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Land off Chapel Lane, Witherley, Atherstone

JMS Project Reference: CO21/294/07

SuDS Strategy Report



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Revisions and Additional Material

Document History and Status

Revision	Date	Purpose/Status
-	13.10.2021	First Issue
REV A	02.12.2021	Second Issue

Document Details

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Project Number	CO21/294/07
Project Name	Land off Chapel Lane, Witherley, Atherstone

Preamble

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The conclusions and recommendations made in this report are limited to those that can be made based on the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside of the stated scope of the research. Any comments made based on information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third-party information has been made by JMS Consulting Engineers Ltd.

1 Introduction

- 1.1 JMS Engineers have been appointed to prepare a drainage strategy and SuDS report to satisfy the requirements of the Hinckley and Bosworth Borough Council for the erection of 5 new dwellings with associated garages, gardens, and car parking spaces.
- 1.2 This report will include a surface water drainage strategy and will consider the use of SuDS wherever possible.

2 Location & Existing Conditions

2.0.1 The application site is a greenfield site with some areas of hard standing ground located south of Chapel Lane in Witherley. There are existing residential dwellings located west of the site and areas of greenfield east of site. A topographical survey has been conducted for this site which can be found in **Appendix A**.

2.0.2 In the absence of intrusive testing, the British Geological Survey (BGS) data has been consulted to obtain information of the soil properties within the vicinity of the site. Borehole information indicates that at a depth of 2m, the soil properties are silty CLAY with a band of 'moderately strong green MUDSTONE' at a further depth of 0.1m. This suggests that the ground conditions contain cohesive clay properties which will be unlikely for infiltration, please see borehole report in **Appendix B**.

2.1 Existing Sewer Assets

2.1.1 Severn Trent Water sewer records, as per **Appendix C**, indicates that there are no surface water assets on Chapel Lane. However, there is an existing 150mm diameter combined sewer pipe which runs west of Chapel Lane and towards Atterton Lane.

2.2 Site Proposals

2.2.1 The development proposals include the erection of 5 new dwellings with associated driveways, gardens, and car parking spaces. A copy of the proposed site layout, current at time of writing, can be found in **Appendix D**.

2.3 Existing Drainage Regime

2.3.1 The greenfield runoff rate for the site has been calculated as 1.9l/s using ICP SuDs methodology and can be found in **Appendix E**.

3 SuDS Considerations

3.0.1 Consideration of SuDS is a planning requirement for new developments. SuDS are designed to replicate the natural course of drainage as closely as possible with a view to reducing the impact of flooding, removing pollutants at source and combining water management with green space.

Developments should utilise SuDS where possible and ensure that surface water run-off is managed as close to its source as possible in line with the following hierarchy:

1. Into ground (infiltration).
2. To a surface water body.
3. To a surface water sewer.
4. To a combined sewer.

3.0.2 Sustainable Drainage Systems should be included in the design in order to manage surface water flood risk. SuDS should be inspired by natural drainage processes and manage water as close to its source as possible whilst offering pollution control and landscape benefits.

3.1 SuDS Incorporation

3.1.1 Site investigation information suggests that disposal of surface water via infiltration is unlikely owing to the cohesive clay soil found within the ground strata.

Design Criteria									
Component Type	Description	Collection Mechanism	Water Quantity (Chapter 3)			Water Quality (Chapter 4)	Amenity (Chapter 5)	Biodiversity (Chapter 6)	Further Information (Chapter Ref)
			Peak Runoff Rate	Runoff Volumes					
				Small Events (Interceptions)	Large Events				
Rainwater Harvesting Systems	Systems that collect runoff from the roof of a building or other paved surface for use	P		●	●		●		11
Green roofs	Planted soil layers on the roof of buildings that slow and store runoff	S	○	●		●	●	●	12
Infiltration systems	Systems that collect and store runoff, allowing it to infiltrate into the ground	P	●	●	●	●	●	●	13
Proprietary treatment systems	Subsurface structures design to provide treatment to runoff	P				●			14

Filter strips	Grass strips that promote sedimentation and filtration as runoff is conveyed over the surface	L		●		●	○	○	15
Filter drains	Shallow stone-filled trenches that provide attenuation, conveyance and treatment of runoff	L	●	○		●	○	○	16
Swales	Shallow landscaped depressions that allow runoff to pond temporarily on the surface, before filtering through vegetation and underlying soils	L	●	●	●	●	●	●	17
Bioretention systems	Trees with soil-filled tree pits, tree planters or structural soils used to collect, store and treat runoff	P	●	●	●	●	●	●	18
Trees	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	P	●	●		●	●	●	19
Pervious pavements	Structural paving through which runoff can soak and subsequently be stored in the sub-base beneath, and/or allowed to infiltrate into the ground below	S	●	●	●	●	○	○	20
Attenuation storage tanks	Large, below-ground voided spaces used to temporarily store runoff before infiltration-controlled release or use	P	●						21
Detention basins	Vegetated depressions that store and treat runoff	P	●	●		●	●	●	22
Ponds and wetlands	Permanent pools of water used to facilitate treatment of runoff – runoff can also be stored in an attenuation zone above the pool	P	●			●	●	●	23

P-Point L-Lateral S-Surface

● – likely valuable contribution to delivery of design criterion

○ – some potential contribution to delivery of design criterion, if specifically included in the design

Figure 1 CIRIA Table 7.1 SuDS Components

- 3.1.2 The above table gives examples of various SuDS components, which may offer source control in accordance with the requirements.
- 3.1.3 The proposed car parking bays offers an opportunity to apply permeable surfacing which can be considered a method of managing surface water at source. In the conventional sense, permeable surfacing would be used as a method of infiltration should soil conditions allow. In the case of this site, infiltration is unlikely but permeable surfacing can still be adopted as it can provide additional SuDS benefits. As per table 7.1 (**Figure 1**), surface water is slowed at source by soaking through the surfacing before discharging to the drainage network. Permeable surfacing offers the added benefit of filtering the runoff as it drains through, hence improving the quality. Furthermore, the sub-base can be used to attenuate surface water when used in conjunction with controlled discharge rates. **Figure 2** below shows a typical cross section.
- 3.1.4 In accordance with Table 26.2 of CIRIA Report C753, the pollution hazard level can be classified as ‘Low’. Using table 26.3 of the same document, the mitigation indices values for permeable paving exceed the pollution hazard values taken from the previous table. This ensures that proposals offer enough pollution risk mitigation.

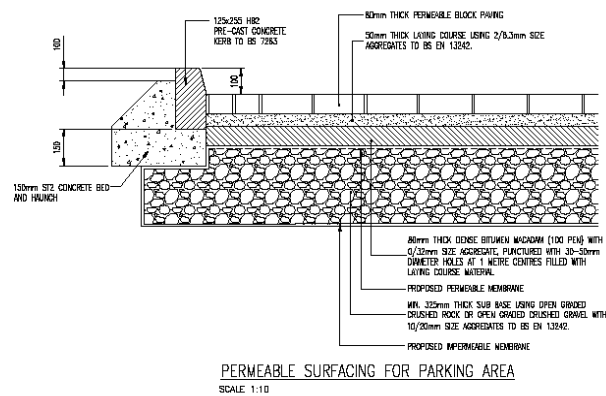


Figure 2 Typical car park permeable paving

3.1.5 The above proposals ensure that an ‘at source’ SuDS measure is applied, and betterment is provided in terms of surface water runoff velocity and quality. Pollution indices from different land types can be found per as per table 26.15 CIRIA SuDS Manual 2015, below.

Land use surface type (Lust)	Impermeability (IMP_{RF})	Total suspended solids pollution index (PI_{TSS})	Organic pollution index (PI_{Org})	Hydrocarbon pollution index (PI_{PAD})	Metals Pollution index (PI)
Roofs					
• Industrial / Commercial	1.0	0.3	0.3-0.4	0.2	0.4-0.8
• Residential	0.9	0.4-0.5	0.6-0.7	0.1	0.2-0.5
Highways					
• Motorways	0.8-0.9	0.9	0.7	0.9	0.8
• Major arterial highways	0.7-0.8	0.8	0.7	0.8	0.8
• Urban distributor roads	0.6-0.7	0.7-0.8	0.5	0.8	0.7
• Residential Street	0.4-0.6	0.4	0.6	0.6	0.6
• Pavements	0.5-0.6	0.4	0.6	0.3	0.3
Car Parks / Hardstanding					
• Industrial/Commercial	0.6-0.8	0.6-0.7	0.6-0.7	0.7	0.4-0.5
• Driveways (Residential)	0.5	0.5	0.6	0.4	0.3

Open Areas					
• Gardens (All types)	0.1	0.3	0.2-0.3	0	0.01
• Parks/Golf Courses	0.2	0.2-0.3	0.2	0	0.02
• Grassed Areas (including verges, all types)	0.1	0.2-0.3	0.2-0.3	0.05	0.05
Note					
1	Pollution index values are based on reported land use type EMC distributions and impact potential thresholds from House et al (1991), Luker and Montague (1994), Butler and Clark (1995), D'Arcy et al (2000), Mitchell (2005) and Moy et al (2003)				

Figure 3 Impermeability and pollution indices for different land use types¹

- 3.1.6 Following the hierarchy, proposals for this site are to discharge surface water to the nearby watercourse situated south of the proposed site.
- 3.1.7 Discharge rates should be managed as close as possible to the required standard by adopting a suitable flow control measure.
- 3.1.8 Where flow controls are applied attenuation volume is required to provide temporary storage during varying storm events. As mentioned above, when using permeable paving storage volume is available within the voids of the sub-base.
- 3.1.9 The above proposals ensure that SuDS measures are applied, and betterment is provided in terms of surface water runoff velocity, volume and quality.

3.2 Preliminary Surface Water Drainage Maintenance Schedule

- 3.2.1 This section of the report gives guidance on the maintenance of the drainage system and outlines who will be responsible for this. The proposed development comprises of site clearance, landscaping, parking, and drainage. By necessity the available SuDS systems will control outfall flow, store, and slow down rainwater.
- 3.2.2 Maintenance of permeable paving will be the responsibility of the Developer see **Table 1** below.

Table 1 System storage operation and maintenance requirements (permeable paving)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Sweeping. [NOTE: Any jointing material between the blocks that is lost or displaced as a result of sweeping must be replaced. New jointing material must be the same type as that removed or a suitable replacement]	3 no. times a year: - - At the end of Winter; - Mid-summer; and - After autumn leaf fall. Also as required based on site specific observations
Occasional Maintenance	Stabilise and mow contributing and adjacent areas to prevent excess sediment being washed into the paving	As required
Remedial actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users	As required
	Rehabilitation of surface and underlying sand a geo-textile	As required (if local distortion or settlement occurs as a result of wash out of bedding)
Monitoring	Inspect for evidence for weed growth or deposits affecting run off. If required, take remedial action	Monthly for 3 no. months after installation, then during regular maintenance visits

- 3.2.3 The rainwater from the roofs is collected via rainwater pipes and will be carried to the attenuation. The maintenance of the collection system is the responsibility of the Developer, see **Table 2** below.

Table 2 System storage operation and maintenance requirements (rainwater pipes and chambers)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspection of silt trap chamber and removal of debris when necessary	Quarterly or as required following monitoring
Remedial Actions	Check for blockages in manholes and pipes. Rodding and jetting of pipes to be carried out. CCTV survey can be carried out to inspect condition of pipework.	Quarterly or as required following monitoring
Monitoring	Inspect collection apparatus for debris and litter. Remove where necessary to prevent blockages in the system.	Monthly or after periods of heavy rainfall

- 3.2.4 Flow Control – Maintenance of the system will be the responsibility of the developer, see **Table 3** below.

Table 3 System operation and maintenance requirements (Flow Control)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris and grass cuttings from upstream to prevent being washed into the flow control. Inspection of the flow control chamber and the removal of any sediment/debris when required.	Quarterly or as required following monitoring
Remedial Actions	Check flow control is functional	Quarterly or as required following monitoring
Monitoring	Inspect flow control and check flows are not impeded	Monthly or after periods of heavy rainfall

3.2.5 Storage and Attenuation - Maintenance of below ground cellular storage tank will be the responsibility of the developer see **Table 4**.

Table 4 (Cellular Storage O&M)

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for three months, then annually.
	Remove debris from the catchment surface (where it may cause risk to performance).	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface or filter for blockage by sediment, algae, etc. Remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays.	Annually or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

3.2.6 The design life of the development is likely to exceed the design life of each of the SuDS components listed above. During the routine inspections of any drainage components, it may become apparent that they have reached the end of their functional lifetime. In the interest of sustainability, repairs should be the first-choice solution where practicable. If this is not the case, then it will be necessary for the property owners to undertake complete replacement of the component in question.

4 Surface Water Strategy

The surface water strategy is based upon the SuDS implementation as outlined above along with the hierarchy for surface water disposal as follows:

A. Use infiltration techniques, such as porous surfaces:

Ground conditions do not appear to support the use of infiltration techniques.

B. Attenuate rainwater in ponds or open water features for gradual release:

The proposed site layout does not provide sufficient area for open water features, please see D.

C. Attenuate rainwater by storing in tanks or sealed water features for gradual release:

Not applicable, see D.

D. Direct rainwater direct to the watercourse:

The proposals include for a flow control using a hydrobrake manhole to restrict surface water flow at a reduced rate before discharge in accordance with the above. The greenfield runoff rate for the site has been calculated as 1.9l/s, see **Appendix E**.

Permeable paving has been considered for areas of treatment and storage purposes within the car parking spaces in the driveways using a minimum sub-base depth of 450mm. Additional to this, underground cellular storage tanks have been considered in this drainage design and is located within the driveway areas of each plot with storage provided within the crate system. This is to be attenuated with a hydrobrake flow control restricting surface water at a rate of 4l/s before discharging into the watercourse south of the site. A Drainage strategy plan can be found in **Appendix F**.

The Microdrainage control calculations in **Appendix G** show sufficient volume is provided to accommodate the worst-case storm event of the 1 in 100-year + 40% climate change storm event inclusive of climate change.

Consideration has been applied to the exceedance flow routes through the site as a result of the development. The levels indicate that the exceedance flows from the garden areas (for each plot) runs towards the south of the site, thus preventing flooding on third party land. For the driveways and car parking areas, the exceedance flow route will direct north into Chapel Lane. The exceedance flow route can be found in **Appendix H**.

A pre-development impermeable plan, see **Appendix I** for the existing greenfield site sums to area in the order of 0.0517ha or 517m². A post-development impermeable area plan, see **Appendix J**, for the new development totals to an area in the order of 0.1362ha or 1362m².

E. Discharge rainwater to a surface water sewer/drain:

Not applicable, see D.

F. Discharge rainwater to combined sewer:

Not applicable, see D.

G. Discharge rainwater to foul sewer:

Not applicable, see D.

Severn Trent Water Developer's Enquiry Response:

Foul Water Drainage

'The sewer records indicate that the nearest foul sewer available is the 150mm combined water sewer on Chapel Lane. The best point of connection would be into manhole SP32978601 (circled purple), from the datum provided there should be sufficient fall, of approximately 2m, from the ground level of the site to the invert level of the manhole. Anticipated foul flows from the proposed development (Approx 0.1l/s @ 2 DWF) should have no adverse hydraulic impact on the system. As such a gravity connection (direct or indirect) to the sewer at any convenient point is acceptable subject to a formal S.106 sewer connection approval (see later).'

Surface Water Drainage

'We would suggest that you explore the option to discharge the surface water flows to the ditch course off Chapel Lane, located on the opposite side of the road from your site.'

JMS Response: The drainage plans have been re-designed from the previous design and updated to show the surface water discharging into the watercourse which is located south of the site at a restricted rate of 4l/s using a hydrobrake.

4.1 Surface Water Management During Construction

4.1.1 Consideration for surface water needs to be taken during the construction process, and how it is managed, including flood risk and pollution control.

4.1.2 Generally, there are three options for managing surface water during construction

- Build, use and remediate permanent surface water drainage system
- Install, use and remove a temporary surface water drainage system
- Utilise existing drainage system with pollution control measures (brownfield sites only)

4.1.3 For this brownfield site, it is recommended to build, use, and remediate the permanent surface water drainage system where possible.

4.1.4 Consideration for the following legislation and guidance should be made:

Legislation and Guidance
The Water Environment (England and Wales) Regulation 2009
Land Drainage Act 1991
SEPA Engineering in the Water Environment Good Practice Guide Temporary Construction Methods
Control of Water Pollution from Construction Sites – Guide to Good Practice (SP156)
Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (C532)
Control of Water Pollution from Linear Construction Projects – Technical Guidance (C648)
Control of Water Pollution from Linear Construction Projects – Site Guide (C649)
Environmental Good Practice – Site Guide (C650)
Site Handbook for the Construction of SUDS (C698)
The SUDS Manual (C753)
BS 8582:2013 Code of Practice for Surface Water Management for Development Sites

Figure 4 Legislation and Guidance for Surface Water Construction Management

5 Summary and Conclusions

- 5.1 The application site is a greenfield site with some areas of hard standing spaces which is situated north of Chapel Lane Road with residential dwellings located west of the site.
- 5.2 The proposal includes for the construction of 5 new dwellings with associated garages, gardens, and car parking spaces.
- 5.3 Surface water disposal via infiltration is not considered feasible owing to the clayey nature of the soil conditions.
- 5.4 The surface water strategy proposes to restrict the surface water runoff to 4l/s providing betterment for the site.
- 5.5 The proposals will make a new connection for the surface water into the watercourse south of the site.

6 Appendices

Appendix A – Topographical Survey



NOTES

[illegible]

LEGEND

- [illegible]

ABBREVIATIONS

[illegible]

STATION CO-ORDINATES

STATION	EASTING	NORTHING	LEVEL	DESCRIPTION
STN/1	432877.06	297569.12	70.57	Survey Nail
STN/2	432942.53	297562.58	71.63	Survey Nail
STN/3	432983.48	297564.35	70.79	Survey Nail
STN/4	432869.54	297569.96	71.11	Survey Nail
STN/5	433014.78	297560.83	71.24	Survey Nail
STN/6	432962.71	297530.53	70.93	Survey Nail
STN/7	432964.58	297575.49	72.04	Survey Nail

UNLESS OTHERWISE STATED THE SURVEY STATIONS LISTED ABOVE ARE ONLY INTENDED TO BE USED FOR TOPOGRAPHICAL SURVEY AT THE STATED SCALE.

DUE CONSIDERATION SHOULD BE GIVEN TO LONGTERM STABILITY OF SURVEY STATION MARKERS.

No.	DIA.	SPREAD IN	H
TEST 1	0.00	1.6	

TE02	0.70	14	16
TE03	0.80	14	14
TE04	0.90	3	6
TE05	0.20	2	6
TE06	0.30	14	14
TE07	0.80	13	18
TE08	0.20	6	10
TE09	0.90	10	17
TE10	0.96	10	12
TE11	0.60	7	11
TE12	0.20	6	8
TE13	0.20	6	8
TE14	0.20	4	6
TE15	0.20	6	8
TE16	0.20	4	8
TE17	0.90	10	13
TE18	0.90	10	12
TE19	0.40	6	12
TE20	0.20	6	7
TE21	0.20	6	

NOTE: THESE ARE THE GENERAL RULES FOR THE SURVEY. THERE MAY BE SOME VARIATIONS IN THE FIELD.

1. 1985-1990: 1/4" BORE

2. 1991-1995: 1/4" BORE

3. 1996-2000: APPROXIMATE DIAMETER MEASURED AT 1.5M ABOVE GROUND LEVEL. THE POINT SHOWN NOT TO SCALE - SEE SCHEDULE ABOVE FOR ACTUAL SIZE.

4. 2001-2005: 1/4" BORE

5. THE TREE SPREADS ARE SYMBOLIC ONLY AND ARE REPRESENTATIVE OF THE WIDEST SPREAD OF THE TREE. THEY ARE NOT TO BE USED TO DETERMINE THE SIZE OF THE TREE. THE TREE MAY NOT BE CENTRAL TO THE CANOPY. THE SPREADS ARE APPROXIMATE HEIGHT TO TOP OF CANOPY ESTIMATED FROM GROUND LEVEL.

6. THE TREE TYPES HAVE NOT BEEN IDENTIFIED BY AN ARBORIST AND HAVE THEREFORE BEEN ASSIGNED THE GENERAL FAMILY OR COLLOQUIAL TREE NAMES RATHER THAN THEIR FULL ORIGINAL SCIENTIFIC NAMES.

7. THE TREE SURVEY CAN BE AMENDED UPON REQUEST.

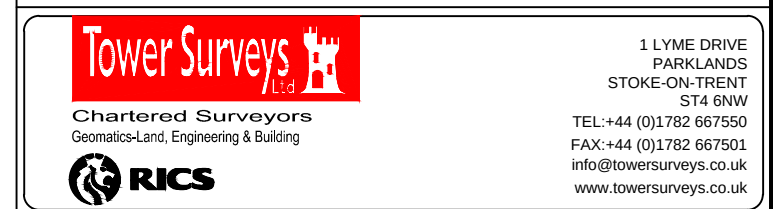
8. ATTENTION SHOULD BE PAID TO THE ORIGINAL TOPOGRAPHICAL SURVEY. IF THE TREE SPREADS ARE NOT SHOWN, THE TREE IS NOT TO BE PLACED THERE. THE TREE LARGER THAN DANGER ZONE OR ONLY TREES WITHIN THE DANGER ZONE ARE TO BE PLACED THERE. THE TREE IS NOT TO BE PLACED OUTSIDE THE DANGER ZONE UNLESS OTHERWISE SPECIFIED AS INCLUDING "OFF SITE" TREES.

GENERAL

- * NO ALLOWANCE HAS BEEN MADE FOR SUB SURFACE ENTRY INTO MANHOLES OR OTHER CHAMBERS OR VOIDS BELOW GROUND LEVEL. THEREFORE ANY DETAILS RELATING TO MANHOLES, ETC. ARE TAKEN FROM MEASUREMENTS AND AS SUCH WILL BE APPROXIMATE ONLY.
- THE CONTRACTOR IS TO CHECK AND VERIFY ALL CRITICAL DIMENSIONS AND LEVELS BEFORE BEGINNING WORK.
- WORKED SURFACES SHOWN ON THIS DRAWING MAY BE RECLAIMED SURFACES AND WILL NORMALLY BE CONSIDERED TO BE UNDISTURBED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING AND TREATING WORKED SURFACES WITHIN THE EXCAVATION WORK. SAFE DIGGING PRACTICES SHOULD BE FOLLOWED.
- IF THERE IS ANY CONFLICT BETWEEN THE DETAILS INDICATED ON THIS DRAWING AND THOSE INDICATED ON OTHER DRAWINGS, THEN TOWER SURVEYS SHOULD BE INFORMED PRIOR TO CONSTRUCTION ON SITE.
- NOTES TO THE CONTRACTOR: THE SAME ALLOWANCES IMPLIED BY THE PLOTTING SCALE ARE EQUALLY APPLIED TO DIGITAL DATA SUPPLIED FOR CAD.
- IF THERE IS A MISMATCH BETWEEN THE SURFACE FEATURES, HOWEVER, THE CONTRACTOR SHOULD BE BORN IN MIND THAT THERE MAY BE ITEMS OCCURRED AT THE TIME OF SURVEY. VISIBLE FEATURES IN THE VICINITY OF THE BOUNDARIES, AS SHOWN ON THIS SURVEY, MAY BE USED TO ESTIMATE THE EXACT POSITION OF THE SURFACE FEATURES.

DESCRIPTION	REV	DATE	DRWN	CHKD	APPR
DRAWING STATUS					

INFORMATION



CLIENT

A R CARTWRIGHT LIMITED

PROJECT TITLE

CHAPEL LANE

WITHERLEY

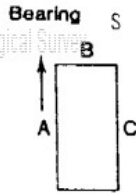
DRAWING DETAIL

DRAWN	DTM	DATE DECEMBER 2013
PROJECT ENGINEER	P/V	
CHECKED	P/V	
APPROVED	P/V	
		SCALE 1:250 (WHEN PLOTTED @ A0)
DRAWING NUMBER R-S8359 / 201		REVISION

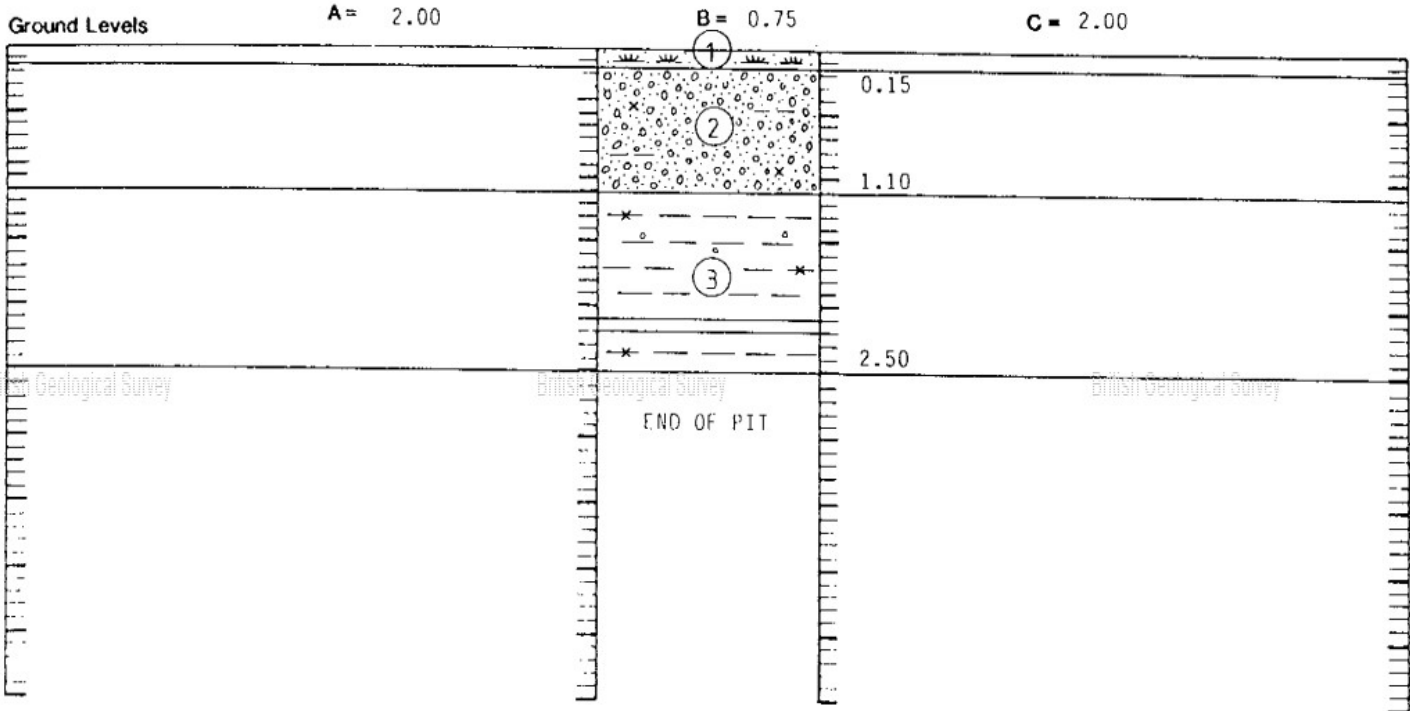
TRIAL PIT RECORD

SP 39 NW 26..

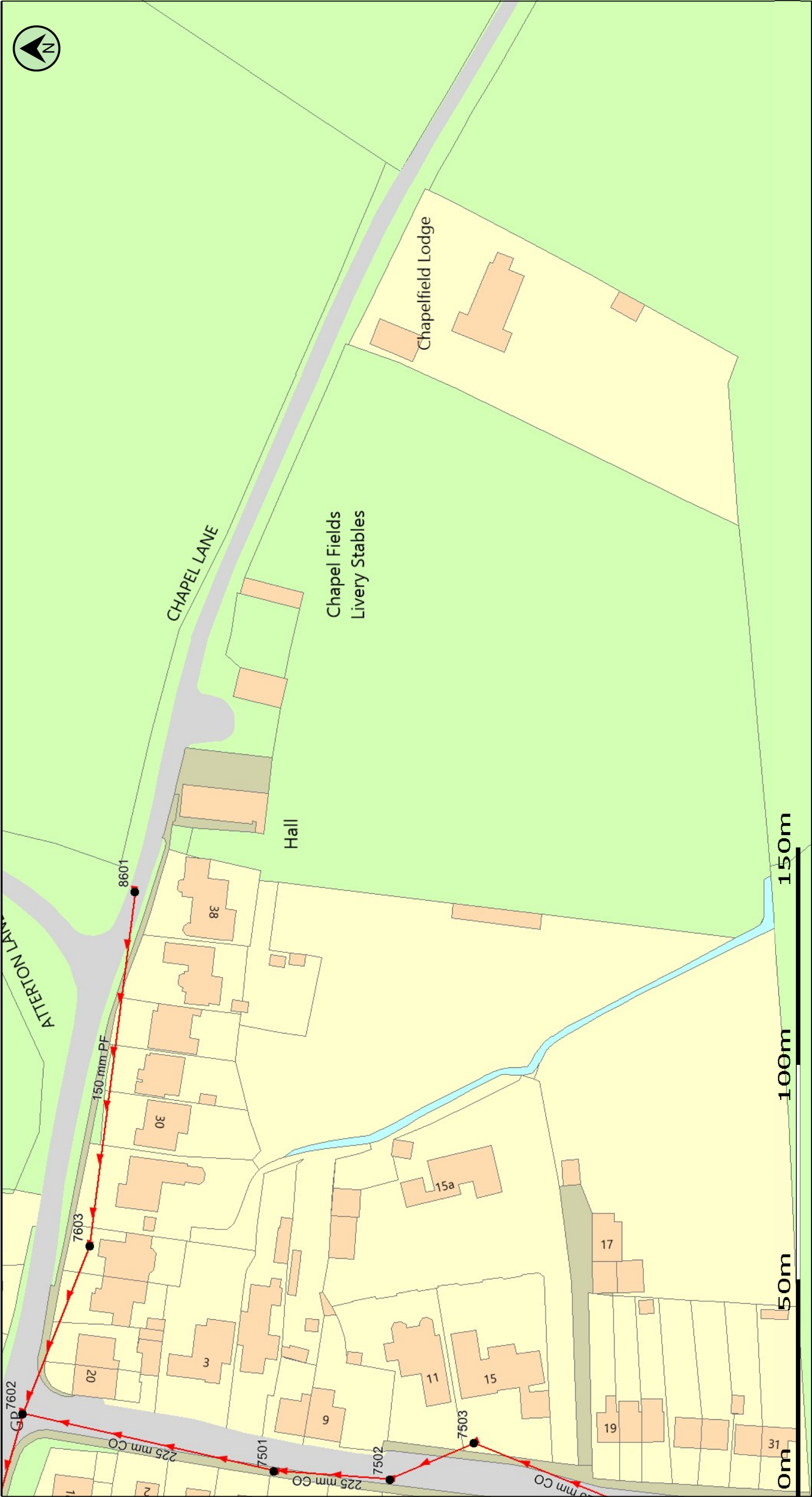
Project	PROPOSED HOUSING DEVELOPMENT	Client	PERSIMMON HOMES	Trial Pit	7
Location	WITHERLEY, NR. ATHERSTONE	Engineer		Project No.	87-5674
Location Plan		Trial Pit Plan			



Date 20.11.87
 Plant JCB 3CII
 Shoring None
 Stability Water inflow and running sand from 1.0m
 Water 0.1m of standing water after 10 minutes.



Samples and Tests			Strata	
Depth	Type	Strength	Reference	Description
1.10	HV	100	1	Sandy TOPSOIL.
1.20	HV	140	2	loose varying to medium dense dull brown silty SAND and GRAVEL. Becomes clayey in parts with clay zones towards base. TERRACE DEPOSITS.
2.00	HP	200	3	Firm to stiff reddish brown friable silty CLAY. Much grey green discolouration. Becomes very stiff, frequent mudstone lithorelicts (1.5). Becomes hard at 1.80m. Band of moderately strong green MUDSTONE at 2.1 ripple marked - difficult digging. MERCIA MUDSTONE.



Do not scale off this Map. This plan and any information supplied with it is furnished as a general guide, is only valid at the date of issue and no warranty as to its correctness is given or implied. In particular this plan and any information shown on it must not be relied upon in the event of any development or works (including but not limited to excavations) in the vicinity of SEVERN TRENT WATER assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems. On 1 October 2011 most private sewers and private lateral drains in Severn Trent Water's sewerage area, which were connected to a public sewer as at 1 July 2011, transferred to the ownership of Severn Trent Water and became public sewers and public lateral drains. A further transfer takes place on 1 October 2012. Private pumping stations, which form part of these sewers or lateral drains, will transfer to ownership of Severn Trent Water on or before 1 October 2016. Severn Trent Water does not possess complete records of these assets. These assets may not be displayed on the map. Reproduction by permission of Ordnance Survey on behalf of HMSO. © Crown Copyright and database right 2004. All rights reserved. Ordnance Survey licence number: 100031673. Document users other than SEVERN TRENT WATER business users are advised that this

Public Foul Gravity/Lateral Drain	Highway Drain	Manhole Foul
Public Combined Gravity/Lateral Drain	Overflow Pipe	Manhole Surface
Public Surface Water Gravity/Lateral Drain	Disposal Pipe	Abandoned Pipe
Pressure Foul	Culverted Water Course	
Pressure Combined	Pumping Station	
Pressure Surface Water	Fitting	

Section 104 sewers are shown in green
Private sewers are shown in magenta

Ifox@jmsengineers.co.uk

CO21_294_07

SEVERN

TRENT



GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

- a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991 (a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.
- b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.
- c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.
- d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.
- e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).
- f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.
2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).
3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.
5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.
6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.
7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.
8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.
9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.
10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.
11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.
12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.
13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,
14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.
16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May2014
18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.
19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.



Illustrative Street Scene from Chapel Lane
Scale 1:200



LANDSCAPING SPECIFICATION

- Derivates eng. tree to be planted (remove trees where shown dotted)

- Cervous new tree plasticity: Mix of -
 - Cherry (*prunus avium*)
 - Silver Birch (*Betula pendula*)
 - Fastigiala (*capraria betulus*)
 - All trees to be standard (10 - 15cm girths)
 - Includes new hydroponic planting: Mix of -
 - Haworn (*cataplicum monogynum*) 75%
 - Holly (*Ilex aquifolium*) 10%
 - Baccharis (*gracilis sinensis*) 10%
 - Dog Rose (*Rosa canina*) 5%
- hydroponics: 60 - 100m whips planted in sagged rows (100 plants per tree)

- Indicates shrub planting
- All proposed shrubbed areas to be planted with densities of max 4no. plants per m² to allow for adequate coverage in accordance with good horticultural practice to BS 4428
- All driveway and courtyard finishes as indicated

- Indicates extent of paving slabs

- Highway Advice
- Planning Advice
- Arboricultural Advice
- Drainage Design
- Ecology Survey
- Flood Risk Advice

To be read in conjunction with Topographical Survey
Drawing No: R-S8359 / 201 by Tower Surveys Ltd

This drawing is subject to:

This drawing is subject to:

Schedule of Accommodation	
PLOTS 1 - 2	4 Bedroom (1.5 storey)
PLOT 3	4 Bedroom
PLOT 4 - 5	5 Bedroom
	3050 sq ft
Total - 5 No Dwellings	11300 sq Feet

B	Drawing updated	27.09.2	
Revisions :	A	Drawing updated	24.09.2

Figure dimensions must be taken in preference to scaled dimensions and any discrepancies are to be referred to David Granger Architectural Design Limited. Contractors, subcontractors and suppliers must verify all dimensions on site before commencing any work, or making any working drawings. All drawings are copyright of David Granger Architectural Design Limited. Ordnance Survey Data © Crown Copyright. All rights reserved. Licence No. ARI00020449. Landmark Ref: LUG0816

DAVID GRANGER
ARCHITECTURAL DESIGN LIMITED

ARCHITECTURAL DESIGN LIMITED

Project Proposed Residential Development

Land at Chapel Lane

Wetherley

Nuneaton, Warwickshire

Drawing Title

Detailed Planni

Sheet 2 of 10

Client

AR Cartwright Ltd.

Drawing No.

21.4021.10B

Date _____

August 2021
Drawn by

MS/SM

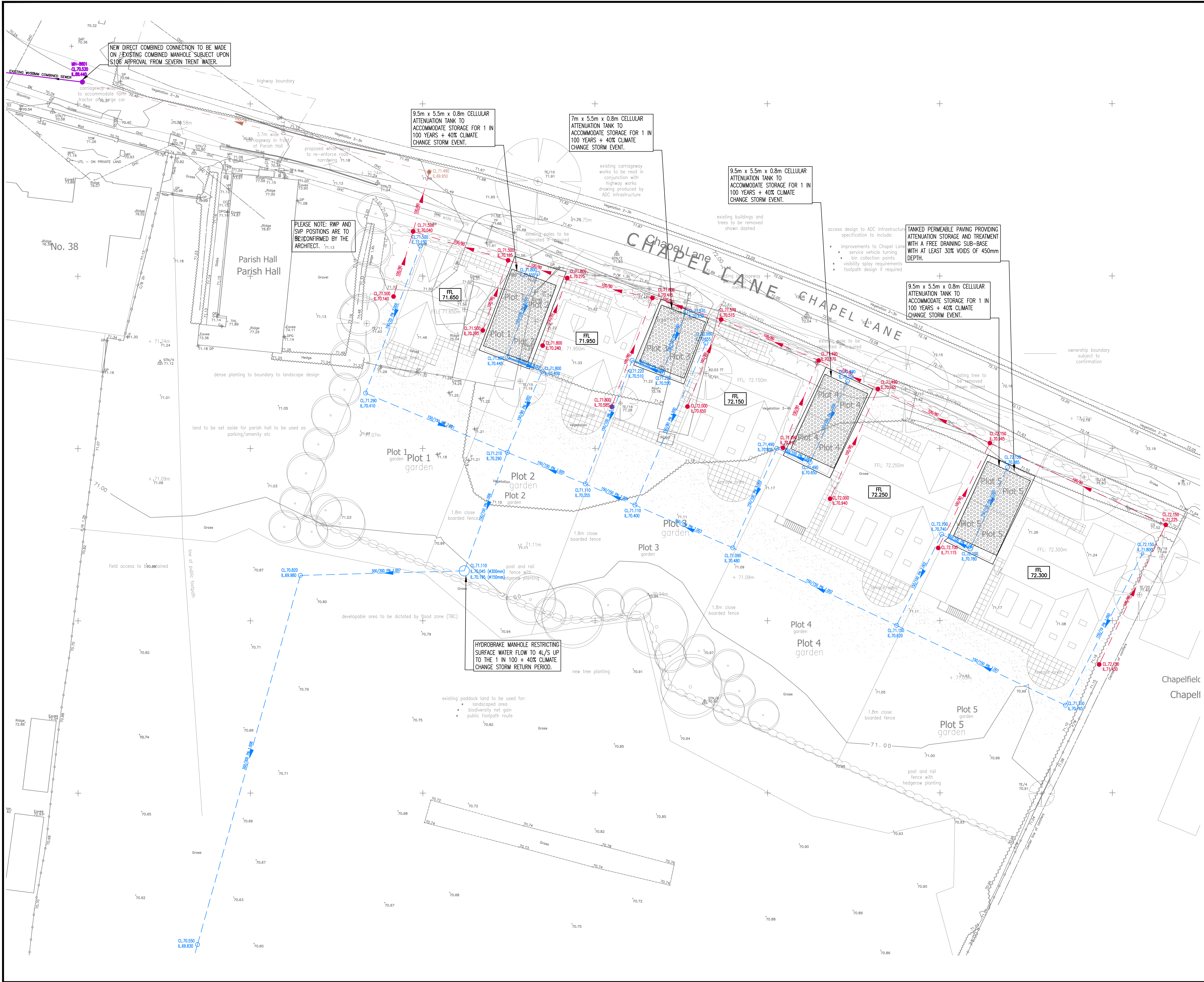
The Old Castle

The Old Collage

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JMS (Midlands) Ltd		Page 1
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	Chapel Lane, Witherley Atherstone	
Date 07/10/2021 11:22 File	Designed by MC Checked by BP	
XP Solutions		
Source Control 2018.1		
ICP SUDS Mean Annual Flood Input Return Period (years)10Soil0.450 Area (ha) 0.428Urban0.000 SAAR (mm)700Region NumberRegion 4 Results1/s QBAR Rural 1.9 QBAR Urban 1.9 Q10 years 2.8 Q1 year 1.6 Q30 years 3.7 Q100 years 4.8		
©1982-2018 Innovyze		

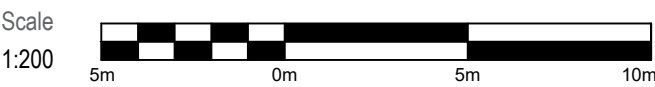


- General Notes:
1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
 2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
 3. All work is to be to the satisfaction of the engineer and local authority building control.
 4. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
 5. All workmanship and materials are to be to current British Standards.
 6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
 7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
 8. All highway works are to be in accordance with the local authorities design guide and specification.
 9. Prior to the occupation of the first dwelling, street nameplates shall be erected in accordance with the highway authority and to the wording agreed with the planning authority.
 10. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.
 11. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.
 12. All road markings and signs are to be in accordance with 'the traffic signs regulations and directions' 2016.
 13. All sewer works are to be in accordance with sewers for adoption 6th edition.
 14. All private connections to adoptable sewers should be a minimum of 100mm diameter (foul) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.

Drainage Key	
Private Surface Water	Private Foul Water
Surface Water Manhole Text	Foul Water Manhole Text
Surface Water Pipe Diameter / Gradient	Foul Water Pipe Diameter / Gradient
Rodding Eye	Inspection Chambers
Perforated Pipe	225mm Ø
Permeable Paving	0-600mm Depth
Private Yard Gully	480mm Ø
Headwalls	>600mm Depth
Crate Attenuation	Adoptable Foul Water
	Foul Water Manhole Text
	Foul Water Pipe Run Diameter / Gradient
	Inspection Chamber Depth Varies

External Works Key	
Existing Level	
Finished Floor Level	

Existing Services Key	
Combined Sewer	



P2	Amended as per STW developer enquiry response	MC	BP	18.11.2021
P1	Preliminary Issue	MC	RP	13.10.2021
Issue	Notes	Drawn	Approved	Date

Engineering That Brings Design To Life.

Issuing Office:
JMS Midlands (Nuneaton): Victoria Court, 25 Tennant Street
Nuneaton, Warwickshire, United Kingdom, CV11 4LZ, Tel: 02476 350505

Project:
Chapel Lane, Witherley
Atherstone

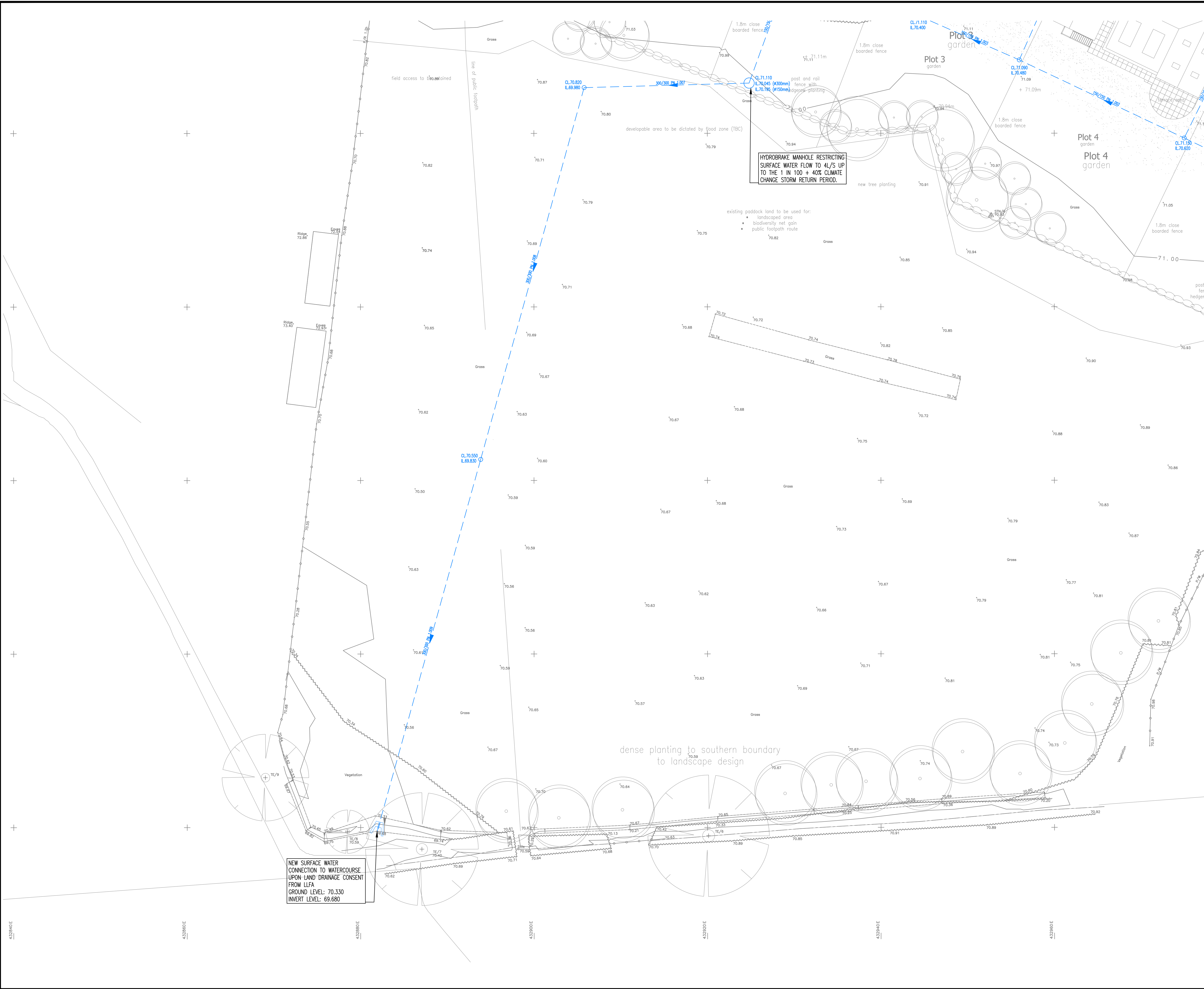
Drawing Title:
Drainage Strategy
Page 1 of 2

Project No.
CO21/294/07

Drawing No.
201

Issue
P2

PRELIMINARY



General Notes:

1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
3. All work is to be to the satisfaction of the engineer and local authority building control.
4. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
5. All workmanship and materials are to be to current British Standards.
6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
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14. All private connections to adoptable sewers should be a minimum of 100mm diameter (foul) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.

Drainage Key

Private Surface Water		Private Foul Water	
Surface Water Manhole Text	CL 00.00 IL 00.00 80.00.00	Foul Water Manhole Text	CL 00.00 IL 00.00 80.00.00
Surface Water Pipe Diameter / Gradient	150/150	Foul Water Pipe Diameter / Gradient	150/150
Rodding Eye	RE IL 00.00	Inspection Chambers	
Perforated Pipe		225mm Ø	
Permeable Paving		0-600mm Depth	
Private Yard Gully		480mm Ø	
Headwalls		>600mm Depth	
Crate Attenuation		Adoptable Foul Water	
		Foul Water Manhole Text	FWH CL 00.000 IL 00.000 80.00.000
		Foul Water Pipe Run Diameter / Gradient	PN 1.001 150/150
		Inspection Chamber Depth Varies	

External Works Key

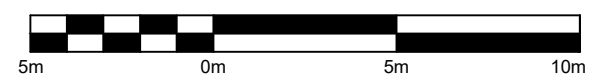
Existing Level	EL 00.00
Finished Floor Level	FFL 00.000

Existing Services Key

Combined Sewer	0.750%
----------------	--------

Scale

1:200



Issue	Notes	MC	RP	Date
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Nuneaton, Warwickshire, United Kingdom, CV11 4LZ, Tel: 02476 350505

Project:
Chapel Lane, Witherley
Atherstone

Drawing Title:
Drainage Strategy
Page 2 of 2

Project No.
CO21/294/07

Drawing No.
205

Issue
P1

PRELIMINARY

JMS (Midlands) Ltd		Page 1
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	Chapel Lane Witherley	
Date 17/11/2021 16:58	Designed by MC	
File NETWORK CALCULATIONS - ...	Checked by MC	
XP Solutions		Network 2018.1

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	10	PIMP (%)	100
M5-60 (mm)	20.000	Add Flow / Climate Change (%)	0
Ratio R	0.408	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

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
1.000	19.700	1.035	19.0	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	21.700	0.145	149.7	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.000	10.400	0.105	99.0	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
2.001	3.700	0.040	92.5	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
2.002	11.800	0.120	98.3	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.002	21.000	0.140	150.0	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.000	10.400	0.105	99.0	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
3.001	4.200	0.045	93.3	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
3.002	12.600	0.125	100.8	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.14	71.800	0.005	0.0	0.0	0.0	2.32	41.0	0.7
1.001	50.00	5.58	70.765	0.010	0.0	0.0	0.0	0.82	14.5	1.4
2.000	50.00	5.17	70.885	0.005	0.0	0.0	0.0	1.01	17.8	0.7
2.001	50.00	5.23	70.780	0.010	0.0	0.0	0.0	1.05	18.5	1.4
2.002	50.00	5.42	70.740	0.015	0.0	0.0	0.0	1.01	17.9	2.0
1.002	50.00	6.01	70.620	0.030	0.0	0.0	0.0	0.82	14.5	4.1
3.000	50.00	5.17	70.755	0.005	0.0	0.0	0.0	1.01	17.8	0.7
3.001	50.00	5.24	70.650	0.010	0.0	0.0	0.0	1.04	18.4	1.4
3.002	50.00	5.45	70.605	0.015	0.0	0.0	0.0	1.00	17.7	2.0

JMS (Midlands) Ltd		Page 2
Victoria Count Tennant St Nuneaton Warwickshire CV11 4LZ	Chapel Lane Witherley	
Date 17/11/2021 16:58	Designed by MC	
File NETWORK CALCULATIONS - ...	Checked by MC	
XP Solutions	Network 2018.1	

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
1.003	12.400	0.080	155.0	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
4.000	20.500	0.255	80.4	0.005	5.00	0.0	0.600	o	150	Pipe/Conduit	
1.004	6.300	0.045	140.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.000	7.600	0.080	95.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
5.001	3.800	0.040	95.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
5.002	15.300	0.155	98.7	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.005	9.800	0.065	150.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.000	10.400	0.105	99.0	0.000	5.00	0.0	0.600	o	150	Pipe/Conduit	
6.001	4.400	0.045	97.8	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
6.002	10.300	0.110	93.6	0.010	0.00	0.0	0.600	o	150	Pipe/Conduit	
7.000	18.200	0.740	24.6	0.010	5.00	0.0	0.600	o	150	Pipe/Conduit	
7.001	17.800	0.120	148.3	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.006	14.600	0.095	153.7	0.005	0.00	0.0	0.600	o	150	Pipe/Conduit	
1.007	19.000	0.065	292.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.008	44.500	0.150	296.7	0.000	0.00	0.0	0.600	o	300	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)
1.003	50.00	6.27	70.480	0.050	0.0	0.0	0.0	0.80	14.2	6.8
4.000	50.00	5.30	70.655	0.005	0.0	0.0	0.0	1.12	19.8	0.7
1.004	50.00	6.39	70.400	0.055	0.0	0.0	0.0	0.85	15.0	7.4
5.000	50.00	5.12	70.630	0.000	0.0	0.0	0.0	1.03	18.2	0.0
5.001	50.00	5.18	70.550	0.000	0.0	0.0	0.0	1.03	18.2	0.0
5.002	50.00	5.44	70.510	0.000	0.0	0.0	0.0	1.01	17.9	0.0
1.005	50.00	6.59	70.355	0.055	0.0	0.0	0.0	0.82	14.4	7.4
6.000	50.00	5.17	70.550	0.000	0.0	0.0	0.0	1.01	17.8	0.0
6.001	50.00	5.24	70.445	0.010	0.0	0.0	0.0	1.02	18.0	1.4
6.002	50.00	5.41	70.400	0.020	0.0	0.0	0.0	1.04	18.4	2.7
7.000	50.00	5.15	71.150	0.010	0.0	0.0	0.0	2.04	36.0	1.4
7.001	50.00	5.51	70.410	0.015	0.0	0.0	0.0	0.82	14.5	2.0
1.006	50.00	6.89	70.290	0.095	0.0	0.0	0.0	0.81	14.3	12.9
1.007	50.00	7.24	70.045	0.095	0.0	0.0	0.0	0.91	64.6	12.9
1.008	50.00	8.06	69.980	0.095	0.0	0.0	0.0	0.91	64.2	12.9

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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
1.009	44.500	0.150	296.7	0.000	0.00	0.0	0.600	o	300	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)
1.009	50.00	8.87	69.830	0.095	0.0	0.0	0.0	0.91	64.2	12.9

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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1.009		70.330	69.680	0.000	0	0
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Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	40.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	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	4
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	FSR	Profile Type	Summer
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	20.000	Storm Duration (mins)	30
Ratio R	0.408		

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Online Controls for Storm

Hydro-Brake® Optimum Manhole: 23, DS/PN: 1.007, Volume (m³): 1.4

Unit Reference	MD-SHE-0093-4000-1100-4000
Design Head (m)	1.100
Design Flow (l/s)	4.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	93
Invert Level (m)	70.045
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.100	4.0
Flush-Flo™	0.326	4.0
Kick-Flo®	0.684	3.2
Mean Flow over Head Range	-	3.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.0	1.200	4.2	3.000	6.4	7.000	9.5
0.200	3.8	1.400	4.5	3.500	6.9	7.500	9.8
0.300	4.0	1.600	4.8	4.000	7.3	8.000	10.2
0.400	4.0	1.800	5.0	4.500	7.7	8.500	10.5
0.500	3.9	2.000	5.3	5.000	8.1	9.000	10.7
0.600	3.6	2.200	5.5	5.500	8.5	9.500	11.0
0.800	3.5	2.400	5.7	6.000	8.9		
1.000	3.8	2.600	6.0	6.500	9.2		

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Storage Structures for Storm

Complex Manhole: 3, DS/PN: 2.000

Cellular Storage

Invert Level (m) 70.885 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	52.3	52.3	0.900	0.0	76.3
0.800	52.3	76.3			

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 6.0
Membrane Percolation (mm/hr) 1000 Length (m) 11.3
Max Percolation (l/s) 18.8 Slope (1:X) 100.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 71.420 Cap Volume Depth (m) 0.450

Complex Manhole: 7, DS/PN: 3.000

Cellular Storage

Invert Level (m) 70.755 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	52.3	52.3	0.900	0.0	76.3
0.800	52.3	76.3			

Porous Car Park

Infiltration Coefficient Base (m/hr) 0.00000 Width (m) 6.0
Membrane Percolation (mm/hr) 1000 Length (m) 11.5
Max Percolation (l/s) 19.2 Slope (1:X) 100.0
Safety Factor 2.0 Depression Storage (mm) 5
Porosity 0.30 Evaporation (mm/day) 3
Invert Level (m) 70.810 Cap Volume Depth (m) 0.450

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Complex Manhole: 13, DS/PN: 5.000

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.2
Membrane Percolation (mm/hr)	1000	Length (m)	8.1
Max Percolation (l/s)	14.0	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	70.540	Cap Volume Depth (m)	0.450

Cellular Storage

Invert Level (m)	70.630	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	38.5	38.5	0.900	0.0	58.5
0.800	38.5	58.5			

Complex Manhole: 17, DS/PN: 6.000

Cellular Storage

Invert Level (m)	70.550	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	52.3	52.3	0.900	0.0	76.3
0.800	52.3	76.3			

Porous Car Park

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	6.1
Membrane Percolation (mm/hr)	1000	Length (m)	12.1
Max Percolation (l/s)	20.5	Slope (1:X)	100.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	71.120	Cap Volume Depth (m)	0.450

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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	40.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	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	4
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	FSR	Ratio R	0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	1	+0%					71.816
1.001	2	15 Winter	1	+0%	30/15 Winter				70.801
2.000	3	240 Winter	1	+0%					70.890
2.001	4	15 Winter	1	+0%	30/15 Winter				70.805
2.002	5	15 Winter	1	+0%	30/15 Summer				70.772
1.002	6	15 Winter	1	+0%	30/15 Summer				70.677
3.000	7	240 Winter	1	+0%	100/60 Winter				70.760
3.001	8	15 Winter	1	+0%	30/15 Summer				70.674
3.002	9	30 Winter	1	+0%	30/15 Summer				70.639
1.003	10	30 Winter	1	+0%	1/30 Winter				70.636
4.000	11	15 Winter	1	+0%	30/15 Summer				70.677
1.004	12	30 Winter	1	+0%	1/15 Summer				70.626
5.000	13	60 Winter	1	+0%	100/30 Winter				70.540
5.001	14	30 Winter	1	+0%	30/15 Summer				70.614
5.002	15	30 Winter	1	+0%	30/15 Summer				70.615
1.005	16	30 Winter	1	+0%	1/15 Summer				70.619
6.000	17	30 Winter	1	+0%	30/60 Winter				70.556
6.001	18	30 Winter	1	+0%	1/15 Winter				70.611
6.002	19	30 Winter	1	+0%	1/15 Summer				70.612

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	1	-0.134	0.000	0.03		1.0	OK	
1.001	2	-0.114	0.000	0.13		1.8	OK	
2.000	3	-0.145	0.000	0.01		0.1	OK	
2.001	4	-0.125	0.000	0.07		0.8	OK	
2.002	5	-0.118	0.000	0.10		1.7	OK	
1.002	6	-0.093	0.000	0.31		4.2	OK	
3.000	7	-0.145	0.000	0.01		0.1	OK	
3.001	8	-0.126	0.000	0.06		0.8	OK	
3.002	9	-0.116	0.000	0.09		1.4	OK	
1.003	10	0.006	0.000	0.42		5.4	SURCHARGED	
4.000	11	-0.128	0.000	0.05		1.0	OK	
1.004	12	0.076	0.000	0.40		5.1	SURCHARGED	
5.000	13	-0.240	0.000	0.00		0.0	OK	
5.001	14	-0.086	0.000	0.02		0.2	OK	
5.002	15	-0.045	0.000	0.03		0.4	OK	
1.005	16	0.114	0.000	0.31		3.9	SURCHARGED	
6.000	17	-0.144	0.000	0.01		0.1	OK	
6.001	18	0.016	0.000	0.10		1.3	SURCHARGED	
6.002	19	0.062	0.000	0.14		2.4	SURCHARGED	

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

US/MH		Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water
PN	Name								Level (m)
7.000	20	15 Winter	1	+0%					71.173
7.001	21	30 Winter	1	+0%	1/15 Summer				70.614
1.006	22	30 Winter	1	+0%	1/15 Summer				70.611
1.007	23	30 Winter	1	+0%	1/15 Summer				70.595
1.008	24	120 Winter	1	+0%					70.030
1.009	25	120 Winter	1	+0%					69.880

US/MH		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level
PN	Name							Exceeded
7.000	20	-0.127	0.000	0.06		1.9	OK	
7.001	21	0.054	0.000	0.14		2.0	SURCHARGED	
1.006	22	0.171	0.000	0.51		6.7	SURCHARGED	
1.007	23	0.250	0.000	0.07		4.0	SURCHARGED	
1.008	24	-0.250	0.000	0.07		4.0	OK	
1.009	25	-0.250	0.000	0.07		4.0	OK	

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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	40.000
Hot Start (mins)	0	MADD Factor * 10m ³ /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	4
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	FSR	Ratio R	0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440	Summer and Winter	
Return Period(s) (years)		1, 30, 100	
Climate Change (%)		0, 0, 40	

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	30	+0%					71.824
1.001	2	30 Winter	30	+0%	30/15 Winter				70.950
2.000	3	30 Winter	30	+0%					70.904
2.001	4	30 Winter	30	+0%	30/15 Winter				70.945
2.002	5	30 Winter	30	+0%	30/15 Summer				70.944
1.002	6	30 Winter	30	+0%	30/15 Summer				70.937
3.000	7	60 Winter	30	+0%	100/60 Winter				70.797
3.001	8	15 Winter	30	+0%	30/15 Summer				70.907
3.002	9	15 Winter	30	+0%	30/15 Summer				70.912
1.003	10	30 Winter	30	+0%	1/30 Winter				70.910
4.000	11	15 Winter	30	+0%	30/15 Summer				70.893
1.004	12	15 Winter	30	+0%	1/15 Summer				70.885
5.000	13	60 Winter	30	+0%	100/30 Winter				70.682
5.001	14	15 Winter	30	+0%	30/15 Summer				70.797
5.002	15	15 Winter	30	+0%	30/15 Summer				70.822
1.005	16	15 Winter	30	+0%	1/15 Summer				70.866
6.000	17	60 Winter	30	+0%	30/60 Winter				70.724
6.001	18	15 Winter	30	+0%	1/15 Winter				70.773
6.002	19	15 Winter	30	+0%	1/15 Summer				70.818

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

PN	US/MH Name	Surcharged		Flooded		Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)			
1.000	1	-0.126	0.000	0.06		2.4	OK	
1.001	2	0.035	0.000	0.24		3.3	FLOOD RISK	
2.000	3	-0.131	0.000	0.04		0.6	OK	
2.001	4	0.015	0.000	0.14		1.8	SURCHARGED	
2.002	5	0.054	0.000	0.22		3.5	SURCHARGED	
1.002	6	0.167	0.000	0.48		6.6	FLOOD RISK	
3.000	7	-0.108	0.000	0.07		1.2	OK	
3.001	8	0.107	0.000	0.15		1.9	SURCHARGED	
3.002	9	0.157	0.000	0.23		3.7	SURCHARGED	
1.003	10	0.280	0.000	0.54		7.0	FLOOD RISK	
4.000	11	0.088	0.000	0.11		2.0	SURCHARGED	
1.004	12	0.335	0.000	0.66		8.3	FLOOD RISK	
5.000	13	-0.098	0.000	0.07		1.0	OK	
5.001	14	0.097	0.000	0.05		0.6	SURCHARGED	
5.002	15	0.162	0.000	0.04		0.6	SURCHARGED	
1.005	16	0.361	0.000	0.42		5.4	FLOOD RISK	
6.000	17	0.024	0.000	0.14		2.2	SURCHARGED	
6.001	18	0.178	0.000	0.21		2.8	SURCHARGED	
6.002	19	0.268	0.000	0.31		5.1	SURCHARGED	

JMS (Midlands) Ltd		Page 12
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XP Solutions	Network 2018.1	

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

US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act. Level (m)
7.000	20	15 Winter	30	+0%				71.188
7.001	21	15 Winter	30	+0%	1/15 Summer			70.882
1.006	22	15 Winter	30	+0%	1/15 Summer			70.858
1.007	23	15 Winter	30	+0%	1/15 Summer			70.844
1.008	24	480 Winter	30	+0%				70.030
1.009	25	480 Winter	30	+0%				69.880

US/MH		Surcharged	Flooded	Pipe		Level	
PN	Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status Exceeded
7.000	20	-0.112	0.000	0.14		4.8	OK
7.001	21	0.322	0.000	0.41		5.5	SURCHARGED
1.006	22	0.418	0.000	0.71		9.3	SURCHARGED
1.007	23	0.499	0.000	0.07		3.9	FLOOD RISK
1.008	24	-0.250	0.000	0.07		4.0	OK
1.009	25	-0.250	0.000	0.07		4.0	OK

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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	40.000
Hot Start (mins)	0	MADD Factor * 10m ³ /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	4
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	FSR	Ratio R	0.408
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	20.000	Cv (Winter)	0.840

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

Profile(s)

Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
1.000	1	15 Winter	100	+40%					71.834
1.001	2	15 Winter	100	+40%	30/15 Winter				71.146
2.000	3	30 Winter	100	+40%					70.973
2.001	4	15 Winter	100	+40%	30/15 Winter				71.099
2.002	5	15 Winter	100	+40%	30/15 Summer				71.127
1.002	6	15 Winter	100	+40%	30/15 Summer				71.132
3.000	7	60 Winter	100	+40%	100/60 Winter				70.911
3.001	8	15 Winter	100	+40%	30/15 Summer				70.993
3.002	9	15 Winter	100	+40%	30/15 Summer				71.043
1.003	10	15 Winter	100	+40%	1/30 Winter				71.090
4.000	11	15 Winter	100	+40%	30/15 Summer				71.088
1.004	12	15 Winter	100	+40%	1/15 Summer				71.068
5.000	13	120 Winter	100	+40%	100/30 Winter				70.869
5.001	14	120 Winter	100	+40%	30/15 Summer				70.871
5.002	15	15 Winter	100	+40%	30/15 Summer				70.922
1.005	16	15 Winter	100	+40%	1/15 Summer				71.042
6.000	17	120 Winter	100	+40%	30/60 Winter				70.877
6.001	18	15 Winter	100	+40%	1/15 Winter				70.919
6.002	19	15 Winter	100	+40%	1/15 Summer				71.005

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

PN	US/MH Name	Surcharged Flooded		Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
		Depth (m)	Volume (m³)					
1.000	1	-0.116	0.000	0.11		4.4	OK	
1.001	2	0.231	0.000	0.63		8.6	FLOOD RISK	
2.000	3	-0.062	0.000	0.28		4.4	OK	
2.001	4	0.169	0.000	0.43		5.3	SURCHARGED	
2.002	5	0.237	0.000	0.35		5.6	SURCHARGED	
1.002	6	0.362	0.000	0.65		8.9	FLOOD RISK	
3.000	7	0.006	0.000	0.11		1.7	SURCHARGED	
3.001	8	0.193	0.000	0.20		2.7	SURCHARGED	
3.002	9	0.288	0.000	0.27		4.4	SURCHARGED	
1.003	10	0.460	0.000	0.72		9.4	FLOOD RISK	
4.000	11	0.283	0.000	0.21		4.0	SURCHARGED	
1.004	12	0.518	0.000	0.82		10.3	FLOOD RISK	
5.000	13	0.089	0.000	0.07		1.1	SURCHARGED	
5.001	14	0.171	0.000	0.09		1.1	SURCHARGED	
5.002	15	0.262	0.000	0.02		0.3	FLOOD RISK	
1.005	16	0.537	0.000	0.40		5.2	FLOOD RISK	
6.000	17	0.177	0.000	0.06		1.0	SURCHARGED	
6.001	18	0.324	0.000	0.23		3.0	SURCHARGED	
6.002	19	0.455	0.000	0.32		5.3	SURCHARGED	

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

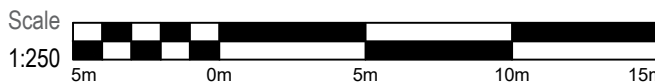
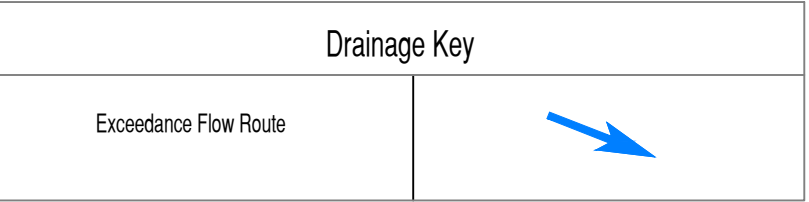
US/MH		Return Climate		First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act. Level (m)
7.000	20	15 Winter	100	+40%				71.202
7.001	21	15 Winter	100	+40%	1/15 Summer			71.159
1.006	22	15 Winter	100	+40%	1/15 Summer			71.068
1.007	23	15 Winter	100	+40%	1/15 Summer			71.051
1.008	24	1440 Summer	100	+40%				70.030
1.009	25	960 Winter	100	+40%				69.880

US/MH		Surcharged Flooded		Pipe		Level	
PN	Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)	Status Exceeded
7.000	20	-0.098	0.000	0.26		8.7	FLOOD RISK
7.001	21	0.599	0.000	0.85		11.6	FLOOD RISK
1.006	22	0.628	0.000	0.67		8.8	FLOOD RISK
1.007	23	0.706	0.000	0.07		3.9	FLOOD RISK
1.008	24	-0.250	0.000	0.07		4.0	OK
1.009	25	-0.250	0.000	0.07		4.0	OK



General Notes:

1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
3. All work is to be to the satisfaction of the engineer and local authority building control.
4. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
5. All workmanship and materials are to be to current British Standards.
6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
8. All highway works are to be in accordance with the local authorities design guide and specification.
9. Prior to the occupation of the first dwelling, street nameplates shall be erected in accordance with the highway authority and to the wording agreed with the planning authority.
10. During construction works on site, all roads and footpaths are to be swept and kept clear of obstructions, this is to include existing highways as appropriate to ensure safe passage of all road users.
11. Provision shall be made for the installation of all mains services including ducting prior to the laying of the road base-course.
12. All road markings and signs are to be in accordance with the traffic signs regulations and directions 2016.
13. All sewer works are to be in accordance with sewers for adoption 6th edition.
14. All private connections to adoptable sewers should be a minimum of 100mm diameter (boul) and 150mm diameter (surface) made in vitrified clay connecting soffit to soffit.



Issue	Notes	Drawn	Approved	Date
P1	Preliminary Issue		MC	BP 13.10.2021



Issuing Office:
JMS Midlands (Nuneaton): Victoria Court, 25 Tennant Street
Nuneaton, Warwickshire, United Kingdom, CV11 4LZ, Tel: 02476 350505

Project
Chapel Lane, Witherley
Atherstone

Drawing Title
Exceedance Flow Route

Project No. CO21/294/07	Drawing No. 204	Issue P1
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PRELIMINARY

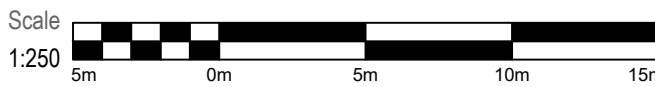
Pre-Development Impermeable Area - 517m²

General Notes:

1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
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KEY

Pre-Development Area



Issue	Notes	Drawn	Approved	Date
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P1	Preliminary Issue	MC	BP	13.10.2021
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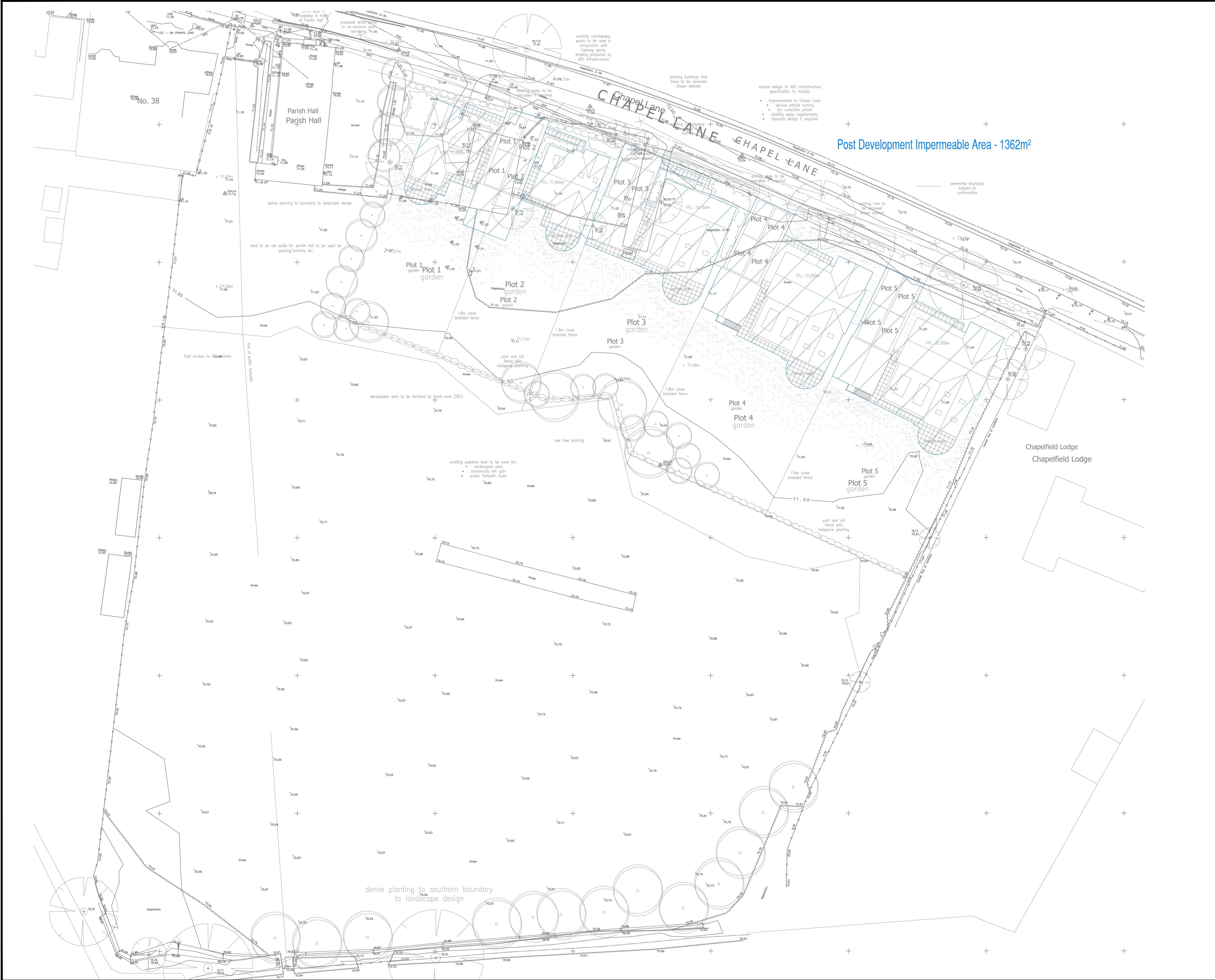
Issuing Office:
JMS Midlands (Nuneaton): Victoria Court, 25 Tennant Street
Nuneaton, Warwickshire, United Kingdom, CV11 4LZ, Tel: 02476 350505

Project
Chapel Lane, Witherley
Atherstone

Drawing Title
Pre-Development Impermeable Area Plan

Project No. CO21/294/07	Drawing No. 202	Issue P1
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PRELIMINARY



- General Notes:**
1. Do not scale this drawing. All dimensions are in metres unless otherwise noted. Any discrepancies are to be recorded and reported to the engineers immediately.
 2. This drawing is to be read in conjunction with all other engineers and architects drawings, and the specification.
 3. All work is to be to the satisfaction of the engineer and local authority building control.
 4. The contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
 5. All workmanship and materials are to be to current British Standards.
 6. All services are to be located and protected as necessary by the contractor prior to the commencement of the works.
 7. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the contractor. Any variations are to be recorded and reported to the engineer immediately.
 8. All highway works are to be in accordance with the local authorities design guide and specification.
 9. Prior to the occupation of the first dwelling, street nameplates shall be erected in accordance with the highway authority and to the wording agreed with the planning authority.
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KEY	
Post-Development Area	

Scale 1:250

5m 0m 5m 10m 15m

P1	Preliminary Issue	MC	BP	13.10.2021
Issue	Notes	Drawn	Approved	Date

jms Group
Engineering That Brings Design To Life.

Issuing Office:
JMS Midlands (Nuneaton): Victoria Court, 25 Tennant Street
Nuneaton, Warwickshire, United Kingdom, CV11 4LZ, Tel: 02476 350505

Project
Chapel Lane, Witherley
Atherstone

Drawing Title
Post-Development Impermeable Area Plan

Project No. CO21/294/07	Drawing No. 203	Issue P1
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PRELIMINARY

WONDERFUL ON TAP



Severn Trent Water Ltd
Regis Road
Wolverhampton
WV6 8RU

Tel: 0345 2667930 option 2
www.stwater.co.uk
network.solutions@severntrent.co.uk

Contact: Pierce Meguer

Your ref:
Our ref: 1022394

1st November 2021

Mou Choudhury
JMS Engineers (Midlands) Limited
Victoria Court
Tennant Street
Nuneaton
CV11 4LZ

FAO: mchoudhury@jmsengineers.co.uk

Dear Mou,

**Proposed development for 5 detached houses off Chapel Lane,
Witherley, Warwickshire.
X: 432960 Y: 297565**

I refer to your 'Development Enquiry Request' in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes which refer to surface water disposal from development sites.

Public Sewers in Site – Required Protection

No STW sewers in this location.

Due to a change in legislation on 1 October 2011, there may be former private sewers on the site which have transferred to the responsibility of Severn Trent Water Ltd, which are not shown on the statutory sewer records, but are located in your client's land. These sewers would also have protective strips that we will not allow to be built over. If such sewers are identified to be present on the site, please contact us for further guidance.

Foul Water Drainage

The sewer records indicate that the nearest foul sewer available is the 150mm combined water sewer on Chapel Lane. The best point of connection would be into manhole SP32978601 (circled purple), from the datum provided there should be sufficient fall, of approximately 2m, from the ground level of the site to the invert level of the manhole.

WONDERFUL ON TAP

SEVERN

TRENT

Anticipated foul flows from the proposed development (Approx 0.1l/s @ 2 DWF) should have no adverse hydraulic impact on the system. As such a gravity connection (direct or indirect) to the sewer at any convenient point is acceptable subject to a formal S.106 sewer connection approval (see later).

Surface Water Drainage

Under the terms of Section H of the Building Regulations 2010, the disposal of surface water by means of soakaways should be considered as the primary method. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is pursued.

If, following the testing, it is demonstrated that soakaways would not be possible on the site, then satisfactory evidence will need to be submitted. The evidence should be either percolation test results or a statement from the SI consultant (extract or a supplementary letter).

Severn Trent Water expects all surface water from the development to be drained in a sustainable way to the nearest watercourse or land drainage channel, subject to the developer discussing all aspects of the developments surface water drainage with the Local Lead Flood Authority (LLFA). Any discharge rate to a watercourse or drainage ditch will be determined by the LLFA / EA.

We would suggest that you explore the option to discharge the surface water flows to the ditch course off Chapel Lane, located on the opposite side of the road from your site.

New Connections

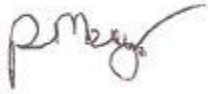
For any new connections (including the re-use of existing connections) to the public sewerage system, the developer will need to submit Section 106 application forms. Our New Connections department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 707 6600 or download from www.stwater.co.uk.

Please quote 1022394 in any future correspondence (including e-mails) with STW Limited. Please note that 'Development Enquiry' responses are only valid for 6 months from the date of this letter.

WONDERFUL ON TAP



Yours sincerely,

A handwritten signature in dark ink, appearing to read "P. Meguer".

Pierce Meguer
Network Solutions
Developer Services