 | 8.5 | i |
| | | Drainage Area | lstoT | ha | 301 | | 660 | 1174 | | 020 | 111 | | 077 | 230 | | 700 | 205 | 477 | · |
| Hydraulic | | Drain | Area | ha | 801 | | 660 | 274 | | 020 | 0.61 | | 0.77 | 0.42 | | 100 | 105 | 0.42 | |
| | | | Downstres Sewers Mc | • | 35 | | | 36 | | | 26 | | | 29 | | | | 32 | |
| | | S19l | vec to co | N | 88 | | 3.4 | 35 | | 23 | 24 | | 25 | 26 | | 27 | 82 | 29 | |

00628453 m³/s-ba Remarks 0: Earth Cover 30 62075 150 70 59975 150 150 71,229 150 63,631 150 150 6530 63575 150 6530 63175 190 6530 63631 150 6530 63175 190 6330 62075 150 150 150 00513 5770 55975 150 5610 54269 150 150 E 7590 74228 7290 71231 5610 54431 00273 6380 62131 00240 6170 60031 78:331 Level × Invert 7290 Sewers 63.80 Diteval3 Z J 02000 P 00286 0:0549 0.0281 00420 0:1164 0.0436 00100 00317 ing of m / 580 F[0M 1589 5 2468 1018 1:795 0,660 1337 1544 1747 1357 1:634 1:647 0 385/₩ Velocity .9. èsi 3400 1640 3210 8200 4 3:4 0 28:00 2480 1450 3530 1390 ...00. 2450 90018 36 150 150 150 150 150 200 2002 200 200 300 150 150 1919msiQ 002260 001050 001030 000000 0:0108 001130 0,00068 wol∃ragiae⁄0 m³ / sec Grand Total 030042 00042 00042 000042 m²/sec Total 3 Other m3/sec **Зеже**г ĸ 20000 00000 0,0063 0:0026 99000 00000 0:0184 00008 m³/sæ 0:0071 00061 WO! 7 บธิเรลา <u>F</u>10₩ ಲ Population Total Person Wastewater Seirer ١., Pe//ha Visne(Pop <€ m3/500 Rainfal Arranged Area Total Hydraulic Calculation for Design of Sewers 13 Run-off Storm Area ha ilo-∩uЯ illeoO m³/sec∙ha | TeanisA Concentrated Fine n in 265 20 505 620 ×0 069 1432 140 765 928 130 Ε Total Length 215 2 145 8 80 5 163 110 175 100 130 գլճսթդ ٤ 2219 23:34 Area 1:30 2133 0.76 960 111 2498 6467 2394 92.9 Total Ę, Drainage / 0.78 .g. 010 960 .<u>=</u> 180 125 E... 0.64 2394 꾱 Z. Area Sewers No. က 40 7.5 45 Downstream 30 55 32 38 رم ဆ 33 40 ---t 5. 42 7 No. of Severs

| :0.00028453m³/s-ha | | Remarks | | | | | | | | | ************************************** | | | | | | | |
|--------------------|-----------------|------------------------------|------------|-----------------|--------------|---------------------------------------|--------------|--------------|--------|----------------|--|----------------------|---|--------------|----------------|----------|----------------|--------|
| 1 .** | - | Earth Cover | E | 7 2 0 2 0 | 21.0 | | 150 | 150 | | 150 | 150 | 151 | | 150 | 150 | <u> </u> | 150 | 150 |
| | | Invort Level | × | 54269 36.969 | 36387 | | 85130 | 84029 | | 84031 83431 | 83430 75731 | 82131 | | 84030 | 82130 80831 | | 83430 80831 | 80.830 |
| | Sewers | noiteval | l 🗵 | 5610 3940 | 3940 3630 | | 8580 8570 | 8570 8510 | | 8570 8510 | 8510 7740 | 8 6 6 0 8 3 3 3 0 | | 8570 8380 | 8250 | | 85.10 82.50 | 8250 |
| | g of S | WOIA | 395 ∕ £Ш | 0,0612 | 01753 | | 000147 | 00156 | | 000167 | 0.00257 | 000254 | | 00242 | 000228 | | 60 2 2 8 | |
| | Designing of | Velocity | | 0,885 | 1587 | | 0831 | 0383 | | 0.344 (| 13455 | 1,440 | | 1371 | 0621 | | 1296 (| |
| | ۲ | Slope | 38 | 8 | 1000 | · · · · · · · · · · · · · · · · · · · | 83 | 1050 | ······ | 1200 | 2850 | 27.90 | | 2530 | 2240 | | 22:60 | 5 |
| | | Diameter | ae | 300 | 375 | | 150 | 150 | |) 150 |) 150 | 150 | | 150 | 150 | | 150 | 1 |
| | | ∃ ngiaod ∏ | 3/826 | 00294 | 00377 | | 00004 | 00000 | | 00000 | 000120 | 000010 | | 000010 | 00003 | | 00000 | |
| | æ. | letoT Grand To | /sec 111, | 00042 0 | 00125 0 | | | | | | | | | | | | | |
| | Other W | Sewer | /sec m;/ | 0 | 00083 0 | | | | | | | | | | | | | |
| | | Wolf | m³/sec m³, | 0.0252 | 00252 0 | | 0:0004 | 00000 | | 00000 | 0:0015 | 00000 | | 00000 | 0000 | | 00000 | |
| | Wastewater Flow | ation Total Ocsign | | 6 | Ö | | 8 | Ö | | | Ö | | | | | | 0 | |
| | stewate | Population Sewer Total | Person | | | ! ! | | | | | | | | | | | | |
| | Was | Pop. | Pe/ha | | | | | | | | | | | | | | | |
| | | Rainfall | m³/soc | - | | | | | | | | | | | | | | |
| | E | red Area Total | ha | | | | | | | | | | | | | | | |
| | ff Storm | Arranged Area | ha | | | - | | | | | | | | | | | | |
| | Run-off | 110-ruA .111900 A A | ~ , | | | | | | | | | | | | | , | | |
| | | Hainia8 | m³/sco·ha | | | | | | | | | | | | | | | |
| | | emiT | min m³/ | | | | | | | | | | | | | | | |
| | Ϊ | Total Total | E | 2432 | 2682 | | 118 | 175 | | 20 | 445 | 100 | | 7.5 | 158 | | 115 | 716 |
| | Length | Length | Ę | 1000 | 250 | | 118 | 57 | | 50 | 270 | 100 | | 7.5 | 58 | | 115 | 4 |
| | e Area | lstoī | ъń | 8861 | 8861 | | 156 | 081 | | 233 | 532 | 0.48 | | 0:29 | 103 | | 0.55 | |
| | Drainage Area | БэлА | ha | 000 | 000 | | 13.6 | 0:34 | | 233 | 103 | 0.48 | | 0.29 | 0.26 | | 0.55 | |
| 1 | ! | Downstrea Cewers Mo. i | | | 125 | | | 20 | | | 58 | 53 | | | 55 | | | 2.5 |
| | | wes to .c | | 4.5 | 7 97 | | 1.7 | 4.8 | | £9 | 20 | . 15 | • | 52 | 53 | | 54 | |
| ı | | | 1 | t | <u>.</u> | | 1 | l | J | | | | | ., ,, l | | | | |
| | | | | | | | | | | ÷ | | | | | | | | |
| | | | | • | | | | | AP- | -33 | : | | | | | | - | |

| 9 9 | :0.00028453m³/s-ha | | Remarks | | | | | | | | | | | | | | | | The second of th | | |
|--------------|--------------------|------------|---------------------------|-----------|---|----------------|--------------|--------|---|----------------|-----------|-------------|--------------|----------------|--------|--------------|----------------------|--------|--|--------------|---|
| ı. ı | | | Earth TovoJ | ٤ | - | 150 | 150 | 150 | | 150 | 151 | | 150 | 178 | | 150 | 130 | | 130 | 197 | |
| | | | fravní ľaval | × | | 80339 78831 | 78829 | 75731 | | 78831 | 75226 151 | | 85131 | 84655 83431 | | 83431 | 8 238 7 8 0 3 3 1 | | 80331 | 79863 197 | |
| | | Sewers | noitaval3 | 3 % | | 8201 8050 | 8050 7740 | 77.40 | | 80:50 76:90 | 7590 | | 8680 8660 | 8510 | | 8510 8510 | 8510 | | 8200 | 8200 7960 | |
| | | ÷0 | WOIT | 385/tm | | 0.0174 | 0.0278 | 00170 | | 0:0323 | 00200 | <u> </u> | 000108 | 000233 | | 80100 | 00335 | | 30100 | 0.0283 | - |
| | | Designing | Velocity | 0 | | 0.986.0 | 1:573 | 0.964 | | 1828 0 | 1159 0 | | 0 6090 | 1254 0 | | 0 6 0 9 0 | 1894 0 | | 0 6090 | 1.601 0 | |
| | | ۵ | 90018 | 36 | | 1310 | 3330 | 1250 | | 45:00 | 1810 | | 20. | 2150 | | 200 | 4830 | - | 200 | 34.50 | |
| | | | nətəmsiQ | E | | 0 150 | > 150 | 0 150 | |) 150 | 150 | | 150 | 150 | | 150 | 150 | | 150 | 150 | |
| (| - 1 | | Tesign Design | m³/sec | | 00000 | 00000 | 000230 | | 00001 | 000240 | | 00003 | 00000 | | 00000 | 00000 | | 00001 | 00007 | |
| T. | | ¥ . | lotal | m³/sec | | | | | | | | | | | | | | | | | |
| - | | Other | Sewer | 385/m | | | | | | | | | 1 | · | | | | | | | |
| 2 | | * | Design Wol7 | m³/sec 1 | | 20000 | 00000 | 00023 | | 00001 | 00024 | | 0.0000 | 0.000 | | 0000 | 0.0000 | | 0.0001 | 0000 | |
| e company | | er Flow | | | | 3 | | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | | 0 | 0 | |
| ا ر | | Wastewater | Population Sewer Total | Person | | | | | | | | | | | | • | | : | | | |
| A | - | ∌≓ | .qoq YfianaQ | Perha | | | | | | | | | | | | | | | | | |
|) | |]_ | RainieA | m³/s∞ | | | | | | | | | | | | | | | | | |
| Hers | - | torm | ged Area Total | ha | | | | | | | | •••• | | | •••••• | | | · · | | | |
| of Sel | | Run-off St | Area | ha | | | | | | | | | | | | | | | | | |
| Design o | | 뒕 | Nun-off illsoO | | | | | | | | | | | | | | | | | | |
| | | | lstnis8 | m³/sec·ha | | | | | | | | ··········· | | | | | | | | | |
| n for | þ | | fneonoO Time | min m | | | | | | | | | | | | | | | | | |
| Calculation | 1 | Length | fstof | E | | 115 | 307 | 485 | | 80 | 540 | | 95 | 152 | | 88 | 207 | | 8.69 | 263 | |
| alcul | _ | | Length | Ę | | 115 | 88 | 40 | | 80 | 5.5 | | 95 | 57 | | 80 | 55 | | 93 | 5.6 | |
| 0 0 | | | letoT | ha | | 054 | 260 | 807 | | 038 | | | 09.2 | 1117 | | 946 | 178 | | 041 | 233 | |
| Hydraulic | | Drainage | Area | ha | | 0.54 | 0:30 | 0.1.5 | - | 388 | 91.0 | | 560 | 0.22 | | 0.46 | 01.5 | | 0.41 | 710 | |
| HY | | | Downstre Sewers M | | | | | 09 | | | 83 | - | | 4,0 | | | 99 | | | 88 | |
| | - | | 798 to .c | _† | | 56 | 57 | တ | | 58 | 90 | | 61 | 62 | | 63 | 64 | | 65 | 55 | |

| 7 J. 00028455 m²/s·ha | | Remarks | | | | | | | | | † | | | | | | | | |
|--------------------------|---------------|-----------------------------|----------------|---|---|--|----------------|------|------------------|-----------|---------|------------------|-------------|----------------|---|----------------|-----------|----------|----------|
| J. 00028 | | Cover | 7 | | | 0.0 | 0.6 | | 0.0 | ന;ശ | | 0:0 | | 0.0 | | 0.0 | 0.0 | ļ | 0.6 |
| į | | Earth | E | | 1 150 | 30 150 31 150 | 31 150 | | 27 150 31 150 | 1 179 | | 31 150 31 180 | 1 1 1 1 2 0 | 1 150 | | 1120 | 1 150 | | 150 |
| | | Invert Level | × | | 78827 | 77.9 | 7.39 | | 7.68 | 73941 | | 8 46 | 84.626 | 82829 79331 | | 80331 79331 | 79328 | | 78.83 |
| | Sewers | noitaval | 3 🔀 | | 8050 7960 | 7960 | 7590 | | 7850 | 7590 | | 86.60 86.60 | 8660 | 8450 | | 8200 | 8100 | | 8050 |
| - | ing of | Wolf | 1113/sec | | 00146 | 00279 | 00108 | } | 1 00197 | 8 00 1 08 | ļ | 9 00 108 | 68200 8 | 3 0,0266 | | 0.0170 | 18100 | | |
| | Designing | Plocity | 385 | | 0.827 | 1580 | 0.603 | | 1114 | 8090 | <u></u> | 6090 | 1.633 | 1503 | | 0364 | 1:027 | | |
| | | edol2 | 36 | | 920 | 3360 | 200 | | 1,670 | 200 | | 200 | 3590 | 3040 | | 1250 | 1420 | | 5 |
| | | iejemsi(|) E | | 150 | 0 150 | 0 150 | | 051 0 | 0 150 | | 0 150 | 0 150 | 0 150 | | 0 150 | 0 150 | | 3 |
| | | ์ เพยาะอ์ป | | | 00001 | 0 80000 | 00034 | | 0000 | 000370 | | 000210 | 000220 | 000230 | | 00000 | 0.0025 | | (|
| | ≥= leto | lstol ol basid | m³/sec m³, | | 0 | 0 | 0 | | 0 | 0 | | 0.0021 0 | 0.0021 | 00021 0 | | - | 0.00021 0 | <u> </u> | |
| | Other W. | | | | | | | | | | | 021 | | <u>8</u> | | | 8- | | |
| | ö | Sewer | c m³/sxc | | ======================================= | 6. | - | | 8 | | | 8 | = | 25 | | 22 | 7. | | |
| | Flow | ngisə0 wol-i | m³/sec | | 00001 | 60000 | 00034 | | 00000 | 0:0037 | | 00000 | 00001 | 0:000 | | 0.0002 | 00004 | | |
| | | Population Sewer Total | Person | | | | | | | | | | | | | | | · | |
| | Wastewater | Ytisne(| | | <u> </u> | | : | | | | | - | | | - | | | | |
| | | .qoq | Peg | ļ | | | | | | ļ | | | | | | | | | |
| | | l (strie) | m³/sœ | | | | | | | | | | | | | | | | |
| | m.c | Arranged Area Area Total | ha | | | <u> </u> | | | | | | | | | | | | | |
| | Run-off Storm | Arrange Area | ha En | | | | | | | | | | | | | | | | , |
| | Pun- | Nun-off Coeffi | - | ļ | | | | | | | ļ | | | | | | | | |
| | | i istois? | m³/sec·ha | | | | | | | | | | | | | | | | |
| | | ЭШ [— | | | | | | | | | | | | | | | | | |
| ŀ | atec | Total Toncentr | m min | | 55 | 373 | 598 | | 155 | 693 | | 09 | 110 | 225 | | 80 | 260 | | ų C |
| | Length | q16uə7 | E . | | 9.7 | 110 | 5.8 | | 155 | 9.2 | | 90 | 50 | 115 | | 80 | 35 | | 001 |
| | Area | lstol | ha | | 0.44 | 3.28 | 12:03 | | 081 | 1315 | | 000 | 037 | 83 | | 0:54 | 1,46 | | 9 |
| | Drainage A | - | <u> </u> - | | 7. | Ę. | | | 11 | 031 1 | | 000 | 0.37 | 0,48 | | 0.54 | 600 | | 0 9 0 |
| - | _لبــــ | Area Area | ha | | 0.44 | 0.51 | 014 | | 0,81 | | | 8- | ő | | | | | | |
| - | | ownstrea OM alowe | | | - | | 7.1 | •••• | | 84 | | | | 75 | | | 18 | | <u>-</u> |
| Ì | 219 | we2 to | બા | | 67 | 89 | 69 | | 7.0 | 7.1 | | 12 | 73 | 74 | | 7.5 | 1.6 | | 77 |

| :0.00028453m³/s·ha | | Remarks | | | | | | | | | | | | | No. of the last of | | | | | |
|--------------------|--------------|---------------------------|-----------|--------------|------------|---------|--------|---|--------|---------|------------------------|--------------|------------|-------|--|----------|---|----------------|-------------|---|
| .0: | <u> </u> | Cover Cover | E | 203 | ļ <u>ļ</u> | 150 | 154 | | 150 | 210 | 210 | 2.26 | | 150 | 150 | 150 | | 150 | | |
| | | favert Level | × | 78304 | | 77.531 | 76787 | | 77,128 | 75731 | 74731 210 74231 150 | 73417 | | 62131 | 61:775 59:275 | 59275 | | 68330 66331 | | |
| | Sewers | noiţeval3 | × | 8050 7850 | | 7920 | 7850 | | 7830 | 77.40 | 7.5.90 | 7590 6350 | | 6380 | 6350 | 90065 | | 7000 | | |
| | Ċ, | WO J | m³/sec | 0.0247 | | 00108 | 0.0228 | | 00130 | 00108 | 0.0120 | 0.0540 | | 00103 | 0.0733 | 00330 | | 00185 | | _ |
| | Designing | Velocity | 1 36c / E | 1398 | | 0.609 | 1230 | L | 1073 | 0,609 | 0.679 | 1719 | | 6090 | 2334 | 1013 | | 1048 | | |
| | | adol2 | 36 | 0 2630 | | 2009 | 0 2240 | | 0 1550 | 200 | 920 | 2710 | | 200 | 2000 | 950 | | 1.480 | | - |
| | | 1919msiO | Æ | O 150 | | 0 150 | 0 150 | | 0 150 | 0 150 | 0 150 | O 200 | | 0 150 | 002 0 | 002 0 | | 0 150 | | |
| 1 | | Tbns10 ngise0 | m³/sec | 00028 | | 00003 | 00031 | | 00002 | 00000 | 00040 | 00085 | ********** | 0,000 | 000870 | 00000 | | 00071 | | |
| ĺ | . ¥. ₩ | tstoT | m3/sec | 00021 | | | 0.001 | | | | 00021 | 00021 | | | 0:0021 | 0.0021 | | | | |
| | Other | Semer | m³/sec | | | | | | | | | | | | | | | | | - |
| | Flow | Design Wolf | m3/sec | 00007 | | 0000 | 01000 | | 00000 | 0.0008 | 00019 | 0:0064 | | 00000 | 00000 | 69000 | | 0:0011 | | |
| | Mastewater F | Population Scwer Total | Person | | | | | | | | | | | | | | | | | |
| ļ | Has | Pop yrianod | Реула | | | | | | | : | | | | | | | | | | _ |
| | | ls]nis8 | m³/sec | | | | | | | | | | | | | | | | | - |
| | Storm | ged Area Tota! | ha | | •••• | | | | | | | | | | | | | | | |
| - 1 | Run-off St | Area | ha | | | | | | | | | | | | | | | | | |
| | \$ | Run-off illaco | <u> </u> | | | | | | | | | | | | | | | | | 1 |
| | | letnie8 | m³/sec∙ha | | | | | | | | | | | | | | | | | |
| p | ete. | itneoneO emiT | пiп | 9 | | 6 | | | 06 | | | - m | | · · | 673 | | | | | |
| - | Length | Length LetoT | E E | 56 316 | | 149 149 | 65 381 | | 8 06 | 200 290 | 80 461 | 430 1123 | | 85 85 | 50 1173 | 210 1383 | - | 135 185 | | |
| | Area | lstoT | | 229 | | 0.88 | 338 | | 990 | 289 2 | 699 | 22:50 4 | | 0.64 | 23:27 | 2422 2 | | 396 | | |
| | Orainage A | - | na na | | | | | | | | | | | | | | | | | - |
| | ᆛ. | Sewers NK | ha | 77 | | 88 | 027 | • | 990 | 223 | 042 | 2,66 | | 790 | 공 | 0.95 | | 39. | | |
| | ш | Downstrea | | 80 | | | 80 | | | | | 98 | | | | 95 | | 8 | | |
| | 219 | rs2 to .ot | N | 78 | İ | 7.8 | 80 | | 8.1 | 82 | 88 | 38 | | 85 | 88 | ∞ ~ | | 88 | | |

| | Drainage | nage Area | Length | <u> </u> | | Rain-off | ff Storm | | T TO + GWO + CCW | mo ju | O+hor |]E | MC | | Period | 1,5 | o diago | | |
|------------------|----------|-----------|----------|----------------|-----------|---|------------|-------------|------------------|----------|--------------|--------------|------------------|----------|----------|---------|----------------|----------------|------------------|
| atream stream | rs No. | lsto | diga: | centra SmiT | llstn | 110-0 111-0 111-0 111-0 111-0 | ; p | 22 Listn | Population | WO | <u>-</u> [` | stol bin | Ign Flo refer | edo | g Viio | 5 | | j19 | 19v 11 19v |
| |]_ | 1 | <u> </u> | | isA | ruñ Cox | Area Total | - | Sewer Total | 1-1 | _ | Gra | | | Velo | lз | Eleva | | rea /o |
| | ъч | h2 | E | min | m³/sec-ha | | ha ha | m³/sec | Peyha Person | m³/sec m | m³/sec m³ | m³/sec m³/: |) Sec | 36 | 305/⊞ | m³ /sec | × | Z | 띰 |
| 88 | 0.68 | 89:0 | 808 | 80 | | | | | | 0.0000 | | 0.0000 | 0 | 150 500 | 609:0 0: | 00108 | 67:00 68:00 | 65331 64931 | 1 290 |
| 90 92 | 088 | 5:50 | 120 255 | 12 | | | | | | 0.0016 | | 000100 | 0 | 150 3240 | 1551 | 0.0274 | 6270 | 64931 61031 | 1 290 |
| | | | | | | | | | | | | | - | 1 | | | | | |
| | 291 | 291 | 210 210 | 0 | | | | | | 80000 | | 000 | 00000 | 150 1950 | 1203 | 00213 | 56.80 62.70 | 65130 | 1 150 |
| 92 94 | 600 | 850 | 35 290 | <u> </u> | | | | | | 0.0024 | | 0:0024 | 0 | 150 5710 | 0 2029 | 0.0364 | 6270 5070 | 61029 59031 | 9 150 150 |
| | | | | ~ | | | | | | | | | | | | | | ļ | |
| 93 | 014 | 014 | 4.5 | 45 | | | | | | 0.0000 | | 00001 | 0 | 150 6:60 | 0.0700 | 0.0124 | 5100 6070 | 59328 59031 | 150 |
| 94 | 013 | 877 | 40 330 | 9 | | | | | | 0.0025 | | | 000250 | 150 4240 | 0 1.775 | 0.0314 | 59.00 | 59027 | 150 |
| 95 | 0.62 | 3361 | 70 1453 | 8 | | | | | 3 | 96000 | 000 | 1021 00117 | 0 | 200 4860 | 0 2302 | 0.0723 | 5560 | 57275 53875 | 150 |
| 86 98 | 899 | 34.29 | 100 1553 | <u>e</u> | | | | | | 8600:0 | 00 | 00021 0:0119 | 0 | 200 4600 | 0 2239 | 0.0703 | 5560 5100 | 53875 49275 | 150 |
| | | | | | | | | | | | | | | | | | | | |
| 97 | 0.79 | 0.79 | 100 100 | 0 | | | | | | 00000 | | 000 | 0:0002 🔾 | 150 500 | 509:0 0 | 00108 | 50.20 51.00 | 48531 | 150 |
| 100 | 020 | 3528 | 40 1593 | | | | | | | 00100 | 8 | 00021 00121 | 0 | 200 550 | 0 0774 | 0.0243 | 5100 | 477981 | 3,51 |
| | | | | | | | | | | | | | | | | | | | |
| | 031 | 031 | 7 07 | 40 | | | | | | 00001 | | 000 | 000000 | 150 500 | 609:0 0 | 00108 | 5160 | 49731 | 1.50 |
| | 0.26 | 3585 | 100 1693 | ~~~ | | | | ******** | | 0.0102 | 8 | 00021 001 | 001230 | 200 2570 | 0 1:674 | 0:0526 | 5160 | 47761 | 361 |

| 00028453 m³/s·ha | | Remarks | | | | | | | | | | | | | | | | | | |
|--|------------|---------------------------|-------------|----------|---------|---------|---------|-----|--------|---------|---|--------|----------------|-------------|--------|--------------|---|--------|-------------------------------------|---|
| 0.0002 | | 85 | | | | | | | | | | | | | | | | | | |
| | | farth 19vo0 | E | 120 | | 150 | 150 | | 150 | 1200 | | 150 | 150 | | 150 | 150 | | 150 | | - |
| | | Invert Level | × | 44275 | | 47331 | 44275 | 444 | 44331 | 43175 | | 53931 | 52929 48931 | | 49931 | 48930 | | 59331 | | |
| | Sewers | noitsval3 | × | 4500 | | 4800 | 4600 | #V. | 44.90 | 4490 | | 5560 | 5460 | | 51.60 | 5060 4730 | | 5100 | | |
| | ō | wo[∃ | m3/585 | 000378 | | 000341 | 0.0426 | | 00152 | 0.0464 | | 000136 | 00321 | | 0.0215 | 060219 | | 80108 | | [|
| - | Designing | VtioolsV | 1 385 /⊞ | 1204 | | 1927 | 1357 | | 0.862 | 1.476 (| | 0771 | 1816 | | 1219 (| 1237 | | 0,6090 | | |
| , | ය | adol2 | 36 | 1330 | | 2000 | 1890 | | 10.00 | 20:00 | | 68 | 4440 | | 20:00 | 20:60 | | | | |
| | | 1919msiQ | 15 | 200 | | 150 | 200 | | 150 | 200 | | 1.50 | . 150 | | 150 | 150 | | 150 | | 1 |
| b 1 | | Design I | m³/sec | 00124 | | 000001 | 00125 🔾 | | O10000 | 00127 🖸 | | 0003 | 00004 | | 00000 | 00000 | | 00003 | | |
| | 3= | Total Grand To | m / sec m | 0,0621 0 | | | 00021 | | 8 | 00021 0 | | 8 | | | 5 | 0 | | ő | | 1 |
| ŧ l | Other M. | 101100 | m /sec m | ~~~~~ | | | | | | | | | | | | | | | | - |
| Target Caller | | wol∃ 19₩92 | /sec m./ | 03 | | 10 | 0.4 | | 01 | 90 | | 003 | 04 | | 0.1 | 0.1 | | 33 | | 1 |
| 1 | Flow | กอเรอป | È. | 0:0103 | | 0:00:01 | 0.0104 | | 00001 | 0:0106 | | 000 | 00004 | | 00001 | 00001 | | 0.0003 | | |
| | astewater | Population Sewer Total | Person | | | | | | | | | | | | | | | | | 1 |
| ,, | :#C | ,qo9 YriansO | Реула | | | | | | | | | | | | | | | | | |
| | i | Istnis8 | m3/svc | | | | | | | | | | | | | | | | | |
| | torm | d Area Total | hа | | | | • | | | | | | | | | | | | | ļ |
| R 1 L | Run-off St | Arranged Area To | 'na | | ******* | | | | | | | | | | | | | | | + |
| | \$ | Nun-off illeol | | | | | | | | | | | | | | | | | | - |
| ALTERNATION OF THE PROPERTY OF | | RainieR | m³/sec.ha | | | | | | | | | | | | | | | | | |
| pe | | ijnəonoO emi∏ | min H | | | | | | | | | | | | | | <u>-</u> - | | · · · · · · · · · · · · · · · · · · | |
| | П | istol | E | 1768 | | 0.9 | 1833 | | 110 | 8261 | | 125 | 215 | | 20 | 375 | | 115 | ·········· | |
| Jane | rengtn | q16uə7 | ш | 3.6 | | 09 | 65 | | 110 | 92 | · | 125 | 96 | | 50 | 160 | ~- | 115 | | 1 |
| A A POS | ige Area | Total | ĥa | 3617 | | 024 | 3658 | | 0.45 | 3727 | | 060 | 1:27 | | 028 | 255 | | 66:0 | | |
| Presing | urainage | ьэтА | na | 0.32 | | 0.34 | 0.17 | | 0.45 | 024 | | 060 | 0.37 | | 0:28 | 1,00 | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 660 | | 1 |
| | | Sovnstres Sewers M∕ | | 103 | | | 105 | | | 124 | | | 118 | | | 119 | | 108 | | - |
| | 191 | vaS to .c | ₩ | 101 | | 102 | 103 | | 104 | 105 | | 115 | 116 | | 11.7 | 118 | | 106 | | |

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| 13 13 13 14 15 15 15 15 15 15 15 |
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| Domistresin Displayers No. |
| |

| 1.2 | :0,00028453m³/s·hæ | | Remarks | | | | | | | | | | | | The state of the s | | | | | |
|---|--------------------|-----------------|-----------------------------|-----------------------|----------|----------|------------------------|-----------|--------------|---|--|------------|----------|--|--|------------|----------|--------------|-------------|----------|
| 0. | - • | } | farth 19voJ | E | 131 | 0.00 | 0.83 | 150 | ļ | ļ | | 1 | | | | | | ļ | | - |
| | | | Level | Ξ. | 45331 | 45:331 | 41224 150 34524 150 | 34304 | | | | | | | | | | | | - |
| | | S | fravert | | 0 45 | 0 45 | 0 41 |) . | | | | | | | | | | | - | |
| | | Sewers | noi taval: | × | 4970 | 4300 | 4300 | 3630 | • | | | | | - | | | | | | |
| | | Designing of | Wolf | m³/sœ | 000263 | 0.0305 | 0.1198 | 01176 | | | | ļ | | <u> </u> | | | | ļ | | |
| | | esigni | ys i pol 5V | - | 1490 | 1724 | 2441 | 0.739 | | | | | | | | | | ļ | | |
| | | Δ | 9d01S | 38 | 2930 | 4000 | 40.60 | 170 | | | | ļ | | | | | | | | |
| | | | 1919msiQ | E | 150 | 1.50 | 250 | 450 | | | | | | | | | | | | |
| ŀ | | MO): | ngisəg | <u> </u> | 000010 | 00000 | 00153 | 00530 | | | | ļ | | | | | <u> </u> | | | |
| $\hat{}$ | | 1 | orand To | 305/ _E ⊞ 3 | 000 | 000 | | | | | | | | | | | | | | |
| 7 | | î. ₩. | lstoT | 30c/ _c m | | | 000021 | 00146 | | | | | | | | | | | | |
| *************************************** | | Other | 19W92 | 305/ _L III | ******** | | | | | | ····· | ·········· | | ļ | | | | | | |
| а | | _ | Wolf | 365/ _t ⊞ | 00000 | 0.0000 | 00132 | 0.0384 | | | | | | | ļ | | | | | ┟╌ |
| 0 | | <u>5</u> | Total Design | - | G | 6 | • | 0 | | | | | | | | | | | | |
| 1 | | Wastewater Flow | Population Sewed Total | Person | · | | | | | } | <u> </u> | | | | | | | | | <u> </u> |
| | | Wast | Yrisns0 | Pe/ha | | <u> </u> | | | | | | | | | | | | | | |
| V | | <u>-</u> | .qog | sec Pe | | | | | | | | | | | | | İ | | | |
| \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | | | Lls inisA | 395/ _E III | | | | | | | | | | | | | | | | |
| Reis | | orm | Arranged Area Area Total | ha | ·••••• | l | | ********* | | | ļ | | | ļ | | | | | | |
| S | | ŝ | ranger | ha | | | | | | | | | | | | | | | | - |
| 0 | | Run-off | Arrea Area | п. | | | | | | | | | | | | | | | , | |
| Design | | | ito-nuñ | па | | | | | | | | | | | | | | | | |
| for D | . | | l Istois8 | m³/sæ-ha | | | | | | | | | | | | | ····· | | | |
| | | bate | Theonoo omiT | E E | | | | | | | | | | | | | | | | |
| atio | | | lstoT | ٤ | . 66 | 190 | 2083 | 2832 | | | | | | | | | | | | } |
| Calculation | | Length | revarp | E | 9.0 | 100 | 165 | 150 | | | | | | | | | | | | |
| Ç | | ea | | | 033 | 0.65 | 4639 | 13500 | | | | | | | | | | | | |
| | | Drainage Area | lstoī | ha | | | | | | | | | | | | | | | | |
| Hydraulic | | Drain | 691A | ha | 033 | 0.32 | 001 | 000 | | · | | | | | | ********** | | | | |
| | | | ownstream owers Mo. | | | | | MH 101 | | | | | | | | | | | | |
| • | | | owed to . | | 122 | 123 | 124 | 125 | | | ļ <u></u> | | | | | | | | | |
| | | | ~ . | | | | | | | | | | | | | 1 | | | │ | ŀ |

| 7450 m | | Remarks | | | | | - | | | | | | | | | | |
|---------------------|-----------------|-----------------------------|----------------------|----------------|---------|---|---|----------|---|---|----------|--------------|-----|------|----------|---|----------|
| :0.00037450 m²/s·ha | | *. | | | | | | | | | | | | | | | ļ |
| | | fitns: 19voJ | E | 155 | 150 | | | | | | | | | | | | |
| ļ | | lavert | × | 42225 36831 | 35394 | | | | | | | | | | | | |
| | Sewers | noifeval | × | 38.50 | 3850 | | | | | - | | | | | | | |
| 9 | Designing of | WOIT | тп³/sec | 0.0323 | 0.0365 | ļ | | ļ | | | <u> </u> | | ļ · | | - | | - |
| | es ign | Ya ioolaY | 395 ∕ E | 1326 | 2063 | | | ļ | | | | | | | | | |
| | | Slope | 36 | 4430 | 5730 | | | | | | | | | | | | - |
| | | netemsi0 | E | 150 | 0 150 | | | | | | | | | | | | |
| | | Grand T Design | m³/sec | 000030 | 0000 | | | | ļ | | | | | | | | |
| 3 | = = | lstoT | 395/ _E EL | | | | - | | | | | | | | | , | |
| 440 | Other | Sewer | m3/sxc | | | | | | | | | | | | | | |
| | | ngis∌(] wo∏∓ | m / sec r | 0000 | 0000 | | | | | | | ļ | | - | | | |
| 3 | Mastewater Flow | | Ę. | | 0 | | | | | | | | | | | | |
| 1 | stewat | Population | Person | | <u></u> | | | <u> </u> | | | - | <u> </u> | | | | | - |
| á | Ta Ta | Pop Yriansu | 9 | | | | | | | | | | | | | | |
| | Ì | letnis8 | m³/sec | | | | | | | | | | | | | | ļ |
| E | | d Area Total | na L | | | | | | | | | | | | | | |
| Rim-off Storm | 010 | Arranged Area Area Total | n'a a | | | | | | | | | | | | | | <u> </u> |
|) i | - 1 | ito-nuñ ,itteoΩ ≪ ≪ | | | | | | | | | | | | | <u> </u> | | |
| | | lginis8 | m³/sœ·ha | | | | | | | | | | | | | | |
| _ | | tnaonoo Tim | min m³/ | | | | | | | | | | | | | | |
| - | 7 | Total Insono | m. | 120 | 180 | | | | | | | | | | | | _ |
| Length | ? - | րեսել | E | 120 | 09 | | | | | | | | | | | | |
| Area | 3 | lstoT | ha | 0.93 | 0.83 | | | | | | | | | | | | |
| Drainage | | Area | ha l | 0.93 | 000 | | | - | | | | | | | | | |
| Ā | l | Sewers A | | 0 | | | | | | | | | | | | | |
| _ | | o, of Se Downstre | | | 1-2 MH | | | | | | | | | | | | |

| д 7 | :0.00037450 m²/s-ha | | Remarks | | | | | 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 | | | | | | | | | | | |
|-------------|---------------------|------------|-----------------------------|---------------------|--------|----------------|---------------------|---------------------------------------|----------------|----------------|------------------|----------------|-----------|---|----------------|----------------|--------|----------------|---|
| | | | farth 19voJ | £ | 130 | 150 | 180 | | 150 | 132 | 555 | 150 | 155 | | 120 | 50.53 | | 150 | |
| | | | Invert | Σ | 59031 | 59031 58931 | 58731 | | 58231 57981 | 57208 56031 | 56029 54531 | 55029 54531 | 54526 | | 53929 53131 | 53130 51731 | | 52925 51731 | |
| | | 2 | | : | 6070 5 | 6070 5 | 60.70 59.90 5 | | | | 5770 5 5620 5 | 20 5 | 30 5 | 1 | | 30 0 5 | | 5340 5 | |
| | | Sewers | noitevala | | 1 : | 1 : | 1 -44 | राग | 5990 | 5990 | 1 : | 5670 | 5620 | | 5550 | 5430 | ŀ | 1 1 | |
| | | ing of | Wolf | m3/5ec | 0.0108 | 00108 | 0.0108 | | 0.0108 | 0.0214 | 0.0269 | 0.0139 | 0:0254 | | 0.0176 | 0.0269 | | 0:0215 | |
| | | Designing | Velocity | 395/E | 0.609 | 6090 | 0.609 | | 0,609 | 1210 | 1522 | 0.785 | 1:440 | | 0.834 | 1520 | | 1216 | |
| | | | 9d0 \$ | 36 | 83 | 200 | 200 | | 250 | 1970 | 3120 | 830 | 27.90 | | 1330 | 3110 | | 1990 | |
| | | | 191emsiQ | E E | 150 | 150 | 150 | | 150 | 150 | 150 | 150 | 150 | | 150 | 150 | | 150 | |
|] | | wol | ingiae√l | - S | 000000 | 0.0020 | 00040 | | 0:0005 | 0:0045⊙ | 00046 | 00001 | 00048 | | 00001 | 000020 | | 00001 | |
| ^ | | | Grand To | .995 / t⊞ 36 | 8 | | | | 8 | | - 8 | | <u></u> § | | 8 | | | , š | |
| | | 3r W W | lstoI. | m ² /sec | | | | | | | | | | | | | ••••• | | |
| | | Other | 19жэ2 | m3/sec | | | | | | | | | | | | | ······ | | |
| 2 | | * | ngisə(l wol-l | m3/500 | \$0000 | 0.0020 | 00040 | | 00000 | 0.0045 | 0.0046 | 0.0001 | 0:0048 | | 00001 | 0.0000 | | 0.0001 | |
| е . | | 1 F10W | | | | 0 | | | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | | 0 | |
| ၿ | | Wastewater | Population Sewed Total | Person | | | | | | | | | · | - | | · | | | |
| L . | | Was. | Y sne() | Peyha | | | | | | | | | | | | | | | |
| ¥ | | | Rainfall .qoA | m³/sec Pe | | | | | | | | | | | | | | | |
| ∨ S S | | | | "m | | | | | | | | | | | | | | | • |
| Sewer | | Storm | ed Are Total | рg | | | | | | ******** | | | | | | | | | |
| of S | | | Arranged Area Area Total | in in | | | | | | | | | | | | | | | |
| <u>=</u> | | Run-off | Run-off Coeffi | _ | | | | | | | | | | | | | | | |
| Desi | | | HainieXI | s · ha | | | | | | | | | - | | | | | | |
| for | | | - Time | 30S/cm | | | | | | | | | | | | | | | |
| 101 | | bəts | Thesines | min | 90 | 20 | N2 | | 50 | ua ua | | | | | | | | | |
| Calculation | | Length | lstol | 티 | 9 09 | 20 2 | 5 245 | | | 335 | 383 | 0 80 | 453 | | 09 | 478 | | 09 0 | |
|)a c | | | Length | ٤ | | | 185 | | 50 | 06 | 48 | 90 | 50 | | 09 | un *# | | 90 | |
| 3 | | e Area | IstoT | ha | 240 | 534 | 1060 | | 0.62 | 1208 | 1231 | 05.0 | 1280 | | 027 | 1325 | | 0.2.2 | |
| Hydraulic | | Drainage | Årea | | 240 | 534 | 286 | . | 0.62 | 986 | 0.23 | 9, | 85 | | | ∞ | | - 2 | |
| Hyd | | 1 | oN anews∂ | r r | 23 | (5) | | | - 5 | | - 3 | 0.26 | 0.23 | | 0.27 | 81 | | | |
| | | | SentarmoO | | ₹ | | ω | | | | თ | | == | | | 13 | | · | |
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| | :0.00037450m/s-ba | | Remarks | | | | | | | | | | | | | | | |
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| 17 Downstream | 2 | | • | sec · ha | | - | | | | | | | | | | | | |
| S Semera No. | - | | | | | | | | | | | | | | | | | |
| Comparities Compar |) p | -7 | | - | 520 | | 0.9 | 280 | 60 | 623 | | 290 | 365 | | 275 | 4.5 | 415 | 771 |
| Comparities Compar | 3 . | Lengt | Length | | 42 | | 9 | 09 | 09 | 43 | | 290 | 7.5 | | 276 | 4.5 | 20 | 148 |
| S Semera No. | 5 | Area | [6fo] | | 13.63 | | 025 | 1413 | 0.23 | 1446 | | 360 | 4:0.2 | | 194 | 080 | 633 | 2144 |
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| meantream | 7. | | | | | | 0 | | 0 | | | 89 | | ., | | 0 | | |
| | | Ш | Sentermox | <u> </u> | | - 7 | | | | | | | | | | | | |

| 16 | U. UUUs (450 m / S* BB | Remarks | | | | | | | | | | | | | | | | |
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| - | | Earth | E | 150 | 150 | | 150 | 150 150 | 150 238 | | 1.50 | 1.80 | 151 | | 150 | 238 | 150 | |
| | | favert Level | × | 46829 | 45275 | | 55028 | 51428 45331 | 46451 | | 56031 55731 | 55731 | 52928 | | 47829 | 46450 | 45927 | |
| | Sewers | noiteval3 | Z | 4850 | 4330 | | 5770 | 5310 | 4350 | | 57.70 57.70 | 57.70 | 4 9 0 0 | | 4950 | 4500 | 4860 | - |
| | 9 | | m³/sec | 00218 | 000681 | | 0.0266 | 00250 | 00108 | | 00108 | 000213 | 0:0304 | | 00138 | 0.0205 | 0.0224 | |
| | Designing | Velocity | v | 1234 | 2167 | | 1508 | 1416 | 0.609 | | 0.609 | 1203 | 1721 | | 0785 | 1163 | 1267 | |
| | <u>ه</u> | sqois | 34 | 20:50 | 4310 | | 30,60 | 2700 | 200 | | 200 | 1950 | 3930 | | | 1820 | 2180 | |
| | | neter | HE. | 150 | 200 | | 150 | 150 | 150 | | 150 | 150 | 150 | | 150 | 150 | 150 | |
| | 1 | ∃ ngia∌0 | m³/sec | 00004 | 000860 | | 00000 | 0000 | 0,0000 | | 0,0002 | 00003 | 0,0005 | - | 00001 | 000120 | 00001 | |
| | 35 | letoT foT brisio | m /sec m | 0 | 0 | | 0 | 8 | 0 | | 0 | C. | 0 | | 0 | | | |
| | Other W. | | m³/sec m³, | | | | | | | | | | | | | | | |
| resistant de la constitución de | | WOIT | m³/sec m | 0.0004 | 0.0056 | · | 0000 | \$0000 | 90000 | | 0.0002 | 0:0003 | 0,0005 | | 0.0001 | 0.0012 | 00001 | |
| 9 | r Flow | lation E | | ö | | | | ŏ | ŏ | | Ö | Ö | 0 | | | ö | 8 | |
| 0 | Hastewater | Population Sewer Total | Person | | | | · | | | | | | | | | | | |
| | al= | .qoq YiisnaO | Реула | | | | | | | | | | | | | | | |
| | | RainisA | m³/soc | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | | | | |
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| r Design | - | HetnisA | m³/ssc · ha | | | | | | | | | | | | | | | |
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| atio | | lstoT | E | 73 | 843 | | 150 | 320 | 396 | | 60 | 203 | 34.3 | | 909 | 441 | 909 | |
| nol | Length | դյճսəղ | E | 73 | 12 | | 150 | 170 | έο 1- | | 69 | 143 | 140 | | 80 | 45 | 09 | |
| Hydraulic Calculation for | ge Area | lsfoT | ha | 106 | 22.98 | | 0.59 | 122 | 150 | - | 0.4.2 | 88 88 | 144 | | 0.2.2 | 330 | 0.24 | |
| ydrau | Drainage | ธอาA | ha | 1.06 | 048 | | 0.59 | 0.63 | 028 | | 0.42 | 0,46 | 0.56 | | 022 | 014 | 024 | , |
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| | | 119Vnl SyeJ | Z | 43931 | | 45127 | 43926 | | 46828 | 42231 | 41758 39175 | 39175 | | 49927 | | 45331 | 45326 | 39231 | 38857 33029 | - |
| · | Sewers | Elevation | × | 4730 | | 4580 | 45.60 | | 4 4 3 5 0 | 4330 | 4330 | 4090 4090 | | 51.60 | | 4 700 | 4700 | | 4090 | - |
| | ing of | Flow | m,/sec | 0.0272 | | 0:0291 | 090280 | 1000 | 00000 | 0,0108 | 0.0514 | 00194 | | 279 | | 80200 | 0.0288 | 1 : | 00792 | |
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| ALL ALL ALL ALL ALL ALL ALL ALL ALL ALL | жо _{]-} | 3 ngiseO | 305, | 0:0014 🔾 | | 000010 | 0,0016 | | 00000 | 0004 | 001110 | 0111 | | 040 | | 00000 | 091 | 0 22 | 082 | - |
| <u> </u> | | Grand To | m ₂ / | | | 8 | 000 | | | 8 | | 0:0111 | | 0:0004 | | | 000 | 0.0015 | 0.0129 | - |
| | н. Н. Н | lstoT | x m ³ /sec | | | | | | | | | | | | | · | | | | |
| The second secon | Other | Sewer | m³/soc | | | | | | 3,55, | | , | | | | | | | | | |
| | мо | ngiaad wo∏ | m³/sec | 00014 | | 00001 | 0.0016 | | 00003 | 0:0004 | 0,0111 | 0.0111 | | 0.0004 | | 0:0004 | 0.0016 | 00016 | 00129 | |
| 2 | Wastewater F | Population Sewer Total | Person | | | | | | | | | | | | | | | | | ļ, |
| ř. | Waste | Yfian90 | Реула Я | | | | · . | | | | | | | | | | | | | |
| A TENCHANISMENT AND AND AND AND AND AND AND AND AND AND | | Histriish .qo9 | m³/sec Pe | | | | | | | | | | | | | | | | | |
| 7.5 | | red Area Total | ha m | | | | ., | | | | | | | | | | | | | |
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| 9 1 | Run-off | Arrang S Area | ng Pu | | | | | ····· | | | | | | | | | | | | |
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| on f | oate. | ntneoncol amiT | ni ^m | | | | | | | | | | | | | | | | | |
| ati | Length | Total | Е | 53 494 | | 60 60 | 50 544 | | 6 116 | 5 201 | 5 948 | 5 933 | | 7 137 | | 0.80 | 0 307 | 5 372 | 0 1093 | |
| alon | | rength | E | · | | | | | 116 | 85 | 105 | 45 | | 137 | | 80 | 170 | 65 | 100 | |
| Hydraulic Galculation for | age Area | lstoT | ha | 382 | | 0.25 | 428 | | 690 | 1904 | 2969 | 2969 | | 095 | | 0.93 | ¥14 | 4114 | 3435 | |
| ydrau | Drainage | Årea | ha | 0.28 | | 0.25 | 021 | | 0.69 | 032 | 133 | 000 | | 0.95 | | 0.98 | 221 | 000 | 0:52 | |
| | | Downstrea Sewers No | | 37 | | | 40-1 | | | | | 44 | | 43-1 | | | | | MH 113 | |
| | \$19 | N9S 10 .0 | N | 3.55 | | 36 | 37 | | 38 | 39 | 40-1 | 40-2 | | 13 | | 42 | 43-1 | 43-2 | 44 | |

| | /s-ha | | | | | | | | | | | Ţ | | | ~ | | | | ************************************** |] | T | | | |
|------------------------|--------------------|-----------------|--------------------|-------------|---------|------------------------|-----------|---|----------|------------|----|---|----------|---|----------|----------|---|---|--|---|--|----------|--------------|--------------|
| e: | 0.00037450 m³/s-ba | | Remarks | | | | | | | | | | | | | | 1 | | | | The state of the s | | | |
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|) | | = ' stoT | etoT Grand | m³/sec m³ | | 2 | 6 | | | | | | | | | | | + | | | | | | |
| | | <u>-</u> - | | m³/sec m³, | | | | | | | | | | | | | | | | | | | | <u> </u> |
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| 3. | ī | | gised | m³/stc | | Š | 8 | | | + | | | | | | | | + | | | | | | |
| C Territory | | Rastewater Flow | Sewen Total | Person | | | | | | + | | _ | | | | | | + | | | | | ļ | |
| t.e | | 1 *** | qo9 isnsQ | Peyna | | | | | | | | | | | | | | + | | • | | | | |
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| Calculation for Design | | 110 | tnisA o-nuA | c. ha | | | | | | | | | | | | | | | | | | | | |
| or De | - | emi I, i | | ı m³∕sec∙ha | | | | | | | | | | | | | | | | | | | | |
| on f | - | entrat | eouog | nim | 8.0 | 228 | 428 | | | _ | | | | - | \dashv | | | + | | | | <u> </u> | | |
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| Calci | Arpa | | | | 192 | 501 | 903 | | | | | | | | - | | | + | | | | | | |
| lt. | Orania a | . [5] | 101 | 'na. | | | | | | | | | | | | | | | | | | | | ······ |
| Hydraulic | 7.2 | حسلب | | ξ | 192 | 309 | 402 | | | <u> </u> | | | | | 1 | | | 1 | | | ********** | | | |
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| | | Earth | E | 150 | 150 | | | | 1 | | - | | | | | | | | | | | | | | | | - |
| | | finvert Level | Z | 36131 | 36131 | | | | - | - | | | | | - | | | | | | | | | | | | |
| | Sewers | noiteval3 | Z | 37.80 | 3780 | | | - | | | | | | _ | | | | | | | | | | | | | |
| | of of | wolf | m³/sec | 0.0266 | 0:0140 | | | | | | | | | ****** | | | | | | | - | | ļ | | | | _ |
| | Designing | Velocity | | 1508 | 0.795 | | | | | | | <u> </u> | | | | | | | | | | - | | - | | | 1 |
| | | Slope | 36 | 0 30 60 | | | | - | | | | | | | | | | | | | | | | | | | |
| | | 19jame (G | 臣 | 0 150 | | | | | | | | | | | | | | | | | | | | | | | |
| | | oT basid Ingised | m³/sec | 00000 | 00057 | | | - | | | | | | | | ****** | | | | | | | | | | | |
| | ≠ ≠ | Total | m³/sec | | | | | | | | | | | | | | | | | | | ••••• | | | | | |
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| | ≆ . | ngisəd wolf | m³/sœ | 90000 | 000027 | | | | | | | | | | 1 | | | | | | | | | | | | |
| | Wastewater Flow | | | | | | | | | | | | | | \dagger | | | 1 | | | - | | - | - | | | |
| | lastewa | Popu Sewer | a Person | | | | | | | | | | | | + | | | 1 | | | | | | | | | - |
| - | - | Pop. Valianoù | Peyha | *************************************** | | - | | - | | | _ | | - | | - | | | _ | | - | - | | | | | · | 1 |
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| | Storm | Arranged Area Area Total | ря | | | | • | | | } | | •••••• | | * | | | | | ••••• | | | | | ļ | | | |
| | Run-off S | Arran | ha | | | | | | | | | | | | - | | | | | | ļ | | | | | | T |
| | 2 | ilo-nuA illeo) | | | | _ | | | | | | | | | | | | - | | | | | | | | | - |
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| - - | Drainage Area | lstoT | μa | | | - | | | | | | | | | | | | | | | | | | | | | _ |
| • | | | z, | 1.63 | 1359 | | | | | • | | | | | | | | | | | | | | | | | |
| | | Oownstre Meners M | | | MH 123 | 1 | | | | | _ | | | | | | | _ | | | | | | | | | |
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| P 20 | 0.00037450 m²/s·ha | | Remarks | | | | | Provide the Control of the Control o | | | | | | | | | | | |
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| | | | fit 16.1 Tovo2 | E | 150 | | 150 | 188 | | 305 | 305 | | 150 | 130 | -15.55 -15.05 | 55.5 | | | |
| | | | 1nvert Level | × | 4 9 9 2 8 | | 46829 | 45331 44951 | | 43781 | 37731 | | 40729 | 377728 34631 | 36126 | 34631 | - | - | |
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| | | of | W013 | m³/sæ | 0:0243 | | 0.0193 | 0.0108 | | 0.0108 | 0.0258 | | 0,0233 | 0.0228 | 00135 | 0.0276 | <u> </u> | - | |
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| | | Other | л <i>эжэ</i> г | m3/sec | | | | | | | | | | | | | | | |
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| 33 | | r Flow | = 1 | | 3 | | 0 | 0 | | 0 | 0 | - | 0 | 6 | Ö | | | | |
| v | | Wastewater | Population Sewer Total | Person | | | | | | | | | | | | | <u></u> | ļ | <u> </u> |
| 1 | | was. | .qoq Yisnə(I vr % | Peyha | | | | | | | | | | | | | | | |
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| emers | | Storm | ged Area Total | ä | | | | | ********* | | | | | | | | | | |
| of Se | | Run-off S | Arran Area | 12 | | | | | | | | | | | | | | | |
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| Design | | | RainisA | m³/sec·ha | | | | | | | · | | | | | | | | |
| for | , | | emil ^T | min m' | | | | | | | | | | | ` | | | | |
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| Calculation | | Length | цъбиат | u u | 180 1 | | 88 | 75 | | 110 | 210 3 | , | 128 | 138 | 190 1 | 100 | | | |
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| | | | lstoT | ha | | | | | | Ħ | | | <u>F</u> | 11:55 | 717 | 1449 | | | |
| Hydraulic | | Drainage | Area | ha | 157 | | 240 | 070 | | 101 | 2.69 | | 175 | 1.67 | 21.9 | 0.75 | | | |
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| 3 | ' | | was to .c | - ; | 909 | | 51 | 52 | | 85 | 55 \$4 | | 55 | 56 | 57 | 58 | | · | ٠ |
| | Ţ | | | J | Ll | | | | | | | | | | | | | | |

| Ì | s.ha | | | | | | | | | | 1 | | | | | | paste, a V to contrast per | | | |
|------------------------|------------------|--|---------------------------|--------------------------|------------------------|----------------------|----------------------|---|--------------------|---|----------------------|--------------------|--------------------|------------|--------------------|--------------------|--------------------------------|------------------------|-----------------------|--|
| 2.1 | 00037450 m³/s·ha | | Remarks | | | | | | | | | | | | | | | , | | |
| ٥ | 3,0 | | TOVOJ | E | 200 | 5.0 | 0.80 | | 6.6 | 1 | 000 | 0.0 | 8.00 | : | 3.4 | 24.8 | 0.0 | 50 | 5.0 | |
| | | | Level | × | 49931 150 49381 205 | 381 205 831 150 | 831 150 156 378 | | 430 150 931 150 | | 2331 150 9931 150 | 931 150 431 150 | 156 378 231 150 | | 993 184 249 248 | | 331 131 150 | 40727 150 35231 150 | 175 150 956 102 | |
| | | rs rs | tiavni | | | 50 45381 50 46831 | 50 46831 10 46156 | | 610 54 160 49 | | 13:4 | 60 499 10 484 | 10 451 90 392 | | 00 5199 90 3824 | 90 3824 90 3523 | 00 52331 40 40731 | | 96 351.75 26 30956 | |
| | | of Sewers | noitevel3 | × | 5150 | 5160 | 4850 | | L. L. | | 5400 | 5 5010 | 3 4090 | | 5400 | 4090 | 277 4240 | 42/40 | 3690 | |
| | | Designing o | Wo[7] | , π³/sας ε μ³/ | 9 00108 | 4 0.0195 | 9 00108 | | 9 00304 | | 93 00264 | 69 0029 | 2 00253 | | 7 0.0303 | 8 00226 | 음음 | 8 0:0217 | 5 00874 | |
| | | Desig | Velocity | 305/⊞ | 6090 0 | 0 1104 | 6090 0 | | | | } <u>-</u> ≍ | | 0 1432 | | 0 1747 | 1278 | 1568 | 30 1228 | 20 2145 | |
| | | | Slope | 36 | 150 500 | 150 1640 | 150 500 | | 150 3980 | | 50 3000 | 150 3750 | 150 2760 | | 150 4110 | 150 2200 | 150 331 | 150 2030 | 200 4220 | |
| | | | Diameter | E | 0 | 0 | Ö | | 0 | | 0 | 0 | 0 | | 0 | | 0 | | | |
| , | | | oT brand IngiseO | m3/sec | 0:00:0 | 01000 | 0:0015 | | 00000 | | 00000 | 00000 | 0.0033 | | 00014 | 0.0003 | 00018 | 000000 | 00087 | |
| acontrol of the second | | 3E 3E | lstoT | m³/286 | | | | | | | | | | | | | | | | |
| | | Other | 2ewet | æs/ _ε ω | | | | | | | | | | | | | | | | |
| 2 | | 3 | ngias⁄d ⊮o[∃ | 385/ _{EE} | 0000 | 00010 | 00015 | | 00004 | | 00003 | 00007 | 00033 | | 00014 | 0.0053 | 0:0018 | 00000 | 0.0087 | |
| rs | | er Flow | | | | | | | | | | | |] | | | | | | |
| e e | | Wastewater | Population Sewer Total | Person | | | | ļ | | | | | | | | | | | · · | |
| T A | | | Pop. | Реула | | | | | | | | | | | | | | | | |
| J | | | HetnisA | 395/ _E W | | | | | | | | | <u> </u> | | | | | | | |
| ers | | Œ. | ged Area Total | ha | | | | | | | ļ | | | | | | | | | |
| Sew | | ff Storm | Arrangec Area | ħa | | | - | | | | | | | | | | ., | | | |
| n of | | Run-off | Run-off Coeffi. A A | | | | | | | | | | | | | | | | | |
| Design | | | 11stnisA Yeers | εη· 985/ _ε μι | | | | | | | | | | | | | | | | |
| for | | | emiT. | | | | | | | | | | | | | | | | | |
| 0 | | H | Total Trinonoo | min). m | 110 | 265 | 700 | | 113 | | 80 | 153 | 6.50 | | 318 | 187 | 350 | 620 | 387 | |
| Calculation | | Length | դդճսթղ | u u | 110 | 155 | 135 | | 113 | | 8 | 0.7 | 250 | | 318 | 137 | 350 | 270 | 100 | |
| Gali | | Area | | | 131 | 2.62 | 402 | | 110 | | 89.0 | 194 | 890 | | 3.73 | 1423 | 430 | 7.96 | 23.18 | |
| Hydraulic | | Drainage A | lstoT | , <u>c</u> | | | | | | | | ıρ | | | ço | | 0 | و | | |
| lydra | | اـــــــــــــــــــــــــــــــــــــ | БЭТА | ha E | 131 | 131 | 140 | | 110 | | 0.68 | 01.6 | 294 | | 373 | 160 | 06.7 | 306 | 66. | |
| | | 1 | ownstream Sewers No. | | | | 65 | | 64 | | | | 67 | | | 7.0 | | | МН 136 | |
| | | 818 | ewe2 to . | 애 | 59 | 0.9 | 6.1 | | 82 | | 63 | 54 | 65 | | . 99 | 67 | 88 | 6.9 | 7.0 | |

| 25 | :0.00037450m/s-ha | | Renarks | | | | | | | | | | | | | | | | |
|--|-------------------|--|------------------------|------------|--------|---------|----------|----------|-----------|------|--|----------|---------------------------------------|------|----------|---|---|--------------|------|
| α. | 0,00037 | | Rea | | | | | | | | | | 4 | | | | | | |
| | | | farth TeyeJ | E | 150 | 1220 | 150 | 150 | 1.02 | | | | | | <u> </u> | | | | |
| | | | Jaynl Leyel | × | 33131 | 33131 | 34631 | 34531 | 33081 | | | | | | | | | | |
| | | Sewers | noiteval∃ | × | 3430 | 3480 | 3530 | 3630 | 3480 | | | | | | | | | | |
| | | | Wo[3 | m³/sec | 0.0273 | 00103 | 0:0327 | 0:0241 | 00140 | | <u> </u> | <u> </u> | | | | | | | |
| | | Designing of | Velocity | 1 3es/11 | 1544 | 0 6090 | 1348 | 1363 | 04.20 | | | | | | | | | | |
| | | 3 | aqo 2 | 38 | 32.10 | | 4600 | 2500 | 0.40 | | | ļ | <u> </u> | | | | | | |
| | | | 1919msiQ | E E | 150 | 150 | 150 | 150 | 150 | | | | | | | | | | 1 |
| | | | ol basıð Ingised | m³/sec | 00040 | 0.00040 | 00000 | 000150 | 000 28 🔾 | | | | | | | | | | |
| and the state of t | | ₩.₩ | lstoT | 1 3≈s / £m | | | | | | | | | | | | | | <u> </u> | 1 |
|) | | Other 1 | Земет | m³/sec m | | ***** | | | | | | | | | | | | | |
| 2 | | | ngisə(I wol-l | m3/38c | 0.0040 | 0.0040 | 0.0005 | 0:0015 | 0.0058 | | | | | | _ | | | | |
| s and a second | | er Flo | 1 | | | 0 | 0 | 0 | 0 | | | | | | | | | | |
| r c | | Wastewater Flow | Popu | a Person | | | | | | | | | | | | - | | | |
| A | | | Pop. | r Peyha | | | | | | | | ···- | | | | | ļ | | |
|) | | | RainisA | m³/sec | | | | | | | | | | | | | | | |
| Rers | · | Storm | ged Area Total | វាឧ | | | | | | •••• | | | · · · · · · · · · · · · · · · · · · · | | | | | •••• | |
| Se | | Run-off S | Arran | ha | | | | | | | | | | | | | | | |
| gu o | | تج | Run-off Coeffi | | | | | | | | | | | | | | | | |
| Design | | ļ | letnis8 | m³∕sec-ha | | | | | | | | | | | | | | | |
| Per l | | nair | ijneonoO emiT | min m | | | | | | | | | | | | | | | |
| tion | | 1 | latoT | E | 380 | 380 | 100 | 160 | 660 | | ······································ | | | | | | | | |
| Calculation | | Length | Length | E | 380 | 01 | 100 | 09 | 270 | | | | | | | | | | |
| c Cal | | e Area | lstoT | ha | 10.69 | 10:69 | 126 | 08. | 1555 | | | | | | | | | | |
| Hydraulic | | Drainage | Area | ha | 10.68 | 000 | 126 | 264 | 9.60 | | | | | | | | | - | |
| Hy | | لبــــــــــــــــــــــــــــــــــــ | Downstres Sewers No | | | 7.5 | | <u>.</u> | MH 138 | | | | | | | | | | |
| | | 219 | 492 to .o | N | 7.1 | 7.2 | 73 | 74 | 7.5 | | | | | | | | | | |

Appendix 6 Design Calculation of Kauma Treatment Plant

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Appendix 6 Design Calcuration of Kauma Sewege Treatment Plant

1) Design Criteria

① Basic Items

Name

Kauma STP

Location

Area 44, Lilongwe City

Land Area

Approximately 40 ha

Blevation

Present Elevation 1,007~1,030m

Land Use

Crop Field, Uncultivated Land

Type of Sewer

Separate Type

Treatment Method:

Sewage Treatment Stabilization Pond Method

(Anaerobic Pond ⇒Facultative Pond⇒Maturation Pond)

Sludge Treatment Pond Drainage⇒Sun Drying⇔Dumping

Effluent Point

Effluent Point Lilongwe River

Recorded Highest Flood Water Level Unknown

and Water Level

Design Highest Water Level HHWL+1,007m

Target Year

2000 (This Project), 2005 (Future Plan)

Lowest Monthly

Average Tempreture: 15.2°C (July)

Design Sewage Volume

| | | Future Plan(m³/day) | This Project(m³/day) |
|---------------|-------|---------------------|----------------------|
| Dayly Maxmum | Q_1 | 15, 600 | 6, 100 |
| Hourly Maxmum | Q2 | 35, 880 | 14, 030 |

Design Population: Future Plan about 67,000 Persons

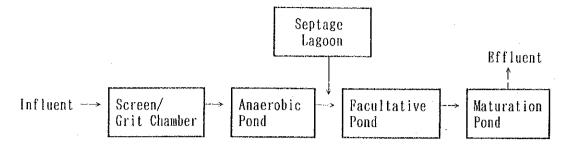
This Project about 22,000 Persons

Design Water Quality

| | Influent | Effluent |
|---------------------------------|---------------------|---------------------|
| BOD ₅ (mg/ ℓ). | 300 | 20 |
| SS (mg/l) | 350 | 30 |
| Coliform (MPN/100ml) | 2.0×10^{7} | 1.0×10^{3} |

^{*}Effluent water quality is target water quality

2) Flow Sheet



· Volume of Sludge

Water content ratio of sedimented sludge is assumed at 97 %, and that of dumping sludge is 80 % after sun drying.

Volumetric reducing ratio =
$$\frac{100-97}{100-80}$$
 = 0.15

3) Design Calcuration

| Items | | Future Plan | This Project | |
|--------------------------------|----|--|---|--|
| 1. Grit Chamber | | | | |
| Туре | | Pallarel Flow Type | ditto | |
| Hourly Maxmum Sewage Volume | Q2 | 35, 880 m³/d=0. 415 m³/s | 14, 030 m³/d=0. 162 m³/s | |
| Area Load | Lg | 1,800 m³/m²/d | ditto | |
| Required Surface Area | Ag | 35, 880×1/1, 800 =19. 93 m ² | 14, 030×1/1, 800 =7, 79 m ² | |
| Average Velocity | v | 0.3 m/sec | ditto | |
| Effective Depth | h | About 0.6 m | ditto | |
| Required Width | W | $\begin{array}{c c} 0.415 \times 1/0.3 \times 1/0.6 \\ =2.31 \mathrm{m} \rightarrow 2.40 \mathrm{m} \end{array}$ | 0. 162×1/0. 3 ×1/0. 6 =0. 90m | |
| Required Length | | 19. 93×1/2. 40 =8. 30m | $7.79 \times 1/1.2$ =6.49m | |
| Dimension | | 1.2m W×8.5m L×2 Units | 1.2m W×8.5m L×2 Units (1 unit stand-by) | |
| Sedimentation Volume | | 0.01 m ³ for every 1,000 m ³ of sewage $\frac{0.01}{1,000}$ = 0.156 m ³ /d | $6,100 \times \frac{0.01}{1,000} = 0.061$ m^{3} / d | |

| (Check) Area Load | Lg | 35, 880×1/(1.2×8.5 ×2) =1, 759 m³/m³/d0K | $\begin{vmatrix} 14,030 \times 1/(1.2 \times 8.5 \times 1) \\ =1,375 \text{ n}^3/\text{n}^2/\text{d}0\text{K} \end{vmatrix}$ |
|--|----------------|---|--|
| Average Velocity | ν | $ \begin{vmatrix} 0.415 \times 1/(0.6 \times 1.2 \times 2) \\ -0.29 \text{m/s} & \dots & 0 \text{K} \end{vmatrix} $ | $\begin{vmatrix} 0.162 \times 1/(0.6 \times 1.2) \\ = 0.23 \text{m/s} & \dots & 0 \text{K} \end{vmatrix}$ |
| 2. Measuring Device | | | |
| Туре | | Parshall Flume | ditto |
| Capacity | | Hourly Max 35,880=1,495 m³/h →1,800 m³/h | Hourly Max 14,030= 585 m³/hr → 1,800 m³/hr |
| No. of unit | | 1 Unit | 1 Unit |
| 3. Anaerobic Pond | | | |
| Type | | Embanked Rectangular Pond | ditto |
| BOD Load | Li | 15, 600×300 ×10 ⁻³ =4, 680 kgBOD ₅ /d | 6, 100×300 ×10 ⁻³ =1, 830 kgB0D ₅ /d |
| BOD Volumetric Load | v | Temperature Ta =15.2°C v=160gBOD₅/m³·d | ditto |
| Required Capacity | V. | 4, $680 \times 10^3 \times 1/160$ = 29, $250 \mathrm{m}^3$ | 1, $830 \times 10^3 \times 1/160$ = 11, $440 \mathrm{m}^3$ |
| Sedimented Sludge Volume Dryed Volume (Sun drying) 97w%→80w% | V ₂ | Dumped once in every 5 year, 67,000person×0.04 m³/person/year×5 years =13,400 m³ 100-97 ×13,400=2,010 m³/ 5 years | ditto 22, 000person × 0. 04 m³/person/ year × 5 years = 4, 400 m³ 100-97 |
| Required Capacity | V | $V_1 + V_2 = 42,650 \mathrm{m}^3$ | $V_1 + V_2 = 15,840 \text{m}^3$ |
| Depth | Da | 4. 0m | 4. 0m |
| Required Surface Area | Ла | 42, 650 ×1/4 =10, 663 m ² | 15. $840 \times 1/4$ = 3, $960 \mathrm{m}^2$ |
| Dimension | | W (54 ~30)m×L (62 ~38)m ×D 4.0m×5 Units ()means length at surface /bottom. | W (54 ~30)m×L (62 ~38)m ×D 4.0m×3 Units (1 unit for stand-by) |
| (Check) Effective Capacity | Vı | 4. $0 \times 1/3 \times (54 \times 62 + 30 \times 38)$ + $\sqrt{(54 \times 62 \cdot 30 \times 38)} \times 5$ - 13, 400 = 29, 545 m ³ | 4. 0 $\times 1/3$ $\times (54 \times 62 + 30 \times 38 + \sqrt{(54 \times 62 \cdot 30 \times 38)}) \times 2 - 4,400 = 12,778 \text{m}^3$ |
| | | | |

| | BOD Volumetric Load | V | $4.680 \div 29.545 \times 10^{3}$ == 158g-BOD ⁵ / m³ / d OK | $\begin{vmatrix} 1,830 \div 12,778 \times 10^3 \\ -143g-800^5 / m^3 / d. \dots 0K \end{vmatrix}$ |
|----|--|----|---|--|
| | Effective Retentin Days | Ra | 29, 545 ÷ 15, 600 == 1, 9d OK | 12, 778 ÷ 6, 100 = 2. 1d 0K |
| | Effluent BOD ₅ Concentration | Le | $300 \times (1-0.5)$ =150 mg/ ℓ | $\begin{array}{c} 300 \times (1-0.5) \\ = 150 \text{ mg} / \ell \end{array}$ |
| 4. | Septage Lagoon | | | |
| | Type | | Embanked Rectangular Pond | ditto |
| | Service Population | - | About 120,000 persons | About 119,000 persons ×60%(Collection Ratio) =71,400 ps |
| | Sludge Volume | | 0.001 ㎡/person/day | ditto ps |
| | BOD Concentration | L | 5,000 mg/l | ditto |
| | Design Sludge Volume | S | 120, 000 ×0. 001 =120 m³/day | 71, 400×0.001 =71 m³/day |
| | Required Capacity | Vs | ①Retention days (>20days) 120 ×20 =2,400 m³ | ① 71×20 =1, 420 m³ |
| | | | ②Volumetric Load (200g BOD/m³/day) 120 ×5,000 ÷ 200 =3,000 m³ ①<② 3,000 m³ | ② $71 \times 5,000 \div 200$ $=1,775 \text{ m}^{3}$ ①<② 1,775 m 3 |
| | Opearation | | Alternative Operation | ditto |
| | Dimension/Capacity | | W(28.2~10.2)m×L(42.2~ 24.2)m×D 3.0m×3 Units (1 unit shall always be left non-operational) 3.0 ×1/3 × (28.2 × 42.2+ 10.2×24.2+√(28.2 × 42.2× 10.2×24.2))×2= 3,958 m³0K | W(28.2~10.2)m×L(42.2 ~ 24.2)m×D 3.0m×2 Units (1 unit shall always be left non-operational) 3.0 ×1/3 ×(28.2 ×42.2+ 10.2×24.2+√(28.2 ×42.2× 10.2×24.2)) = 1,979 m³0K |
| | Effluent BOD Load | | $120 \times 5,000 \times (1-0.5) \times 10^{-3}$ = $300 \text{ kg-BOD}_{5}/\text{d}$ | 71 \times 5, 000 \times (1-0.5) \times 10 ⁻³ = 178 kg-B0D ₅ /d |
| | Sludge Dumping (Once per month) | | Design SS volume SS 50 g/person/day×120,000p =6.0 ton/day Sedimentation rate 50 % 6.0 ton/day × 50 % =3.0 ton/day Water content of dry sludge 8 | Design SS volume SS 50 g/person/day×71,400 =3.6 ton/day Sedimentation rate 50 % 3.6 ton/day × 50 % =1.8 ton/day 0% ditto |

| 5. Facultative Pond Type | | 3.0 ton/day × \frac{100}{100-80} = 15.0 ton/day = 15.0 m³/day = 450 m³/month | 1.8 ton/day × \(\frac{100}{100-80}\) = 9 ton/day = 9 m³/day = 270 m³/month |
|-------------------------------|----|--|---|
| Influent BOD Load | | 15, 600 $\times 150 \times 10^{-3} + 300$ =2, 640 kg-BOD ₅ /d | 6, $100 \times 150 \times 10^{-3} + 178$ =1, 093 kg-B0D ₅ /d |
| BOD Area Load | | s=60.3×1.0993 ^{Ta} ×1/α Ta:Lowest Monthly Average Temperature (15.2°C) α:Safety Rate(Among 8units 2units are to be drained, 8/6 =1.33) =60.3×1.0993 ^{15.2} ×1/1.33 =192 kg-BOD ₅ /ha/d | s=60. 3×1. 0993 ^{Ta} ×1/α ditto α:Safety Rate(Among 4units 1 unit is to be drained, 4/3 =1.33) =60. 3×1. 0993 ^{Ta} ×1/1. 33 =192 kg-BOD ₅ /ha/d |
| Required Surface Area | | 2.640×1/192 =13.8ha | 1, 093×1/192 = 5. 7ha |
| Depth Dimension | Df | 1.5m W (105~96)m×L (144~135)m ×D 1.5m×4 Units +2.1ha ×D 1.5m×4 Units | 1.5m W (105~96)m×L (144~135)m ×D 1.5m×4 Units |
| (Check) Capacity Surface Area | V1 | 1. $5 \times 1/3 \times (105 \times 144 + 96 \times 135 + \sqrt{(105 \times 144 \times 96 \times 135)} \times 4 + 21,000 \times 1.5 \times 4$ = 210, 157 m ³ 210, 157 ÷ 1. 5 = 14, 01 ha | 1.5 $\times 1/3 \times (105 \times 144 + 96 \times 135 + \sqrt{(105 \times 144 \times 96 \times 135)} \times 4 = 84,157 \text{ m}$ 84, 157 $\div 1.5 = 5.61 \text{ ha}$ |
| ourrave nrea | | > 13. 8ha | = 5.7ha OK |

| Retention Days | Rf | 210, 964 ÷15, 600 =13. 5d | $\begin{vmatrix} 84.157 & \div 6.100 \\ = 13.86 \end{vmatrix}$ |
|--|----------------|---|--|
| Area Load against Influent BOD ₅ Load | S | Surface Area 1.05×1.44×4 +2.1 ×4 =14.45 ha 2,640×1/14.45 =183 kg-BOD ₅ /ha/d0K | 1.05×1.44×4 = 6.05 ha 1.093×1/6.05 =181 kg-BOD ₅ /ha/d0K |
| Volume of Sludge | V ₂ | Dumped once in every 5 years 67,000人×0.03㎡/person/year ×5 years =10,050㎡ | 22,000人×0.03㎡/person/year ×5 years = 3,300㎡ |
| Dumping Sludge Volume | 7745000 | 10,050×0.15=1,508m³/5years | 3,300×0.15=495 m³/5years |
| Depth of Sedimented Sludge | Ds | 10, 050 ×1/ 140, 100 =0. 072 m | 3, 300×1/ 56, 100 =0. 059 m |
| 6. Maturation Pond | | | |
| Туре | | Embanked Rectangular Pond | ditto |
| Retention Days | Rm | 3 days/Pond | 3 days/Pond |
| No. of Units | N | 3 units/1 series×4 series =12 units | 3 units/1 series×2 series = 6 units |
| Check of Coliform Bacteria Number contained in | NR | $NR = \frac{No}{(K Ra+1)(K' Rf+1)(K')}$ | Rm+1) ⁿ |
| effluent | | where: No:Coliform Baccontained in (2.0×10°, k':Death Const.) k'at15.2 = 2.0 n = 3 (number of | n Influent /100 <i>ml</i>) ant ×1.07 ^(15.2-20) |

| | | NR $= \frac{2.0 \times 10^{7}}{(1.446 \times 1.9 + 1)} \times (1.446 \times 13.5 + 1) \times (1.446 \times 3 + 1)^{3} \times (1.446 \times 3 + 1)^{3} = 1 \times 10^{3} \dots 0 \text{K}$ | NR $= \frac{2.0 \times 10^{7}}{(1.446 \times 2.1 + 1)} \times (1.446 \times 13.8 + 1) \times (1.446 \times 3 + 1)^{3} \times (1.446 \times 3 + 1)^{3} = 1 \times 10^{3} \dots 0 K$ |
|----------------------------|----|---|--|
| Influent volume per series | q | 6, $100 \times 1/2=3$, $050 \text{m}^3/\text{day}$ 9, $500 \times 1/2=4$, $750 \text{m}^3/\text{day}$ | 6, 100×1/2=3, 050 m³/day |
| Required Capacity per unit | V | 3,050 ×3= 9,150 m³/unit 4,750 ×3=14,250 m³/unit | 3,050×3 = 9,150 m³/unit |
| Depth | Dm | 1.5m | 1.5m |
| Dimension | | W (72~63)m×L (95~86)m ×D 1.5m×3 units/1 series ×2 series +14,250 m³×3 units/1 series ×2 series | W (72~63)m×L (95~86)m ×D 1.5m×3 units/1 series ×2 series |
| (Check) | | | |
| Capacity | | 1.5 $\times 1/3 \times (72 \times 95 + 63 \times 86)$ + $\sqrt{(72 \times 95 \cdot 63 \times 86)} \times 6$ + 14, 250 $\times 6$ = 140, 540 m ³ | 1. $5 \times 1/3 \times (72 \times 95 + 63 \times 86)$ + $\sqrt{(72 \times 95 \cdot 63 \times 86)} \times 6$ = 55, 040 m ³ |
| Retention Time | | 140, 540 \div 15, 600=9. 01 9. 01 \div 3 = 3. 0 \ge 3. 0 | 55, 040 \div 6, 100 = 9, 02 9, 02 \div 3 = 3, 0 \ge 3, 0 |