Appendix C **MK Surveys Topographical and Utility Survey**

KEY

TOPOGRAPHICAL KEY

SURVEY STATION 5 — FENCE — WALL — BANKING (TOP / BOTTOM) — BUILDING — HEDGE SPREADS — OPEN SIDED BUILDING — WOODLAND CANOPY — OVERHANG / CANOPY — MARSH / WATERLOGGED — GLASSHOUSE — CONTOUR 25.50 — TREES (SPREAD & GIRTH SHOWN TO SCALE) — SPOT LEVEL + 127.13 — SONAR LEVEL 127.13 — BORE HOLE BH — GATE — TRIAL HOLE TH — KERB CHANNEL — FOOTPATH — ROAD UNKERBED — CHANGE IN SURFACE

GENERAL

(ACP)	ASSUMED CONNECTION POINT
COW	CABLE ON WALL
CW	COMBINED WATER
DIS	DISUSED
EML	ELECTROMAGNETIC LOCATOR
EOT	END OF TRACE
FO	FIBRE OPTIC
FP	FOOTPATH
FW	FOUL WATER
GP	GATE POST
GPR	GROUND PENETRATING RADAR
H/P	HIGH PRESSURE
HV	HIGH VOLTAGE
KV	KILO VOLT
I/P	INTERMEDIATE PRESSURE
L/P	LOW PRESSURE
LV	LOW VOLTAGE
M/P	MEDIUM PRESSURE
NDI	NO DEPTH INFORMATION
NFI	NO FURTHER INFORMATION
NDV	NO DUCTS VISIBLE
NPV	NO PIPES VISIBLE
OSBM	ORDNANCE SURVEY BENCHMARK
POW	PIPE ON WALL
P.BOX	POST BOX
RED	REDUNDANT SERVICE
R/MAIN	RISING MAIN
RW	RETAINING WALL
SNP	STREET NAME PLATE
SW	SURFACE WATER
TAC	TACTILE PAVING
TW	TRADE EFFLUENT WATER
UTL	UNABLE TO LOCATE
UTR	UNABLE TO RAISE
UTS	UNABLE TO SURVEY

APPARATUS

ACU	AIR CONDITIONING UNIT
AV	AIR VENT
BB	BELISHA BEACON
BO	BOLLARD
BOL	BOLLARD LIGHT
BS	BUS STOP
BT	BT INSPECTION COVER
CATV	CABLE TELEVISION
CB	CONTROL BOX
CP	CATCH PIT
CR	CABLE RISER
DCH	DRAINAGE CHANNEL
EB	ELECTRIC CONTROL BOX
EP	ELECTRIC POLE
ER	EARTH ROD
FD	FILTER DRAIN
FFP	FUEL TANK FILL POINT
FH	FIRE HYDRANT
GR	GAS RISER
GV	GAS VALVE
GY	GULLY
IC	INSPECTION COVER
INT	INTERCEPTOR
IT	INLET
KO	KERB OUTLET
LD	LOOP DETECTOR
LH	LAMP HOLE
LP	LAMP POST
MK	MARKER POST / PLATE
MH	MANHOLE
MT	METER
M/WELL	MONITORING WELL
OL	OUTLET
OU	OUTFALL
PO	POST
PTG	PIPE TO GROUND
PTS	PIPE TO SURFACE
PU	PUMP
RE	RODDING EYE
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SC	STOP COCK
SP	SOIL PIPE
ST	STAY CABLE
SVP	SOIL VENT PIPE
SV	STOP / SLUICE VALVE
TCB	TELEPHONE CALL BOX
TL	TRAFFIC LIGHT
TLC	TRAFFIC LIGHT COVER
TP	TELECOM POLE
VP	VENT PIPE
WM	WATER METER
WO	WASH OUT
WR	WATER RISER
W/WELL	WET WELL

DEPTHS

d	ELECTRONICALLY DERIVED
Pd	PASSIVELY DERIVED
Bd	BASE DEPTH
Cd	DEPTH TO CROWN
Id	DEPTH TO INVERT
Sd	DEPTH TO SOFFIT

PIPE MATERIALS

AC	ASBESTOS CEMENT
ALK	ALKATHENE
BK	BRICK
CI	CAST IRON
CO	CONCRETE
DI	DUCTILE IRON
HDPE	HIGH DENSITY PE
MDPE	MEDIUM DENSITY PE
PE	POLYETHYLENE
PF	PITCH FIBRE
PP	POLYPROPYLENE
PVC	POLYVINYL CHLORIDE
PVC-U	ULTRA RIB (PVC)
SI	SPUN IRON
ST	STEEL
VC	VITRIFIED CLAY

FENCES

B/W	BARBED WIRE FENCE
C/B	CLOSED BOARDED FENCE
CPL	CONCRETE PANEL FENCE
C/I	CORRUGATED IRON FENCE
CNP	CHESTNUT PAILING
C/L	CHAIN LINK FENCE
I/R	IRON RAILINGS
L/L	LARCH LAP FENCE
P/R	POST AND RAIL FENCE
P/W	POST AND WIRE FENCE
W/M	WIRE MESH FENCE

LEVELS

BD	BACKDROP LEVEL
BL	BASE LEVEL
CL	COVER LEVEL
FL	FLOOR LEVEL
IL	INVERT LEVEL
PT	P TRAP LEVEL
RL	ROOF LEVEL
SOF	SOFFIT LEVEL
WL	WATER LEVEL

LINESTYLE

INTERNAL METER (MT) — POT ENDED SERVICE — SEWER CAPPED RUN — SURVEY ABANDONED — INTERNAL VALVE — UNKNOWN UNDERGROUND ANOMALY — UNDERGROUND CHAMBERS — POST PROCESSING AREA (FROZEN LAYER) — ABOVE GROUND (AG) — ASSUMED ROUTE (AR) — EMPTY DUCTS (E) — OVERHEAD (OH) — BACK DROP — P TRAP — UTILITY CROSSOVER — SURVEY BOUNDARY — VERBAL INFORMATION (VI) — RECORD INFORMATION (R) — REDUNDANT SERVICE — RISING MAIN

CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

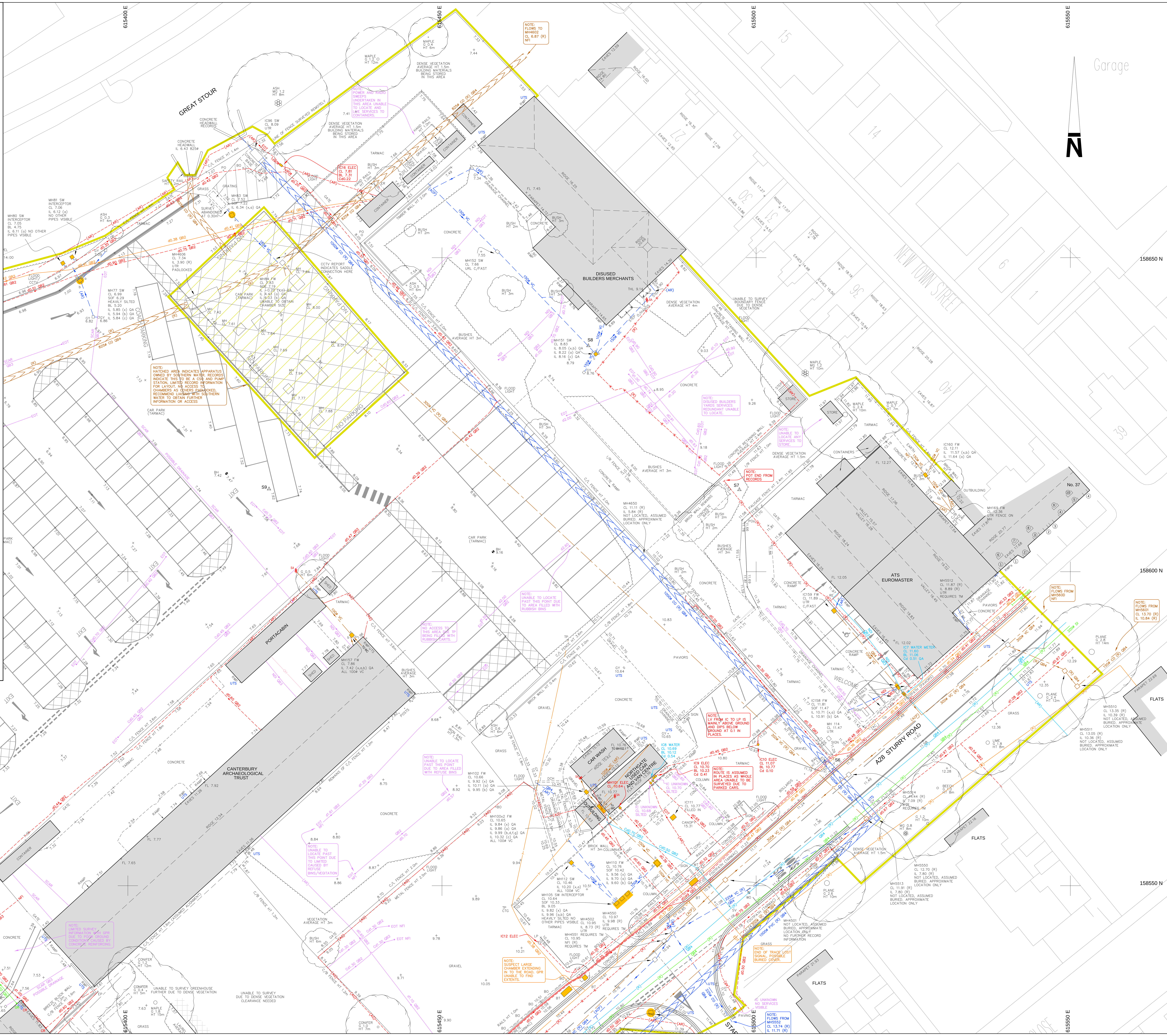
SERVICE TYPE

CATV / DATA — ELECTRICITY (HV) — ELECTRICITY (LV) — FUEL — GAS — HEATING — OVERHEAD ELECTRIC — OVERHEAD TELECOM — TRADE EFFLUENT — COMBINED SEWER — FOUL SEWER — SURFACE SEWER — UNIDENTIFIED SEWER — TELECOM — UNKNOWN SERVICE — WATER

CAUTIONARY NOTES

1. EML techniques have been used in the detection of underground utilities as outlined in Table 2 of PAS 128:2014, the results are not infallible and trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
2. GPR techniques has been used in the detection of non-metallic utilities as outlined in Table 2 of PAS 128:2014. The interpretation of these results is not infallible and success will depend on a number of factors including soil type, ground water levels and surface conditions, hence trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
3. Depths derived via EML are taken to the centre of the conductor (cable, metallic pipe) and those derived via GPR are usually to the crown of the utility unless otherwise indicated.
4. Where cables cannot be detected individually an average depth has been obtained and trial excavations are recommended to confirm number and depths of cables banded together.
5. 'Pot-ended' cables are often difficult to detect and although we have made all reasonable efforts to locate or transpose this information from records, we cannot guarantee that all 'pot-ended' cables have been located.
6. Fibre optic cables are often difficult to detect, and commonly access chambers can be locked and thereby made inaccessible by the utility provider. All reasonable efforts have been made to locate these ducts using GPR. Cables not located have been transposed from records.
7. Within close proximity of electric substations and similar structures results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
8. Underneath overhead power lines results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
9. Drainage information has been obtained without man entry into the chamber.
10. Wherever possible we have attempted to locate the route of the sewer. Issues such as blockages, surcharging, flooding, sedimentation, sewer collapse, root ingress, excessive depth, obstructions or heavy traffic flow may have affected our ability to obtain meaningful results. In these cases recommendations have been made for further survey or maintenance work.
11. Pipe / duct sizes have been recorded from surface inspection or taken from record information. Pipe sizes have been recorded in millimetres and depths in metres, except in instances where sizes are indicated in imperial units on the record information.
12. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation, whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only.
13. All utilities detected by MK Surveys should be considered live unless confirmed otherwise by client or service provider.
14. MK Surveys cannot confirm when utilities are redundant unless there is visual or record evidence to indicate this. In addition MK Surveys cannot guarantee being able to detect all redundant utilities.
15. Wherever available the results of our investigations have been cross referenced with record information. If a utility shown on the records cannot be detected on site, the information has been added to the drawing and indicated as QB4 (R). However it should be noted that the completeness and accuracy of the records cannot be guaranteed.
16. The utility information has been obtained from non-intrusive survey techniques; it always remains possible that there are additional utilities within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all utility records are used in conjunction with this survey.
17. The responsibility for avoiding damage to assets and utilities on site shall be that of the persons proposing to excavate within the surveyed area, who shall be liable to the asset owner and any third party who may be affected in any way for any loss or damage.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING.



Notes :

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GPS NETWORK. LOCAL SCALE FACTOR 1.00017 USED IN ALL CALCULATIONS.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. BACKGROUND INFORMATION (SHOWN GREY) IS ORDNANCE SURVEY DIGITAL DATA, SUPPLIED BY CLIENT.
4. ARROWS ON STEPS/RAMPS DENOTE DIRECTION UPWARDS.
5. THIS SURVEY SHOULD ALWAYS BE READ IN CONJUNCTION WITH DESKTOP UTILITY REPORT,THAT WAS CARRIED OUT AS A PREREQUISITE TO THIS DETECTION SURVEY.
6. TO BE READ IN CONJUNCTION WITH INSEWER SURVEYS CCTV REPORT. REF: TV151203.

Coordinate Table

Station	Description	Easting	Northing	Level
S1	ROAD NAIL	615310.803	158618.946	7.377
S2	ROAD NAIL	615212.091	158570.335	9.420
S3	ROAD NAIL	615302.430	158497.621	7.853
S4	ROAD NAIL	615379.230	158442.356	9.015
S5	ROAD NAIL	615450.111	158503.682	10.152
S6	ROAD NAIL	615510.892	158569.801	11.294
S7	ROAD NAIL	615497.337	158613.058	11.641
S8	ROAD NAIL	615473.294	158635.975	8.836
S9	ROAD NAIL	615422.472	158613.166	7.582

DETECTION SURVEY REPORT

GENERAL

This survey was carried out in accordance with PAS 128:2014 (Publicly Available Specification from BSI). After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2014. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT

Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. Record information was at the time of the survey less than 90 days old in accordance with the requirements of the PAS 128:2014. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the enclosures page of the desktop utility report.

DETECTION SURVEY

DRAINAGE

Drainage was lifted with pipe sizes and invert levels recorded where not in highway these details have been taken from records only. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven otherwise. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Recommend traffic management to lift MH'S in Highway.

WATER

Water has been located using both EML and GPR methods. Water mains on Kingsmead Road and A28 Sturry Road have been taken from records as no services have been attempted to be located within these roads. Water scar on Kingsmead road has been positioned due to it being visibly different to record information. Recommend trial excavations to confirm position and depth.

GAS

Gas has been located where possible using both EML and GPR methods. Unable to locate gas main on footpath on Kingsmead Road due to being in close proximity to other services. Gas mains in highways Kingsmead Road and A28 Sturry Road have been not attempted to be located and positioned from records only. Recommend traffic management to locate gas in highways. Also recommend trial excavations to confirm position and depth.

ELECTRICITY

Electricity within survey area has been located using EML methods with electronically derived depths recorded. Electricity located matches with records provided. Electricity on Highway Roads has been positioned from records or assumed only. Recommend traffic management to located electric on roads and trail excavations to confirm position and depth of cable.

Please note the presence of numerous abandoned cables located in both Kingsmead Road, Sturry Road and the roundabout connecting the two roads. These abandoned cables could not be located on site and have been indicated as single lines on the drawing, whereas the records indicate multiple cables along these routes. Please read the UK Power Networks record plans in conjunction with the survey for more information.

TELECOM

Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly. Telecom in Highway Roads has been positioned from records only.

CATV

No CATV located within survey area, Records also confirm this.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

PAS 128:2014 Quality Level Guide

Quality Level	Description	Accuracy
QB4	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 QB3P	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
QB2 QB2P	Horizontal and vertical location only using one geophysical technique.	+/- 250mm or +/- 40% of depth whichever is greater
QB1 QB1P	Horizontal and vertical location only using two geophysical techniques.	+/- 150mm or +/- 15% of depth whichever is greater
QA	Service verified in an open excavation, inside an inspection chamber / draw pit, or at the point the service enters / exits the ground.	+/- 50mm Horizontal +/- 25mm Vertical

Desktop Utility Records

Utility Type	Provider Details	Date Acquired
Drainage	Southern Water	06/10/2015
Water	South East Water	09/10/2015
Gas	Scotia Gas Networks	05/10/2015
Electricity	UK Power Networks	05/10/2015
Telecom	Openreach	05/10/2015
CATV	Virgin Media	06/09/2015

Sheet Layout: (Not to Scale)

1 2 3

Revision	Description	Surv. by	Appr. by	Date
2	Survey updated post CCTV survey	KS	NS	05/01/2016
1	Utility survey added	KS	GL	27/11/2015

0m 2 4 6 8 10 12 14 16 18 20 22

mksurveys

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Tel 01384 404203 — West Midlands — westmidlands@mksurveys.co.uk
Tel 01403 243162 — Horsham — horsham@mksurveys.co.uk
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BOUYGUES UK

Canterbury Riverside
Canterbury
Kent

Topographical and Utility Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:200	A0	1	November 2015
Project Number: 21530	Rev: 2	Surveyed By: RG	Approved By: AJ/NS

KEY

TOPOGRAPHICAL KEY

SURVEY STATION 5
BANKING (TOP / BOTTOM)
HEDGE SPREADS
WOODLAND CANOPY
MARSH / WATERLOGGED
TREES — SPREAD & GIRTH SHOWN TO SCALE
GATE
KERB CHANNEL
ROAD UNKERBED
FENCE
WALL
BUILDING
OPEN SIDED BUILDING
OVERHANG / CANOPY
GLASSHOUSE
CONTOUR 25.50
SPOT LEVEL + 127.13 SONAR LEVEL 127.13
BORE HOLE BH
TRIAL HOLE TH
FOOTPATH
CHANGE IN SURFACE

GENERAL

(ACP)	ASSUMED CONNECTION POINT
COW	CABLE ON WALL
CW	COMBINED WATER
DIS	DISUSED
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PT	P TRAP LEVEL
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SOF	SOFFIT LEVEL
WL	WATER LEVEL

APPARATUS

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LINESTYLE

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SEWER CAPPED RUN
SURVEY ABANDONED
INTERNAL VALVE
UNKNOWN UNDERGROUND ANOMALY
UNDERGROUND CHAMBERS
POST PROCESSING AREA (FROZEN LAYER)
ABOVE GROUND (AG)
ASSUMED ROUTE (AR)
EMPTY DUCTS (E)
OVERHEAD (OH)
BACK DROP
P TRAP
UTILITY CROSSOVER
SURVEY BOUNDARY
VERBAL INFORMATION (VI)
RECORD INFORMATION (R)
REDUNDANT SERVICE
RISING MAIN
CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

SERVICE TYPE

CATV / DATA
ELECTRICITY (HV)
ELECTRICITY (LV)
FUEL
GAS
HEATING
OVERHEAD ELECTRIC
OVERHEAD TELECOM
TRADE EFFLUENT
COMBINED SEWER
FOUL SEWER
SURFACE SEWER
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UNKNOWN SERVICE
WATER

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5. 'Pot-ended' cables are often difficult to detect and although we have made all reasonable efforts to locate or transpose this information from records, we cannot guarantee that all 'pot-ended' cables have been located.
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16. The utility information has been obtained from non-intrusive survey techniques; it always remains possible that there are additional utilities within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all utility records are used in conjunction with this survey.
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Notes :

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6. TO BE READ IN CONJUNCTION WITH INSEWER SURVEYS CCTV REPORT. REF: TV151203.

Coordinate Table

Station	Description	Easting	Northing	Level
S1	ROAD NAIL	615310.803	158618.946	7.377
S2	ROAD NAIL	615212.091	158570.335	9.420
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S9	ROAD NAIL	615422.472	158613.166	7.582

DETECTION SURVEY REPORT

GENERAL

This survey was carried out in accordance with PAS 128:2014 (Publicly Available Specification from BSI). After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2014. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT

Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. Record information was at the time of the survey less than 90 days old in accordance with the requirements of the PAS 128:2014. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the enclosures page of the desktop utility report.

DETECTION SURVEY

DRAINAGE

Drainage was lifted with pipe sizes and invert levels recorded where not in highway these details have been taken from records only. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven otherwise. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Recommend traffic management to lift MH'S in Highway.

WATER

Water has been located using both EML and GPR methods. Water mains on Kingsmead Road and A28 Sturry Road have been taken from records as no services have been attempted to be located within these roads. Water scar on Kingsmead road has been positioned due to it being visibly different to record information. Recommend trial excavations to confirm position and depth.

GAS

Gas has been located where possible using both EML and GPR methods. Unable to locate gas main on footpath on Kingsmead Road due to being in close proximity to other services. Gas mains in highways Kingsmead Road and A28 Sturry Road have not been attempted to be located and positioned from records only. Recommend traffic management to locate gas in highways. Also recommend trial excavations to confirm position and depth.

ELECTRICITY

Electricity within survey area has been located using EML methods with electronically derived depths recorded. Electricity located matches with records provided. Electricity on Highway Roads has been positioned from records or assumed only. Recommend traffic management to located electric on roads and trail excavations to confirm position and depth of cable.

Please note the presence of numerous abandoned cables located in both Kingsmead Road, Sturry Road and the roundabout connecting the two roads. These abandoned cables could not be located on site and have been indicated as single lines on the drawing, whereas the records indicate multiple cables along these routes. Please read the UK Power Networks record plans in conjunction with the survey for more information.

TELECOM

Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly. Telecom in Highway Roads has been positioned from records only.

CATV

No CATV located within survey area, Records also confirm this.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

PAS 128:2014 Quality Level Guide

Quality Level	Description	Accuracy
QB4	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 QB3P	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
QB2 QB2P	Horizontal and vertical location only using one geophysical technique.	+/- 250mm or +/- 40% of depth whichever is greater
QB1 QB1P	Horizontal and vertical location only using two geophysical techniques.	+/- 150mm or +/- 15% of depth whichever is greater
QA	Service verified in an open excavation, inside an inspection chamber / draw pit, or at the point the service enters / exits the ground.	+/- 50mm Horizontal +/- 25mm Vertical

Desktop Utility Records

Utility Type	Provider Details	Date Acquired
Drainage	Southern Water	06/10/2015
Water	South East Water	09/10/2015
Gas	Scotia Gas Networks	05/10/2015
Electricity	UK Power Networks	05/10/2015
Telecom	Openreach	05/10/2015
CATV	Virgin Media	06/09/2015

Sheet Layout: (Not to Scale)

1 2 3

Revision	Description	Surv. by	Appr. by	Date
2	Survey updated post CCTV survey	KS	NS	05/01/2016
1	Utility survey added	KS	GL	27/11/2015

0m 2 4 6 8 10 12 14 16 18 20 22

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BOUYGUES UK

Canterbury Riverside
Canterbury
Kent

Topographical and Utility Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:200	A0	2	November 2015
Project Number: 21530	Rev: 2	Surveyed By: RG/KS	Approved By: AJ/NS

KEY

TOPOGRAPHICAL KEY

SURVEY STATION	5	FENCE	
BANKING	TOP / BOTTOM	WALL	
HEDGE SPREADS		BUILDING	
WOODLAND CANOPY		OPEN SIDED BUILDING	
MARSH / WATERLOGGED		OVERHANG / CANOPY	
TREES	SPREAD & GIRTH SHOWN TO SCALE	GLASSHOUSE	
GATE		CONTOUR	25.50
KERB CHANNEL		SPOT LEVEL	+ 127.13
ROAD UNKERBED		SONAR LEVEL	127.13
		BORE HOLE	BH
		TRIAL HOLE	TH
		FOOTPATH	
		CHANGE IN SURFACE	

GENERAL

(ACP)	ASSUMED CONNECTION POINT
COW	CABLE ON WALL
CW	COMBINED WATER
DIS	DISUSED
EML	ELECTROMAGNETIC LOCATOR
EOT	END OF TRACE
FO	FIBRE OPTIC
FP	FOOTPATH
FW	FOUL WATER
GP	GATE POST
GPR	GROUND PENETRATING RADAR
H/P	HIGH PRESSURE
HV	HIGH VOLTAGE
KV	KILO VOLT
I/P	INTERMEDIATE PRESSURE
L/P	LOW PRESSURE
LV	LOW VOLTAGE
M/P	MEDIUM PRESSURE
NDI	NO DEPTH INFORMATION
NFI	NO FURTHER INFORMATION
NDV	NO DUCTS VISIBLE
NPV	NO PIPES VISIBLE
OSBM	ORDNANCE SURVEY BENCHMARK
POW	PIPE ON WALL
P.BOX	POST BOX
RED	REDUNDANT SERVICE
R/MAIN	RISING MAIN
RW	RETAINING WALL
SNP	STREET NAME PLATE
SW	SURFACE WATER
TAC	TACTILE PAVING
TW	TRADE EFFLUENT WATER
UTL	UNABLE TO LOCATE
UTR	UNABLE TO RAISE
UTS	UNABLE TO SURVEY

PIPE MATERIALS

AC	ASBESTOS CEMENT
ALK	ALKATHENE
BK	BRICK
CI	CAST IRON
CO	CONCRETE
DI	DUCTILE IRON
HDPE	HIGH DENSITY PE
MDPE	MEDIUM DENSITY PE
PE	POLYETHYLENE
PF	PITCH FIBRE
PP	POLYPROPYLENE
PVC	POLYVINYL CHLORIDE
PVC-U	ULTRA RIB (PVC)
SI	SPUN IRON
ST	STEEL
VC	VITRIFIED CLAY

FENCES

B/W	BARBED WIRE FENCE
C/B	CLOSED BOARDED FENCE
CPL	CONCRETE PANEL FENCE
C/I	CORRUGATED IRON FENCE
CNP	CHESTNUT PAILING
C/L	CHAIN LINK FENCE
I/R	IRON RAILINGS
L/L	LARCH LAP FENCE
P/R	POST AND RAIL FENCE
P/W	POST AND WIRE FENCE
W/M	WIRE MESH FENCE

LEVELS

BD	BACKDROP LEVEL
BL	BASE LEVEL
CL	COVER LEVEL
FL	FLOOR LEVEL
IL	INVERT LEVEL
PT	P TRAP LEVEL
RL	ROOF LEVEL
SOF	SOFFIT LEVEL
WL	WATER LEVEL

APPARATUS

ACU	AIR CONDITIONING UNIT
AV	AIR VENT
BB	BELISHA BEACON
BO	BOLLARD
BOL	BOLLARD LIGHT
BS	BUS STOP
BT	BT INSPECTION COVER
CATV	CABLE TELEVISION
CB	CONTROL BOX
CP	CATCH PIT
CR	CABLE RISER
DCH	DRAINAGE CHANNEL
EB	ELECTRIC CONTROL BOX
EP	ELECTRIC POLE
ER	EARTH ROD
FD	FILTER DRAIN
FFP	FUEL TANK FILL POINT
FH	FIRE HYDRANT
GR	GAS RISER
GV	GAS VALVE
GY	GULLY
IC	INSPECTION COVER
INT	INTERCEPTOR
IT	INLET
KO	KERB OUTLET
LD	LOOP DETECTOR
LH	LAMP HOLE
LP	LAMP POST
MK	MARKER POST / PLATE
MH	MANHOLE
MT	METER
M/WELL	MONITORING WELL
OL	OUTLET
OU	OUTFALL
PO	POST
PTG	PIPE TO GROUND
PTS	PIPE TO SURFACE
PU	PUMP
RE	RODDING EYE
RS	ROAD SIGN
RWP	RAIN WATER PIPE
SC	STOP COCK
SP	SOIL PIPE
ST	STAY CABLE
SVP	SOIL VENT PIPE
SV	STOP / SLUICE VALVE
TCB	TELEPHONE CALL BOX
TL	TRAFFIC LIGHT
TLC	TRAFFIC LIGHT COVER
TP	TELECOM POLE
VP	VENT PIPE
WM	WATER METER
WO	WASH OUT
WR	WATER RISER
W/WELL	WET WELL

LINESTYLE

INTERNAL METER (MT)
POT ENDED SERVICE
SEWER CAPPED RUN
SURVEY ABANDONED
INTERNAL VALVE
UNKNOWN UNDERGROUND ANOMALY
UNDERGROUND CHAMBERS
POST PROCESSING AREA (FROZEN LAYER)
ABOVE GROUND (AG)
ASSUMED ROUTE (AR)
EMPTY DUCTS (E)
OVERHEAD (OH)
BACK DROP
P TRAP
UTILITY CROSSOVER
SURVEY BOUNDARY
VERBAL INFORMATION (VI)
RECORD INFORMATION (R)
REDUNDANT SERVICE
RISING MAIN
CCTV SECTION 4 AND 5 FAULTS ARE SHOWN IN RED

SERVICE TYPE

CATV / DATA
ELECTRICITY (HV)
ELECTRICITY (LV)
FUEL
GAS
HEATING
OVERHEAD ELECTRIC
OVERHEAD TELECOM
TRADE EFFLUENT
COMBINED SEWER
FOUL SEWER
SURFACE SEWER
UNIDENTIFIED SEWER
TELECOM
UNKNOWN SERVICE
WATER

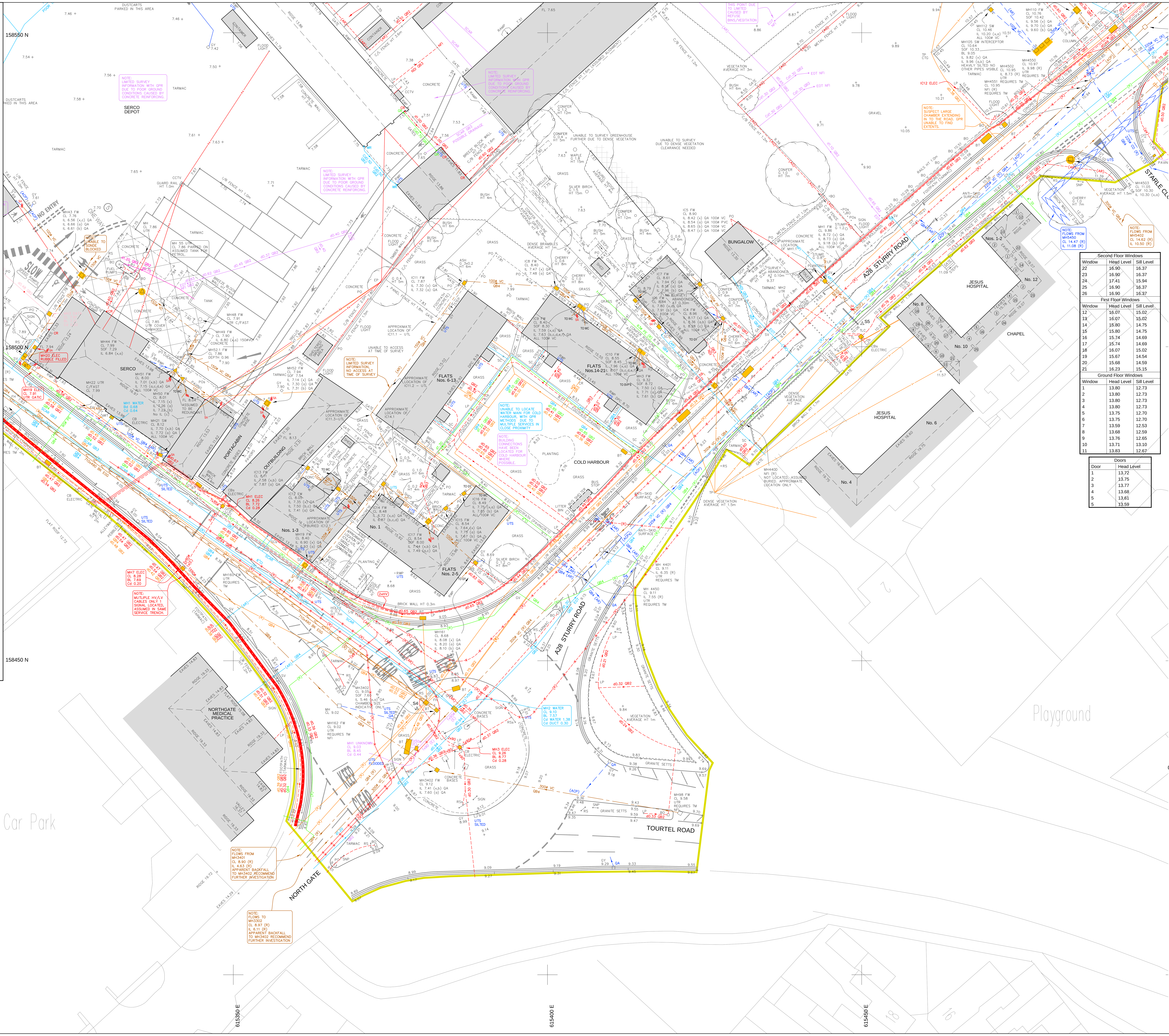
DEPTHS

d	ELECTRONICALLY DERIVED
Pd	PASSIVELY DERIVED
Bd	BASE DEPTH
Cd	DEPTH TO CROWN
Id	DEPTH TO INVERT
Sd	DEPTH TO SOFFIT

CAUTIONARY NOTES

1. EML techniques have been used in the detection of underground utilities as outlined in Table 2 of PAS 128:2014, the results are not infallible and trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
2. GPR techniques has been used in the detection of non-metallic utilities as outlined in Table 2 of PAS 128:2014. The interpretation of these results is not infallible and success will depend on a number of factors including soil type, ground water levels and surface conditions, hence trial excavations must be carried out in order to confirm identification, position and in particular depth of the utility.
3. Depths derived via EML are taken to the centre of the conductor (cable, metallic pipe) and those derived via GPR are usually to the crown of the utility unless otherwise indicated.
4. Where cables cannot be detected individually an average depth has been obtained and trial excavations are recommended to confirm number and depths of cables banded together.
5. 'Pot-ended' cables are often difficult to detect and although we have made all reasonable efforts to locate or transpose this information from records, we cannot guarantee that all 'pot-ended' cables have been located.
6. Fibre optic cables are often difficult to detect, and commonly access chambers can be locked and thereby made inaccessible by the utility provider. All reasonable efforts have been made to locate these ducts using GPR. Cables not located have been transposed from records.
7. Within close proximity of electric substations and similar structures results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
8. Underneath overhead power lines results using EML may become distorted. All reasonable efforts have been made to verify our results using GPR wherever conditions permitted.
9. Drainage information has been obtained without man entry into the chamber.
10. Wherever possible we have attempted to locate the route of the sewer. Issues such as blockages, surcharging, flooding, sedimentation, sewer collapse, root ingress, excessive depth, obstructions or heavy traffic flow may have affected our ability to obtain meaningful results. In these cases recommendations have been made for further survey or maintenance work.
11. Pipe / duct sizes have been recorded from surface inspection or taken from record information. Pipe sizes have been recorded in millimetres and depths in metres, except in instances where sizes are indicated in imperial units on the record information.
12. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation, whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only.
13. All utilities detected by MK Surveys should be considered live unless confirmed otherwise by client or service provider.
14. MK Surveys cannot confirm when utilities are redundant unless there is visual or record evidence to indicate this. In addition MK Surveys cannot guarantee being able to detect all redundant utilities.
15. Wherever available the results of our investigations have been cross referenced with record information. If a utility shown on the records cannot be detected on site, the information has been added to the drawing and indicated as QB4 (R). However it should be noted that the completeness and accuracy of the records cannot be guaranteed.
16. The utility information has been obtained from non-intrusive survey techniques; it always remains possible that there are additional utilities within the survey boundary that we have not been able to detect. We recommend that care is taken on site and that all utility records are used in conjunction with this survey.
17. The responsibility for avoiding damage to assets and utilities on site shall be that of the persons proposing to excavate within the surveyed area, who shall be liable to the asset owner and any third party who may be affected in any way for any loss or damage.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING.



Notes :

1. GRID AND LEVELS BASED ON ORDNANCE DATUM, DERIVED FROM THE NATIONAL GPS NETWORK. LOCAL SCALE FACTOR 1.00017 USED IN ALL CALCULATIONS.
2. TREE AND HEDGE SPECIES HAVE BEEN IDENTIFIED AS ACCURATELY AS POSSIBLE BUT SHOULD BE CROSS CHECKED IN CRITICAL AREAS.
3. BACKGROUND INFORMATION (SHOWN GREY) IS ORDNANCE SURVEY DIGITAL DATA, SUPPLIED BY CLIENT.
4. ARROWS ON STEPS/RAMPS DENOTE DIRECTION UPWARDS.
5. THIS SURVEY SHOULD ALWAYS BE READ IN CONJUNCTION WITH DESKTOP UTILITY REPORT,THAT WAS CARRIED OUT AS A PREREQUISITE TO THIS DETECTION SURVEY.
6. TO BE READ IN CONJUNCTION WITH INSEWER SURVEYS CCTV REPORT. REF: TV151203.

Coordinate Table

Station	Description	Easting	Northing	Level
S1	ROAD NAIL	615310.803	158618.946	7.377
S2	ROAD NAIL	615212.091	158570.335	9.420
S3	ROAD NAIL	615302.430	158497.621	7.853
S4	ROAD NAIL	615379.230	158442.356	9.015
S5	ROAD NAIL	615450.111	158503.682	10.152
S6	ROAD NAIL	615510.892	158569.801	11.294
S7	ROAD NAIL	615497.337	158613.058	11.641
S8	ROAD NAIL	615473.294	158635.975	8.836
S9	ROAD NAIL	615422.472	158613.166	7.582

DETECTION SURVEY REPORT

GENERAL

This survey was carried out in accordance with PAS 128:2014 (Publicly Available Specification from BSI). After a pre-survey consultation with the client it was agreed to carry out the detection survey using methodology M1 as per Table 2 of the PAS 128:2014. The survey boundary has been shown on the drawing; please see linestyle section of the key for reference.

DESKTOP UTILITY REPORT

Prior to the survey commencing record information was gathered and compiled in a separate desktop utility report. This report should be read in conjunction with the information contained in this utility detection survey. Record information was at the time of the survey less than 90 days old in accordance with the requirements of the PAS 128:2014. For a full list of the providers searched, records received and the dates the information was obtained, please refer to the enclosures page of the desktop utility report.

DETECTION SURVEY

DRAINAGE

Drainage was lifted with pipe sizes and invert levels recorded where not in highway these details have been taken from records only. Wherever possible the chamber sizes have been recorded and positioned on the drawing. All connections from gullies, external rainwater pipes and external soil stacks have been proven wherever possible into manholes and sewer runs by radio sonde location and/or GPR. Where a saddle connection is present the position is assumed only until proven otherwise. In instances where other detection methods were unsuccessful connections between manholes have been assumed to be straight and labelled as QB4. All drainage should be cross checked in critical areas by CCTV survey or verification survey type A. Recommend traffic management to lift MH'S in Highway.

WATER

Water has been located using both EML and GPR methods. Water mains on Kingsmead Road and A28 Sturry Road have been taken from records as no services have been attempted to be located within these roads. Water scar on Kingsmead road has been positioned due to it being visibly different to record information. Recommend trial excavations to confirm position and depth.

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Gas has been located where possible using both EML and GPR methods. Unable to locate gas main on footpath on Kingsmead Road due to being in close proximity to other services. Gas mains in highways Kingsmead Road and A28 Sturry Road have been not attempted to be located and positioned from records only. Recommend traffic management to locate gas in highways. Also recommend trial excavations to confirm position and depth.

ELECTRICITY

Electricity within survey area has been located using EML methods with electronically derived depths recorded. Electricity located matches with records provided. Electricity on Highway Roads has been positioned from records or assumed only. Recommend traffic management to located electric on roads and trail excavations to confirm position and depth of cable.

Please note the presence of numerous abandoned cables located in both Kingsmead Road, Sturry Road and the roundabout connecting the two roads. These abandoned cables could not be located on site and have been indicated as single lines on the drawing, whereas the records indicate multiple cables along these routes. Please read the UK Power Networks record plans in conjunction with the survey for more information.

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Telecom ducts have been traced with depths recorded. Due to laws protecting British Telecom apparatus all ducts have been located using remote detection techniques only and compared with record information. Chamber sizes have been recorded using GPR techniques wherever possible. For further information regarding BT apparatus please contact Openreach directly. Telecom in Highway Roads has been positioned from records only.

CATV

No CATV located within survey area, Records also confirm this.

SEE CAUTIONARY NOTES WITHIN THE UTILITY KEY

Second Floor Windows

Window	Head Level	Sill Level
22	16.90	16.37
23	16.90	16.37
24	17.41	15.94
25	16.90	16.37
26	16.90	16.37

First Floor Windows

Window	Head Level	Sill Level
12	16.07	15.02
13	16.07	15.02
14	15.80	14.75
15	15.80	14.75
16	15.74	14.69
17	15.74	14.69
18	16.07	15.02
19	15.67	14.54
20	15.68	14.59
21	16.23	15.15

Ground Floor Windows

Window	Head Level	Sill Level
1	13.80	12.73
2	13.80	12.73
3	13.80	12.73
4	13.80	12.73
5	13.75	12.70
6	13.75	12.70
7	13.59	12.53
8	13.68	12.59
9	13.76	12.65
10	13.71	13.10
11	13.83	12.67

Doors

Door	Head Level
1	13.72
2	13.75
3	13.77
4	13.68
5	13.61
5	13.59

PAS 128:2014 Quality Level Guide

Quality Level	Description	Accuracy
QB4	A utility is expected to exist but cannot be detected - (AR), (R), (VI)	Undefined
QB3 QB3P	Horizontal location only using one geophysical technique. No depth information - NDI.	+/- 500mm Horizontal Undefined Vertical
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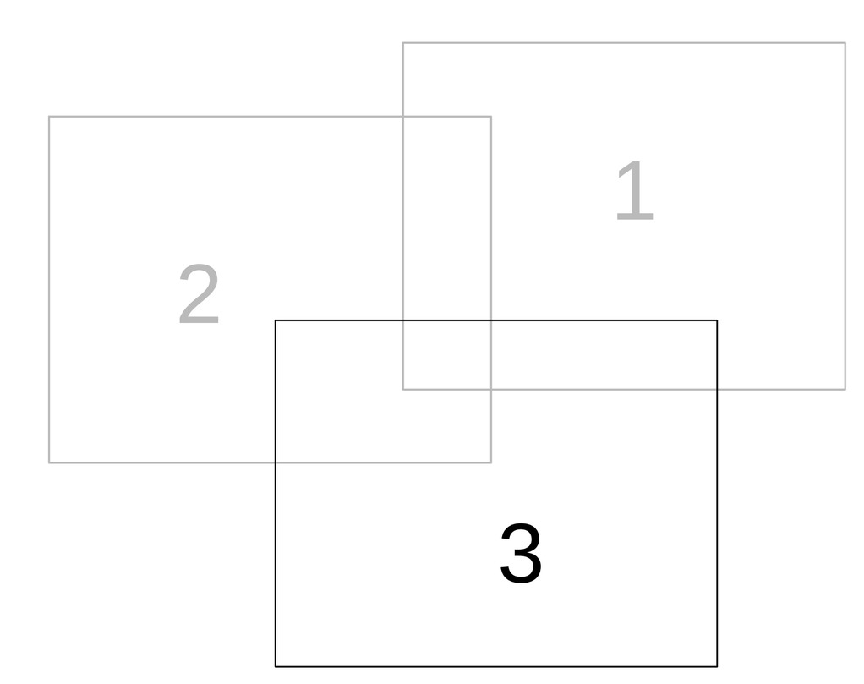
CATV	Virgin Media	06/09/2015

Sheet Layout: (Not to Scale)



Revision	Description	Surv. by	Appr. by	Date
2	Survey updated post CCTV survey	KS	NS	05/01/2016
1	Utility survey added	KS	GL	27/11/2015

0m 2 4 6 8 10 12 14 16 18 20 22

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BOUYGUES UK

Canterbury Riverside
Canterbury
Kent

Topographical and Utility Survey

Scale	Sheet Size:	Sheet Number:	Date:
1:200	A0	3	November 2015
Project Number: 21530	Rev: 2	Surveyed By: RG/KS	Approved By: AJ/NS

WALSH

Appendix D **Sitewide Below Ground Drainage Strategy**

Walsh
walsh.co.uk

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london@walsh.co.uk

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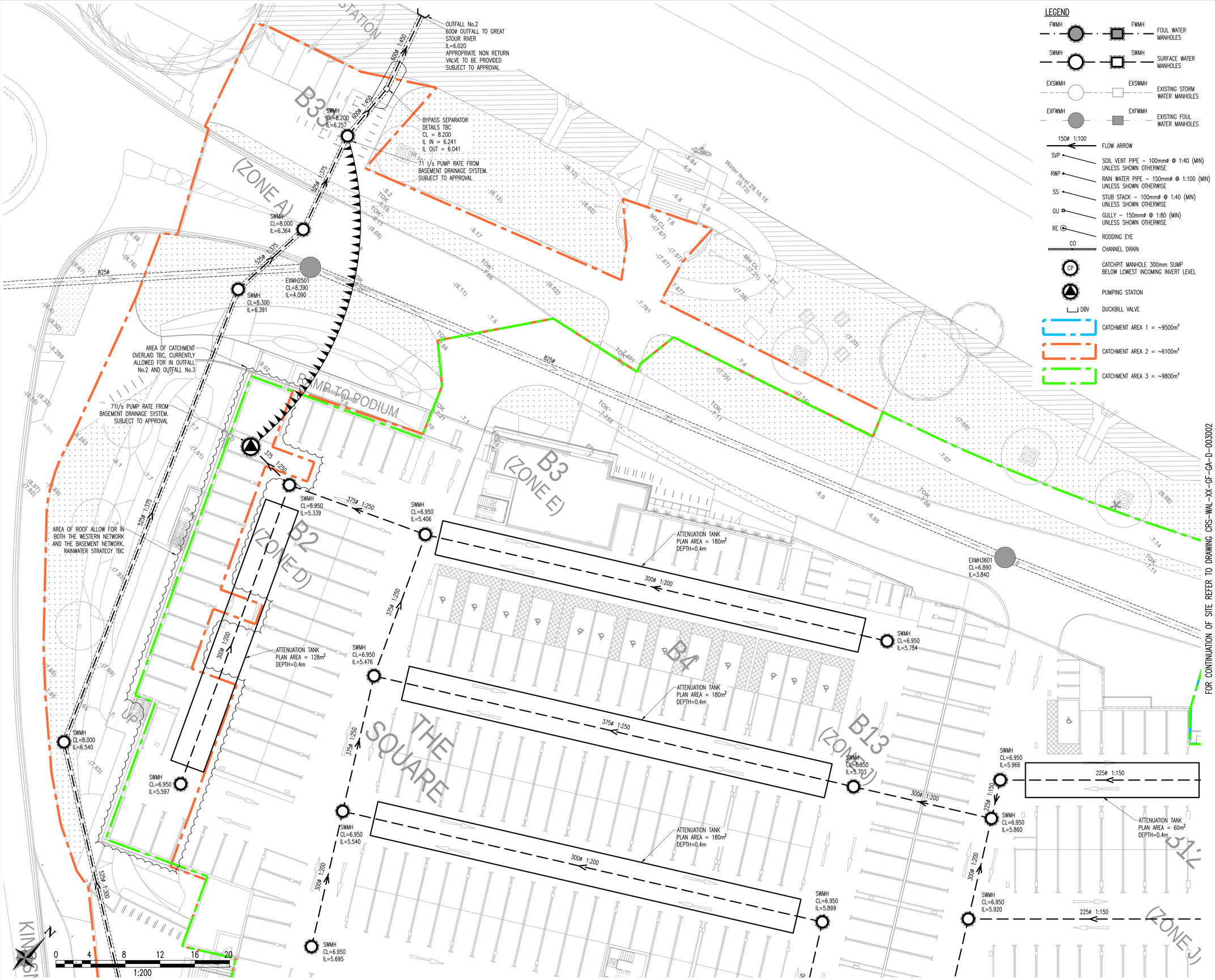
London, SE1 2LX



LEGEND

- FWMH — FOUL WATER MANHOLES
- SWMH — SURFACE WATER MANHOLES
- EXSWMH — EXISTING STORM WATER MANHOLES
- EXFWMH — EXISTING FOUL WATER MANHOLES
- 150ø 1:100 — FLOW ARROW
- SVP — SOIL VENT PIPE – 100mmø @ 1:40 (MIN) UNLESS SHOWN OTHERWISE
- RWP — RAIN WATER PIPE – 150mmø @ 1:100 (MIN) UNLESS SHOWN OTHERWISE
- SS — STUB STACK – 100mmø @ 1:40 (MIN) UNLESS SHOWN OTHERWISE
- GU — GULLY – 150mmø @ 1:80 (MIN) UNLESS SHOWN OTHERWISE
- RE — RODDING EYE
- CO — CHANNEL DRAIN
- CP — CATCHPIT MANHOLE 300mm SUMP BELOW LOWEST INCOMING INVERT LEVEL
- PUMPING STATION
- DBV — DUCKBILL VALVE
- CATCHMENT AREA 1 = ~9500m²
- CATCHMENT AREA 2 = ~6100m²
- CATCHMENT AREA 3 = ~9800m²

0mm 50mm 100mm

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED AND LEVELS ARE IN METRES.

2. THIS DRAWING TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND SPECIFICATIONS.

3. THIS DRAWING HAS BEEN PRODUCED ELECTRONICALLY AND MAY HAVE BEEN PHOTO REDUCED OR ENLARGED WHEN COPIED. HENCE, DO NOT RELY ON ANY SCALES QUOTED. WORK ONLY TO FIGURED DIMENSIONS (DO NOT SCALE). ALL DIMENSIONS TO BE CHECKED ON SITE. ANY ERRORS OR OMISSIONS TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

C.D.M.
SIGNIFICANT RISKS AND HAZARDS:
KEY DESIGN DECISIONS TO REDUCE OR ELIMINATE HAZARDS:
THIS DRAWING IS BASED ON THE FOLLOWING CONSULTANTS FILES

Rev	DESCRIPTION	Status	DRW	APP	DATE
P02	REVISED FOLLOWING DESIGN DEVELOPMENT	S3	EB	HW	13.12.19
P01	FIRST ISSUE	S3	MDL	HW	29.11.19

BOUYGUES UK
www.bouygues-uk.com

linkcity

KEY PLAN

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e: london@walsh.co.uk
walsh.co.uk

PROJECT
CANTERBURY RIVERSIDE
STURRY ROAD

DRAWING TITLE
BELOW GROUND DRAINAGE LAYOUT
SHEET 1 OF 4

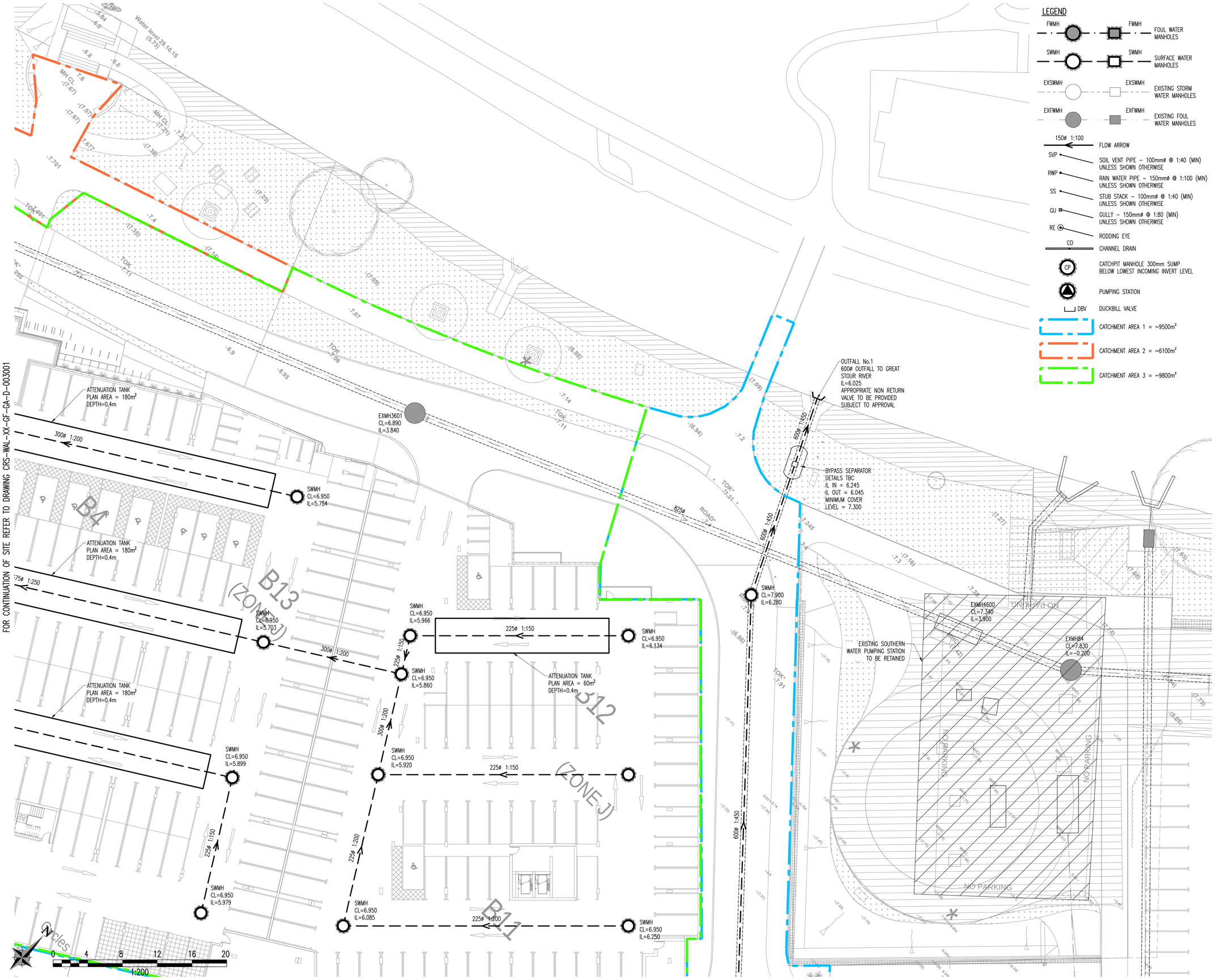
BIM FILE NAME
CRS-WAL-XX-GF-M3-D-003000

PROJECT STAGE	FIRST ISSUE DATE
STAGE 4	29/11/2019
STATUS CODE	SCALE
S3 : SUITABLE FOR REVIEW & COMMENT	1:200 @ A1

PROJECT	ORIGINATOR	ZONE	LEVEL	TYPE	ROLE	NUMBER	REV
CRS	WAL	XX	GF	GA	D	003001	P02

FOR CONTINUATION OF SITE REFER TO DRAWING CRS-WAL-XX-GF-GA-D-003002

FOR CONTINUATION OF SITE REFER TO DRAWING CRS-WAL-XX-GF-GA-D-003003



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C.D.M.

SIGNIFICANT RISKS AND HAZARDS:

KEY DESIGN DECISIONS TO REDUCE OR ELIMINATE HAZARDS:

THIS DRAWING IS BASED ON THE FOLLOWING CONSULTANTS FILES

Rev	DESCRIPTION	Status	DRW	APP	DATE
P02	REVISED FOLLOWING DESIGN DEVELOPMENT	S3	EB	HW	13.12.19
P01	FIRST ISSUE	S3	MDL	HW	29.11.19

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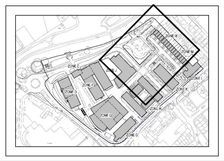
KEY PLAN



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PROJECT
CANTERBURY RIVERSIDE
STURRY ROAD

DRAWING TITLE
BELOW GROUND DRAINAGE LAYOUT
SHEET 2 OF 4

BIM FILE NAME
CRS-WAL-XX-GF-M3-D-003000

PROJECT STAGE	FIRST ISSUE DATE
STAGE 4	29/11/2019
STATUS CODE	SCALE
S3 : SUITABLE FOR REVIEW & COMMENT	1:200 @ A1

PROJECT	ORIGINATOR	ZONE	LEVEL	TYPE	ROLE	NUMBER	REV
CRS	WAL	XX	GF	GA	D	003002	P02

FOR CONTINUATION OF SITE REFER TO DRAWING CRS-WAL-XX-GF-GA-D-003001

FOR CONTINUATION OF SITE REFER TO DRAWING CRS-WAL-XX-GF-GA-D-003004

SERVICE LAYBY

SWMH CL=8.000 IL=6.653

SWMH CL=9.900 IL=7.037

SWMH CL=9.900 IL=7.190

SWMH CL=8.150 IL=6.810

SWMH CL=6.950 IL=5.695

SWMH CL=6.950 IL=5.899

SWMH CL=6.950 IL=5.979

SWMH CL=6.950 IL=5.920

SWMH CL=6.950 IL=6.085

SWMH CL=9.500 IL=6.767

SWMH CL=8.200 IL=6.920

SWMH CL=9.500 IL=7.276

SWMH CL=9.500 IL=7.405

SWMH CL=9.350 IL=7.321

SWMH CL=9.450 IL=7.001

SWMH CL=8.500 IL=7.295

SWMH CL=9.200 IL=7.419

SWMH CL=9.200 IL=7.539

SWMH CL=9.330 IL=7.439

SWMH CL=9.300 IL=7.194

225ø 1:150

300ø 1:200

450ø 1:250

375ø 1:250

450ø 1:300

DEPTH=0.4m

LGV Parking

THE QUAD

Cycles

5 Student DDA Bays

2 Car Club

B1

B5

B6

B7

B8

B10

(ZONE G)

(ZONE H)

SUB STATION

LINE OF POTENTIAL BUS LANE EXTENSION

0 4 8 12 16 20

1:200

LEGEND

- FWMH — FOUL WATER MANHOLES
- SWMH — SURFACE WATER MANHOLES
- EXSWMH — EXISTING STORM WATER MANHOLES
- EXFWMH — EXISTING FOUL WATER MANHOLES
- 150ø 1:100 — FLOW ARROW
- SVP — SOIL VENT PIPE – 100mmø @ 1:40 (MIN) UNLESS SHOWN OTHERWISE
- RWP — RAIN WATER PIPE – 150mmø @ 1:100 (MIN) UNLESS SHOWN OTHERWISE
- SS — STUB STACK – 100mmø @ 1:40 (MIN) UNLESS SHOWN OTHERWISE
- GU — GULLY – 150mmø @ 1:80 (MIN) UNLESS SHOWN OTHERWISE
- RE — RODDING EYE
- CO — CHANNEL DRAIN
- CP — CATCHPIT MANHOLE 300mm SUMP BELOW LOWEST INCOMING INVERT LEVEL
- PUMPING STATION
- DBV — DUCKBILL VALVE
- CATCHMENT AREA 1 = ~9500m²
- CATCHMENT AREA 2 = ~6100m²
- CATCHMENT AREA 3 = ~9800m²

0mm 50mm 100mm

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED AND LEVELS ARE IN METRES.

2. THIS DRAWING TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND SPECIFICATIONS.

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C.D.M.

SIGNIFICANT RISKS AND HAZARDS:

KEY DESIGN DECISIONS TO REDUCE OR ELIMINATE HAZARDS:

THIS DRAWING IS BASED ON THE FOLLOWING CONSULTANTS FILES

Rev	DESCRIPTION	Status	DRW	APP	DATE
P02	REVISED FOLLOWING DESIGN DEVELOPMENT	S3	EB	HW	13.12.19
P01	FIRST ISSUE	S3	MDL	HW	29.11.19

BOUYGUES UK
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PROJECT
CANTERBURY RIVERSIDE
STURRY ROAD

DRAWING TITLE
BELOW GROUND DRAINAGE LAYOUT
SHEET 3 OF 4

BIM FILE NAME
CRS-WAL-XX-GF-M3-D-003000

PROJECT STAGE
STAGE 4

FIRST ISSUE DATE
29/11/2019

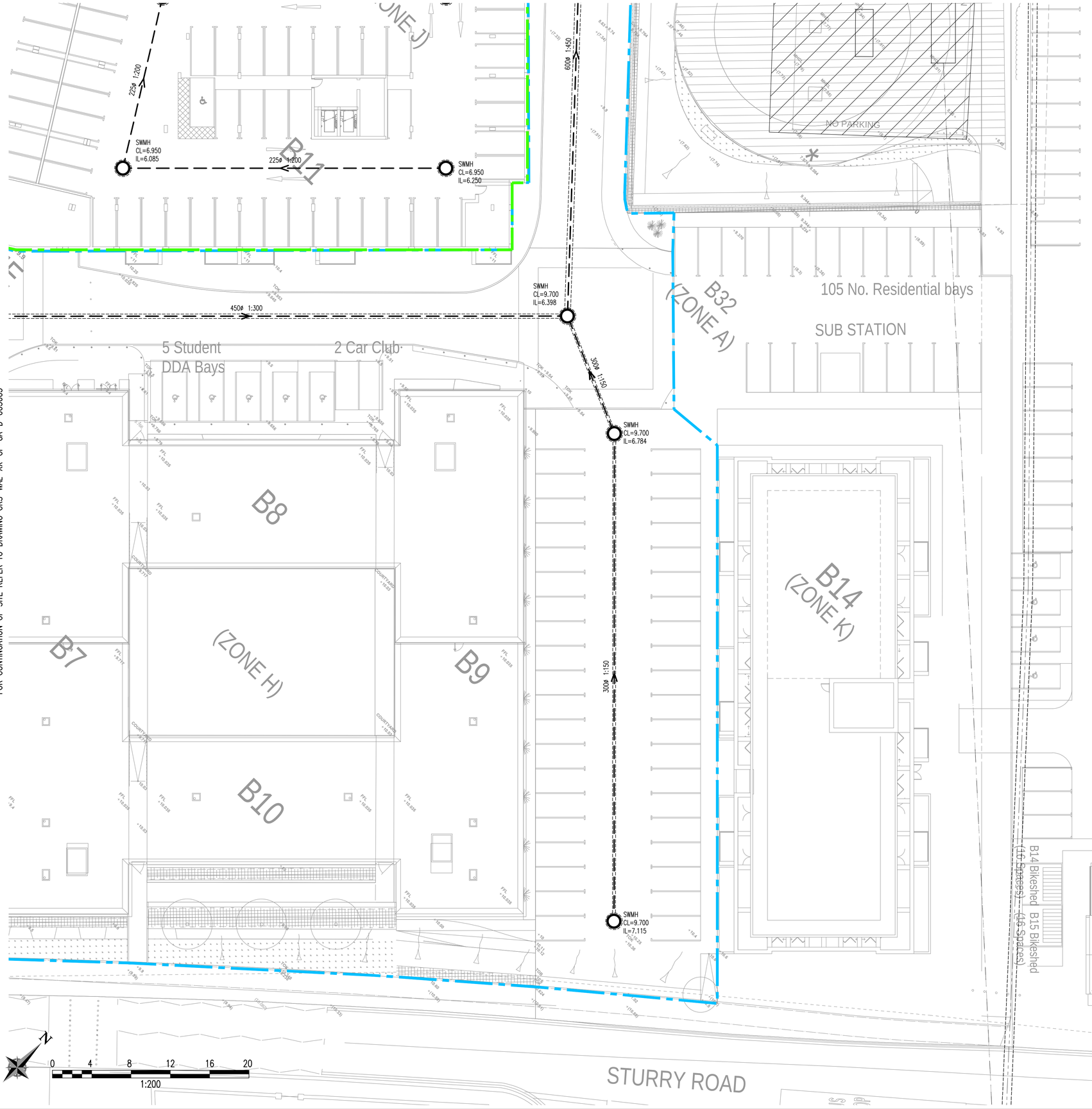
STATUS CODE
S3 : SUITABLE FOR REVIEW & COMMENT

SCALE
1:200 @ A1

PROJECT	ORIGINATOR	ZONE	LEVEL	TYPE	ROLE	NUMBER	REV
CRS	WAL	XX	GF	GA	D	003003	P02

FOR CONTINUATION OF SITE REFER TO DRAWING CRS-WAL-XX-GF-GA-D-003002

FOR CONTINUATION OF SITE REFER TO DRAWING CRS-WAL-XX-GF-GA-D-003003



LEGEND

- FWMH — FOUL WATER MANHOLES
- SWMH — SURFACE WATER MANHOLES
- EXSWMH — EXISTING STORM WATER MANHOLES
- EXFWMH — EXISTING FOUL WATER MANHOLES
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- GU — GULLY – 150mmø @ 1:80 (MIN) UNLESS SHOWN OTHERWISE
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- CO — CHANNEL DRAIN
- CP — CATCHPIT MANHOLE 300mm SUMP BELOW LOWEST INCOMING INVERT LEVEL
- PUMPING STATION
- DBV — DUCKBILL VALVE
- CATCHMENT AREA 1 = ~9500m²
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- CATCHMENT AREA 3 = ~9800m²

0mm 50mm 100mm

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C.D.M.
SIGNIFICANT RISKS AND HAZARDS:
KEY DESIGN DECISIONS TO REDUCE OR ELIMINATE HAZARDS:
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Rev	DESCRIPTION	Status	DRW	APP	DATE
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P01	FIRST ISSUE	S3	MDL	HW	29.11.19

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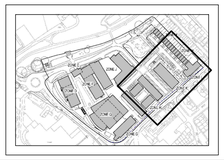
KEY PLAN



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PROJECT
CANTERBURY RIVERSIDE
STURRY ROAD

DRAWING TITLE
BELOW GROUND DRAINAGE LAYOUT
SHEET 4 OF 4

BIM FILE NAME
CRS-WAL-XX-GF-M3-D-003000

PROJECT STAGE	FIRST ISSUE DATE
STAGE 4	29/11/2019
STATUS CODE	SCALE
S3 : SUITABLE FOR REVIEW & COMMENT	1:200 @ A1

PROJECT	ORIGINATOR	ZONE	LEVEL	TYPE	ROLE	NUMBER	REV
CRS	WAL	XX	GF	GA	D	003004	P02

DENOTES CATCHMENT 1, PLAN
AREA = 9500m²

DENOTES CATCHMENT 2, PLAN
AREA = 6100m²

DENOTES CATCHMENT 3, PLAN
AREA = 9800m²

PROPOSED EASTERN OUTFALL TO
GREAT STOUR RIVER
OUTFALL DIAMETER = 600mm
IL = 6.025

PROPOSED WESTERN OUTFALL TO
GREAT STOUR RIVER
OUTFALL DIAMETER = 600mm
IL = 6.020

BASEMENT SURFACE WATER PUMPING STATION
PUMP RATE = 71 l/s
ATTENUATION VOLUME FOR BASEMENT
AREA=277m³
PHILOSOPHY SUBJECT TO APPROVAL

B33 (ZONE A)
B3 (ZONE E)
B4 (ZONE E)
B2 (ZONE D)
B1
B5
B6
B7
B8
B9
B10
B11
B12 (ZONE J)
B13 (ZONE J)
B14 (ZONE K)
B32 (ZONE A)
(ZONE G)
(ZONE H)
(ZONE M)
B28
B27
B26
B25
B24
B23

THE SQUARE
THE QUAD
SUB STATION
105 No. Residential bays
2 Car Club
5 Student
4 DDA Bays
Cycles
LGV Parking
RAMP TO PODIUM
UP
KINGSMEAD ROAD
SERVICE LAYBY
STURRY ROAD
OUTLINE OF POTENTIAL BUS LANE EXTENSION
Supermarket

Reference list:

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KEY PLAN

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ORIGINATOR REFERENCE: 5196

PROJECT
CANTERBURY RIVERSIDE
STURRY ROAD

DRAWING TITLE
SITEWIDE BELOW GROUND
DRAINAGE STRATEGY

BIM FILE NAME
CRS-WAL-XX-XX-M3-D-3000

PROJECT STAGE	FIRST ISSUE DATE
STAGE 4	29/11/2019
STATUS CODE	SCALE
S3 : SUITABLE FOR REVIEW & COMMENT	1:250 @ A0

PROJECT	ORIGINATOR	ZONE	LEVEL	TYPE	ROLE	NUMBER	REV
CRS	WAL	XX	XX	DR	D	003000	P02

Appendix E **Micro Drainage Hydraulic Calculations**

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STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S2.000	12.570	0.084	149.6	0.031	5.00	0.0	0.600	o	300	Pipe/Conduit	
S2.001	12.570	0.084	149.6	0.028	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.002	4.541	0.031	146.5	0.084	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	32.857	0.165	199.1	0.000	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	17.883	0.090	198.7	0.066	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.002	11.880	0.060	198.0	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.003	16.300	0.082	198.8	0.016	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.004	28.358	0.114	248.8	0.051	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.005	28.358	0.114	248.8	0.036	0.00	0.0	0.600	o	375	Pipe/Conduit	
S4.000	16.001	0.080	200.0	0.054	5.00	0.0	0.600	o	300	Pipe/Conduit	
S4.001	28.358	0.142	199.7	0.042	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.002	28.358	0.142	199.7	0.037	0.00	0.0	0.600	o	300	Pipe/Conduit	
S5.000	16.001	0.080	200.0	0.056	5.00	0.0	0.600	o	300	Pipe/Conduit	
S4.003	16.000	0.064	250.0	0.050	0.00	0.0	0.600	o	375	Pipe/Conduit	
S2.006	17.329	0.070	247.6	0.046	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S2.000	50.00	5.16	6.134	0.031	0.0	0.0	0.0	1.28	90.7	4.1
S2.001	50.00	5.33	6.050	0.059	0.0	0.0	0.0	1.28	90.7	7.9
S2.002	50.00	5.38	5.966	0.143	0.0	0.0	0.0	1.30	91.7	19.3
S3.000	50.00	5.59	6.250	0.000	0.0	0.0	0.0	0.92	36.7	0.0
S3.001	50.00	5.86	6.010	0.066	0.0	0.0	0.0	1.11	78.6	8.9
S3.002	50.00	6.04	5.920	0.090	0.0	0.0	0.0	1.11	78.7	12.2
S2.003	50.00	6.25	5.785	0.249	0.0	0.0	0.0	1.28	141.5	33.7
S2.004	50.00	6.66	5.703	0.299	0.0	0.0	0.0	1.14	126.4	40.6
S2.005	50.00	7.08	5.589	0.336	0.0	0.0	0.0	1.14	126.4	45.5
S4.000	50.00	5.24	5.979	0.054	0.0	0.0	0.0	1.11	78.3	7.2
S4.001	50.00	5.67	5.899	0.096	0.0	0.0	0.0	1.11	78.4	13.0
S4.002	50.00	6.09	5.757	0.133	0.0	0.0	0.0	1.11	78.4	18.0
S5.000	50.00	5.24	5.695	0.056	0.0	0.0	0.0	1.11	78.3	7.6
S4.003	50.00	6.33	5.540	0.239	0.0	0.0	0.0	1.14	126.1	32.3
S2.006	50.00	7.33	5.475	0.621	0.0	0.0	0.0	1.15	126.7	84.1

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S6.000	27.301	0.137	200.0	0.035	5.00	0.0	0.600	o	300	Pipe/Conduit	
S6.001	27.301	0.137	200.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.007	16.673	0.067	248.9	0.140	0.00	0.0	0.600	o	375	Pipe/Conduit	
S7.000	18.327	0.092	200.3	0.026	5.00	0.0	0.600	o	300	Pipe/Conduit	
S7.001	18.327	0.092	200.3	0.043	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.008	9.099	0.036	252.8	0.051	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S6.000	50.00	5.41	5.754	0.035	0.0	0.0	0.0	1.11	78.3	4.8
S6.001	50.00	5.82	5.618	0.035	0.0	0.0	0.0	1.11	78.3	4.8
S2.007	50.00	7.57	5.405	0.796	0.0	0.0	0.0	1.14	126.4	107.8
S7.000	50.00	5.28	5.597	0.026	0.0	0.0	0.0	1.11	78.3	3.5
S7.001	50.00	5.55	5.506	0.069	0.0	0.0	0.0	1.11	78.3	9.3
S2.008	50.00	7.71	5.338	0.916	0.0	0.0	0.0	1.14	125.4	124.1

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S2.000	o	300	S4	6.950	6.134	0.516	Open Manhole	1200
S2.001	o	300	S2	6.950	6.050	0.600	Open Manhole	1200
S2.002	o	300	S4	6.950	5.966	0.684	Open Manhole	1200
S3.000	o	225	S1	6.950	6.250	0.475	Open Manhole	1200
S3.001	o	300	S2	6.950	6.010	0.640	Open Manhole	1200
S3.002	o	300	S3	6.950	5.920	0.730	Open Manhole	1200
S2.003	o	375	S5	6.950	5.785	0.790	Open Manhole	1350
S2.004	o	375	S7	6.950	5.703	0.872	Open Manhole	1800
S2.005	o	375	S8	6.950	5.589	0.986	Junction	
S4.000	o	300	S9	6.950	5.979	0.671	Open Manhole	1200
S4.001	o	300	S10	6.950	5.899	0.751	Open Manhole	1200
S4.002	o	300	S11	6.950	5.757	0.893	Open Manhole	1200
S5.000	o	300	S11	6.950	5.695	0.955	Open Manhole	1200
S4.003	o	375	S11	6.950	5.540	1.035	Open Manhole	1800
S2.006	o	375	S8	6.950	5.475	1.100	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S2.000	12.570	149.6	S2	6.950	6.050	0.600	Open Manhole	1200
S2.001	12.570	149.6	S4	6.950	5.966	0.684	Open Manhole	1200
S2.002	4.541	146.5	S5	6.950	5.935	0.715	Open Manhole	1350
S3.000	32.857	199.1	S2	6.950	6.085	0.640	Open Manhole	1200
S3.001	17.883	198.7	S3	6.950	5.920	0.730	Open Manhole	1200
S3.002	11.880	198.0	S5	6.950	5.860	0.790	Open Manhole	1350
S2.003	16.300	198.8	S7	6.950	5.703	0.872	Open Manhole	1800
S2.004	28.358	248.8	S8	6.950	5.589	0.986	Junction	
S2.005	28.358	248.8	S8	6.950	5.475	1.100	Open Manhole	1800
S4.000	16.001	200.0	S10	6.950	5.899	0.751	Open Manhole	1200
S4.001	28.358	199.7	S11	6.950	5.757	0.893	Open Manhole	1200
S4.002	28.358	199.7	S11	6.950	5.615	1.035	Open Manhole	1800
S5.000	16.001	200.0	S11	6.950	5.615	1.035	Open Manhole	1800
S4.003	16.000	250.0	S8	6.950	5.476	1.099	Open Manhole	1800
S2.006	17.329	247.6	S9	6.950	5.405	1.170	Open Manhole	1800

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S6.000	o	300	S10	6.950	5.754	0.896	Open Manhole	1200
S6.001	o	300	S14	6.950	5.618	1.033	Open Manhole	1200
S2.007	o	375	S9	6.950	5.405	1.170	Open Manhole	1800
S7.000	o	300	S17	6.950	5.597	1.053	Open Manhole	1200
S7.001	o	300	S16	6.950	5.506	1.145	Open Manhole	1200
S2.008	o	375	S10	6.950	5.338	1.237	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S6.000	27.301	200.0	S14	6.950	5.618	1.033	Open Manhole	1200
S6.001	27.301	200.0	S9	6.950	5.481	1.169	Open Manhole	1800
S2.007	16.673	248.9	S10	6.950	5.338	1.237	Open Manhole	1800
S7.000	18.327	200.3	S16	6.950	5.506	1.145	Open Manhole	1200
S7.001	18.327	200.3	S10	6.950	5.414	1.236	Open Manhole	1800
S2.008	9.099	252.8	S	8.200	5.302	2.523	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
2.000	User	-	100	0.031	0.031	0.031
2.001	User	-	100	0.028	0.028	0.028
2.002	User	-	100	0.032	0.032	0.032
	User	-	100	0.052	0.052	0.084
3.000	-	-	100	0.000	0.000	0.000
3.001	User	-	100	0.066	0.066	0.066
3.002	User	-	100	0.024	0.024	0.024
2.003	User	-	100	0.016	0.016	0.016
2.004	User	-	100	0.044	0.044	0.044
	User	-	100	0.007	0.007	0.051
2.005	User	-	100	0.036	0.036	0.036
4.000	User	-	100	0.054	0.054	0.054
4.001	User	-	100	0.042	0.042	0.042
4.002	User	-	100	0.037	0.037	0.037
5.000	User	-	100	0.056	0.056	0.056
4.003	User	-	100	0.050	0.050	0.050
2.006	User	-	100	0.046	0.046	0.046
6.000	User	-	100	0.016	0.016	0.016
	User	-	100	0.019	0.019	0.035
6.001	-	-	100	0.000	0.000	0.000
2.007	User	-	100	0.104	0.104	0.104
	User	-	100	0.018	0.018	0.122
	User	-	100	0.018	0.018	0.140
7.000	User	-	100	0.015	0.015	0.015
	User	-	100	0.011	0.011	0.026
7.001	User	-	100	0.043	0.043	0.043
2.008	User	-	100	0.051	0.051	0.051
				Total	Total	Total
				0.916	0.916	0.916

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	5
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950

Synthetic Rainfall Details

C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

Online Controls for Storm

Pump Manhole: S10, DS/PN: S2.008, Volume (m³): 6.9

Invert Level (m) 5.338

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	71.0000	0.900	71.0000	1.700	71.0000	2.500	71.0000
0.200	71.0000	1.000	71.0000	1.800	71.0000	2.600	71.0000
0.300	71.0000	1.100	71.0000	1.900	71.0000	2.700	71.0000
0.400	71.0000	1.200	71.0000	2.000	71.0000	2.800	71.0000
0.500	71.0000	1.300	71.0000	2.100	71.0000	2.900	71.0000
0.600	71.0000	1.400	71.0000	2.200	71.0000	3.000	71.0000
0.700	71.0000	1.500	71.0000	2.300	71.0000		
0.800	71.0000	1.600	71.0000	2.400	71.0000		

Storage Structures for Storm

Cellular Storage Manhole: S2, DS/PN: S2.001

Invert Level (m) 6.050 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	60.0	0.0	0.401	0.0	0.0
0.400	60.0	0.0			

Cellular Storage Manhole: S8, DS/PN: S2.005

Invert Level (m) 5.590 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	180.0	0.0	0.401	0.0	0.0
0.400	180.0	0.0			

Cellular Storage Manhole: S11, DS/PN: S4.002

Invert Level (m) 5.757 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	180.0	0.0	0.401	0.0	0.0
0.400	180.0	0.0			

Cellular Storage Manhole: S14, DS/PN: S6.001

Invert Level (m) 5.618 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	180.0	0.0	0.401	0.0	0.0
0.400	180.0	0.0			

Cellular Storage Manhole: S16, DS/PN: S7.001

Invert Level (m) 5.506 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Cellular Storage Manhole: S16, DS/PN: S7.001

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	128.0	0.0	0.401	0.0	0.0
0.400	128.0	0.0			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	5
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S2.000	S4	15 minute 100 year Winter I+40%	6.950	6.944	0.510	0.000	0.36
S2.001	S2	15 minute 100 year Winter I+40%	6.950	6.941	0.591	0.000	0.54
S2.002	S4	15 minute 100 year Winter I+40%	6.950	6.917	0.651	0.000	1.18
S3.000	S1	30 minute 100 year Winter I+40%	6.950	6.903	0.428	0.000	0.05
S3.001	S2	30 minute 100 year Winter I+40%	6.950	6.905	0.595	0.000	0.56
S3.002	S3	30 minute 100 year Winter I+40%	6.950	6.900	0.680	0.000	0.84
S2.003	S5	30 minute 100 year Winter I+40%	6.950	6.896	0.736	0.000	1.01
S2.004	S7	30 minute 100 year Winter I+40%	6.950	6.885	0.807	0.000	1.28
S2.005	S8	15 minute 30 year Winter I+40%	6.950	5.991	0.027	0.000	0.65
S4.000	S9	30 minute 100 year Winter I+40%	6.950	6.893	0.614	0.000	0.54
S4.001	S10	30 minute 100 year Winter I+40%	6.950	6.889	0.690	0.000	0.90
S4.002	S11	30 minute 100 year Winter I+40%	6.950	6.879	0.822	0.000	0.48

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S2.000	S4		13.693	26.1	FLOOD RISK
S2.001	S2		25.553	39.4	FLOOD RISK
S2.002	S4		63.016	69.5	FLOOD RISK
S3.000	S1		-0.005	1.6	FLOOD RISK
S3.001	S2		34.428	37.8	FLOOD RISK
S3.002	S3		47.009	51.7	FLOOD RISK
S2.003	S5		127.227	113.2	FLOOD RISK
S2.004	S7		151.678	142.0	FLOOD RISK
S2.005	S8		86.294	81.8	SURCHARGED*
S4.000	S9		27.886	35.7	FLOOD RISK
S4.001	S10		49.700	64.0	FLOOD RISK
S4.002	S11		26.618	34.0	FLOOD RISK

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S5.000	S11	30 minute 100 year Winter I+40%	6.950	6.871	0.876	0.000	0.55
S4.003	S11	30 minute 100 year Winter I+40%	6.950	6.866	0.951	0.000	0.57
S2.006	S8	30 minute 100 year Winter I+40%	6.950	6.855	1.005	0.000	1.38
S6.000	S10	30 minute 100 year Winter I+40%	6.950	6.835	0.781	0.000	0.33
S6.001	S14	30 minute 100 year Winter I+40%	6.950	6.831	0.914	0.000	0.32
S2.007	S9	30 minute 100 year Winter I+40%	6.950	6.828	1.048	0.000	1.31
S7.000	S17	30 minute 100 year Winter I+40%	6.950	6.801	0.904	0.000	0.24
S7.001	S16	30 minute 100 year Winter I+40%	6.950	6.799	0.994	0.000	0.38
S2.008	S10	30 minute 100 year Winter I+40%	6.950	6.794	1.081	0.000	0.79

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S5.000	S11		28.757	36.3	FLOOD RISK
S4.003	S11		76.803	57.7	FLOOD RISK
S2.006	S8		197.230	143.7	FLOOD RISK
S6.000	S10		17.965	23.4	FLOOD RISK
S6.001	S14		-40.378	22.9	FLOOD RISK
S2.007	S9		222.786	134.5	FLOOD RISK
S7.000	S17		13.106	16.2	FLOOD RISK
S7.001	S16		-14.440	25.3	FLOOD RISK
S2.008	S10		229.849	71.0	FLOOD RISK

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	25.421	0.170	149.5	0.009	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	23.366	0.118	198.0	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	25.421	0.170	149.5	0.043	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	39.796	0.159	250.3	0.158	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	65.494	0.219	299.1	0.250	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	49.639	0.331	150.0	0.051	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	12.870	0.086	149.7	0.185	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	53.186	0.118	450.0	0.131	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.005	15.889	0.035	454.0	0.098	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.006	7.987	0.018	443.7	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.40	7.439	0.009	0.0	0.0	0.0	1.07	42.4	1.2
S1.001	50.00	5.75	7.194	0.033	0.0	0.0	0.0	1.11	78.7	4.4
S2.000	50.00	5.40	7.321	0.043	0.0	0.0	0.0	1.07	42.4	5.8
S1.002	50.00	6.33	7.001	0.234	0.0	0.0	0.0	1.14	126.0	31.6
S1.003	50.00	7.26	6.767	0.483	0.0	0.0	0.0	1.17	186.1	65.5
S3.000	50.00	5.65	7.115	0.051	0.0	0.0	0.0	1.28	90.6	6.9
S3.001	50.00	5.81	6.784	0.236	0.0	0.0	0.0	1.28	90.7	32.0
S1.004	50.00	8.04	6.398	0.851	0.0	0.0	0.0	1.14	322.7	115.3
S1.005	50.00	8.27	6.280	0.949	0.0	0.0	0.0	1.14	321.3	128.5
S1.006	50.00	8.39	6.045	0.949	0.0	0.0	0.0	1.15	325.0	128.5

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	9.330	7.439	1.666	Open Manhole	1200
S1.001	o	300	S2	9.300	7.194	1.806	Open Manhole	1200
S2.000	o	225	S3	9.350	7.321	1.804	Open Manhole	1200
S1.002	o	375	S3	9.450	7.001	2.074	Open Manhole	1350
S1.003	o	450	S4	9.500	6.767	2.283	Open Manhole	1350
S3.000	o	300	S6	9.700	7.115	2.285	Open Manhole	1200
S3.001	o	300	S7	9.700	6.784	2.616	Open Manhole	1200
S1.004	o	600	S5	9.700	6.398	2.702	Open Manhole	1500
S1.005	o	600	S6	7.900	6.280	1.020	Open Manhole	1500
S1.006	o	600	S7	7.300	6.045	0.655	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	25.421	149.5	S2	9.300	7.269	1.806	Open Manhole	1200
S1.001	23.366	198.0	S3	9.450	7.076	2.074	Open Manhole	1350
S2.000	25.421	149.5	S3	9.450	7.151	2.074	Open Manhole	1350
S1.002	39.796	250.3	S4	9.500	6.842	2.283	Open Manhole	1350
S1.003	65.494	299.1	S5	9.700	6.548	2.702	Open Manhole	1500
S3.000	49.639	150.0	S7	9.700	6.784	2.616	Open Manhole	1200
S3.001	12.870	149.7	S5	9.700	6.698	2.702	Open Manhole	1500
S1.004	53.186	450.0	S6	7.900	6.280	1.020	Open Manhole	1500
S1.005	15.889	454.0	S7	7.300	6.245	0.455	Open Manhole	1500
S1.006	7.987	443.7	S	7.300	6.027	0.673	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.009	0.009	0.009
1.001	User	-	100	0.024	0.024	0.024
2.000	User	-	100	0.043	0.043	0.043
1.002	User	-	100	0.098	0.098	0.098
	User	-	100	0.060	0.060	0.158
1.003	User	-	100	0.220	0.220	0.220
	User	-	100	0.030	0.030	0.250
3.000	User	-	100	0.051	0.051	0.051
3.001	User	-	100	0.185	0.185	0.185
1.004	User	-	100	0.112	0.112	0.112
	User	-	100	0.019	0.019	0.131
1.005	User	-	100	0.052	0.052	0.052
	User	-	100	0.047	0.047	0.098
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.949	0.949	0.949

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	7.300	6.027	0.000	0	0

Datum (m) 7.220 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
240	0.000	480	0.000	720	0.000	960	0.000	1200	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model FEH

Synthetic Rainfall Details

Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 1 year Winter I+40%	9.330	7.470	-0.194	0.000	0.04
S1.001	S2	30 minute 1 year Winter I+40%	9.300	7.335	-0.159	0.000	0.06
S2.000	S3	15 minute 1 year Winter I+40%	9.350	7.392	-0.154	0.000	0.21
S1.002	S3	30 minute 1 year Winter I+40%	9.450	7.330	-0.046	0.000	0.24
S1.003	S4	30 minute 1 year Winter I+40%	9.500	7.310	0.093	0.000	0.31
S3.000	S6	30 minute 1 year Winter I+40%	9.700	7.308	-0.107	0.000	0.08
S3.001	S7	30 minute 1 year Winter I+40%	9.700	7.298	0.214	0.000	0.39
S1.004	S5	30 minute 1 year Winter I+40%	9.700	7.276	0.278	0.000	0.33
S1.005	S6	30 minute 1 year Winter I+40%	7.900	7.251	0.371	0.000	0.53
S1.006	S7	30 minute 1 year Winter I+40%	7.300	7.232	0.587	0.000	0.59

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		0.818	1.7	OK
S1.001	S2		3.697	4.2	OK
S2.000	S3		3.906	8.2	OK
S1.002	S3		25.538	27.2	OK
S1.003	S4		49.003	53.4	SURCHARGED
S3.000	S6		5.656	7.0	OK
S3.001	S7		22.922	28.9	SURCHARGED
S1.004	S5		73.748	92.6	SURCHARGED
S1.005	S6		67.340	102.5	SURCHARGED
S1.006	S7		61.377	102.3	FLOOD RISK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 30 year Winter I+40%	9.330	8.590	0.926	0.000	0.24
S1.001	S2	15 minute 30 year Winter I+40%	9.300	8.581	1.087	0.000	0.33
S2.000	S3	15 minute 30 year Winter I+40%	9.350	8.626	1.080	0.000	0.68
S1.002	S3	15 minute 30 year Winter I+40%	9.450	8.564	1.188	0.000	1.09
S1.003	S4	15 minute 30 year Winter I+40%	9.500	8.370	1.153	0.000	1.45
S3.000	S6	15 minute 30 year Winter I+40%	9.700	8.213	0.798	0.000	0.36
S3.001	S7	15 minute 30 year Winter I+40%	9.700	8.170	1.086	0.000	1.89
S1.004	S5	15 minute 30 year Winter I+40%	9.700	7.865	0.867	0.000	1.55
S1.005	S6	15 minute 30 year Winter I+40%	7.900	7.558	0.678	0.000	2.53
S1.006	S7	15 minute 30 year Winter I+40%	7.300	7.329	0.684	28.856	1.99

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		2.634	9.3	SURCHARGED
S1.001	S2		9.544	23.0	SURCHARGED
S2.000	S3		12.610	26.5	SURCHARGED
S1.002	S3		67.360	124.2	SURCHARGED
S1.003	S4		135.548	250.0	SURCHARGED
S3.000	S6		14.793	30.6	SURCHARGED
S3.001	S7		65.291	138.5	SURCHARGED
S1.004	S5		226.097	440.6	SURCHARGED
S1.005	S6		237.142	486.3	SURCHARGED
S1.006	S7		231.010	347.1	FLOOD

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 100 year Winter I+40%	9.330	9.329	1.665	0.000	0.38
S1.001	S2	15 minute 100 year Winter I+40%	9.300	9.310	1.816	9.972	1.39
S2.000	S3	15 minute 100 year Winter I+40%	9.350	9.357	1.811	6.891	1.72
S1.002	S3	15 minute 100 year Winter I+40%	9.450	9.450	2.074	0.449	1.66
S1.003	S4	15 minute 100 year Winter I+40%	9.500	9.396	2.179	0.000	1.94
S3.000	S6	15 minute 100 year Winter I+40%	9.700	9.318	1.903	0.000	0.57
S3.001	S7	15 minute 100 year Winter I+40%	9.700	9.240	2.156	0.000	2.86
S1.004	S5	15 minute 100 year Winter I+40%	9.700	8.494	1.496	0.000	2.23
S1.005	S6	15 minute 100 year Winter I+40%	7.900	7.877	0.997	0.000	3.69
S1.006	S7	15 minute 100 year Winter I+40%	7.300	7.396	0.751	96.688	2.42

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		4.043	15.0	FLOOD RISK
S1.001	S2		14.603	96.7	FLOOD
S2.000	S3		19.228	67.3	FLOOD
S1.002	S3		103.382	190.3	FLOOD
S1.003	S4		209.914	335.2	FLOOD RISK
S3.000	S6		22.648	48.8	SURCHARGED
S3.001	S7		101.668	209.9	SURCHARGED
S1.004	S5		357.072	635.9	SURCHARGED
S1.005	S6		383.251	709.7	FLOOD RISK
S1.006	S7		377.116	420.8	FLOOD

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	25.421	0.170	149.5	0.009	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	23.366	0.118	198.0	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	25.421	0.170	149.5	0.043	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	39.796	0.159	250.3	0.158	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	65.494	0.219	299.1	0.250	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	49.639	0.331	150.0	0.051	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	12.870	0.086	149.7	0.185	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	53.186	0.118	450.0	0.131	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.005	15.889	0.035	454.0	0.098	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.006	7.987	0.018	443.7	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.40	7.439	0.009	0.0	0.0	0.0	1.07	42.4	1.2
S1.001	50.00	5.75	7.194	0.033	0.0	0.0	0.0	1.11	78.7	4.4
S2.000	50.00	5.40	7.321	0.043	0.0	0.0	0.0	1.07	42.4	5.8
S1.002	50.00	6.33	7.001	0.234	0.0	0.0	0.0	1.14	126.0	31.6
S1.003	50.00	7.26	6.767	0.483	0.0	0.0	0.0	1.17	186.1	65.5
S3.000	50.00	5.65	7.115	0.051	0.0	0.0	0.0	1.28	90.6	6.9
S3.001	50.00	5.81	6.784	0.236	0.0	0.0	0.0	1.28	90.7	32.0
S1.004	50.00	8.04	6.398	0.851	0.0	0.0	0.0	1.14	322.7	115.3
S1.005	50.00	8.27	6.280	0.949	0.0	0.0	0.0	1.14	321.3	128.5
S1.006	50.00	8.39	6.045	0.949	0.0	0.0	0.0	1.15	325.0	128.5

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	9.330	7.439	1.666	Open Manhole	1200
S1.001	o	300	S2	9.300	7.194	1.806	Open Manhole	1200
S2.000	o	225	S3	9.350	7.321	1.804	Open Manhole	1200
S1.002	o	375	S3	9.450	7.001	2.074	Open Manhole	1350
S1.003	o	450	S4	9.500	6.767	2.283	Open Manhole	1350
S3.000	o	300	S6	9.700	7.115	2.285	Open Manhole	1200
S3.001	o	300	S7	9.700	6.784	2.616	Open Manhole	1200
S1.004	o	600	S5	9.700	6.398	2.702	Open Manhole	1500
S1.005	o	600	S6	7.900	6.280	1.020	Open Manhole	1500
S1.006	o	600	S7	7.300	6.045	0.655	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	25.421	149.5	S2	9.300	7.269	1.806	Open Manhole	1200
S1.001	23.366	198.0	S3	9.450	7.076	2.074	Open Manhole	1350
S2.000	25.421	149.5	S3	9.450	7.151	2.074	Open Manhole	1350
S1.002	39.796	250.3	S4	9.500	6.842	2.283	Open Manhole	1350
S1.003	65.494	299.1	S5	9.700	6.548	2.702	Open Manhole	1500
S3.000	49.639	150.0	S7	9.700	6.784	2.616	Open Manhole	1200
S3.001	12.870	149.7	S5	9.700	6.698	2.702	Open Manhole	1500
S1.004	53.186	450.0	S6	7.900	6.280	1.020	Open Manhole	1500
S1.005	15.889	454.0	S7	7.300	6.245	0.455	Open Manhole	1500
S1.006	7.987	443.7	S	7.300	6.027	0.673	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.009	0.009	0.009
1.001	User	-	100	0.024	0.024	0.024
2.000	User	-	100	0.043	0.043	0.043
1.002	User	-	100	0.098	0.098	0.098
	User	-	100	0.060	0.060	0.158
1.003	User	-	100	0.220	0.220	0.220
	User	-	100	0.030	0.030	0.250
3.000	User	-	100	0.051	0.051	0.051
3.001	User	-	100	0.185	0.185	0.185
1.004	User	-	100	0.112	0.112	0.112
	User	-	100	0.019	0.019	0.131
1.005	User	-	100	0.052	0.052	0.052
	User	-	100	0.047	0.047	0.098
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.949	0.949	0.949

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	7.300	6.027	0.000	0	0

Datum (m) 6.870 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
240	0.000	480	0.000	720	0.000	960	0.000	1200	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model FEH

Synthetic Rainfall Details

Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	1	+40%	30/15 Summer			
S1.001	S2	15 Winter	1	+40%	30/15 Summer	100/15 Summer		
S2.000	S3	15 Winter	1	+40%	30/15 Summer	100/15 Summer		
S1.002	S3	15 Winter	1	+40%	30/15 Summer	100/15 Summer		
S1.003	S4	15 Winter	1	+40%	30/15 Summer			
S3.000	S6	15 Winter	1	+40%	30/15 Summer			
S3.001	S7	15 Winter	1	+40%	30/15 Summer			
S1.004	S5	15 Winter	1	+40%	30/15 Summer			
S1.005	S6	15 Winter	1	+40%	1/15 Summer			
S1.006	S7	15 Winter	1	+40%	1/15 Summer	100/15 Summer		

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	7.470	-0.194	0.000	0.04		1.7	OK	
S1.001	S2	7.251	-0.243	0.000	0.08		5.6	OK	2
S2.000	S3	7.392	-0.154	0.000	0.21		8.2	OK	2
S1.002	S3	7.154	-0.222	0.000	0.34		39.3	OK	2
S1.003	S4	7.007	-0.210	0.000	0.43		74.1	OK	
S3.000	S6	7.183	-0.232	0.000	0.11		9.7	OK	
S3.001	S7	6.971	-0.113	0.000	0.53		39.1	OK	
S1.004	S5	6.942	-0.056	0.000	0.42		119.9	OK	
S1.005	S6	6.910	0.030	0.000	0.68		131.1	SURCHARGED	
S1.006	S7	6.885	0.240	0.000	0.76		131.6	SURCHARGED	2

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	30	+40%	30/15 Summer			
S1.001	S2	15 Winter	30	+40%	30/15 Summer	100/15 Summer		
S2.000	S3	15 Winter	30	+40%	30/15 Summer	100/15 Summer		
S1.002	S3	15 Winter	30	+40%	30/15 Summer	100/15 Summer		
S1.003	S4	15 Winter	30	+40%	30/15 Summer			
S3.000	S6	15 Winter	30	+40%	30/15 Summer			
S3.001	S7	15 Winter	30	+40%	30/15 Summer			
S1.004	S5	15 Winter	30	+40%	30/15 Summer			
S1.005	S6	15 Winter	30	+40%	1/15 Summer			
S1.006	S7	15 Winter	30	+40%	1/15 Summer	100/15 Summer		

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	8.333	0.669	0.000	0.24		9.4	SURCHARGED	
S1.001	S2	8.326	0.832	0.000	0.36		25.0	SURCHARGED	2
S2.000	S3	8.368	0.822	0.000	0.66		25.8	SURCHARGED	2
S1.002	S3	8.310	0.934	0.000	1.05		120.7	SURCHARGED	2
S1.003	S4	8.127	0.910	0.000	1.42		245.7	SURCHARGED	
S3.000	S6	7.964	0.549	0.000	0.35		30.0	SURCHARGED	
S3.001	S7	7.921	0.837	0.000	1.83		134.7	SURCHARGED	
S1.004	S5	7.644	0.646	0.000	1.53		435.2	SURCHARGED	
S1.005	S6	7.345	0.465	0.000	2.50		481.3	SURCHARGED	
S1.006	S7	7.104	0.459	0.000	2.77		481.8	FLOOD RISK	2

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S1.000	S1	15 Winter	100	+40%	30/15 Summer			
S1.001	S2	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S2.000	S3	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S1.002	S3	15 Winter	100	+40%	30/15 Summer	100/15 Summer		
S1.003	S4	15 Winter	100	+40%	30/15 Summer			
S3.000	S6	15 Winter	100	+40%	30/15 Summer			
S3.001	S7	15 Winter	100	+40%	30/15 Summer			
S1.004	S5	15 Winter	100	+40%	30/15 Summer			
S1.005	S6	15 Winter	100	+40%	1/15 Summer			
S1.006	S7	15 Winter	100	+40%	1/15 Summer	100/15 Summer		

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	9.326	1.662	0.000	0.37		14.4	FLOOD RISK	
S1.001	S2	9.308	1.814	7.791	1.12		78.3	FLOOD	2
S2.000	S3	9.355	1.809	5.496	1.78		69.6	FLOOD	2
S1.002	S3	9.450	2.074	0.286	1.67		191.5	FLOOD	2
S1.003	S4	9.398	2.181	0.000	1.97		339.5	FLOOD RISK	
S3.000	S6	9.206	1.791	0.000	0.56		47.8	SURCHARGED	
S3.001	S7	9.129	2.045	0.000	2.79		204.8	SURCHARGED	
S1.004	S5	8.446	1.448	0.000	2.22		631.1	SURCHARGED	
S1.005	S6	7.827	0.947	0.000	3.68		707.0	FLOOD RISK	
S1.006	S7	7.305	0.660	5.451	3.80		661.0	FLOOD	2

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	25.421	0.170	149.5	0.009	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	23.366	0.118	198.0	0.024	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	25.421	0.170	149.5	0.043	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	39.796	0.159	250.3	0.158	0.00	0.0	0.600	o	375	Pipe/Conduit	
S1.003	65.494	0.219	299.1	0.250	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	49.639	0.331	150.0	0.051	5.00	0.0	0.600	o	300	Pipe/Conduit	
S3.001	12.870	0.086	149.7	0.185	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	53.186	0.118	450.0	0.131	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.005	15.889	0.035	454.0	0.098	0.00	0.0	0.600	o	600	Pipe/Conduit	
S1.006	7.987	0.018	443.7	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.40	7.439	0.009	0.0	0.0	0.0	1.07	42.4	1.2
S1.001	50.00	5.75	7.194	0.033	0.0	0.0	0.0	1.11	78.7	4.4
S2.000	50.00	5.40	7.321	0.043	0.0	0.0	0.0	1.07	42.4	5.8
S1.002	50.00	6.33	7.001	0.234	0.0	0.0	0.0	1.14	126.0	31.6
S1.003	50.00	7.26	6.767	0.483	0.0	0.0	0.0	1.17	186.1	65.5
S3.000	50.00	5.65	7.115	0.051	0.0	0.0	0.0	1.28	90.6	6.9
S3.001	50.00	5.81	6.784	0.236	0.0	0.0	0.0	1.28	90.7	32.0
S1.004	50.00	8.04	6.398	0.851	0.0	0.0	0.0	1.14	322.7	115.3
S1.005	50.00	8.27	6.280	0.949	0.0	0.0	0.0	1.14	321.3	128.5
S1.006	50.00	8.39	6.045	0.949	0.0	0.0	0.0	1.15	325.0	128.5

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	9.330	7.439	1.666	Open Manhole	1200
S1.001	o	300	S2	9.300	7.194	1.806	Open Manhole	1200
S2.000	o	225	S3	9.350	7.321	1.804	Open Manhole	1200
S1.002	o	375	S3	9.450	7.001	2.074	Open Manhole	1350
S1.003	o	450	S4	9.500	6.767	2.283	Open Manhole	1350
S3.000	o	300	S6	9.700	7.115	2.285	Open Manhole	1200
S3.001	o	300	S7	9.700	6.784	2.616	Open Manhole	1200
S1.004	o	600	S5	9.700	6.398	2.702	Open Manhole	1500
S1.005	o	600	S6	7.900	6.280	1.020	Open Manhole	1500
S1.006	o	600	S7	7.300	6.045	0.655	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	25.421	149.5	S2	9.300	7.269	1.806	Open Manhole	1200
S1.001	23.366	198.0	S3	9.450	7.076	2.074	Open Manhole	1350
S2.000	25.421	149.5	S3	9.450	7.151	2.074	Open Manhole	1350
S1.002	39.796	250.3	S4	9.500	6.842	2.283	Open Manhole	1350
S1.003	65.494	299.1	S5	9.700	6.548	2.702	Open Manhole	1500
S3.000	49.639	150.0	S7	9.700	6.784	2.616	Open Manhole	1200
S3.001	12.870	149.7	S5	9.700	6.698	2.702	Open Manhole	1500
S1.004	53.186	450.0	S6	7.900	6.280	1.020	Open Manhole	1500
S1.005	15.889	454.0	S7	7.300	6.245	0.455	Open Manhole	1500
S1.006	7.987	443.7	S	7.300	6.027	0.673	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.009	0.009	0.009
1.001	User	-	100	0.024	0.024	0.024
2.000	User	-	100	0.043	0.043	0.043
1.002	User	-	100	0.098	0.098	0.098
	User	-	100	0.060	0.060	0.158
1.003	User	-	100	0.220	0.220	0.220
	User	-	100	0.030	0.030	0.250
3.000	User	-	100	0.051	0.051	0.051
3.001	User	-	100	0.185	0.185	0.185
1.004	User	-	100	0.112	0.112	0.112
	User	-	100	0.019	0.019	0.131
1.005	User	-	100	0.052	0.052	0.052
	User	-	100	0.047	0.047	0.098
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.949	0.949	0.949

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.006	S	7.300	6.027	0.000	0	0

Datum (m) 6.550 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
240	0.000	480	0.000	720	0.000	960	0.000	1200	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model FEH

Synthetic Rainfall Details

Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 1 year Winter I+40%	9.330	7.470	-0.194	0.000	0.04
S1.001	S2	15 minute 1 year Winter I+40%	9.300	7.251	-0.243	0.000	0.08
S2.000	S3	15 minute 1 year Winter I+40%	9.350	7.392	-0.154	0.000	0.21
S1.002	S3	15 minute 1 year Winter I+40%	9.450	7.154	-0.222	0.000	0.34
S1.003	S4	15 minute 1 year Winter I+40%	9.500	6.981	-0.236	0.000	0.45
S3.000	S6	15 minute 1 year Winter I+40%	9.700	7.183	-0.232	0.000	0.11
S3.001	S7	15 minute 1 year Winter I+40%	9.700	6.944	-0.140	0.000	0.55
S1.004	S5	15 minute 1 year Winter I+40%	9.700	6.734	-0.264	0.000	0.45
S1.005	S6	15 minute 1 year Winter I+40%	7.900	6.661	-0.219	0.000	0.72
S1.006	S7	15 minute 1 year Winter I+40%	7.300	6.566	-0.079	0.000	0.80

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		0.817	1.7	OK
S1.001	S2		2.969	5.6	OK
S2.000	S3		3.903	8.2	OK
S1.002	S3		21.200	39.3	OK
S1.003	S4		43.889	76.9	OK
S3.000	S6		4.632	9.7	OK
S3.001	S7		21.471	40.1	OK
S1.004	S5		76.882	128.6	OK
S1.005	S6		80.772	138.9	OK
S1.006	S7		78.500	139.1	OK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 30 year Winter I+40%	9.330	8.119	0.455	0.000	0.24
S1.001	S2	15 minute 30 year Winter I+40%	9.300	8.110	0.616	0.000	0.39
S2.000	S3	15 minute 30 year Winter I+40%	9.350	8.154	0.608	0.000	0.67
S1.002	S3	15 minute 30 year Winter I+40%	9.450	8.093	0.717	0.000	1.08
S1.003	S4	15 minute 30 year Winter I+40%	9.500	7.901	0.684	0.000	1.46
S3.000	S6	15 minute 30 year Winter I+40%	9.700	7.732	0.317	0.000	0.36
S3.001	S7	15 minute 30 year Winter I+40%	9.700	7.689	0.605	0.000	1.87
S1.004	S5	15 minute 30 year Winter I+40%	9.700	7.398	0.400	0.000	1.55
S1.005	S6	15 minute 30 year Winter I+40%	7.900	7.089	0.209	0.000	2.54
S1.006	S7	15 minute 30 year Winter I+40%	7.300	6.835	0.190	0.000	2.80

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		2.635	9.4	SURCHARGED
S1.001	S2		9.573	27.4	SURCHARGED
S2.000	S3		12.608	26.4	SURCHARGED
S1.002	S3		68.466	123.9	SURCHARGED
S1.003	S4		141.764	251.3	SURCHARGED
S3.000	S6		14.948	30.4	SURCHARGED
S3.001	S7		69.344	137.4	SURCHARGED
S1.004	S5		249.233	442.5	SURCHARGED
S1.005	S6		272.924	488.3	SURCHARGED
S1.006	S7		270.671	488.2	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 100 year Winter I+40%	9.330	9.324	1.660	0.000	0.39
S1.001	S2	15 minute 100 year Winter I+40%	9.300	9.305	1.811	4.931	1.02
S2.000	S3	15 minute 100 year Winter I+40%	9.350	9.354	1.808	3.656	1.65
S1.002	S3	15 minute 100 year Winter I+40%	9.450	9.433	2.057	0.000	1.66
S1.003	S4	15 minute 100 year Winter I+40%	9.500	9.247	2.030	0.000	2.04
S3.000	S6	15 minute 100 year Winter I+40%	9.700	9.012	1.597	0.000	0.55
S3.001	S7	15 minute 100 year Winter I+40%	9.700	8.926	1.842	0.000	2.76
S1.004	S5	15 minute 100 year Winter I+40%	9.700	8.286	1.288	0.000	2.25
S1.005	S6	15 minute 100 year Winter I+40%	7.900	7.647	0.768	0.000	3.72
S1.006	S7	15 minute 100 year Winter I+40%	7.300	7.115	0.470	0.000	4.12

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		4.022	15.5	FLOOD RISK
S1.001	S2		14.599	71.4	FLOOD
S2.000	S3		19.208	64.6	FLOOD
S1.002	S3		104.367	190.5	FLOOD RISK
S1.003	S4		216.060	352.5	FLOOD RISK
S3.000	S6		22.790	46.6	SURCHARGED
S3.001	S7		105.683	202.7	SURCHARGED
S1.004	S5		379.987	641.6	SURCHARGED
S1.005	S6		418.627	715.0	FLOOD RISK
S1.006	S7		416.310	716.5	FLOOD RISK

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.856	0.120	148.8	0.030	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	18.606	0.124	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	22.391	0.150	149.3	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	19.199	0.129	148.8	0.016	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	19.746	0.131	150.7	0.068	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	27.516	0.110	250.1	0.015	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	20.351	0.082	248.2	0.079	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	22.842	0.153	149.3	0.025	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	12.567	0.084	149.6	0.048	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	33.895	0.113	300.0	0.006	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.006	55.863	0.149	375.0	0.047	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.007	10.182	0.027	375.0	0.148	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.008	11.920	0.032	375.0	0.073	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.009	7.071	0.016	441.9	0.000	0.00	71.0	0.600	o	600	Pipe/Conduit	
S1.010	9.325	0.021	444.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.28	7.539	0.030	0.0	0.0	0.0	1.07	42.5	4.0
S1.001	50.00	5.57	7.419	0.030	0.0	0.0	0.0	1.07	42.3	4.0
S1.002	50.00	5.92	7.295	0.046	0.0	0.0	0.0	1.07	42.5	6.2
S2.000	50.00	5.30	7.405	0.016	0.0	0.0	0.0	1.07	42.5	2.1
S2.001	50.00	5.61	7.276	0.084	0.0	0.0	0.0	1.06	42.3	11.3
S1.003	50.00	6.28	6.920	0.145	0.0	0.0	0.0	1.28	203.7	19.6
S1.004	50.00	6.54	6.810	0.224	0.0	0.0	0.0	1.29	204.5	30.3
S3.000	50.00	5.36	7.190	0.025	0.0	0.0	0.0	1.07	42.5	3.4
S3.001	50.00	5.55	7.037	0.073	0.0	0.0	0.0	1.07	42.4	9.9
S1.005	50.00	6.98	6.653	0.302	0.0	0.0	0.0	1.29	278.8	40.9
S1.006	50.00	7.79	6.540	0.349	0.0	0.0	0.0	1.15	249.1	47.2
S1.007	50.00	7.94	6.391	0.497	0.0	0.0	0.0	1.15	249.1	67.3
S1.008	50.00	8.11	6.364	0.570	0.0	0.0	0.0	1.15	249.1	77.2
S1.009	50.00	8.21	6.257	0.570	71.0	0.0	0.0	1.15	325.7	148.2
S1.010	50.00	8.35	6.041	0.570	71.0	0.0	0.0	1.15	324.9	148.2

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	9.200	7.539	1.436	Open Manhole	1200
S1.001	o	225	S2	9.200	7.419	1.556	Open Manhole	1200
S1.002	o	225	S3	8.500	7.295	0.980	Open Manhole	1200
S2.000	o	225	S4	9.500	7.405	1.870	Open Manhole	1200
S2.001	o	225	S5	9.500	7.276	1.999	Open Manhole	1200
S1.003	o	450	S4	8.200	6.920	0.830	Open Manhole	1350
S1.004	o	450	S5	8.150	6.810	0.890	Open Manhole	1350
S3.000	o	225	S8	9.900	7.190	2.485	Open Manhole	1200
S3.001	o	225	S9	9.900	7.037	2.638	Open Manhole	1200
S1.005	o	525	S6	8.000	6.653	0.822	Open Manhole	1800
S1.006	o	525	S7	8.000	6.540	0.935	Open Manhole	1800
S1.007	o	525	S8	8.300	6.391	1.384	Open Manhole	1800
S1.008	o	525	S9	8.000	6.364	1.111	Open Manhole	1800
S1.009	o	600	S10	8.200	6.257	1.343	Open Manhole	1800
S1.010	o	600	S11	8.200	6.041	1.559	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	17.856	148.8	S2	9.200	7.419	1.556	Open Manhole	1200
S1.001	18.606	150.0	S3	8.500	7.295	0.980	Open Manhole	1200
S1.002	22.391	149.3	S4	8.200	7.145	0.830	Open Manhole	1350
S2.000	19.199	148.8	S5	9.500	7.276	1.999	Open Manhole	1200
S2.001	19.746	150.7	S4	8.200	7.145	0.830	Open Manhole	1350
S1.003	27.516	250.1	S5	8.150	6.810	0.890	Open Manhole	1350
S1.004	20.351	248.2	S6	8.000	6.728	0.822	Open Manhole	1800
S3.000	22.842	149.3	S9	9.900	7.037	2.638	Open Manhole	1200
S3.001	12.567	149.6	S6	8.000	6.953	0.822	Open Manhole	1800
S1.005	33.895	300.0	S7	8.000	6.540	0.935	Open Manhole	1800
S1.006	55.863	375.0	S8	8.300	6.391	1.384	Open Manhole	1800
S1.007	10.182	375.0	S9	8.000	6.364	1.111	Open Manhole	1800
S1.008	11.920	375.0	S10	8.200	6.332	1.343	Open Manhole	1800
S1.009	7.071	441.9	S11	8.200	6.241	1.359	Open Manhole	1800
S1.010	9.325	444.0	S	8.000	6.020	1.380	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.030	0.030	0.030
1.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.016	0.016	0.016
2.000	User	-	100	0.016	0.016	0.016
2.001	User	-	100	0.047	0.047	0.047
	User	-	100	0.021	0.021	0.068
1.003	User	-	100	0.015	0.015	0.015
1.004	User	-	100	0.079	0.079	0.079
3.000	User	-	100	0.025	0.025	0.025
3.001	User	-	100	0.019	0.019	0.019
	User	-	100	0.028	0.028	0.048
1.005	User	-	100	0.006	0.006	0.006
1.006	User	-	100	0.015	0.015	0.015
	User	-	100	0.031	0.031	0.047
1.007	User	-	100	0.038	0.038	0.038
	User	-	100	0.045	0.045	0.084
	User	-	100	0.011	0.011	0.095
	User	-	100	0.036	0.036	0.131
	User	-	100	0.017	0.017	0.148
1.008	User	-	100	0.073	0.073	0.073
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.570	0.570	0.570

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	S	8.000	6.020	0.000	0	0

Datum (m) 7.500 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
240	0.000	480	0.000	720	0.000	960	0.000	1200	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	30 minute 1 year Summer I+40%	9.200	7.637	-0.127	0.000	0.11
S1.001	S2	30 minute 1 year Summer I+40%	9.200	7.628	-0.016	0.000	0.10
S1.002	S3	30 minute 1 year Summer I+40%	8.500	7.621	0.101	0.000	0.15
S2.000	S4	30 minute 1 year Summer I+40%	9.500	7.635	0.005	0.000	0.06
S2.001	S5	30 minute 1 year Summer I+40%	9.500	7.630	0.129	0.000	0.29
S1.003	S4	30 minute 1 year Summer I+40%	8.200	7.608	0.238	0.000	0.11
S1.004	S5	30 minute 1 year Summer I+40%	8.150	7.600	0.340	0.000	0.17
S3.000	S8	30 minute 1 year Summer I+40%	9.900	7.612	0.197	0.000	0.10
S3.001	S9	30 minute 1 year Summer I+40%	9.900	7.604	0.342	0.000	0.28
S1.005	S6	30 minute 1 year Summer I+40%	8.000	7.588	0.410	0.000	0.16
S1.006	S7	30 minute 1 year Summer I+40%	8.000	7.576	0.511	0.000	0.19

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		2.998	4.4	OK
S1.001	S2		2.811	4.0	OK
S1.002	S3		3.692	6.0	SURCHARGED
S2.000	S4		1.469	2.3	SURCHARGED
S2.001	S5		7.377	11.3	SURCHARGED
S1.003	S4		10.060	18.7	SURCHARGED
S1.004	S5		11.905	28.4	SURCHARGED
S3.000	S8		2.123	3.8	SURCHARGED
S3.001	S9		5.389	10.2	SURCHARGED
S1.005	S6		12.222	38.7	SURCHARGED
S1.006	S7		6.796	43.3	SURCHARGED

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	30 minute 1 year Winter I+40%	8.300	7.559	0.643	0.000	0.41
S1.008	S9	30 minute 1 year Winter I+40%	8.000	7.548	0.659	0.000	0.45
S1.009	S10	30 minute 1 year Winter I+40%	8.200	7.533	0.676	0.000	0.75
S1.010	S11	30 minute 1 year Winter I+40%	8.200	7.518	0.877	0.000	0.86

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		11.220	60.9	SURCHARGED
S1.008	S9		13.622	69.9	SURCHARGED
S1.009	S10		263.322	140.7	SURCHARGED
S1.010	S11		257.624	141.0	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 30 year Winter I+40%	9.200	8.164	0.400	0.000	0.42
S1.001	S2	15 minute 30 year Winter I+40%	9.200	8.133	0.489	0.000	0.45
S1.002	S3	15 minute 30 year Winter I+40%	8.500	8.104	0.584	0.000	0.64
S2.000	S4	15 minute 30 year Winter I+40%	9.500	8.256	0.626	0.000	0.26
S2.001	S5	15 minute 30 year Winter I+40%	9.500	8.239	0.738	0.000	1.22
S1.003	S4	15 minute 30 year Winter I+40%	8.200	8.053	0.683	0.000	0.43
S1.004	S5	15 minute 30 year Winter I+40%	8.150	8.021	0.761	0.000	0.69
S3.000	S8	15 minute 30 year Winter I+40%	9.900	8.105	0.690	0.000	0.37
S3.001	S9	15 minute 30 year Winter I+40%	9.900	8.075	0.813	0.000	1.12
S1.005	S6	15 minute 30 year Winter I+40%	8.000	7.977	0.799	0.000	0.65
S1.006	S7	15 minute 30 year Winter I+40%	8.000	7.927	0.862	0.000	0.77

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		8.656	15.8	SURCHARGED
S1.001	S2		8.462	17.2	SURCHARGED
S1.002	S3		12.507	24.9	SURCHARGED
S2.000	S4		4.501	9.8	SURCHARGED
S2.001	S5		23.407	46.5	SURCHARGED
S1.003	S4		37.805	74.5	FLOOD RISK
S1.004	S5		54.778	115.1	FLOOD RISK
S3.000	S8		6.951	14.2	SURCHARGED
S3.001	S9		19.343	40.8	SURCHARGED
S1.005	S6		70.092	155.0	FLOOD RISK
S1.006	S7		73.547	172.1	FLOOD RISK

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 30 year Winter I+40%	8.300	7.835	0.919	0.000	1.61
S1.008	S9	15 minute 30 year Winter I+40%	8.000	7.776	0.887	0.000	1.78
S1.009	S10	15 minute 30 year Winter I+40%	8.200	7.642	0.785	0.000	1.83
S1.010	S11	15 minute 30 year Winter I+40%	8.200	7.563	0.922	0.000	2.10

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		100.374	237.6	SURCHARGED
S1.008	S9		115.764	274.4	FLOOD RISK
S1.009	S10		365.379	345.3	SURCHARGED
S1.010	S11		359.563	346.0	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 100 year Winter I+40%	9.200	8.474	0.710	0.000	0.68
S1.001	S2	15 minute 100 year Winter I+40%	9.200	8.416	0.772	0.000	0.68
S1.002	S3	15 minute 100 year Winter I+40%	8.500	8.358	0.838	0.000	0.99
S2.000	S4	15 minute 100 year Winter I+40%	9.500	8.779	1.149	0.000	0.42
S2.001	S5	15 minute 100 year Winter I+40%	9.500	8.752	1.251	0.000	2.00
S1.003	S4	15 minute 100 year Winter I+40%	8.200	8.200	0.830	0.199	0.71
S1.004	S5	15 minute 100 year Winter I+40%	8.150	8.147	0.887	0.000	1.16
S3.000	S8	15 minute 100 year Winter I+40%	9.900	8.400	0.985	0.000	0.62
S3.001	S9	15 minute 100 year Winter I+40%	9.900	8.343	1.081	0.000	1.87
S1.005	S6	15 minute 100 year Winter I+40%	8.000	8.040	0.862	40.699	0.91
S1.006	S7	15 minute 100 year Summer I+40%	8.000	8.005	0.940	5.473	0.98

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		13.190	26.1	SURCHARGED
S1.001	S2		13.002	26.1	SURCHARGED
S1.002	S3		19.569	38.4	FLOOD RISK
S2.000	S4		6.928	16.3	SURCHARGED
S2.001	S5		36.224	76.3	SURCHARGED
S1.003	S4		59.991	123.6	FLOOD
S1.004	S5		89.151	191.7	FLOOD RISK
S3.000	S8		10.814	24.0	SURCHARGED
S3.001	S9		30.527	68.2	SURCHARGED
S1.005	S6		116.498	217.1	FLOOD
S1.006	S7		110.364	220.3	FLOOD

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 100 year Summer I+40%	8.300	8.021	1.104	0.000	1.67
S1.008	S9	15 minute 100 year Winter I+40%	8.000	7.969	1.080	0.000	1.95
S1.009	S10	15 minute 100 year Winter I+40%	8.200	7.795	0.937	0.000	1.99
S1.010	S11	15 minute 100 year Winter I+40%	8.200	7.644	1.003	0.000	2.28

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		152.884	246.8	FLOOD RISK
S1.008	S9		203.323	300.7	FLOOD RISK
S1.009	S10		452.939	375.2	SURCHARGED
S1.010	S11		447.123	375.7	SURCHARGED

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.856	0.120	148.8	0.030	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	18.606	0.124	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	22.391	0.150	149.3	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	19.199	0.129	148.8	0.016	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	19.746	0.131	150.7	0.068	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	27.516	0.110	250.1	0.015	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	20.351	0.082	248.2	0.079	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	22.842	0.153	149.3	0.025	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	12.567	0.084	149.6	0.048	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	33.895	0.113	300.0	0.006	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.006	55.863	0.149	375.0	0.047	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.007	10.182	0.027	375.0	0.148	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.008	11.920	0.032	375.0	0.073	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.009	7.071	0.016	441.9	0.000	0.00	71.0	0.600	o	600	Pipe/Conduit	
S1.010	9.325	0.021	444.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.28	7.539	0.030	0.0	0.0	0.0	1.07	42.5	4.0
S1.001	50.00	5.57	7.419	0.030	0.0	0.0	0.0	1.07	42.3	4.0
S1.002	50.00	5.92	7.295	0.046	0.0	0.0	0.0	1.07	42.5	6.2
S2.000	50.00	5.30	7.405	0.016	0.0	0.0	0.0	1.07	42.5	2.1
S2.001	50.00	5.61	7.276	0.084	0.0	0.0	0.0	1.06	42.3	11.3
S1.003	50.00	6.28	6.920	0.145	0.0	0.0	0.0	1.28	203.7	19.6
S1.004	50.00	6.54	6.810	0.224	0.0	0.0	0.0	1.29	204.5	30.3
S3.000	50.00	5.36	7.190	0.025	0.0	0.0	0.0	1.07	42.5	3.4
S3.001	50.00	5.55	7.037	0.073	0.0	0.0	0.0	1.07	42.4	9.9
S1.005	50.00	6.98	6.653	0.302	0.0	0.0	0.0	1.29	278.8	40.9
S1.006	50.00	7.79	6.540	0.349	0.0	0.0	0.0	1.15	249.1	47.2
S1.007	50.00	7.94	6.391	0.497	0.0	0.0	0.0	1.15	249.1	67.3
S1.008	50.00	8.11	6.364	0.570	0.0	0.0	0.0	1.15	249.1	77.2
S1.009	50.00	8.21	6.257	0.570	71.0	0.0	0.0	1.15	325.7	148.2
S1.010	50.00	8.35	6.041	0.570	71.0	0.0	0.0	1.15	324.9	148.2

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	9.200	7.539	1.436	Open Manhole	1200
S1.001	o	225	S2	9.200	7.419	1.556	Open Manhole	1200
S1.002	o	225	S3	8.500	7.295	0.980	Open Manhole	1200
S2.000	o	225	S4	9.500	7.405	1.870	Open Manhole	1200
S2.001	o	225	S5	9.500	7.276	1.999	Open Manhole	1200
S1.003	o	450	S4	8.200	6.920	0.830	Open Manhole	1350
S1.004	o	450	S5	8.150	6.810	0.890	Open Manhole	1350
S3.000	o	225	S8	9.900	7.190	2.485	Open Manhole	1200
S3.001	o	225	S9	9.900	7.037	2.638	Open Manhole	1200
S1.005	o	525	S6	8.000	6.653	0.822	Open Manhole	1800
S1.006	o	525	S7	8.000	6.540	0.935	Open Manhole	1800
S1.007	o	525	S8	8.300	6.391	1.384	Open Manhole	1800
S1.008	o	525	S9	8.000	6.364	1.111	Open Manhole	1800
S1.009	o	600	S10	8.200	6.257	1.343	Open Manhole	1800
S1.010	o	600	S11	8.200	6.041	1.559	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	17.856	148.8	S2	9.200	7.419	1.556	Open Manhole	1200
S1.001	18.606	150.0	S3	8.500	7.295	0.980	Open Manhole	1200
S1.002	22.391	149.3	S4	8.200	7.145	0.830	Open Manhole	1350
S2.000	19.199	148.8	S5	9.500	7.276	1.999	Open Manhole	1200
S2.001	19.746	150.7	S4	8.200	7.145	0.830	Open Manhole	1350
S1.003	27.516	250.1	S5	8.150	6.810	0.890	Open Manhole	1350
S1.004	20.351	248.2	S6	8.000	6.728	0.822	Open Manhole	1800
S3.000	22.842	149.3	S9	9.900	7.037	2.638	Open Manhole	1200
S3.001	12.567	149.6	S6	8.000	6.953	0.822	Open Manhole	1800
S1.005	33.895	300.0	S7	8.000	6.540	0.935	Open Manhole	1800
S1.006	55.863	375.0	S8	8.300	6.391	1.384	Open Manhole	1800
S1.007	10.182	375.0	S9	8.000	6.364	1.111	Open Manhole	1800
S1.008	11.920	375.0	S10	8.200	6.332	1.343	Open Manhole	1800
S1.009	7.071	441.9	S11	8.200	6.241	1.359	Open Manhole	1800
S1.010	9.325	444.0	S	8.000	6.020	1.380	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.030	0.030	0.030
1.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.016	0.016	0.016
2.000	User	-	100	0.016	0.016	0.016
2.001	User	-	100	0.047	0.047	0.047
	User	-	100	0.021	0.021	0.068
1.003	User	-	100	0.015	0.015	0.015
1.004	User	-	100	0.079	0.079	0.079
3.000	User	-	100	0.025	0.025	0.025
3.001	User	-	100	0.019	0.019	0.019
	User	-	100	0.028	0.028	0.048
1.005	User	-	100	0.006	0.006	0.006
1.006	User	-	100	0.015	0.015	0.015
	User	-	100	0.031	0.031	0.047
1.007	User	-	100	0.038	0.038	0.038
	User	-	100	0.045	0.045	0.084
	User	-	100	0.011	0.011	0.095
	User	-	100	0.036	0.036	0.131
	User	-	100	0.017	0.017	0.148
1.008	User	-	100	0.073	0.073	0.073
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.570	0.570	0.570

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	S	8.000	6.020	0.000	0	0

Datum (m) 7.070 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
240	0.000	480	0.000	720	0.000	960	0.000	1200	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 1 year Winter I+40%	9.200	7.597	-0.167	0.000	0.15
S1.001	S2	15 minute 1 year Winter I+40%	9.200	7.477	-0.167	0.000	0.15
S1.002	S3	15 minute 1 year Winter I+40%	8.500	7.365	-0.155	0.000	0.21
S2.000	S4	15 minute 1 year Winter I+40%	9.500	7.448	-0.182	0.000	0.08
S2.001	S5	15 minute 1 year Winter I+40%	9.500	7.371	-0.130	0.000	0.37
S1.003	S4	15 minute 1 year Winter I+40%	8.200	7.198	-0.172	0.000	0.14
S1.004	S5	15 minute 1 year Winter I+40%	8.150	7.189	-0.071	0.000	0.20
S3.000	S8	15 minute 1 year Winter I+40%	9.900	7.243	-0.172	0.000	0.12
S3.001	S9	15 minute 1 year Winter I+40%	9.900	7.193	-0.069	0.000	0.30
S1.005	S6	15 minute 1 year Winter I+40%	8.000	7.177	-0.001	0.000	0.18
S1.006	S7	15 minute 1 year Winter I+40%	8.000	7.151	0.086	0.000	0.21

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		2.682	5.7	OK
S1.001	S2		2.684	5.7	OK
S1.002	S3		4.183	8.3	OK
S2.000	S4		1.438	3.0	OK
S2.001	S5		7.594	14.2	OK
S1.003	S4		12.886	23.6	OK
S1.004	S5		17.304	32.9	OK
S3.000	S8		2.288	4.8	OK
S3.001	S9		6.507	11.0	OK
S1.005	S6		20.865	43.0	OK
S1.006	S7		16.790	47.7	SURCHARGED

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 1 year Winter I+40%	8.300	7.132	0.216	0.000	0.44
S1.008	S9	15 minute 1 year Winter I+40%	8.000	7.120	0.231	0.000	0.48
S1.009	S10	15 minute 1 year Winter I+40%	8.200	7.104	0.247	0.000	0.77
S1.010	S11	15 minute 1 year Winter I+40%	8.200	7.089	0.448	0.000	0.88

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		15.493	65.3	SURCHARGED
S1.008	S9		17.738	74.5	SURCHARGED
S1.009	S10		268.482	145.3	SURCHARGED
S1.010	S11		263.805	145.2	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 30 year Winter I+40%	9.200	7.765	0.001	0.000	0.47
S1.001	S2	15 minute 30 year Winter I+40%	9.200	7.735	0.091	0.000	0.52
S1.002	S3	15 minute 30 year Winter I+40%	8.500	7.708	0.188	0.000	0.78
S2.000	S4	15 minute 30 year Winter I+40%	9.500	7.864	0.234	0.000	0.26
S2.001	S5	15 minute 30 year Winter I+40%	9.500	7.848	0.347	0.000	1.23
S1.003	S4	15 minute 30 year Winter I+40%	8.200	7.665	0.295	0.000	0.43
S1.004	S5	15 minute 30 year Winter I+40%	8.150	7.634	0.374	0.000	0.68
S3.000	S8	15 minute 30 year Winter I+40%	9.900	7.717	0.302	0.000	0.37
S3.001	S9	15 minute 30 year Winter I+40%	9.900	7.687	0.425	0.000	1.11
S1.005	S6	15 minute 30 year Winter I+40%	8.000	7.591	0.413	0.000	0.64
S1.006	S7	15 minute 30 year Winter I+40%	8.000	7.543	0.478	0.000	0.77

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		8.655	17.8	SURCHARGED
S1.001	S2		8.656	19.8	SURCHARGED
S1.002	S3		13.484	30.2	SURCHARGED
S2.000	S4		4.635	10.0	SURCHARGED
S2.001	S5		24.501	46.8	SURCHARGED
S1.003	S4		42.160	74.7	SURCHARGED
S1.004	S5		62.627	112.6	SURCHARGED
S3.000	S8		7.380	14.2	SURCHARGED
S3.001	S9		21.254	40.7	SURCHARGED
S1.005	S6		82.074	152.6	SURCHARGED
S1.006	S7		87.453	172.3	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 30 year Winter I+40%	8.300	7.454	0.537	0.000	1.62
S1.008	S9	15 minute 30 year Winter I+40%	8.000	7.393	0.504	0.000	1.80
S1.009	S10	15 minute 30 year Winter I+40%	8.200	7.257	0.400	0.000	1.84
S1.010	S11	15 minute 30 year Winter I+40%	8.200	7.153	0.512	0.000	2.11

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		116.227	239.8	SURCHARGED
S1.008	S9		133.203	278.2	SURCHARGED
S1.009	S10		383.928	347.9	SURCHARGED
S1.010	S11		379.215	347.1	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 100 year Winter I+40%	9.200	8.418	0.654	0.000	0.65
S1.001	S2	15 minute 100 year Winter I+40%	9.200	8.364	0.720	0.000	0.66
S1.002	S3	15 minute 100 year Winter I+40%	8.500	8.313	0.793	0.000	0.94
S2.000	S4	15 minute 100 year Winter I+40%	9.500	8.672	1.042	0.000	0.41
S2.001	S5	15 minute 100 year Winter I+40%	9.500	8.648	1.147	0.000	1.89
S1.003	S4	15 minute 100 year Winter I+40%	8.200	8.174	0.804	0.000	0.68
S1.004	S5	15 minute 100 year Winter I+40%	8.150	8.120	0.860	0.000	1.06
S3.000	S8	15 minute 100 year Winter I+40%	9.900	8.362	0.947	0.000	0.59
S3.001	S9	15 minute 100 year Winter I+40%	9.900	8.309	1.047	0.000	1.81
S1.005	S6	15 minute 100 year Winter I+40%	8.000	8.012	0.834	12.556	1.02
S1.006	S7	15 minute 100 year Winter I+40%	8.000	7.987	0.922	0.000	1.13

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		13.193	24.9	SURCHARGED
S1.001	S2		13.187	25.1	SURCHARGED
S1.002	S3		20.546	36.7	FLOOD RISK
S2.000	S4		7.064	15.8	SURCHARGED
S2.001	S5		37.339	72.4	SURCHARGED
S1.003	S4		64.402	117.2	FLOOD RISK
S1.004	S5		96.999	175.1	FLOOD RISK
S3.000	S8		11.248	23.0	SURCHARGED
S3.001	S9		32.448	66.0	SURCHARGED
S1.005	S6		128.519	242.9	FLOOD
S1.006	S7		141.032	254.9	FLOOD RISK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 100 year Winter I+40%	8.300	7.931	1.015	0.000	2.09
S1.008	S9	15 minute 100 year Winter I+40%	8.000	7.757	0.868	0.000	2.45
S1.009	S10	15 minute 100 year Winter I+40%	8.200	7.491	0.633	0.000	2.40
S1.010	S11	15 minute 100 year Winter I+40%	8.200	7.277	0.636	0.000	2.76

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		192.622	309.7	SURCHARGED
S1.008	S9		220.802	377.7	FLOOD RISK
S1.009	S10		471.549	452.8	SURCHARGED
S1.010	S11		466.850	454.1	SURCHARGED

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.856	0.120	148.8	0.030	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	18.606	0.124	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	22.391	0.150	149.3	0.016	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	19.199	0.129	148.8	0.016	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	19.746	0.131	150.7	0.068	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	27.516	0.110	250.1	0.015	0.00	0.0	0.600	o	450	Pipe/Conduit	
S1.004	20.351	0.082	248.2	0.079	0.00	0.0	0.600	o	450	Pipe/Conduit	
S3.000	22.842	0.153	149.3	0.025	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	12.567	0.084	149.6	0.048	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	33.895	0.113	300.0	0.006	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.006	55.863	0.149	375.0	0.047	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.007	10.182	0.027	375.0	0.148	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.008	11.920	0.032	375.0	0.073	0.00	0.0	0.600	o	525	Pipe/Conduit	
S1.009	7.071	0.016	441.9	0.000	0.00	71.0	0.600	o	600	Pipe/Conduit	
S1.010	9.325	0.021	444.0	0.000	0.00	0.0	0.600	o	600	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	50.00	5.28	7.539	0.030	0.0	0.0	0.0	1.07	42.5	4.0
S1.001	50.00	5.57	7.419	0.030	0.0	0.0	0.0	1.07	42.3	4.0
S1.002	50.00	5.92	7.295	0.046	0.0	0.0	0.0	1.07	42.5	6.2
S2.000	50.00	5.30	7.405	0.016	0.0	0.0	0.0	1.07	42.5	2.1
S2.001	50.00	5.61	7.276	0.084	0.0	0.0	0.0	1.06	42.3	11.3
S1.003	50.00	6.28	6.920	0.145	0.0	0.0	0.0	1.28	203.7	19.6
S1.004	50.00	6.54	6.810	0.224	0.0	0.0	0.0	1.29	204.5	30.3
S3.000	50.00	5.36	7.190	0.025	0.0	0.0	0.0	1.07	42.5	3.4
S3.001	50.00	5.55	7.037	0.073	0.0	0.0	0.0	1.07	42.4	9.9
S1.005	50.00	6.98	6.653	0.302	0.0	0.0	0.0	1.29	278.8	40.9
S1.006	50.00	7.79	6.540	0.349	0.0	0.0	0.0	1.15	249.1	47.2
S1.007	50.00	7.94	6.391	0.497	0.0	0.0	0.0	1.15	249.1	67.3
S1.008	50.00	8.11	6.364	0.570	0.0	0.0	0.0	1.15	249.1	77.2
S1.009	50.00	8.21	6.257	0.570	71.0	0.0	0.0	1.15	325.7	148.2
S1.010	50.00	8.35	6.041	0.570	71.0	0.0	0.0	1.15	324.9	148.2

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	9.200	7.539	1.436	Open Manhole	1200
S1.001	o	225	S2	9.200	7.419	1.556	Open Manhole	1200
S1.002	o	225	S3	8.500	7.295	0.980	Open Manhole	1200
S2.000	o	225	S4	9.500	7.405	1.870	Open Manhole	1200
S2.001	o	225	S5	9.500	7.276	1.999	Open Manhole	1200
S1.003	o	450	S4	8.200	6.920	0.830	Open Manhole	1350
S1.004	o	450	S5	8.150	6.810	0.890	Open Manhole	1350
S3.000	o	225	S8	9.900	7.190	2.485	Open Manhole	1200
S3.001	o	225	S9	9.900	7.037	2.638	Open Manhole	1200
S1.005	o	525	S6	8.000	6.653	0.822	Open Manhole	1800
S1.006	o	525	S7	8.000	6.540	0.935	Open Manhole	1800
S1.007	o	525	S8	8.300	6.391	1.384	Open Manhole	1800
S1.008	o	525	S9	8.000	6.364	1.111	Open Manhole	1800
S1.009	o	600	S10	8.200	6.257	1.343	Open Manhole	1800
S1.010	o	600	S11	8.200	6.041	1.559	Open Manhole	1800

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	17.856	148.8	S2	9.200	7.419	1.556	Open Manhole	1200
S1.001	18.606	150.0	S3	8.500	7.295	0.980	Open Manhole	1200
S1.002	22.391	149.3	S4	8.200	7.145	0.830	Open Manhole	1350
S2.000	19.199	148.8	S5	9.500	7.276	1.999	Open Manhole	1200
S2.001	19.746	150.7	S4	8.200	7.145	0.830	Open Manhole	1350
S1.003	27.516	250.1	S5	8.150	6.810	0.890	Open Manhole	1350
S1.004	20.351	248.2	S6	8.000	6.728	0.822	Open Manhole	1800
S3.000	22.842	149.3	S9	9.900	7.037	2.638	Open Manhole	1200
S3.001	12.567	149.6	S6	8.000	6.953	0.822	Open Manhole	1800
S1.005	33.895	300.0	S7	8.000	6.540	0.935	Open Manhole	1800
S1.006	55.863	375.0	S8	8.300	6.391	1.384	Open Manhole	1800
S1.007	10.182	375.0	S9	8.000	6.364	1.111	Open Manhole	1800
S1.008	11.920	375.0	S10	8.200	6.332	1.343	Open Manhole	1800
S1.009	7.071	441.9	S11	8.200	6.241	1.359	Open Manhole	1800
S1.010	9.325	444.0	S	8.000	6.020	1.380	Open Manhole	0

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	User	-	100	0.030	0.030	0.030
1.001	-	-	100	0.000	0.000	0.000
1.002	User	-	100	0.016	0.016	0.016
2.000	User	-	100	0.016	0.016	0.016
2.001	User	-	100	0.047	0.047	0.047
	User	-	100	0.021	0.021	0.068
1.003	User	-	100	0.015	0.015	0.015
1.004	User	-	100	0.079	0.079	0.079
3.000	User	-	100	0.025	0.025	0.025
3.001	User	-	100	0.019	0.019	0.019
	User	-	100	0.028	0.028	0.048
1.005	User	-	100	0.006	0.006	0.006
1.006	User	-	100	0.015	0.015	0.015
	User	-	100	0.031	0.031	0.047
1.007	User	-	100	0.038	0.038	0.038
	User	-	100	0.045	0.045	0.084
	User	-	100	0.011	0.011	0.095
	User	-	100	0.036	0.036	0.131
	User	-	100	0.017	0.017	0.148
1.008	User	-	100	0.073	0.073	0.073
1.009	-	-	100	0.000	0.000	0.000
1.010	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.570	0.570	0.570

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.010	S	8.000	6.020	0.000	0	0

Datum (m) 6.750 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
240	0.000	480	0.000	720	0.000	960	0.000	1200	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Storm Duration (mins)	30

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 1 year Winter I+40%	9.200	7.597	-0.167	0.000	0.15
S1.001	S2	15 minute 1 year Winter I+40%	9.200	7.477	-0.167	0.000	0.15
S1.002	S3	15 minute 1 year Winter I+40%	8.500	7.365	-0.155	0.000	0.21
S2.000	S4	15 minute 1 year Winter I+40%	9.500	7.448	-0.182	0.000	0.08
S2.001	S5	15 minute 1 year Winter I+40%	9.500	7.371	-0.130	0.000	0.37
S1.003	S4	15 minute 1 year Winter I+40%	8.200	7.036	-0.334	0.000	0.14
S1.004	S5	15 minute 1 year Winter I+40%	8.150	6.954	-0.306	0.000	0.22
S3.000	S8	15 minute 1 year Winter I+40%	9.900	7.243	-0.172	0.000	0.12
S3.001	S9	15 minute 1 year Winter I+40%	9.900	7.129	-0.133	0.000	0.35
S1.005	S6	15 minute 1 year Winter I+40%	8.000	6.872	-0.306	0.000	0.21
S1.006	S7	15 minute 1 year Winter I+40%	8.000	6.837	-0.228	0.000	0.24

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		2.683	5.7	OK
S1.001	S2		2.690	5.7	OK
S1.002	S3		4.174	8.3	OK
S2.000	S4		1.440	3.0	OK
S2.001	S5		7.606	14.2	OK
S1.003	S4		13.182	24.6	OK
S1.004	S5		20.401	36.8	OK
S3.000	S8		2.290	4.8	OK
S3.001	S9		6.634	12.7	OK
S1.005	S6		27.295	48.9	OK
S1.006	S7		28.976	53.6	OK

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 1 year Winter I+40%	8.300	6.816	-0.100	0.000	0.49
S1.008	S9	15 minute 1 year Winter I+40%	8.000	6.803	-0.086	0.000	0.53
S1.009	S10	15 minute 1 year Winter I+40%	8.200	6.786	-0.071	0.000	0.81
S1.010	S11	15 minute 1 year Winter I+40%	8.200	6.770	0.129	0.000	0.93

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		34.093	72.8	OK
S1.008	S9		38.115	82.2	OK
S1.009	S10		290.230	153.1	OK
S1.010	S11		286.725	152.8	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 30 year Winter I+40%	9.200	7.650	-0.114	0.000	0.48
S1.001	S2	15 minute 30 year Winter I+40%	9.200	7.530	-0.114	0.000	0.48
S1.002	S3	15 minute 30 year Winter I+40%	8.500	7.440	-0.080	0.000	0.73
S2.000	S4	15 minute 30 year Winter I+40%	9.500	7.646	0.016	0.000	0.27
S2.001	S5	15 minute 30 year Winter I+40%	9.500	7.626	0.125	0.000	1.37
S1.003	S4	15 minute 30 year Winter I+40%	8.200	7.310	-0.060	0.000	0.48
S1.004	S5	15 minute 30 year Winter I+40%	8.150	7.275	0.015	0.000	0.73
S3.000	S8	15 minute 30 year Winter I+40%	9.900	7.354	-0.061	0.000	0.39
S3.001	S9	15 minute 30 year Winter I+40%	9.900	7.323	0.061	0.000	1.25
S1.005	S6	15 minute 30 year Winter I+40%	8.000	7.228	0.050	0.000	0.68
S1.006	S7	15 minute 30 year Winter I+40%	8.000	7.179	0.114	0.000	0.80

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		8.655	18.3	OK
S1.001	S2		8.655	18.4	OK
S1.002	S3		13.485	28.3	OK
S2.000	S4		4.639	10.3	SURCHARGED
S2.001	S5		24.506	52.2	SURCHARGED
S1.003	S4		42.439	83.7	OK
S1.004	S5		65.639	121.3	SURCHARGED
S3.000	S8		7.383	15.2	OK
S3.001	S9		21.365	45.7	SURCHARGED
S1.005	S6		88.315	160.8	SURCHARGED
S1.006	S7		99.308	179.7	SURCHARGED

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 30 year Winter I+40%	8.300	7.084	0.168	0.000	1.60
S1.008	S9	15 minute 30 year Winter I+40%	8.000	7.025	0.136	0.000	1.77
S1.009	S10	15 minute 30 year Winter I+40%	8.200	6.890	0.033	0.000	1.82
S1.010	S11	15 minute 30 year Winter I+40%	8.200	6.813	0.172	0.000	2.10

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		134.446	237.1	SURCHARGED
S1.008	S9		153.146	272.9	SURCHARGED
S1.009	S10		405.194	343.7	SURCHARGED
S1.010	S11		401.594	344.8	SURCHARGED

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	0
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FEH
FEH Rainfall Version	1999
Site Location	GB 616800 159950 TR 16800 59950
C (1km)	-0.022
D1 (1km)	0.324
D2 (1km)	0.353
D3 (1km)	0.270
E (1km)	0.316
F (1km)	2.493
Cv (Summer)	0.750
Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	OFF
Inertia Status	OFF

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	40, 40, 40

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.000	S1	15 minute 100 year Winter I+40%	9.200	8.269	0.505	0.000	0.65
S1.001	S2	15 minute 100 year Winter I+40%	9.200	8.224	0.580	0.000	0.66
S1.002	S3	15 minute 100 year Winter I+40%	8.500	8.185	0.665	0.000	0.93
S2.000	S4	15 minute 100 year Winter I+40%	9.500	8.518	0.888	0.000	0.40
S2.001	S5	15 minute 100 year Winter I+40%	9.500	8.494	0.993	0.000	1.75
S1.003	S4	15 minute 100 year Winter I+40%	8.200	8.095	0.725	0.000	0.62
S1.004	S5	15 minute 100 year Winter I+40%	8.150	8.050	0.790	0.000	0.97
S3.000	S8	15 minute 100 year Winter I+40%	9.900	8.230	0.815	0.000	0.55
S3.001	S9	15 minute 100 year Winter I+40%	9.900	8.186	0.924	0.000	1.60
S1.005	S6	15 minute 100 year Winter I+40%	8.000	7.969	0.791	0.000	0.93
S1.006	S7	15 minute 100 year Winter I+40%	8.000	7.872	0.807	0.000	1.10

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.000	S1		13.190	24.9	SURCHARGED
S1.001	S2		13.183	25.1	SURCHARGED
S1.002	S3		20.545	36.1	SURCHARGED
S2.000	S4		7.064	15.3	SURCHARGED
S2.001	S5		37.338	67.0	SURCHARGED
S1.003	S4		64.658	106.5	FLOOD RISK
S1.004	S5		100.007	160.9	FLOOD RISK
S3.000	S8		11.244	21.4	SURCHARGED
S3.001	S9		32.552	58.4	SURCHARGED
S1.005	S6		134.730	220.8	FLOOD RISK
S1.006	S7		152.901	248.0	FLOOD RISK

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Event	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.
S1.007	S8	15 minute 100 year Winter I+40%	8.300	7.689	0.772	0.000	2.30
S1.008	S9	15 minute 100 year Winter I+40%	8.000	7.476	0.588	0.000	2.55
S1.009	S10	15 minute 100 year Winter I+40%	8.200	7.193	0.336	0.000	2.47
S1.010	S11	15 minute 100 year Winter I+40%	8.200	6.969	0.328	0.000	2.85

PN	US/MH Name	Overflow (l/s)	Discharge Vol (m³)	Pipe Flow (l/s)	Status
S1.007	S8		210.857	341.0	SURCHARGED
S1.008	S9		240.785	393.4	SURCHARGED
S1.009	S10		492.857	467.0	SURCHARGED
S1.010	S11		489.274	468.2	SURCHARGED

Appendix F **Greenfield Runoff Rate Estimation**

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Harry Wyatt
Site name:	Canterbury Riverside
Site location:	Whole Development

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.28560° N
Longitude:	1.08760° E
Reference:	3073904877
Date:	Dec 13 2019 11:45

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 3.85

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	650	650
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	6.43	6.43
1 in 1 year (l/s):	5.47	5.47
1 in 30 years (l/s):	14.8	14.8
1 in 100 year (l/s):	20.52	20.52
1 in 200 years (l/s):	24.06	24.06

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Harry Wyatt
Site name:	Canterbury Riverside
Site location:	Zones D,E,G,H,J

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	51.28560° N
Longitude:	1.08760° E
Reference:	2528935351
Date:	Dec 13 2019 11:47

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 2.78

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.3

Hydrological characteristics

	Default	Edited
SAAR (mm):	650	650
Hydrological region:	7	7
Growth curve factor 1 year:	0.85	0.85
Growth curve factor 30 years:	2.3	2.3
Growth curve factor 100 years:	3.19	3.19
Growth curve factor 200 years:	3.74	3.74

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	4.65	4.65
1 in 1 year (l/s):	3.95	3.95
1 in 30 years (l/s):	10.68	10.68
1 in 100 year (l/s):	14.82	14.82
1 in 200 years (l/s):	17.37	17.37

Appendix G **Exceedance Plan**

PROPOSED EASTERN OUTFALL TO
GREAT STOUR RIVER
OUTFALL DIAMETER = 600mm
IL = 6.025

PROPOSED WESTERN OUTFALL TO
GREAT STOUR RIVER
OUTFALL DIAMETER = 600mm
IL = 6.020

BASEMENT SURFACE WATER PUMPING STATION
PUMP RATE = 71 l/s
ATTENUATION VOLUME FOR BASEMENT
AREA=277m³
PHILOSOPHY SUBJECT TO APPROVAL

REFER TO BELOW FOR DETAILS

MINIMAL FLOODING 1% PLUVIAL 1% FLUVIAL

→ DENOTES EXCEEDANCE FLOW ROUTES FOR MODELED STORM EVENTS. REFER TO BELOW GROUND DRAINAGE PHILOSOPHY SECTION 7.3

DENOTES LOCATION OF FLOODING

→ DENOTES EXCEEDANCE FLOW ROUTES IN EVENT OF SYSTEM FAILURE

Reference list:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED AND LEVELS ARE IN METRES.

2. THIS DRAWING TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECT'S AND ENGINEER'S DRAWINGS AND SPECIFICATIONS.

3. THIS DRAWING HAS BEEN PRODUCED ELECTRONICALLY AND MAY HAVE BEEN PHOTO REDUCED OR ENLARGED WHEN COPIED. HENCE, DO NOT RELY ON ANY SCALES QUOTED. WORK ONLY TO FIGURED DIMENSIONS (DO NOT SCALE). ALL DIMENSIONS TO BE CHECKED ON SITE. ANY ERRORS OR OMISSIONS TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

WALSH

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Project: CANTERBURY RIVERSIDE	
Drawing Title: PROPOSED EXCEEDENCE PLAN	
Scale: N.T.S	Job No: 5196
Drawing No: 5196-SK-191213-HW-001	
Rev: A	

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