



MA10967-FRA-PH2-R01

**Proposed Residential Development
Land Off Southgore Lane North
Leverton DN22 0AA**

UKSD Development Group Limited

Flood Risk Assessment

November 2018

millward

- Civil & Structural Engineering
- Environmental & Geotechnical
- Flood Risk & Drainage
- Highways & Infrastructure
- Structural Inspections
- Transportation

REVISION

Reference	Revision	Author	Date
MA10967-FRA-PH2-R01	Initial Issue for Planning	JMcK	Oct 2018

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Proposed Site Layout and Impermeable Areas: MA10967/601

UKSD-SA-08-0003 A.00- Proposed Site Layout Phase 2

1318 – Topographical survey

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Severn Trent Water Pre-Development Response 2015

Appendix C – WinDES Calculation Results

UK SUDS Greenfield Run Off Calculation

Proposed Peak Foul Flows

Source Control Surface water Attenuation Preliminary Volumes



1. INTRODUCTION

- 1.1 Millward have been appointed to undertake a Flood Risk Assessment (FRA) for Phase 2 of the proposed residential development on land adjacent to Orchard Lodge, Southgore Lane North Leverton. DN22 0AA.
- 1.2 The Phase 1 part of this site has been lodged under a separate application.
- 1.3 This FRA is undertaken in accordance with the National Planning Policy Framework.
- 1.4 This FRA discusses and provides both a qualitative assessment and quantitative assessment for the residential development in terms of flood risk, future flood risk over the anticipated lifetime of the development and reference to the sequential and exception test using a precautionary and risk based approach.



2 THE SITE

- 2.1 This proposed residential development is located to the west side of Southgore Lane on Greenfield Land just to the south of Orchard Lodge totalling 0.431 Hectares (3,306m²) in area. The site is located within the urban extents of North Leverton approximately 6 miles east of the centre of Retford. The site location is shown on drawing MA10967/004 contained within Appendix A.
- 2.2 Vehicular access to the development will via the new road junction (which would be constructed as part of the Phase 1 scheme) onto Southgore Lane to the frontage of the site as per the architects drawing contained within Appendix A.
- 2.3 As the site is not currently developed nor has been previously developed, the site is classed as Greenfield.
- 2.4 There is no evidence that the site is or has been formally drained into the existing adopted sewer system on Southgore Lane and it is assumed from the site visit that the land currently drains naturally towards the east (Southgore Lane) due to the topography of the land.
- 2.5 Site levels within the development area vary from 15.00m AOD to the frontage of the site (South East corner) onto Southgore Lane to 18.77m AOD in the western boundary the site to the rear of the site as confirmed by the levels on the topographical survey which is shown on drawing 1318 contained within Appendix A.
- 2.6 The site is currently 100% permeable and therefore the site surface water run-off has been calculated by the UK suds Greenfield Run off Calculator, which confirms a Greenfield run-off rate of 1.44 l/s for the 1 in 1-year event. The results are contained within Appendix C.



3 CONSULTATIONS

3.1 Environment Agency (EA)

- 3.1.1 The EA national flood risk maps available on their web site have been interrogated firstly to define in terms of planning what flood zone the site is contained within.
- 3.1.2 The development site is contained wholly within Flood Zone 1 which in accordance with Table 1 of the NPPF Technical Guidance document, is defined as Low Probability having less than a 1 in 1000 chance (<0.1%) of flooding from rivers in any one year.
- 3.1.3 Therefore further EA consultation has not taken place for this development as the development is in the lowest flood zone in terms of planning.
- 3.1.4 The Environment Agency standing advice note for sites within Flood Zone 1 greater than 1 hectare in size requires a flood risk assessment to be undertaken which should concentrate on dealing with the proposed surface water run-off from the site and how the run-off is dealt with and controlled.
- 3.1.5 The drainage for the site will be dealt with by sustainable drainage techniques and would be tied into the Phase 1 development.

3.2 Severn Trent Water (STW)

- 3.2.1 STW have been consulted regarding this development and a pre development enquiry has been lodged.
- 3.2.2 The STW response is provided in Appendix B from the previous application in 2015 and confirms that Foul water flows from this development can be accommodated within the sewer network with a new connection onto the existing 150mm diameter foul sewer on Southgore Lane, adjacent to Orchard Lodge. (This solution may require pumping of the development drainage). This will be verified through the results of a new pre-development enquiry if there is any change to the situation.



- 3.2.3 STW have previously stated that disposal of surface water should be by soakaways if viable. If this is not viable and there are no watercourses available then discharge to the nearest public combined sewer in Southgore Lane some 250m north of the site is acceptable in principle with a restriction in outflow to 5 l/s/ha. (This solution may require pumping of the development drainage). This 5 l/s/ha would take both the Phase 1 and Phase 2 foul flows together as whole.
- 3.2.4 The connections to the existing adopted sewer are subject to a S106 application which would be undertaken as part of the detailed design of the drainage for the development.



4 SEQUENTIAL AND EXCEPTION TESTS

4.1 Sequential Test

- 4.1.1 The site has been assessed in line with the Department for Environment, Food & Rural Affairs and The Environment Agency . The site is confirmed to be within Flood Zone 1 (Low probability). Residential development (buildings used for dwelling houses) is classified as 'More Vulnerable' development.
- 4.1.2 More vulnerable' development in Flood Zone 1 is considered appropriate.'
- 4.1.3 In terms of Sequential Test there are no areas within a lower flood risk zone as zone 1 is the lowest risk zone.
- 4.1.4 As the development principle of residential is deemed appropriate in terms of Sequential Test, the Exception Test does not apply.



5 PROPOSED DEVELOPMENT

- 5.1 The proposed phase 2 development proposals consist of 9 no detached dwellings in total with associated driveways and garages (off road) and generously sized garden areas to the rear of the proposed buildings. The site is accessed by a central cul-de-sac access road with a turning head at the western end for service vehicles. The proposed block plan layout of the development is shown on drawing UKSD-SA-08-0003-A00 contained within in Appendix A.
- 5.2 The impermeable areas of the proposed site are 57% (0.245Ha) as shown on drawing MA10967/601 contained in Appendix A which is an increase in impermeable area on the site, which therefore will require mitigation measures in terms of surface water drainage.
- 5.3 The proposals will also look into provision of permeable paving solutions to the driveways and potentially soakaways for roof drainage subject to on site percolation testing of the soil strata. Desk top investigations in the Phase 1 Geo-Environmental Study suggests the site is underlain by cohesive soils which do not lend themselves to infiltration SUDS. Therefore on site testing would be required before detailed design of any drainage system for the site to determine if soakaways are potentially viable at this site.
- 5.4 Foul drainage would connect into the existing Severn Trent Water sewer network in Southgore Lane with anticipated peak foul flows of less than 1 l/s (Circa 0.8 l/s peak cumulative for Phases 1 and 2) into the existing sewer.



5.5 As the site is located within Flood Zone 1 (Low probability of flooding from Watercourses) there is no requirement to set minimum finished floor levels on the site. However, as part of the detailed design of the site levels it should be ensured that the finished floor levels of the properties are not within localised low points within the site which would put them at risk of surface water flooding. As the site naturally falls west to east as a pretty constant gradient then this existing topography can be easily utilised to ensure this is not the case.



6 FLOOD RISK

6.1 Flooding From Watercourses

6.1.1 The development area is shown within Flood Zone 1 (Less than a 1 in 1000 (0.1%) chance of flooding in any one year – Low Probability in line with the NPPF) from watercourses.

6.1.2 The risk of flooding to the development area from fluvial sources is considered to be **LOW** probability as the site is situated in the lowest flood zone from this source.

6.2 Flooding From Land / Adjacent Development

6.2.1 The main risk of flooding to this site is from the impermeable surfaces within the adjacent residential area surrounding the site which due to failure of the existing adopted drainage systems or intense rainfall saturating the soil resulting in run off over land instead of infiltration or interception by drainage infrastructure.

6.2.2 Any overland flow from adjacent development site is likely to be shallow and there are no low points within the site which would create a localised depression in the ground which would be at risk of ponding / pooling water from this source.

6.2.3 Overall the risk of flooding from this source is considered to be **LOW**.

6.3 Flooding From Infrastructure Failure

6.3.1 The site is not within an area deemed to be at risk of flooding from reservoirs (according to the data on the EA website).

6.3.2 As the site is outside the limits of any deemed flood extents from a reservoir failure, the risk of flooding to the site considered **LOW**.



6.4 Flooding From Groundwater

- 6.4.1 There are no confirmed records of groundwater flooding in the vicinity of the site in the SFRA.
- 6.4.2 Overall the risk of flooding from this source is considered to be **LOW**. As there should not be any dwellings in localised low points within the site it is not considered further assessment is required to assess flooding from this source.

6.5 Flooding From Sewers

- 6.5.1 There are existing adopted sewers within Southgore Lane to the east of the site.
- 6.5.2 If any of these sewers were to flood, the water flow routes would be along the existing highway (Southgore Lane) and would be considered to be shallow in depth. The site topography rises up from Southgore Lane which would ensure that any flow routes from flooding of the sewers would not affect any properties on the site.
- 6.5.3 Overall the risk of flooding from this source is considered to be **LOW**.

6.6 Flooding From Climate Change

- 6.6.1 The NPPF Technical Guidance Document confirms in Table 5 that peak rainfall intensity is estimated to increase up to 40% over the lifetime of this development (100 years) and peak river flows by 20%.
- 6.6.2 As the site is within Flood Zone 1 which has less than 1 in 1000 chance of flooding from watercourses in any one year, the effects of climate change are not a material consideration in terms of increased flood risk to the site itself.
- 6.6.3 The proposed site drainage will however be designed not to flood with an allowance of 40% for climate change in line with the latest Climate Change Guidance
- 6.6.4 Overall the risk of flooding from this source is considered to be **LOW**.



7 MITIGATION MEASURES

7.1 Essential Mitigation Measures

7.1.1 The assessment of flood risk in Section 6 of this assessment confirms a **LOW** risk of flooding from all sources of flooding.

7.1.2 Therefore, there is one essential mitigation measure required for the proposed site which is that the proposed drainage design for the site should be designed to accommodate the 1 in 100-year event storm scenarios including a 40% allowance for climate change.

7.2 Recommended Mitigation Measures

7.2.1 All dwellings should have concrete ground floors with damp proof membranes as they are regarded as the most flood resilient floor types with effective connections between the dpc and dpm. The dpm should be between the surface screed and the concrete slab as this enables the concrete floor to dry out quickly and would also protect against any rising groundwater (unlikely) should flood risk from this source increase over the lifetime of the development.

7.2.2 The proposed drainage design for the development should be restricted in run off to equivalent Greenfield run off rate if infiltration SUDS are viable. Permeable paving and infiltration techniques for surface water discharge should be further investigated by on site testing as part of any detailed design which we recommend is conditioned into any planning approval.

7.2.3 Permeable paving to private driveways and parking areas should be utilised even if infiltration SUDS are not viable as permeable paving can be designed into a sealed system before outfall into either the sewer or drainage ditch. This would form part of a SUDS treatment train in line with CIRIA C697. This would be in line with the Parish Council's pre planning response regarding this development site.



- 7.2.4 Consideration should be given to the potential of permeable paving to the main access road into the site as part of any detailed drainage design.
- 7.2.5 If infiltration SUDS are not viable for this site, then it is recommended that the maximum surface water discharge rate for this site (phase 1 and phase 2 cumulative) should be 5 l/s which is applicable up to and including the 1 in 100-year event scenario including 40% allowance for climate change. 5 l/s is considered the minimum viable discharge rate which can be sustainably controlled in line with the Severn Trent Water adoption requirements.
- 7.2.6 The outfall for surface water drainage from this site should either be into any existing STW adopted combined sewer (Subject to STW approvals some 250m North of the site which may require pumping) or into the existing drainage ditch to the south east corner of the site (to the frontage of Olinda) subject to further investigation as to the condition of this watercourse / ditch.
- 7.2.7 Further investigations will be required as part of the detailed design of the drainage outfall which may require off site mitigation works to this existing drainage ditch to ensure free flow of the ditch.
- 7.2.8 Preliminary attenuation requirements for this site based upon a 5l/s outfall rate (assuming infiltration SUDS are not viable) are between 381m³ and 519m³ (Based upon quick storage estimate in WinDES source control) for the cumulative of Phase 1 and Phase 2 developments.
- 7.2.9 This attenuation could be provided in the form of swales, oversized pipes, cellular storage and permeable paving mediums (could be a combination of some or all of the methods). Due to the size of the site it is not considered viable to introduce a pond structure within the proposals but this options should be further considered and justification as to inclusion or exclusion be provided as part of the detailed design of the site drainage process.



7.2.10 Where external gradients fall towards the dwellings on this site which will be required due to the topography of the site., then suitable linear drainage (or other suitable drainage) should be provided to ensure that any overland flows are intercepted before presenting a risk of flooding to the internals of the dwellings (this applies to the rear of the buildings where site levels are slightly higher than the frontage levels.



8 CONCLUSIONS

- 8.1 This Flood Risk Assessment serves to review, assess and quantify (where applicable) the sources, or any potential flooding, the pathways of this flooding and potential receptors within the vicinity of the site.
- 8.2 The assessment of flood risk undertaken for this development confirms that the risk of flooding is **LOW** from all sources of flooding.
- 8.3 As the site is outside the limits of flooding at the 1 in 100 year event including climate change safe, dry access egress to the dwellings at the 1 in 100 year event is achievable along Southgore Lane.
- 8.4 The recommended mitigation measures will provide further protection to the development and reduce any residual risk (however low) as far as practicable. It is recommended that compliance with the recommendations of this FRA are conditioned as part of any planning permission.
- 8.5 This assessment concludes that the site is suitable for development for residential use without unacceptable risk of flooding from all sources to the site itself and elsewhere.



Appendix A – Drawings

Site Location Plan: MA10967/004

Proposed Site Layout and Impermeable Areas: MA10967/601

UKSD-SA-08-0003 A.00- Proposed Site Layout Phase 2

1318 – Topographical survey





North Leverton with Hablesthorpe

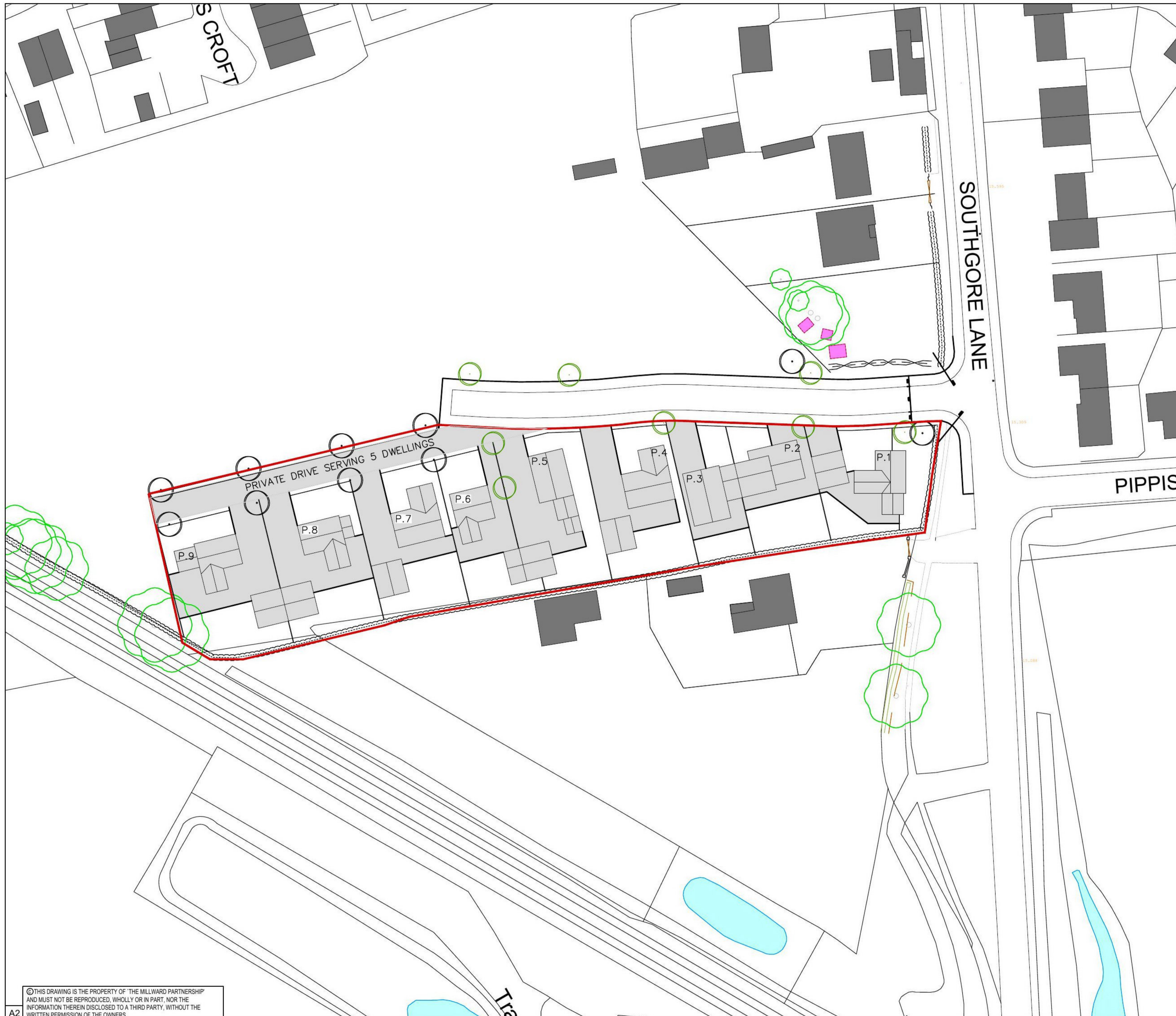
**SITE
LOCATION**

ASSOCIATED DRAWINGS				
No.	TITLE			
NOTES				
REV	DATE	BY	DETAILS	CHKD
AMENDMENTS				
CLIENT				
Mr & Mrs Bland				
PROJECT				
Land Off Southgore Lane North Leverton DN22 0AA				
TITLE				
Site Location Phase 2				
DRAWING No:		DRAWING STATUS		
MA10967/004		PLANNING		
SCALE	DRAWN	ENGINEER		
1:5000	JMcK	JMCK		
DATE	CHECKED	APPROVED BY		
October 2018	JMcK	JMCK		

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A3


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ASSOCIATED DRAWINGS

No.	TITLE

NOTES

-  Impermeable Areas total 0.245Ha
- Total Site Area 0.431 Ha

REV	DATE	BY	DETAILS	CHK'D

AMENDMENTS

CLIENT
Mr & Mrs Bland

PROJECT
**Land Off Southgore Lane
North Leverton
DN22 0AA**

TITLE
Proposed
Impermeable Areas
Phase 2

DRAWING No: MA10967/601
DRAWING STATUS: PLANNING

SCALE	1:500	DRAWN	JMcK	ENGINEER	JMcK
DATE	October 2018	CHECKED	JMcK	APPROVED BY	JMcK

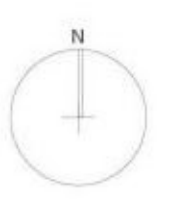


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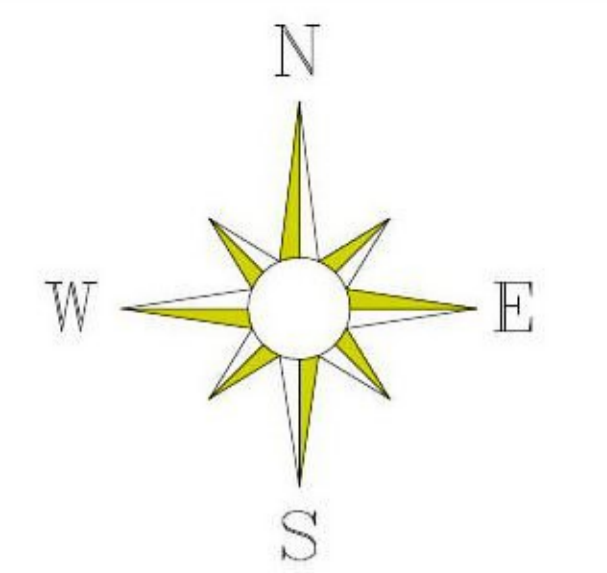
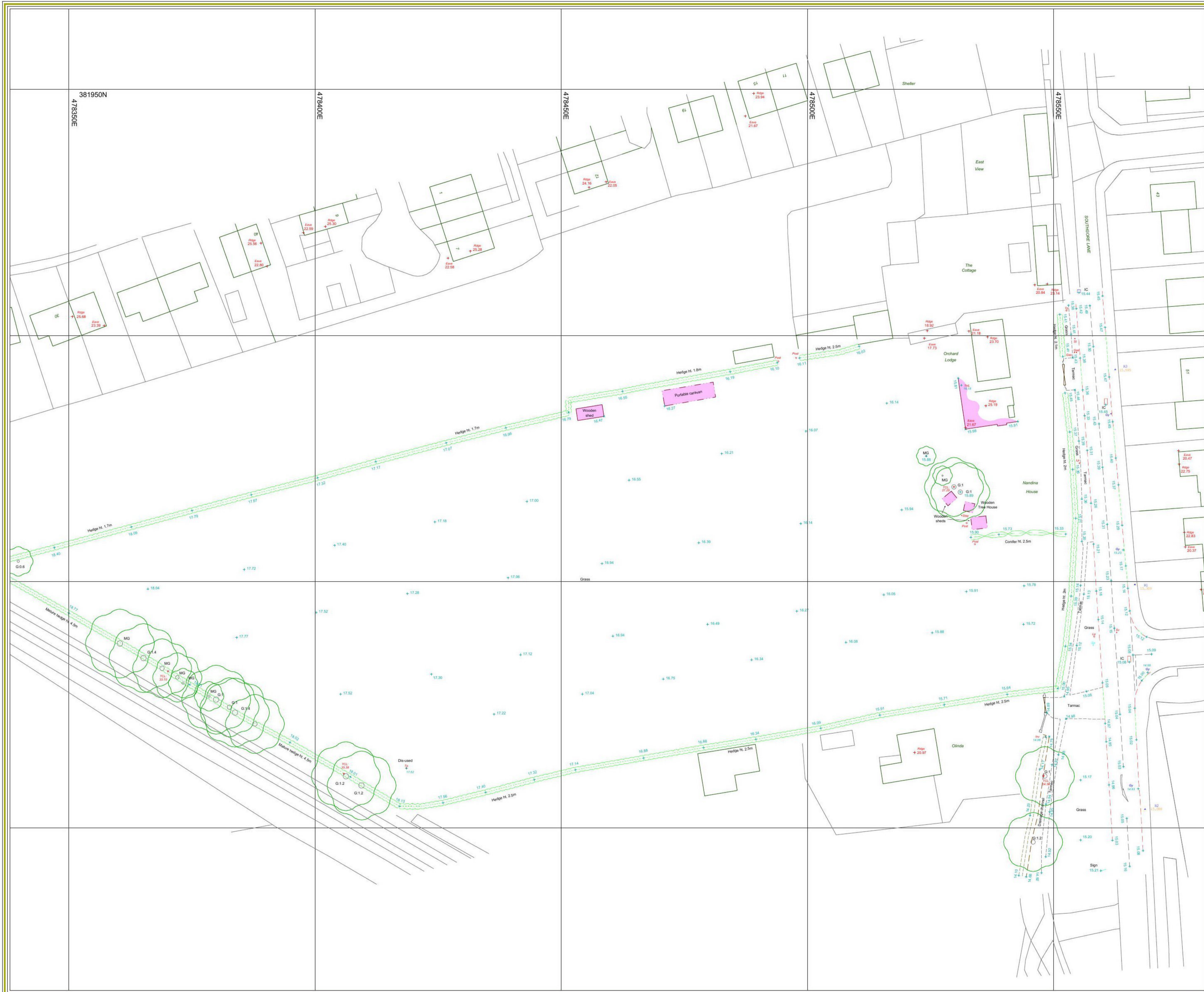
Notes
 All dimensions to be verified on site. Do not scale this drawing. All discrepancies to be clarified with project Architect.
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 The CDM 2015 hazard management procedure for the UKSD aspects of the design of this project are to be based on the 'UKSD - Designer's Hazard Identification and Management Sheet' and/or drawings. The full project design team's comprehensive set of hazard management procedures are available from the Planning Supervisor/Safety Coordinator appointed for the project.



Rev	Date	Description	By	Chk'd

Client: UKSD LIMITED
 Project Name: RESIDENTIAL DEVELOPMENT SOUTHGORE LANE NORTH LEVERTON RETFORD
 Drawing Title: PROPOSED OUTLINE SITE MASTERPLAN
 Scale: 1:500 @ A1 Date: OCTOBER 2018
 Job No: 1580 Drawing No: UKSD-P2-08-0003 Revision No: A.00

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KEY:

IC	Institution (shelter)	Ph	Fire Hydrant	SH	Shed Hole
CL	Clear Level	SC	Stop Sign	TH	Track Hole
LC	Level Line	Sv	Stop Valve	Pb	Post Box
Pl	Pipe (man)	Wp	Water Pipe	Lb	Letter Box
Gy	Gully	Wm	Waste Man	Rp	Road
Ry	Rail Gully	Wkr	Water Meter	TCB	Telephone Call Box
MH	Manhole	Wp	Water Post	THL	Telephone Lead
EC	Electric	Ep	Electric Post	Re	Working Eye
HT	High Tension	Wp	Water Post	DK	Drop Kerb
Tp	Traffic Post	WHL	Water Level	Ck	Clack
TL	Traffic Light	HC	Height	Cr	Earth Rod
Rd	Road Stop	FL	Internal Floor Level	BM	Benchmark
G	Gate	TH	Tree Hole		
MG	Manhole				

Legend:

Road	--- (dashed line)	Verge Grass	--- (dotted line)
Drop Kerb	--- (dashed line)	Verge Tarmac	--- (dotted line)
Verge Tarmac	--- (dashed line)	Verge Concrete	--- (dotted line)
Verge Concrete	--- (dashed line)	Bottoms	--- (dotted line)

Ordnance Survey information is provided for a guide only.

OS BUILDING OUTLINE
OS DETAIL

Station	Easting (m)	Northing (m)	Level (m)
R1	478566.498	381849.448	15.309
R2	478568.558	381803.811	15.088
R3	478562.505	381893.099	15.595

REV	DATE	DESCRIPTION OF WORK	SURVEYOR	CHECKED
-----	------	---------------------	----------	---------

MMPMATIC
LAND SURVEYING & SITE ENGINEERING

Mapmatic, 4 St George's House, Vernon Gate, Derby, DE1 1UG
Tel/Fax: 01332 650580 MAPMATIC.COM EMAIL: INFO@MAPMATIC.COM

CLIENT Henry Taylor
Building Surveyors

PROJECT Land at Southgore Lane
North Leverton

TITLE Topographical
Survey

SCALE	1:500@A2	DATE	24.03.15
DRAWN	RP	CHECKED	AW
Level datum	OS GPS	Grid orientation	OS GPS
Job number	1318	Rev.	0

NOTES:
All critical measurements should be checked on site prior to design.
No liability will be taken for this plan if passed on to 3rd parties.
Trees and other survey data may be omitted due to dense vegetation.
Please note drainage information has been ascertained by visual inspection from the surface and therefore values are estimated.
This survey was carried out on the 24th of March 2015. The survey was carried out using a Leica TS12 total station and a Leica GNSS receiver. The survey was carried out on the 24th of March 2015. The survey was carried out using a Leica TS12 total station and a Leica GNSS receiver. The survey was carried out on the 24th of March 2015. The survey was carried out using a Leica TS12 total station and a Leica GNSS receiver.



Appendix B – Consultations

Severn Trent Water Pre-Development Response 2015





Millward Partnership
1 Main Hill
Nottingham
NG1 1JQ

FAO: Jason McKellar

10th April 2015

Dear Mr McKellar

**Proposed Residential Development (15 New Dwellings) at:
Southgore Lane, North Leverton, Retford, DN22 0DN**

I refer to your Development Enquiry Request submitted in respect of the above site. Please find enclosed the sewer records that are included in the fee together with the Supplementary Guidance Notes (SGN) referred to below.

Public Sewers in Site – Required Protection

There are no public sewers shown crossing the site on our sewer records. Due to a change in legislation on 1 October 2011 there may also 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 require protective strips of 2.5 metres either side of the sewer's centreline 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 enclosed sewer record extract shows a 150mm diameter public foul water sewer in Southgore Lane. A foul connection for 15 new dwellings could be accommodated in this sewer. Please be advised that a new connection to this sewer could be made subject to a formal S106 connection approval (see later). Please submit foul water drainage proposals based on these comments for review when available.

Severn Trent Water
Severn Trent Water Ltd
Leicester Water Centre
Gorse Hill
Anstey
Leicester
LE7 7GU

Tel: 0116 234 3834
Fax: 0116 234 3035

www.stwater.co.uk
net.dev.east@severntrent.co.uk

Contact: Asif Mussa

Your ref:
Our ref: WT31680 / 8178490



Surface Water Drainage

Under the terms of Section H of the Building Regulations 2000, the disposal of surface water by means of soakaways should be considered as the primary method. If this is not practical and no watercourse is available as an alternative, the use of sewerage should be considered. In addition, other sustainable drainage methods should also be explored before a discharge to the public sewerage system is considered.

In the event that following testing, it is demonstrated that soakaways would not be possible on the site; 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). This would satisfy SGN1 (enclosed).

According to our sewer records, the nearest public surface water sewer in Southgore Lane is approximately 250 metres to the North of the site. A surface water connection to the available public combined water sewer would be acceptable subject to formal S106 approval (see later) with the discharge rate requested to be restricted to 5 litres / second / hectare as SGN3 (Greenfield site). Any flows exceeding this would need to be appropriately attenuated on site and discharged at a controlled rate. Please submit surface water drainage proposals based on these comments for review when available.

New Connections

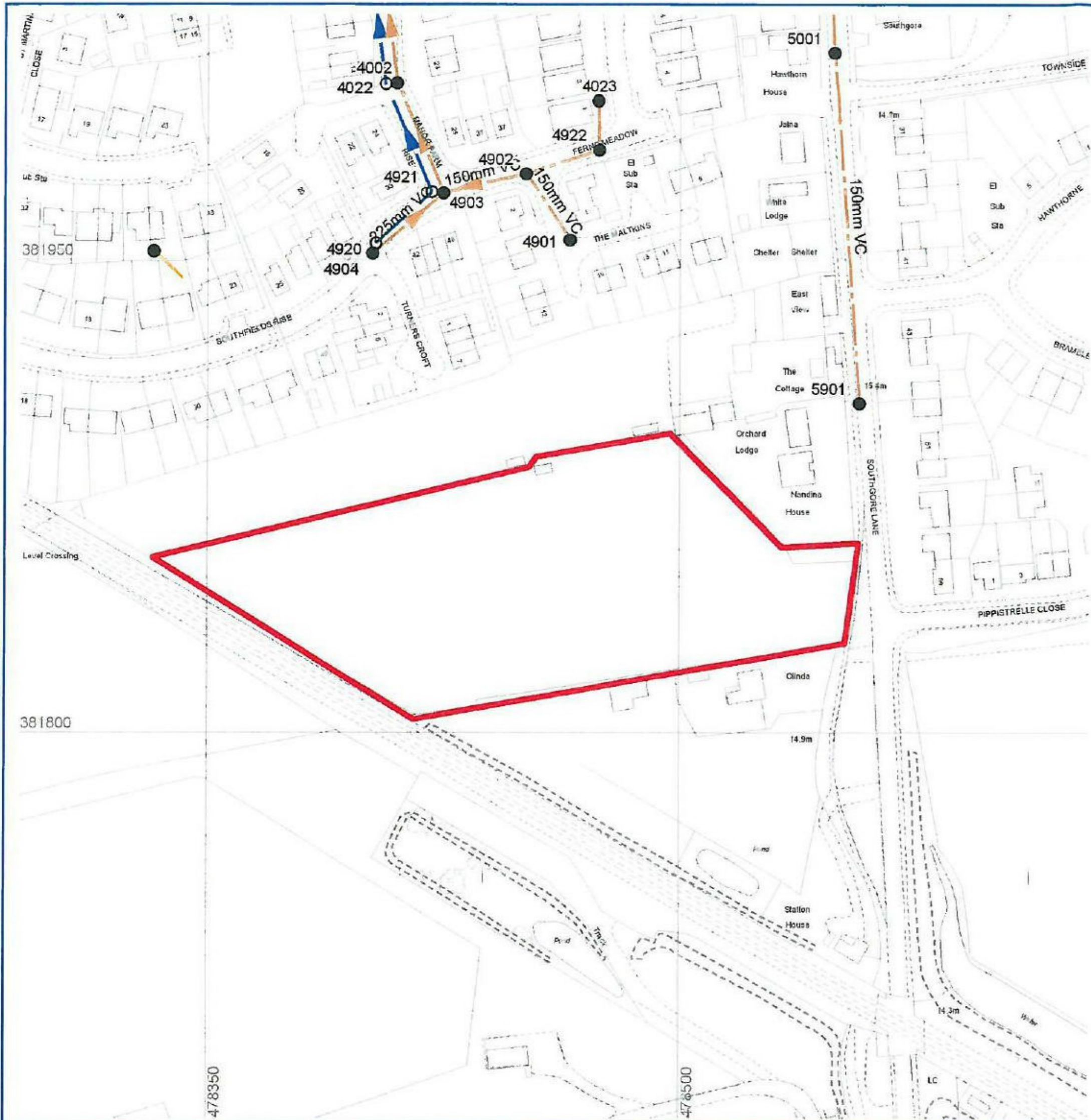
For any new connections (including the re-use of existing connections) to the public sewerage system, you will need to submit a Section 106 application form. Our New Connections department are responsible for handling all such enquiries and applications. To contact them for an application form and associated guidance notes please call 0800 7076600 or download from www.stwater.co.uk.

Please quote WT31680 / SAP8178490 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.

Yours sincerely,

A black rectangular box redacting the signature of Asif Mussa.

Asif Mussa
Waste Water Services - Asset Protection (East)



Sewer Node Sewer Pipe Data

REFERENCE	COVER LEVEL	INV LEVEL UPSTR	INV LEVEL DOWNSTR	PURP	MATL	SHAPE	MAX SIZE	MIN SIZE	GRADIENT	YEAR LAID
SK78814901	16.87	15.84	15.48	F	VC	C	150	nil	70.11	nil
SK78814902	16.92	15.41	15.20	F	VC	C	150	nil	127.05	nil
SK78814903	17.33	15.11	14.80	F	VC	C	225	nil	122.84	nil
SK78814904	17.39	15.65	15.12	F	VC	C	225	nil	53.83	nil
SK78814920	17.39	16.25	15.69	S	VC	C	225	nil	42.84	nil
SK78814921	17.33	15.69	15.10	S	VC	C	225	nil	63.64	nil
SK78814922	16.86	15.69	nil	F	PVC	C	150	nil	2.10	2005
SK78815901	15.16	13.64	13.22	F	VC	C	150	nil	264.98	nil
SK78824002	17.69	14.79	14.08	F	VC	C	225	nil	81.07	nil
SK78824022	17.69	15.10	14.25	S	VC	C	225	nil	78.46	nil
SK78824023	16.82	15.73	15.69	F	PVC	C	150	nil	212.50	2005
SK78825001	14.67	13.21	11.04	F	VC	C	150	nil	48.82	nil

Legend

- Abandoned Gravity Sewer
- Private Combined Gravity Sewer
- Private Foul Gravity Sewer
- Private Surface Water Gravity Sewer
- Public Combined Gravity Sewer
- Public Foul Gravity Sewer
- Public Surface Water Gravity Sewer
- Trunk Combined Gravity Sewer
- Trunk Foul Use Gravity Sewer
- Trunk Surface Water Gravity Sewer
- Combined Use Pressurised Sewer
- Foul Use Pressurised Sewer
- Surface Water Pressurised Sewer
- Highway Drain
- Combined Lateral Drain (SS)
- Foul Lateral Drain (SS)
- Surface Water Lateral Drain (SS)
- Culverted Watercourse
- Cable, Earthing
- Cable Junction
- Cable, Optical Fibre/Instrumentation
- Cable, Low Voltage
- Cable, High Voltage
- Cable, Other
- Housing, Building
- Housing, Kiosk
- Disposal Site
- Sewage Treatment Works
- Housing, Other
- Pipe Support Structure
- Sewage Pumping Facility
- Sewer Facility Connection Inlet / Outlet
- Blind Shaft
- Combined Use Manhole
- Flushing Chamber
- Foul Use Manhole
- Grease Trap
- Head Node
- Hydrobrake
- Lampole
- Outfall
- Overflow
- Penstock
- Patrol Interceptor
- Sewer Chemical Injection Point
- Sewer Junction
- Sewerage Air Valve
- Sewerage Hatch Box Point
- Sewerage Isolation Valve
- Soakaway
- Surface Water Manhole
- Vent Column
- Waste Water Storage
- Pre-1937 Properties

TABULAR KEY

A. Sewer pipe data refers to downstream sewer pipe.
B. Where the node bifurcates (splits) X and Y indicates downstream sewer pipe.
C. Gradient is stated as 1 in...

MATERIALS

- NONE
- AC - ASBESTOS CEMENT
- BR - BRICK
- CC - CONCRETE BOX CULVERT
- CI - CAST IRON
- CO - CONCRETE
- CSB - CONCRETE SEGMENTS (BOLTED)
- CSU - CONCRETE SEGMENTS (UNBOLTED)
- DI - DUCTILE IRON
- GRC - GLASS REINFORCED CONCRETE
- GRP - GLASS REINFORCED PLASTIC
- MAC - MASONRY IN REGULAR COURSES
- MAR - MASONRY RANDOMLY COURSED
- PE - POLYETHYLENE
- PF - PITCH
- PP - POLYPROPYLENE
- PSC - PLASTIC STEEL COMPOSITE
- PVC - POLYVINYL CHLORIDE
- RPM - REINFORCED PLASTIC MATRIX
- SI - SPUN (GREY) IRON
- ST - STEEL
- U - UNKNOWN
- VC - VITRIFIED CLAY
- XXX - OTHER

SHAPE

- C - CIRCULAR
- E - EGG SHAPED
- O - OTHER
- R - RECTANGLE
- S - SQUARE
- T - TRAPEZOIDAL
- U - UNKNOWN

PURPOSE

- C - COMBINED
- E - FINAL EFFLUENT
- F - FOUL
- L - SLUDGE
- S - SURFACE WATER

CATEGORIES

- W - WEIR
- C - CASCADE
- DB - DAMBOARD
- SE - SIDE ENTRY
- FV - FLAP VALVE
- BD - BACK DROP
- S - SIPHON
- HD - HIGHWAY DRAIN
- S104 - SECTION 104

SEWER RECORD (Tabular)

O/S Map scale: 1:1750
 Date of issue: 10.04.15
 Sheet No. 1 of 1

This map is centred upon:
 O / S Grid reference:
 x : 478460
 y : 381852

Disclaimer Statement:
 1. Do not scale off this map.
 2. This map 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 Map 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's assets or for the purposes of determining the suitability of a point of connection to the sewerage or distribution systems.
 3. On 1 October 2015 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 (date to be confirmed). Private pumping stations, which form part of these sewers or lateral drains, will transfer to the 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 this Map.
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SEVERN TRENT WATER

Severn Trent Water Limited
 Asset Data Management
 PO Box 3344
 Coventry CV3 9FT
 Telephone: 0845 601 6616

Appendix C – WinDES Calculation Results

UK SUDS Greenfield Run Off Calculation

Proposed Peak Foul Flows

Source Control Surface water Attenuation Preliminary Volumes



Calculated by: Jason McKellar
 Site name: Southgore Ln Ph2
 Site location: North Leverton

Site coordinates

Latitude: 53.32758° N
 Longitude: 0.82309° W

This is an estimation of the greenfield runoff rate limits that are needed to meet normal best practice criteria in line with Environment Agency guidance "Preliminary rainfall runoff management for developments", W5-074/A/TR1/1 rev. E (2012) and the SuDS Manual, C753 (Ciria, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Reference: 6451054

Date: 2018-10-22T10:34:12

Methodology	IH124
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Site characteristics

Total site area (ha)	0.431
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Methodology

Qbar estimation method	Calculate from SPR and SAAR
SPR estimation method	Calculate from SOIL type

	Default	Edited
SOIL type	4	4
HOST class	---	---
SPR/SPRHOST	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm)	599	599
Hydrological region	4	4
Growth curve factor: 1 year	0.83	0.83
Growth curve factor: 30 year	2	2
Growth curve factor: 100 year	2.57	2.57

Notes:

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


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

Where flow rates are less than 5.0 l/s consents are usually set at 5.0l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set in which case blockage work must be addressed by using appropriate drainage elements.

(3) Is $SPR/SPRHOST \leq 0.3$?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	1.73	1.73
1 in 1 year (l/s)	1.44	1.44
1 in 30 years (l/s)	3.47	3.47
1 in 100 years (l/s)	4.46	4.46

The Millward Partnership		Page 1
1 Malin Hill Nottingham NG1 1JQ	Southgore Ln North Leverton Foul Flows	
Date 22/10/2018 10:55 File MA10967 Foul Flows.mdx	Designed by JMcK Checked by	
XP Solutions	Network 2017.1.2	

FOUL SEWERAGE DESIGN


Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	222.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	10.000	0.067	150.0	0.000	18	0.0	1.500	o	100	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse (l/s)	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	12.000	0.000	0.0	18	0.0	30	0.42	0.54	4.3	0.8

Quick Storage Estimate

Micro Drainage

Variables

Results

Design

Overview 2D

Overview 3D

Vt

Results

Global Variables require approximate storage of between 381 m³ and 519 m³.

These values are estimates only and should not be used for design purposes.

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

Quick Storage Estimate

Micro Drainage

Variables

Results

Design

Overview 2D

Overview 3D

Vt

FSR Rainfall

Return Period (years) 100

Region England and Wales

Map

M5-60 (mm) 19.000

Ratio R 0.403

Cv (Summer) 0.750

Cv (Winter) 0.840

Impervious Area (ha) 0.695

Maximum Allowable Discharge (l/s) 5.0

Infiltration Coefficient (m/hr) 0.00000

Safety Factor 2.0

Climate Change (%) 40

Analyse OK Cancel Help

Enter Climate Change between -100 and 600