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Ref: 6196/R1
Rev A

Preston Road
Longridge

Flood Risk Assessment

December 2017

REPORT DETAILS

Site Name: Preston Road, Longridge

Report Title: Flood Risk Assessment

Report Number: 6196/R1

Revision	Date	Status
-	December 2017	
A	January 2018	

Client: Kier Living Ltd

Client Contact: Andrew Tee

Prepared By: John E Lees B.Sc., C.Eng., M.I.C.E., M.C.I.W.E.M.

CONTENTS

APPENDICES

1.0 INTRODUCTION

1.1 Lees Roxburgh have been instructed by Kier Living Limited to carry out a Flood Risk Assessment (FRA) for proposed the residential development of land off Preston Road, Longridge.

1.2 The site has the benefit of an outline planning consent granted on 18th September 2017 (Ref. 3/2016/0974). This report has been prepared to accompany a detailed planning application.

1.3 The site lies within an area designated on EA Flood mapping as Flood Risk Zone 1 and therefore comprises land assessed as having a less than a 1 in 1000 annual probability of river or sea flooding in any year.

1.4 *The National Planning Policy Framework (NPPF)* and the accompanying *Planning Practice Guidance* set out the requirements for addressing flood risk with respect to potential development sites.

In accordance with the NPPF at over 1 hectare in area the site is required to be the subject of an FRA.

1.5 Developers are required to provide an assessment which addresses the following;

- The potential for the proposed development to be affected by flooding either from the development proposal or external sources.
- The potential for the proposed development to increase the flood risk elsewhere.
- That mitigation measures introduced to deal with any risks identified can be successfully managed.
- That the site can be developed and occupied safely.

The NPPF indicates that an assessment of flood risk should be proportionate to the risk and appropriate to the scale, nature and location of the development. This report reflects the requirements of the NPPF in this regard.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Location

2.1.1 The site is centred on National Grid references SD59913, 35938 **(Appendix 1)** and comprises a total area of 18.84ha.

2.1.2 The site is situated to the southern outskirts of Longridge some 8km to the north east of Preston city centre.

2.2 Surrounding Land Use and Access

2.2.1 The site is bounded by residential development within Longridge to the north, including the current Miller Homes Development.

2.2.2 The site fronts onto the B6243 Preston Road to the east, from which access to the Miller Homes development is achieved, with open countryside beyond.

To the south and west is open countryside which continues around Longridge to the north.

2.2.3 Three large elevated reservoirs, Alston Reservoir No.1, No.2 and No.3 are located just beyond Preston Road to the north east of the site.

2.2.4 A dismantled railway runs north east to south west about 200m from the site at its closest.

2.2.5 Numerous farms are recorded in the area including Bolton Fold Farm, Daniels Farm and Alston Folds Farm immediately to the south of the site.

2.3 Site Description

2.3.1 The site substantially comprises 6 No. open fields, used as pasture for sheep and cows.

Internal and external field boundaries are generally formed by timber and post/wire fences, reinforced in places with hedges and occasional trees. There are garden fences, as well as post and wire fencing to the boundary of the residential properties to the north of the site.

2.3.2 A high voltage overhead power line cuts across the very northern area of the site and is supported by two pylons within the site area.

Charnley Farm, Fold and Cottage buildings share frontage to Preston Road but lie outside the site area.

2.3.3 There are four ponds recorded within the north west area of the site, although only two of them contained much water at the time of the site visit on 9th October 2014.

2.4 Topography

2.4.1 Ground levels across the site are uniform, falling generally in a south/south westerly direction.

2.4.2 Reference should be made to the topographical survey (**Appendix 2**) but levels can be summarised as follows;

- North east boundary with Preston Road … 83m AOD
- North west boundary… 85m AOD
- South west boundary… 77m AOD
- South east boundary adjacent to Preston Road… 78.5m AOD

2.4.3 Slopes in a north east to south westerly direction average 1 in 86**.**

2.5 Existing Drainage

2.5.1 Numerous minor watercourse systems are recorded in the area, including within the site.

The nearest main river system is Savick Brook located just beyond the dismantled railway to the north west.

The systems within the site generally flow in a south/south westerly direction through Tippings Farm and Dam House Farm before turning westerly towards Savick Brook.

Drainage to the opposite side of Preston Road generally falls in a southerly direction towards Turn Brook.

2.5.2 Within the site, three systems are recorded on OS mapping and have been confirmed on site.

2.5.3 Much of the western boundary of the site is formed by a deep ditch which commences with two separate surface water outfalls from the Longridge housing development at the northern site boundary. This ditch system collects a new 225mm diameter outfall from the Miller Homes development, before joining with a second ditch system which crosses the site from northeast to southwest. This latter ditch commences with a 300mm outfall pipe close to the site boundary with properties associated with Grimbledeston Farm.

2.5.4 Close to the south eastern site boundary, and running parallel with the Preston Road frontage, a short section of drain issues just south of Charnley Cottage before sinking in what appears to be a south easterly culvert direction. No obvious outfall for this culverted system was located within, or adjacent to the site, on the opposite side of Preston Road. It is presumed to connect with Turn Brook beyond Bolton Fold Farm.

2.5.5 A manhole was noted in Preston Road providing some evidence of a highway drainage system.

2.6 Development Proposals

2.6.1 The development proposals comprise 256 No. dwellings and are incorporated in **Appendix 5.**

3.0 FLOOD RISK

3.1 Flood Mapping

3.1.1 Gov. UK Flood Map for Planning

3.1.1.1 Reference to the Gov.UK Flood Map for Planning **(Figure. 1)** indicates that the site is situated within a Flood Zone 1 Area of flood risk. This is land defined within the NPPF as assessed as having a less than 1 in 1000 annual probability of flooding (<0.1% in any year). All uses of land are appropriate in this zone.

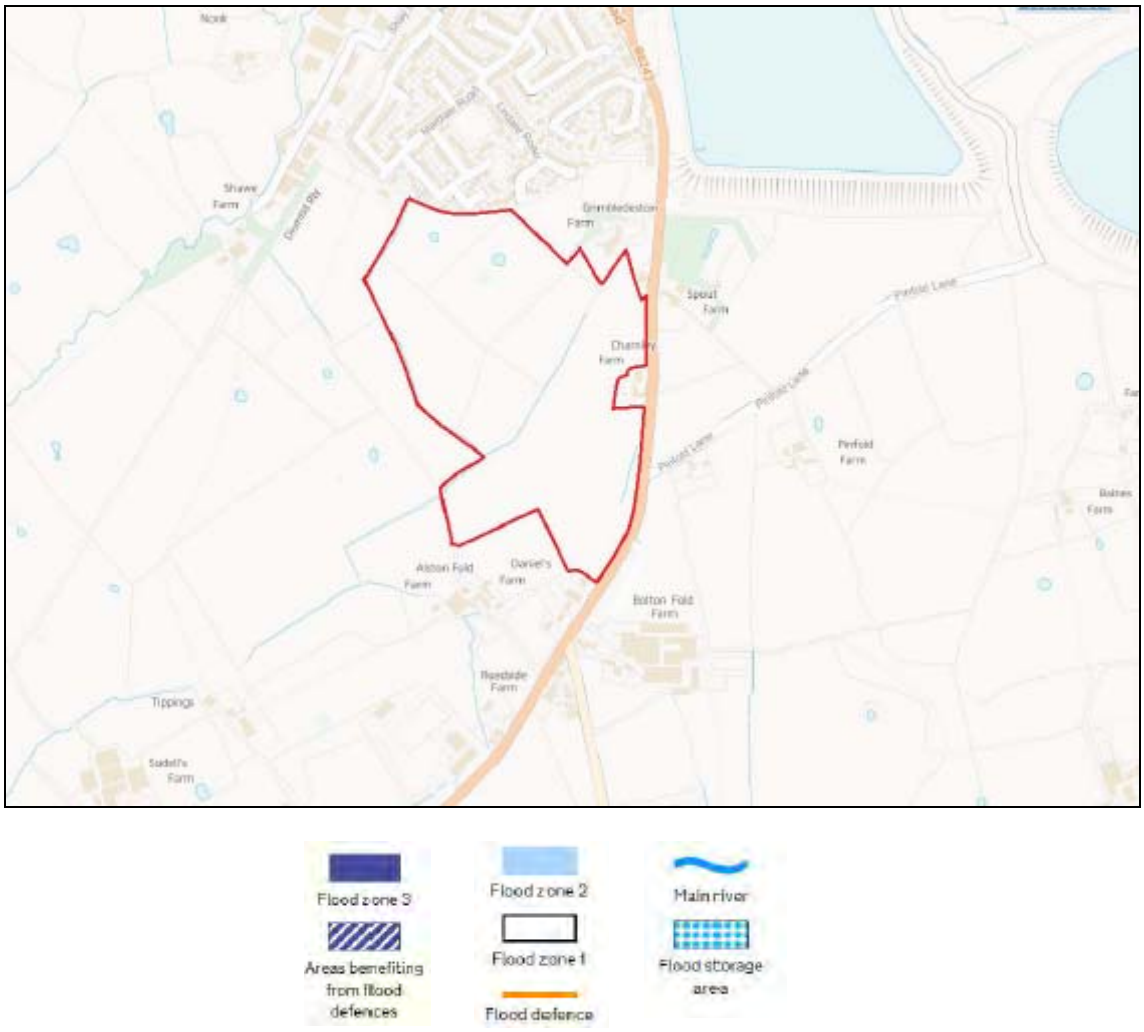


Figure 1: Gov.UK Flood Map for Planning

3.1.2 Gov. UK Surface Water Flood Risk

3.1.2.1 Reference to the Gov.UK Surface Water Flood Risk Map **(Figure 2)** identifies surface water flooding sporadically in the area and within the site including along the route of the ditch.

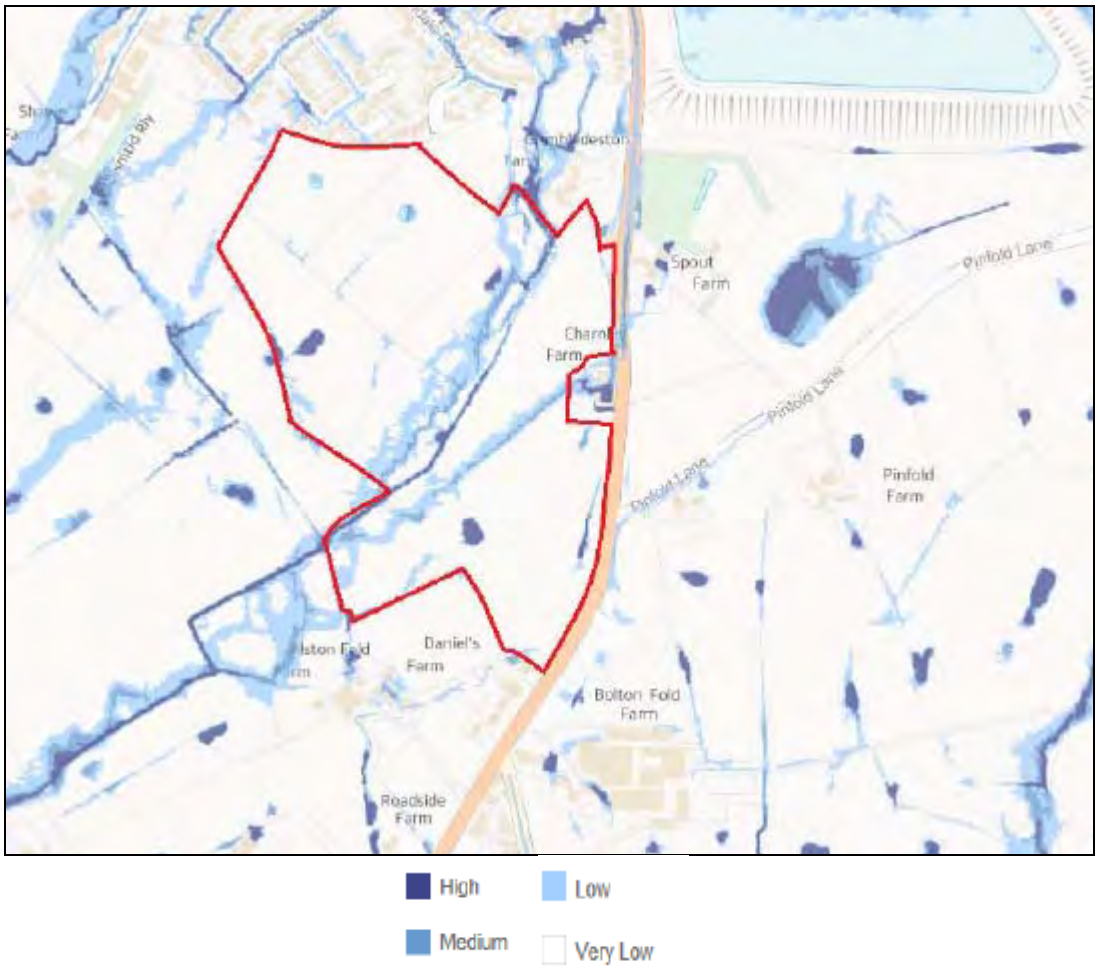


Figure 2: Gov.UK Flood Risk from Surface Water

3.2 Sequential and Exception Tests

3.2.1 The proposed development is situated within a Flood Zone 1 Risk Area. On this basis, the Sequential and Exception Tests as set out in NPPF are not applicable.

3.3 Sources of Flood Risk

3.3.1 Water Bodies and Watercourse Systems

3.3.1.1 Grimsargh Reservoirs are situated well below site level and do not present a source of risk to the development.

The Alston Reservoirs are operated and managed by United Utilities and as such will be subject to regular inspection and maintenance to ensure no overtopping or risk of breach.

On this basis it is concluded that the risk of flooding from water bodies can be discounted.

3.3.1.2 The nearest main watercourse system is Savick Brook to the west and which flows away from the site and is not viewed as presenting a source of flood risk. This is confirmed by reference to EA mapping.

As noted, there are minor watercourse systems within the site, the risk of flooding from which will need to be considered.

3.3.2 **Existing Sewers and Drainage**

3.3.2.1 Copies of United Utilities public sewer records have been obtained and identify the presence of adopted drainage infrastructure in the area of the site. These records have been incorporated in **Appendix 3.**

3.3.2.2 Reference to the public sewer records indicates the following;

- Generally, foul, combined and surface water systems within the development to the north.

  The records here are incomplete.

  Foul (375mm diameter) and surface water systems (675mm diameter) exit the development to the north from Thirlmere Drive, cutting into the north west corner of the site.

  The surface water system outfalls into the boundary watercourse with the foul system continuing as combined to just beyond the dismantled railway before turning south westerly.

- A 300mm diameter abandoned sewer is also recorded extending down from the residential development and cutting across the western extremity of the site.

- No systems are recorded in Preston Road.

3.3.2.3 Information for the drainage from the Miller development has been obtained **(Appendix 3B).**

This identifies;

- Foul drainage draining to a new pumping station at the southern limit of the development, immediately adjacent to the northern site boundary with a rising main running along the boundary and understood to be connecting into (but not shown as such) the public system described above as it leaves Thirlmere Drive.

- Surface water gravity sewer cutting north east to south west across this development site and outfalling into the watercourse at the southern boundary with flows limited to a flat rate of 15 litres/sec.

3.3.2.4 Reference to United Utilities has not identified any flooding issues associated with the public systems although their presence within the site needs to be taken into account within the development proposals.

3.3.3 **Land Drainage and Groundwater**

3.3.3.1 The site appeared generally well drained with the presence of four ponds noted.

3.3.3.2 On this basis, land drainage and groundwater issues will need to be considered by this FRA but none are anticipated which cannot be dealt with as part of the normal design and construction process.

3.3.4 **Comment**

3.3.5.1 On the basis of the assessment of the potential sources of flood risk described above, it is considered that the risks associated with the following need to be addressed by this FRA;

- Minor watercourse systems within the site and along the site boundary
- Development drainage proposals
- Land drainage

4.0 SURFACE WATER RUNOFF

4.1 Requirements for Surface Water Drainage of the Site

4.1.1 The NPPF recommends that surface water generated by the development site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development.

4.1.2 Proposals should ensure that peak flow rates of surface water leaving the developed site are no greater than those prior to development, reducing surface water run off where possible and taking climate change into consideration.

4.2 Site Area

4.2.1 Within the overall site area the developable area comprises 11.554 ha.

4.3 Existing Site Run Off

4.3.1 The existing site is greenfield.

4.3.2 Existing greenfield run off rates have been calculated based on the HR Wallingford greenfield runoff estimation method apportioned to the west and east development areas (**Appendix 4**), giving total rates as follows;

- Q_{bar} … 93.7 litres/sec
- Q_{1}… 81.5 litres/sec
- Q_{30} … 159.3 litres/sec
- Q_{100} … 195.0 litres/sec

4.4 Surface Water Run Off from the Developed Site

4.4.1 The development plan is incorporated in **Appendix 5.**

4.4.2 Uncontrolled flows from the development will significantly exceed greenfield run off rates. For the purposes of this FRA, it is considered that development run off rates limited to the greenfield run off rates identified in 4.3.2 would be appropriate.

4.5 Comment

4.5.1 A Phase 2 Geoenvironmental Site Assessment has been undertaken by Coopers (report ref. 6772si 18th July 2017) and has identified that the site is underlain by clay. On this basis, ground conditions will not favour a ground percolation based drainage solution.

A positive surface water outfall from the development is therefore required.

4.5.2 Levels within the proposed development area fall towards the watercourse system to the south which accommodates flows from the main systems running along the site boundary and within the site.

4.5.3 It is therefore proposed to connect the surface water drainage system into this system, thus capturing and controlling surface water discharge from the development.

5.0 FLOOD MITIGATION MEASURES

5.1 Existing Ditch Systems

5.1.1 There are two existing ditch systems one running along the west boundary and one running through the centre of the site, both outfalling into a single system to the south west.

There is also a third system just within the Preston Road boundary which outfalls to the south east.

5.1.2 The western boundary system receives surface water from the development to the north.

The source of flows into the central system appears limited with flows from the current Miller development being directed through the site area to the watercourse system to the south.

5.1.3 Development levels will be set to ensure flows are safely directed through the development to the downstream watercourse system, and therefore not a source of flood risk (also note 5.2.2). Where required, channel improvement works and maintenance will be undertaken.

5.1.4 Measures will similarly be undertaken to the system which runs close to the Preston Road frontage.

5.2 Drainage Development Proposals

5.2.1 It is proposed that flows from the development will be connected into the existing ditch system to the south of the site with flows limited to the greenfield runoff rates identified in 4.3.2. This will be achieved by the incorporation of a complex control arrangement to ensure that flows are contained within the system so as not to exceed the greenfield runoff rates for the equivalent storm event.

The flow of 15 litres/sec from the Miller Homes development will be allowed for in the pipe design but simply passed forward and not attenuated.

The on site piped systems will be designed to accommodate flows up to the 1 in 30 year event and will be proposed for adoption by United Utilities. These systems will connect into two attenuation ponds within the southern area of the site.

Overall flows up to the 1 in 100 year event plus 30% climate change allowance will be accommodated onsite within attenuation ponds, and by appropriate setting of development levels prior to discharge off site, all subject to design development.

5.2.2 It is anticipated some raising of site levels may be required to achieve a gravity drainage solution.

More generally, development levels will also be set in accordance with good design practice and will therefore further mitigate against any risk of associated flooding of properties.

The drainage strategy is incorporated in **Appendix 5.**

5.3 Land Drainage

5.3.1 Where required, land drainage will be provided to ensure residual flows are safely conveyed through the development utilising the existing ditch system wherever practicable.

5.3.2 Development of itself will reduce uncontrolled land drainage run off from the site area.

6.0 CONCLUSIONS

6.1 The FRA has identified that the site lies in an area of Zone 1 Flood Risk.

6.2 Setting of development levels will ensure that flows within the existing ditch systems both to the boundary and within the site will be safely conveyed through the development.

Development of itself will reduce uncontrolled land drainage run off from the site area.

6.3 It is proposed to connect surface water drainage into the existing surface water system with flows limited to greenfield run off rates, thus mimicking existing run off in accordance with the NPPF.

6.4 The proposed drainage system will be designed to accommodate a 1 in 30 year event including allowance for the 15 litres/sec flow from the Miller Homes development which will be passed forward to outfall. The system will be put forward for adoption by United Utilities who will therefore become responsible for the long term maintenance of the new drainage system.

The site systems will connect into two attenuation ponds located in the southern area of the site. Overall the drainage system including the ponds and appropriate setting of development levels will accommodate flows generated by up to the 1 in 100 year event plus 30% allowance for climate change.

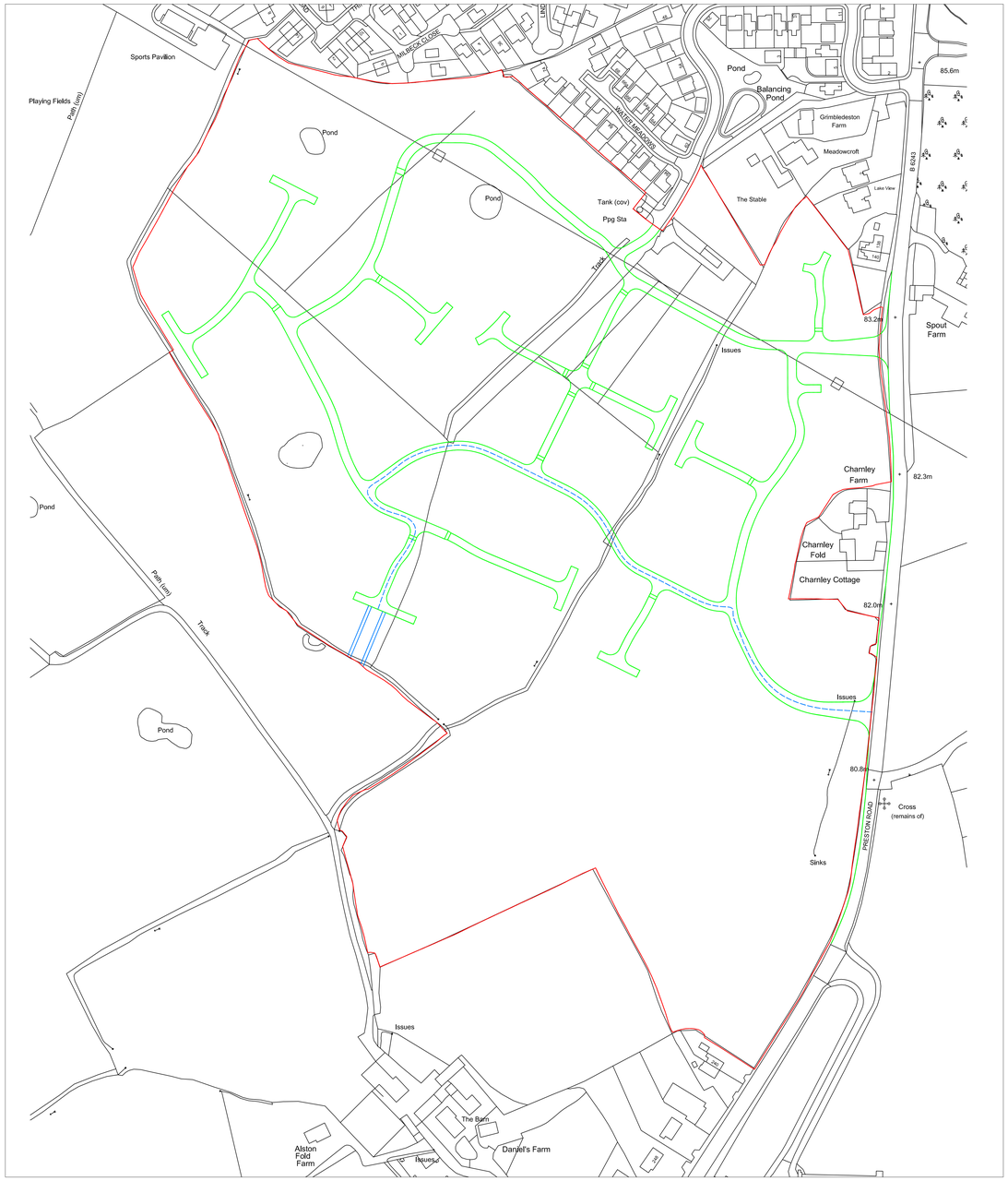
Private drainage (i.e. not adoptable) serving houses within the development will be designed to current building standards.

6.5 Where required, land drainage will be introduced to pick up residual land drainage flows.

6.6 It is therefore concluded that this FRA has demonstrated in accordance with the NPPF that the development is not at risk of flooding from external sources, will not increase flood risk associated with the development and its environment and is therefore appropriate.

Appendix 1: Site Details

Appendix 1A: Location Plan



Notes

- Land To Be Transferred
- Proposed Future Access
- Proposed Future Access To Retained Land
- Proposed Future Access Construcion Traffic Route

Rev	Details	Date	By
F	Red Line Boundary Amended	11.12.17	APT
E	Red Line Boundary Amended	30.11.17	APT
D	Topographic Information Removed	17.11.17	APT
C	Future Construction Access Route Added	08.09.17	APT
B	Future Access Amended	07.09.17	APT
A	Red Line Boundary Amended	10.07.17	APT

Kier Living Limited
The Genesis Centre
Science Park South
Birchwood
Warrington
WA3 7BH
Tel: 01925 817 800

Project: Preston Road Longridge

Drawing: Contract Plan

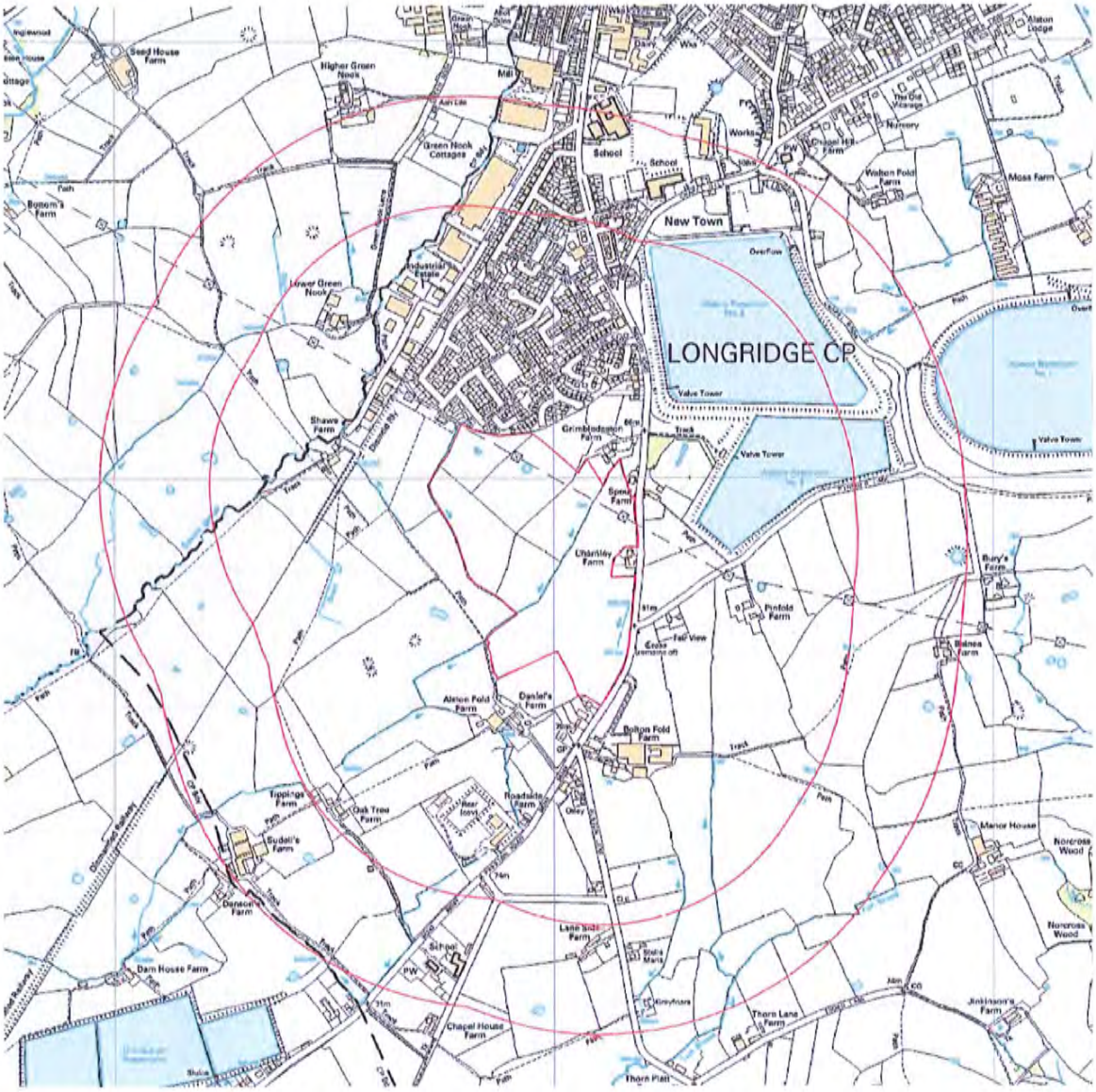
Drawing File Location:

Drawn by:	Date:
APT	11/05/17
Scale: 1:1250 @ A0	COINS code: ------

Drawing no: NWL17012 - CP

Revision: F

Appendix 1B: Watercourse Systems



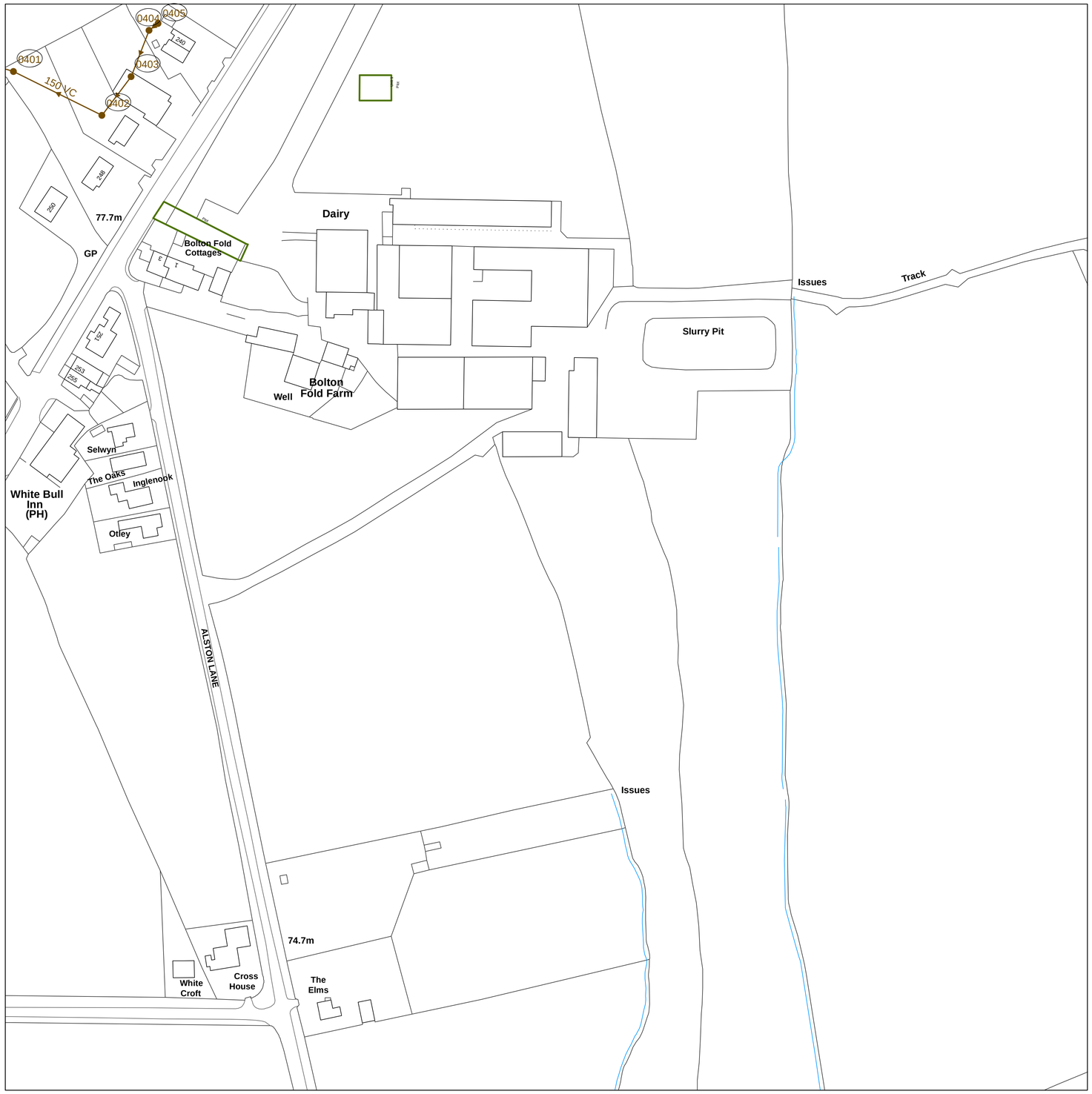
WATERCOURSE SYSTEMS **1:10,000**	**PRESTON ROAD,** **LONGRIDGE**	

Appendix 2: Topographical Survey

Tri CAD Solutions Ltd Ref. TRI-1192-01

Appendix 3: Existing Drainage

Appendix 3A: United Utilities Public Sewer Records



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OS Sheet No: SD6035SW

Scale: 1: 1250 Date: 24/09/2014

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WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
Cascade
Non Return Valve
Extent of Survey
Flow Meter
Gulley
Hatch Box
Head of System
Hydrobrake / Vortex
Inlet
Inspection Chamber
Bifurcation
Catchpit
Contaminated Surface Water
WW Pumping Station
Sludge Pumping Station
Sewer Overflow
T Junction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole

Foul Surface Combined Overflow

Screen Chamber
Discharge Point
Outfall

Control Kiosk
Unspecified

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

The position of underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available.
The actual positions may be different from those shown on
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Sheet 1 of 1

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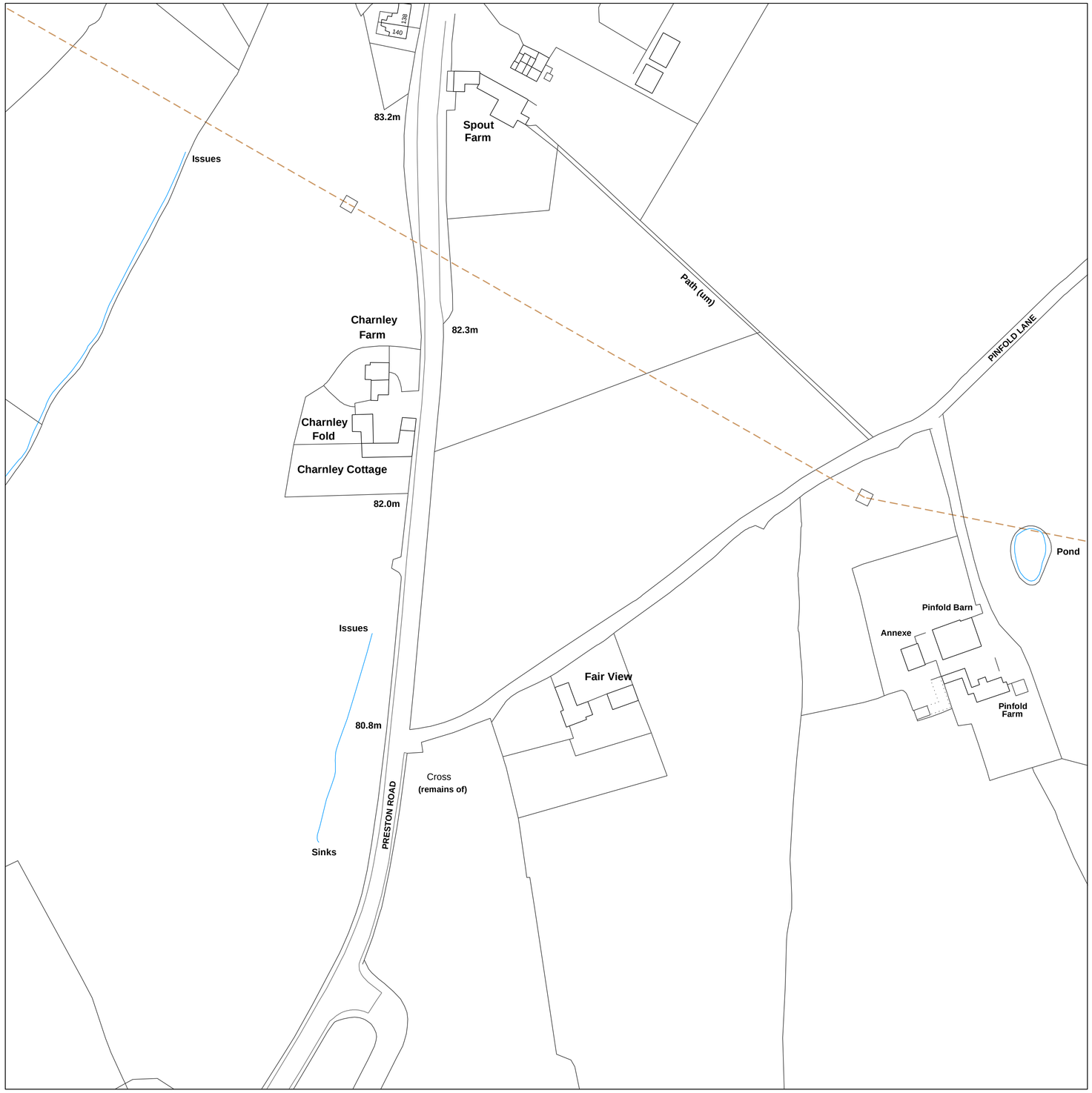
SEWER RECORDS



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Refno Cover Func Invert Size.x Size.y Shape Matl Length Grad

OS Sheet No: SD6035NW

Scale: 1: 1250 Date: 24/09/2014

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WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

- Manhole
- Manhole, Side Entry
- MainSewer, Public
- MainSewer, Private
- MainSewer, S104
- Rising Main, Public
- Rising Main, Private
- Rising Main, S104
- Highway Drain, Private

Foul Surface Combined

- WW Site Termination
- Air Valve
- Cascade
- Non Return Valve
- Extent of Survey
- Flow Meter
- Gulley
- Hatch Box
- Head of System
- Hydrobrake / Vortex
- Inlet
- Inspection Chamber
- Bifurcation
- Catchpit
- Contaminated Surface Water
- WW Pumping Station
- Sludge Pumping Station
- Sewer Overflow
- T Junction/Saddle
- LampHole
- OilInterceptor
- PenStock
- Pump
- RoddingEye
- Soakaway
- Summit
- Valve
- Valve Chamber
- Washout Chamber
- DropShaft
- WW Treatment Works
- Septic Tank
- Vent Column
- Network Storage Tank
- Orifice Plate
- Vortex Chamber
- Penstock Chamber
- Blind Manhole

Foul Surface Combined Overflow

- Screen Chamber
- Discharge Point
- Outfall

- Sludge Main, Public
- Sludge Main, Private
- Sludge Main, S104

ABANDONED PIPE

- MainSewer
- Rising Main
- Highway Drain
- Sludge Main

- Control Kiosk
- Unspecified

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
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Sheet 1 of 1

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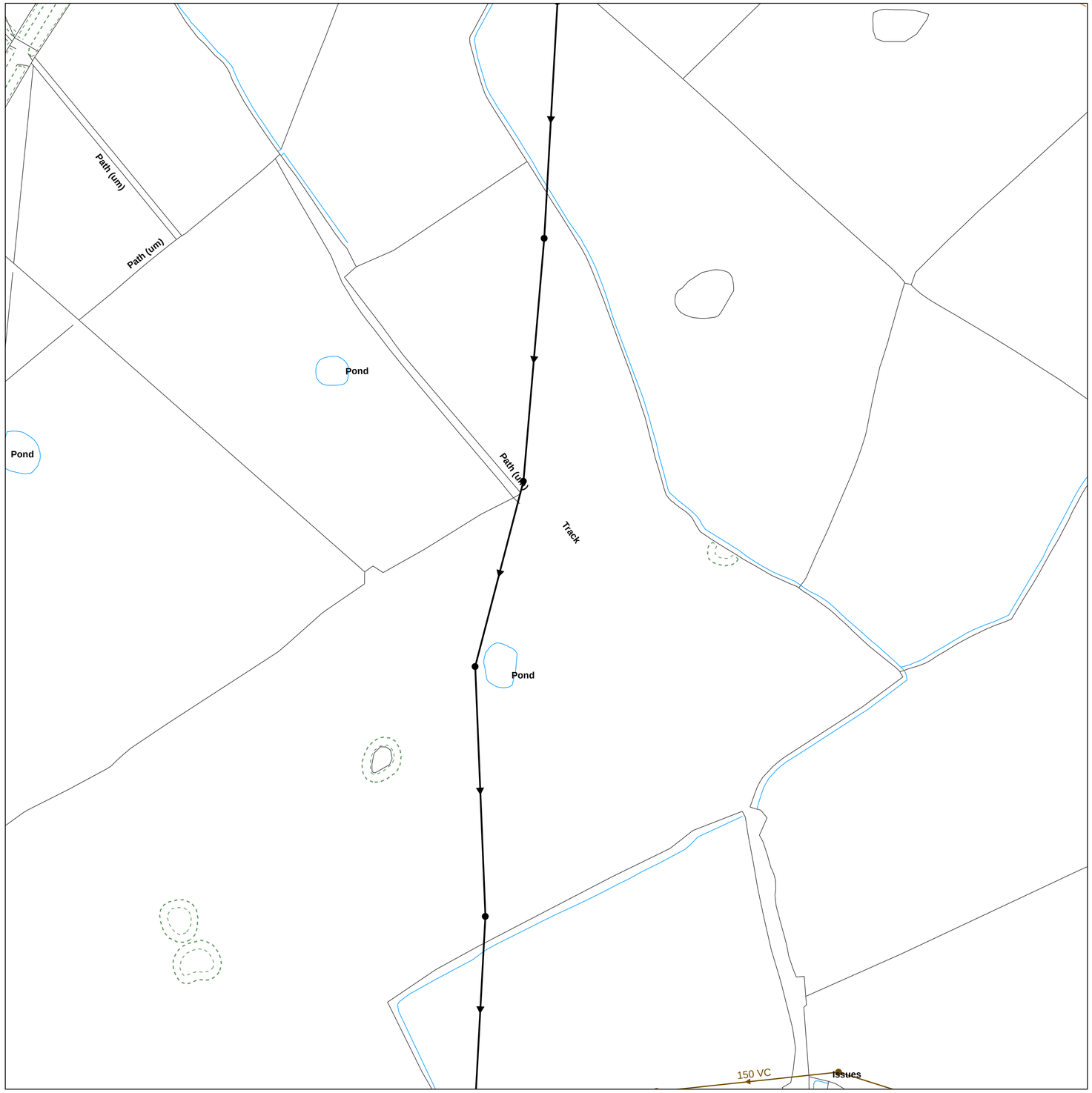
SEWER RECORDS



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7601		FO																	
7701		FO																	
7801		FO																	

OS Sheet No: SD5935NE

Scale: 1: 1250 Date: 24/09/2014

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WASTE WATER SYMBOLOGY

Foul Surface Combined Overflow

Manhole
Manhole, Side Entry
MainSewer, Public
MainSewer, Private
MainSewer, S104
Rising Main, Public
Rising Main, Private
Rising Main, S104
Highway Drain, Private

Foul Surface Combined

WW Site Termination
Air Valve
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Inspection Chamber
Bifurcation
Catchpit
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WW Pumping Station
Sludge Pumping Station
Sewer Overflow
TJunction/Saddle
LampHole
OilInterceptor
PenStock
Pump
RoddingEye
Soakaway
Summit
Valve
Valve Chamber
Washout Chamber
DropShaft
WW Treatment Works
Septic Tank
Vent Column
Network Storage Tank
Orifice Plate
Vortex Chamber
Penstock Chamber
Blind Manhole

Foul Surface Combined Overflow

Screen Chamber
Discharge Point
Outfall

Control Kiosk
Unspecified

Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

LEGEND

MANHOLE FUNCTION

FO	Foul
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OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
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SEWER RECORDS

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0102		FO							
0103	86.21	FO	85.53	150		CI	VC	24.16	
0104	85.95	SW	85.17	225		CI	VC	10.71	40
0201	86.37	FO							
0202		FO	0	150		CI	VC	40.28	
0203	87.01	SW	85.39	225		CI	VC	43.12	37
0204	87.85	SW							
0205		SW	0	450		CI	CO	26.87	
0301	86.22	FO	83.97	375		CI	CO	90.21	1002
0302	89.4	SW	84.53	375		CI	CO	92.02	188
0401	93.85	FO	90.66	375		CI	VC	46.81	360
0402	94.29	FO	90.95	300		CI	VC	84.26	351
0403		CO							
0404		CO							
0406		CO							
0407		FO		0		CI	VC	13.16	
0408		FO							
0409		SW							
0414		CO							
0416		CO		100		CI	VC	18.61	
1201	86.95	SW	85.61	225		CI	VC	14.71	105
1202		FO	0	150		CI	VC	22.74	
1203	86.94	SW							
1204	87.19	SW							
1205		FO							
1206	87.36	FO							
1207		GV							
1301	91.17	FO	88.62	375		CI	CO	49.15	45
1302	89.78	FO	87.53	375		CI	CO	32.69	78
1303	89.6	FO	87.09	375		CI	CO	14.25	89
1304	89.48	SW	84.93	300		CI	VC	52.6	159
1305	89.24	FO							
1309	88.14	SW							
1401	96.49	FO							
1402	93.19	FO							
1403	92.94	FO							
1405		CO							
1411		SW							
1413		CO		100		CI	VC	5.84	
1405		FO	91.67	375		CI	CO	31.98	27
0410		FO							
0415		FO							
1208		FO	0			CI	PVC	5.12	

OS Sheet No: sd6036sw

Scale: 1: 1250 Date: 26/09/2014

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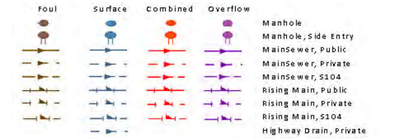
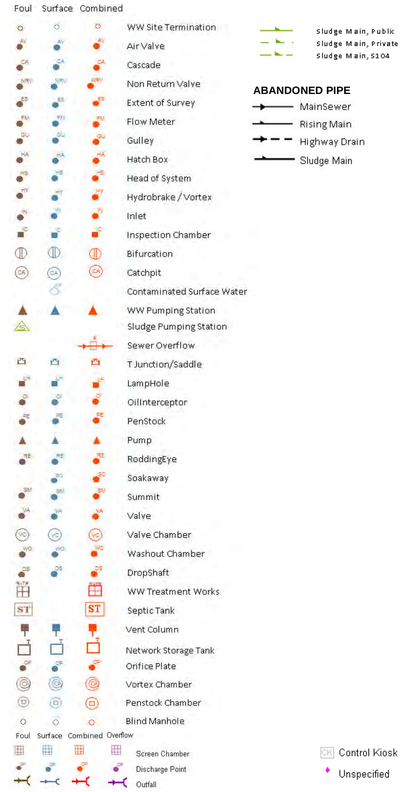
WASTE WATER SYMBOLOGY





Sludge Main, Public
Sludge Main, Private
Sludge Main, S104

ABANDONED PIPE

MainSewer
Rising Main
Highway Drain
Sludge Main

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

OS Sheet No: sd6036sw
Scale: 1: 1250 Date: 26/09/2014
44 Nodes
Sheet 1 of 1

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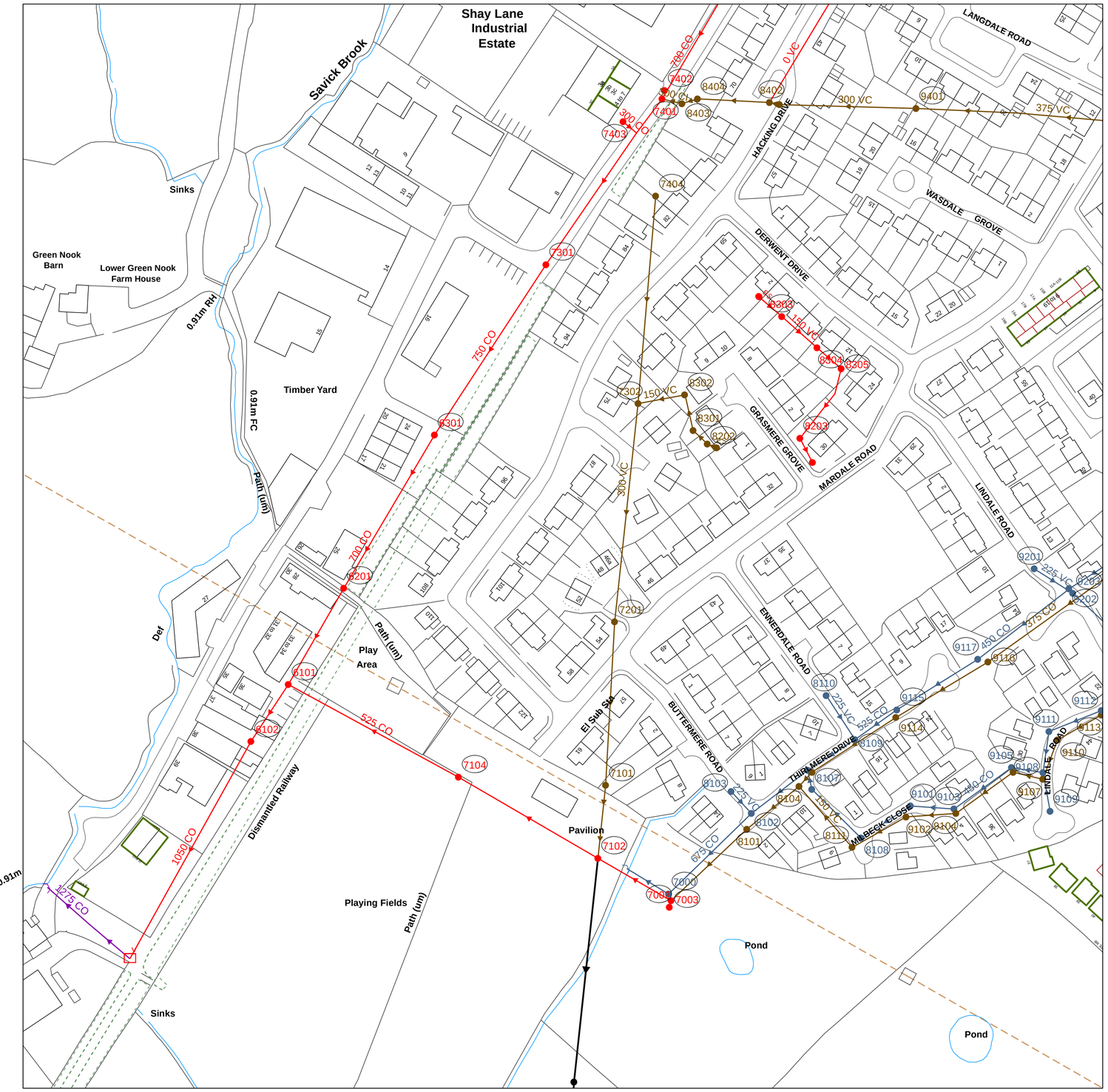
SEWER RECORDS



Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad
6101	84.83	CO	81.75	1050		CI	CO	31.56	
6102		CO	0	1050		CI	CO	115.21	
6201		CO							
6301	86.38	CO	83.95	750		CI	CO	40.85	
7000	84.67	SW	83.53	675		CI	CO	22.66	1133
7002		CO							
7003	84.46	CO							
7101	84.89	FO	83.34	300		CI	VC	15.99	89
7102	84.4	CO							
7104	84.42	CO							
7201	85.82	FO	84.39	300		CI	VC	75.76	74
7301	87.81	CO	86.17	750		CI	CO	94.34	43
7302	87.58	FO							
7401	91.21	CO							
7402	91.25	CO							
7403	90.48	CO	87.77	300		CI	CO	8.13	
7404		FO	0	300		CI	VC	96.38	
8101	85.36	FO	83.17	375		CI	CO	48.26	179
8102	85.49	SW							
8103	85.24	SW	84.15	225		CI	VC	13.88	278
8104	85.57	FO	83.34	375		CI	CO	31.21	195
8105	85.68	SW	83.7	675		CI	CO	32.85	411
8106	85.63	FO	83.38	375		CI	CO	8.97	224
8107	85.41	SW	83.91	450		CI	CO	9.02	451
8108	85.55	SW	84.01	450		CI	CO	32.08	356
8109	85.88	SW							
8110	85.96	SW	84.33	225		CI	VC	24.34	135
8111		FO	0	150		CI	VC	37.46	
8202		FO		150		CI	VC	9.05	
8203		CO							
8204		CO							
8301		FO							
8302		FO		150		CI	VC	21.94	
8303		CO							
8304		CO							
8305		CO							
8401		FO							
8402	92.2	FO							
8403		FO	0	300		CI	CI	9.54	
8404	91.42	FO							
9101	85.85	SW	84.14	450		CI	CO	27.33	228
9102		FO	0	150		CI	VC	28.63	
9103	86.32	SW	84.23	450		CI	CO	20.19	288
9104		FO	0	150		CI	VC	23.2	
9105	86.78	SW	84.25	450		CI	CO	32.81	
9106		FO	0	150		CI	VC	32.61	
9107		FO	0	150		CI	VC	14.16	
9108	86.4	SW							
9109	86.21	SW	85.1	225		CI	VC	18.13	38
9110		FO	0	150		CI	VC	19.39	
9111	86.59	SW	84.47	450		CI	CO	19.25	275
9112	86.46	SW	84.56	450		CI	CO	26.04	289
9113		FO	0	150		CI	VC	23.37	
9114	86.08	FO	83.86	375		CI	CO	46.34	101
9115	86.12	SW	83.81	525		CI	CO	23.76	792
9116	87.25	FO	84.39	375		CI	CO	49.77	98
9117	87.18	SW	83.86	450		CI	CO	44.19	884
9201	87.31	SW	85.85	225		CI	VC	21.2	68
9202	87.09	SW	83.93	450		CI	CO	53.31	888
9203	87.01	SW							
9401	93.32	FO							
5004		OV	81.27	1275		CI	CO	25.01	
6202		CO	0	700		CI	CO	41.64	
7106		FO	83.16	300		CI	CO	18.07	100
9402		FO	90.53	300		CI	VC	47.16	393
7405		CO							
7001	82.67	FO							
5001		CO	0	1300	600	RE	CC	25.52	

Refno	Cover	Func	Invert	Size.x	Size.y	Shape	Matl	Length	Grad

WASTE WATER SYMBOLOGY

Foul / Surface / Combined / Overflow

- Manhole
- Manhole, Side Entry
- MainSewer, Public
- MainSewer, Private
- MainSewer, S104
- Rising Main, Public
- Rising Main, Private
- Rising Main, S104
- Highway Drain, Private

Foul / Surface / Combined

- WW Site Termination
- Air Valve
- Cascade
- Non Return Valve
- Extent of Survey
- Flow Meter
- Gulley
- Hatch Box
- Head of System
- Hydrobrake / Vortex
- Inlet
- Inspection Chamber
- Bifurcation
- Catchpit
- Contaminated Surface Water
- WW Pumping Station
- Sludge Pumping Station
- Sewer Overflow
- TJunction/Saddle
- LampHole
- OilInterceptor
- PenStock
- Pump
- RoddingEye
- Soakaway
- Summit
- Valve
- Valve Chamber
- Washout Chamber
- DropShaft
- WW Treatment Works
- Septic Tank
- Vent Column
- Network Storage Tank
- Orifice Plate
- Vortex Chamber
- Penstock Chamber
- Blind Manhole

Foul / Surface / Combined / Overflow

- Screen Chamber
- Discharge Point
- Outfall

- Control Kiosk
- Unspecified

- Sludge Main, Public
- Sludge Main, Private
- Sludge Main, S104

ABANDONED PIPE

- MainSewer
- Rising Main
- Highway Drain
- Sludge Main

LEGEND

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement	DI	Ductile Iron
BR	Brick	PVC	Polyvinyl Chloride
PE	Polyethylene	CI	Cast Iron
RP	Reinforced Plastic Matrix	SI	Spun Iron
CO	Concrete	ST	Steel
CSB	Concrete Segment Bolted	VC	Vitrified Clay
CSU	Concrete Segment Unbolted	PP	Polypropylene
CC	Concrete Box Culverted	PF	Pitch Fibre
PSC	Plastic/Steel Composite	MAC	Masonry, Coursed
GRC	Glass Reinforced Concrete	MAR	Masonry, Random
GRP	Glass Reinforced Plastic	U	Unspecified

OS Sheet No: sd5936se
Scale: 1: 1250 Date: 26/09/2014
68 Nodes
Sheet 1 of 1

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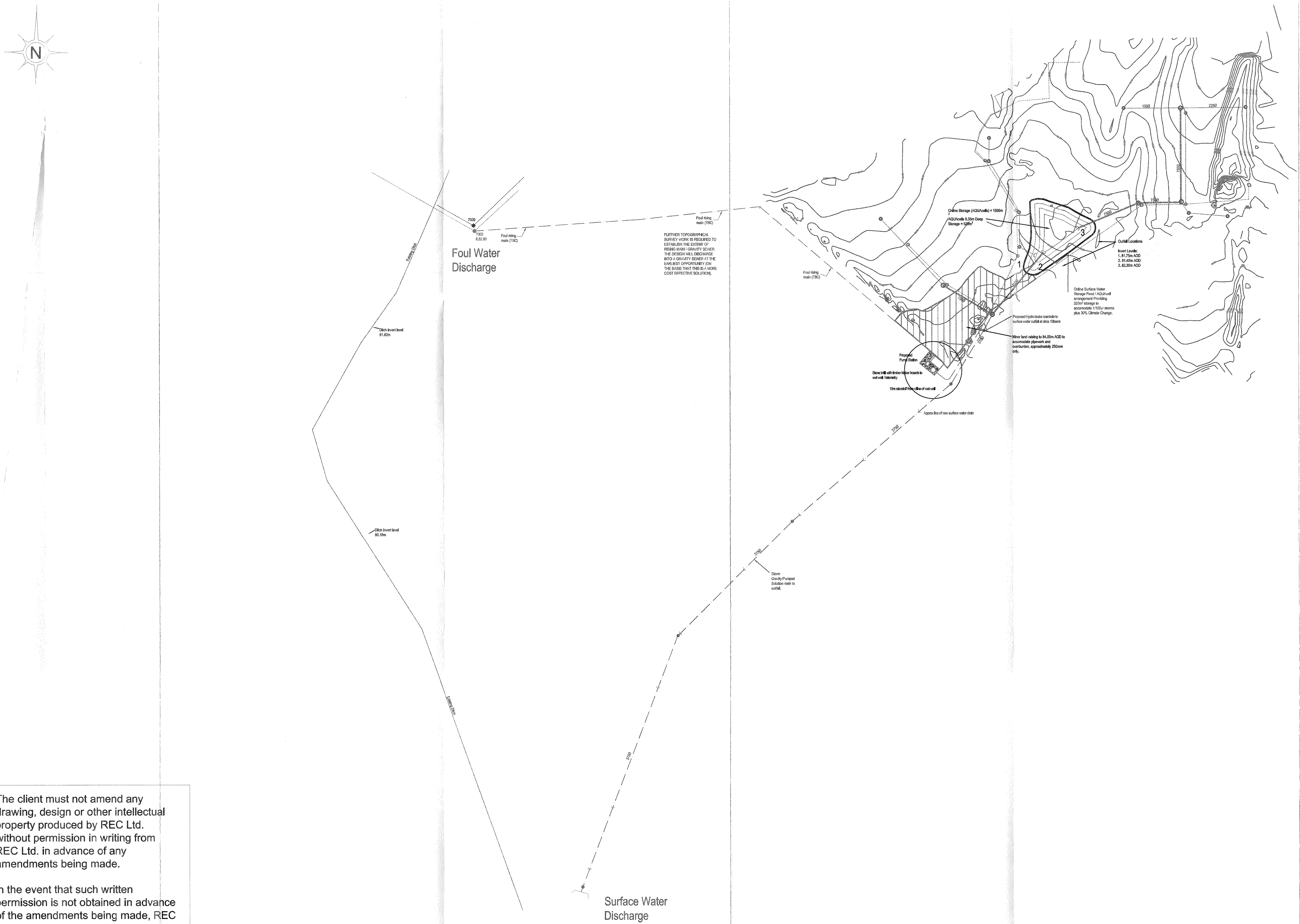
SEWER RECORDS

OS Sheet No: sd5936se

Scale: 1: 1250 Date: 26/09/2014

Printed By: Gareth Hindley

Appendix 3B: Miller Homes Proposals



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Website: www.recltd.co.uk

Job Title	Client			Notes:	Drawing Title
Preston Road, Longridge	Miller Homes	Job No: 44661	DATE 22-01-13		44661p1r1-001 Conceptual Drainage Feasibility Plan
		Drawn by: R. Willoughby			
		Approved by: L. Waterhouse			
		Scale: 1:1000 @ A1			

Appendix 4: Existing Run Off Rates

HR Wallingford Greenfield Runoff Estimation for Sites

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Lees Roxburgh
Site name:	Site East
Site location:	Longridge

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.

Site coordinates

Latitude:	53.81825° N
Longitude:	2.61115° W

Reference:	6198798
Date:	2017-12-12T08:24:48

Methodology	IH124

Site characteristics

Total site area (ha)	3.407

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)	1091	1091
Hydrological region	10	10
Growth curve factor: 1 year	0.87	0.87
Growth curve factor: 30 year	1.7	1.7
Growth curve factor: 100 year	2.08	2.08

Notes:

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	27.64	27.64
1 in 1 year (l/s)	24.05	24.05
1 in 30 years (l/s)	47	47
1 in 100 years (l/s)	57.5	57.5

HR Wallingford
Working with water

Greenfield runoff estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Lees Roxburgh
Site name:	Site West
Site location:	Longridge

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.

Site coordinates

Latitude:	53.81852° N
Longitude:	2.61104° W

Reference:	6198795
Date:	2017-12-12T08:19:49

Methodology	IH124

Site characteristics

Total site area (ha)	8.147

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)	1091	1091
Hydrological region	10	10
Growth curve factor: 1 year	0.87	0.87
Growth curve factor: 30 year	1.7	1.7
Growth curve factor: 100 year	2.08	2.08

Notes:

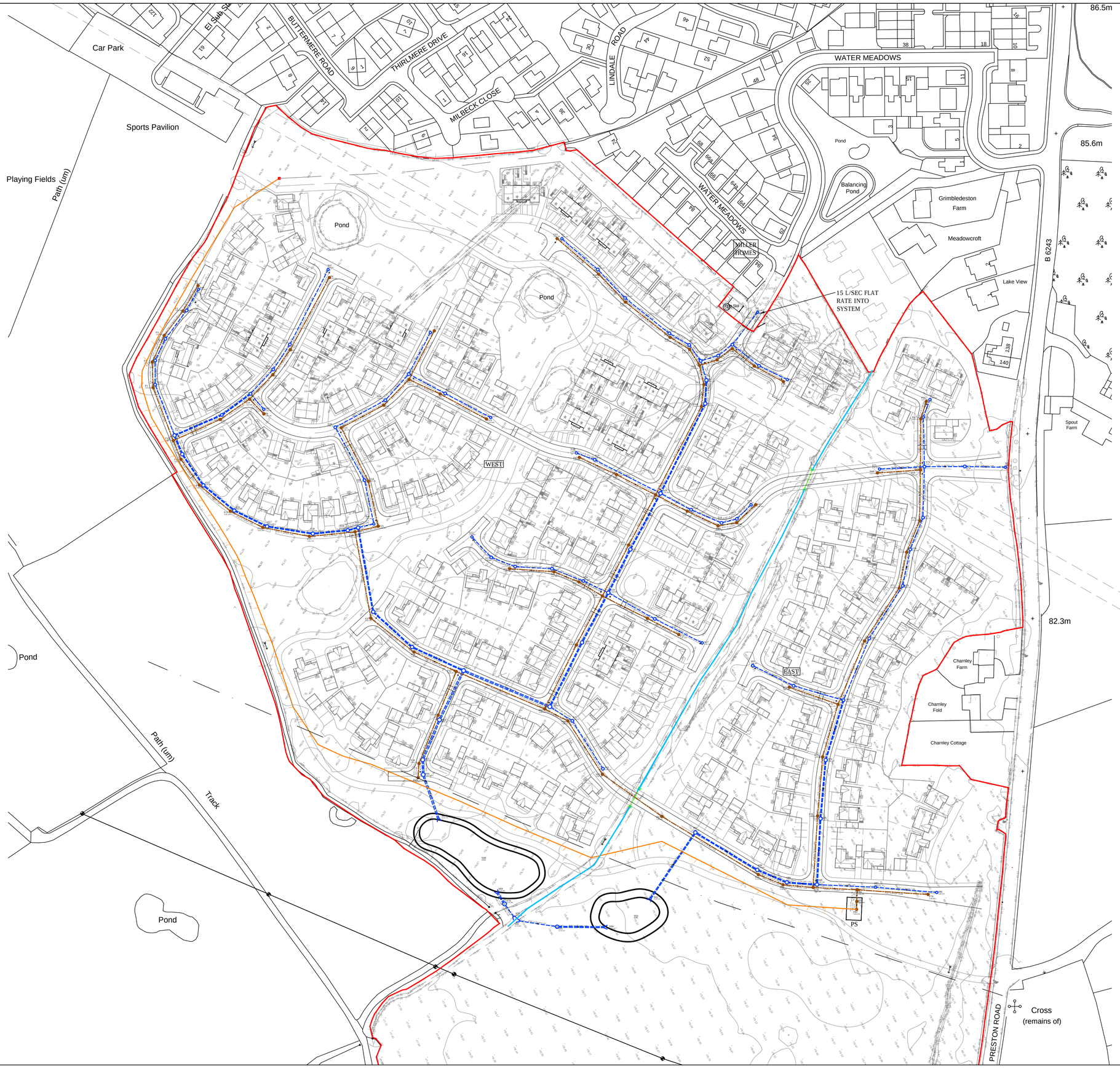
(1) Is Q_{BAR} < 2.0 l/s/ha?
(2) Are flow rates < 5.0 l/s?
(3) Is SPR/SPRHOST ≤ 0.3?

Greenfield runoff rates

	Default	Edited
Qbar (l/s)	66.11	66.11
1 in 1 year (l/s)	57.51	57.51
1 in 30 years (l/s)	112.38	112.38
1 in 100 years (l/s)	137.5	137.5

Appendix 5: Drainage Proposals

Lees Roxburgh Drg. No. 6196/01-07 Rev A



Notes

Surface Water

Developable Area = 11.554 Ha

Western side of development drainage to be restricted to Greenfield Rate + 15L/S for the Miller Homes site to be added to the system. Rates as follows:

Q_{BAR}	81.1 L/S
Q_1	72.5L/S
Q_{30}	127.4L/S
Q_{100}	152.5L/S

Eastern side of development drainage to be restricted to Greenfield Rate. Rates as follows:

Q_{BAR}	27.6 L/S
Q_1	24L/S
Q_{30}	47L/S
Q_{100}	57.5L/S

Flows up to 1 in 100 event + 30% allowance for CC to be contained on site.

Piped system to Sewers for Adoption 6th Edition.

Foul Water

Piped system to Sewers for Adoption 6th Edition.
Pumping Station to Sewers for Adoption 7th Edition.

Key

- PS — S104 Foul Pumping Station
- Existing SW Sewer
- Existing UU Combined Sewer
- Proposed S104 SW Sewer
- Proposed Attenuation Basin (2 No.)
- Proposed S104 FW Sewer
- Proposed S104 Rising Main
- Existing Ditch
- Proposed Culvert

Rev	Revision	By	Date
A	NEW LAYOUT ADDED FROM 26.01.18 AND DESIGN AMENDED TO SUIT.	DM	02.02.18

KIER

Preston Road
Longridge

Drainage Proposals

Lees Roxburgh
Consulting Engineers
The Genesis Centre
Science Park South
Birchwood
Warrington
WA3 7BH
01925 812898
office@leesroxburgh.co.uk
www.leesroxburgh.co.uk

Job No.	Drawing No.	Revision.
6196	01-07	A

Scale 1:1000@A1 — Date December 2017

Drawn By	Designed By	Checked By
DM	DM	JEL